PROJECT SUMMARY

to the Agreement between the Maria Franke and
the Board of Management of the Toronto Zoo.

PROJECT TITLE: Black-Footed Ferret Canadian Reintroduction – Post Release Monitoring

PURPOSE: To secure funding to allow the Toronto Zoo to continue to be a major participant in black-footed ferret and prairie dog field research and assist with reintroductions and post release monitoring of the highly endangered black-footed ferret in Canada.

PROJECT OUTLINE: N/A

BACKGROUND

The black-footed ferret (BFF) is the only native ferret known to North America. Once thought to be extinct, it is now listed as one of North America’s most endangered species. In the 1980s, the last remaining wild ferrets were brought into captivity to set up a breeding and reintroduction program. Over 6,500 kits have been born in six facilities within the Association of Zoos and Aquariums Species Survival Plan (AZA – SSP). Toronto Zoo has been involved in the program since 1992 and is the only Canadian facility breeding BFF for release into the USA and Mexico.

In 2004, the Toronto Zoo, in partnership with Parks Canada, US Fish & Wildlife Service (USFWS), private stakeholders and other organizations established a joint Black-footed Ferret/Black-tailed Prairie Dog Canadian Recovery Team to look at reintroducing black-footed ferrets into Canada. In Canada, the BFF historically ranged from the western prairies, to the south of Calgary, Alberta, and south of Regina, Saskatchewan. It was listed as extirpated in Canada in 1978. The black-tailed prairie dog (Cynomys ludovicianus), the ferrets primary prey, has the largest Canadian distribution in Grasslands National Park (GNP), Saskatchewan.

Extensive analyses and planning have already been completed and the first Canadian release occurred in GNP on October 2, 2009. The site will be a small managed release site with the hope of expansion in the future. This exploratory reintroduction will involve frequent monitoring to mitigate threats and bolster the population with additional individuals when necessary.

GOALS & METHODS

The goals of this project are as follows:

1) Transfer of BFF’s to Grasslands National Park for reintroduction
2) Conduct post release research and monitoring of BFF’s

Black-footed ferrets will be monitored to estimate population size, survival and reproduction. The first monitoring period occurred 30 days post-release to determine early survival rates. Because BFF are nocturnal, spotlighting (Clark et al. 1984, Biggins et al. 2006) will be used to locate, count and determine distribution of BFF. This initial monitoring will occur after every additional reintroduction.

Subsequently, BFF will also be surveyed by spotlighting every spring in late March or early April to determine over winter survival and spatial distribution of ferrets. In addition, from late July through September, a combination of spotlighting surveys and live trapping will be used to estimate annual population size and litter production.
PARTNERSHIPS

US Fish and Wildlife
BFF Recovery Team
Canadian BFF/Pdog Recovery Team
BFF SSP
Parks Canada
Saskatchewan Lands
Saskatchewan Fish & Wildlife

Anticipated date of completion: This is an ongoing project.

BUDGET

Black-footed ferret release & monitoring

Spring, Summer and 30 day post release monitoring
Staff travel x 6 $6,000.00
Food & Accommodations x 6 $4,000.00
Car rental $2,000.00
Total $12,000.00

The total budget from the ESRF for this project is $12,000.00
Submitted for 2014 ESRF

FUNDING

Endangered Species Reserve Fund Grant $12,000 CDN

The Grant will be paid upon execution of this Agreement.

REPORT

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

PROJECT CONTACT: Maria Franke
Toronto Zoo
361A Old Finch Ave.
Toronto, ON M1B 5K7
Tel – (416) 392-5967
PROJECT SUMMARY

to the Agreement between the Mabula Ground Hornbill Project and the Board of Management of the Toronto Zoo.

PROJECT TITLE: Support of the Mabula Ground Hornbill Project

PURPOSE: To stop the decline of the Southern Ground Hornbill in South Africa

PROJECT OUTLINE: N/A

BACKGROUND

The Southern Ground Hornbill (*Bucorvus leadbeateri*) is a large and charismatic bird of the southern African savannas. They are the largest and one of the most primitive of all extant hornbills. They form large family groups, which makes for interesting behavioural ecology. Unfortunately, their global population is in decline and they are listed as Vulnerable in the wild. Within South Africa they are classified as Endangered.

The Toronto Zoo has recently had good success breeding this species, which helps sustain the captive North American population, but there are a number of threats still facing the wild population. The factors affecting their success in the wild are varied, but include habitat loss, poisoning, trapping, direct persecution, and collection for live trade. Furthermore, like many top predators, their life history strategies (i.e. delayed sexual maturity, small clutch size, etc.) do not support rapid population growth.

The Mabula Ground Hornbill Research and Conservation Project was launched in 1999 to take action against the decline of this species.

GOALS & METHODS

The Mabula Project has taken a multifaceted approach to slowing the decline of the Southern Ground Hornbill. They have been involved in a hand-rearing and reintroduction program, which takes advantage of second-hatched chicks that typically die in the wild. They have reintroduced birds back to areas from which they have been previously extirpated. They have supported wild populations through the production of artificial nests, which counteracts the impact of habitat destruction. And they have launched an awareness campaign for the general public to better inform them about the threats facing this species and what they can do to help.

Additionally, this group has also supported research into the general biology (genetics, breeding, behaviour, etc.) of the Southern Ground Hornbill. This research has yielded new insights into this species breeding biology, which in turn has aided the recovery project.

Anticipated date of completion: January 1, 2016

BUDGET

The total budget from the Endangered Species Reserve Fund for this larger project is $2,000
FUNDING

Endangered Species Reserve Fund Grant
The Grant will be paid upon execution of this Agreement. $2,000 CDN

REPORT

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

PROJECT CONTACT: Lucy Kemp
Mabula Private Game Reserve
Private Bag X1644
Bela-Bela 0480
Limpopo Province
South Africa

Non-Profit Organization (NPO) registration number: 016-183
Public Benefit Organisation (PBO): 13/00/00/723.
PROJECT SUMMARY

to the Agreement between the Giraffe Conservation Foundation and
the Board of Management of the Toronto Zoo.

PROJECT TITLE: Human-Giraffe Conflict Management & Outreach in the Mara Ecosystem

PURPOSE: An emergency response to rapid habitat losses and deaths and maiming of giraffe on the Siria Plateau.

PROJECT OUTLINE:

Life Net Nature (LNN), a US charity, empowers local communities to conserve wildlife and habitat. In 2012, LNN facilitated establishment of Maasi Morans Conservation and Walking Safaris (MMCCWS), a community-based organization or CBO, on the Siria Plateau in western Kenya. MMCCWS aims to protect native grasslands and forests for wildlife and traditional uses, such as livestock grazing, honey production, firewood collection, and water collection, to sustain the Maasai way of life. Conversion of native habitats to maize fields has increased human-wildlife conflicts on the Siria Plateau and threatens the wildlife and integrity of the Masai Mara ecosystem, which includes the prominent Masai Mara National Reserve.

BACKGROUND

This project is an emergency response to rapid habitat losses and unexplained deaths and maiming of giraffe on the Siria Plateau. MMCCWS is trying to determine why some local people perceive giraffe as competition and is working with them to avoid human-giraffe conflict in the area. The project focuses on the preservation and conservation of Masai giraffe that move from the Masai Mara National Reserve to the Siria Plateau on a regular basis, possibly daily. The extent to which giraffe in the Mara ecosystem rely on the Siria Plateau for survival, security for their young, and for escape from predation in the Mara in currently unknown, but will be investigated as part of this project.

GOALS & METHODS

The project aims to:
- Establish community-based giraffe population monitoring on the Siria Plateau.
- Determine patterns of movement, resource use, and human-giraffe conflict.
- Determine the reasons for human-giraffe conflict and develop mechanisms to avoid these.
- Develop and implement outreach to the local community for giraffe conservation and raise awareness for its importance.

With the giraffe as a focal species, the project will promote capacity building and make management recommendations for the long-term compatibility of wildlife, livestock and pastoralists on the Siria Plateau. Results will provide information on giraffe movements, group composition, and productivity, and will form the basis of conservation and monitoring within an area proposed for a wildlife conservancy on Maasai properties owned by members of the Oloirien Group Ranch.

Anticipated date of completion: January 1, 2016

BUDGET

The total budget from the Endangered Species Reserve Fund for this larger project is $2,000.
FUNDING

Endangered Species Reserve Fund Grant  $2,000 CDN
The Grant will be paid upon execution of this Agreement.

REPORT

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

PROJECT CONTACT: Giraffe Conservation Foundation
UK
26 Grasmere Road
Purley
Surrey CR8 1DU
England
info@giraffeconservation.org
PROJECT SUMMARY

to the Agreement between Reproductive Programs and
the Board of Management of the Toronto Zoo.

PROJECT TITLE: Evaluation of Ovulation Induction Protocols for Artificial Insemination in Chinchillas

PURPOSE: Research

PROJECT OUTLINE: N/A

BACKGROUND

Reproductive Programs is a primary collaborator in a long-term study using domestic chinchillas as a model for the two threatened species of chinchillas (*Chinchilla lanigera* and *Chinchilla brevicaudata*) found in remnant populations throughout Argentina, Bolivia and Chile. To add to the wild population crisis, individuals in captivity suffer from poor fertility and attempts to reintroduce animals back to the wild have not been successful. The application of assisted reproductive technologies is needed to overcome fertility issues and store genetic material for the future.

In phase one of the study (with funding assistance from ESRF 2011, $2,000), reproductive hormone evaluation was carried out on females exhibiting natural cycles and post-partum cycles. Samples were collected from the chinchilla colony at the Universidad Nacional de Cordoba, Argentina, and analysed at the Toronto Zoo. The hormone data provided us with information on the cycle length, gestation length and post-partum estrus interval in chinchillas. The work has been published in numerous abstracts and a manuscript has recently been submitted to General and Comparative Endocrinology.

In the next phase of the study, exogenous hormone treatments will be attempted to develop an effective ovulation induction protocol for subsequent insemination of the females. Developing induction protocols with >50% ovulation rates is a necessity prior to establishing any artificial insemination routines. In previous studies, my collaborator, Dr. Marina Ponzio (U. Nacional de Cordoba, Argentina), has already developed semen collection and freezing protocols for chinchillas.

Further funds are now required to support a PhD student (co-advised by me and Dr. Marina Ponzio) who will be enrolled at the U. Nacional de Cordoba. All sample analyses will now be carried out at the U. Nacional de Cordoba in order to establish non-invasive hormone monitoring techniques in Argentina. These tools will be instrumental in providing many universities and zoos in South America with reproductive hormone evaluation of their animals.

GOALS & METHODS

The goals of this study are to evaluate the effects of two exogenous hormone treatments (eCG and GnRH) on follicular growth and ovulation in domestic chinchillas.

Female chinchillas will be maintained in a research colony at the U. Nacional de Cordoba. Urine samples will be collected daily and kept frozen until analysis. Females will be randomly assigned to one of three treatment groups: control (no hormones), eCG and GnRH. Urine samples will be evaluated for estrogen and progesterone levels two weeks prior to hormone administration and for 3-4 weeks following hormone administration. Changes in estrogen and progesterone following hormone injection will be assessed.

Upon development of an effective protocol with appropriate ovarian response, insemination of the females with fresh semen will be attempted.
Anticipated date of completion: December 31, 2017

BUDGET
PhD student stipend $7,000 ¹
Hormones $500 ²
Estrogen, progesterone EIA kits $0 (purchased during previous study phase)
Disposables (microtitre plates, pipettes, etc.) $2,500 ²
Media (assay buffers, etc.) $500 ²
Animals/housing/food $2,500 ²

Note: ESRF funds ($3,500) are being used to obtain matching grant funds ($3,500) from the Argentine government funding agency (CONYCET).

FUNDING
Endangered Species Reserve Fund Grant $3,500 ¹
The Grant will be paid upon execution of this Agreement.

CONYCET (Argentine granting agency) $3,500 ¹
M. Ponzio operating grant $6,000 ²

REPORT
A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

PROJECT CONTACT: Gabriela Mastromonaco
Curator of Reproductive Programs & Research
PROJECT SUMMARY

to the Agreement between International Rhino Foundation and
the Board of Management of the Toronto Zoo.

PROJECT TITLE: Operation Stop Poaching Now

PURPOSE: To provide dogs for rangers that will be able to detect snares, track poachers, and find orphans

PROJECT OUTLINE:

As the demand for rhino horn in China, Vietnam, and other Asian countries increases, poaching rates in southern Africa have soared sky high. At the end of 2012, 668 rhinos had been killed in South Africa alone. Responding to high demand and high prices, poaching gangs are becoming more sophisticated, more vicious and much harder to catch. But there are thousands of dedicated, passionate rangers in South Africa and Zimbabwe, standing in between the rhinos and the poachers – and they need our help.

The IRF partnered with security experts in South Africa to provide 16 rangers with advanced training in hand-to-hand combat, firearms safety, investigative techniques, intelligence gathering, evidence collection, communications, rhino identification and monitoring. We provided scene-of-crime kits containing basic investigation equipment such as a camera, metal detector, GPS, finger-printing materials, and scalable evidence bags. These key items aid rhino protection and crime scene investigations so that sound evidence against poaching suspects can be generated and used in court. In addition, rangers are now utilizing dogs to aid in their efforts. Donated funds to this project will supply and additional pair of dogs and handlers for training the dogs.

BACKGROUND

For two years, IndoMalaya Pavilion and Africa Savanna have hosted Rhino Awareness Weekend (RAW) to raise funds for important rhino conservation projects. This year they would like to direct funds to support this important project.

Anticipated date of completion: January 1, 2016 with project ongoing until total project money is raised

BUDGET

Funds directly raised from the Rhino Awareness Weekend (RAW) 2013 and deposited into the Endangered Species Reserve Fund will be directed towards Operation Stop Poaching Now.

FUNDING

Endangered Species Reserve Fund Grant
The Grant will be paid upon execution of this Agreement. $2,000 CDN from RAW dedicated fund

REPORT:

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.
PROJECT CONTACT: International Rhino Foundation (IRF)
201 Main Street, Suite 2600
Fort Worth TX 76102
540-465-9595
PROJECT SUMMARY

to the Agreement between the Minnesota Zoo Foundation – Asian Wild Horse SSP and
the Board of Management of the Toronto Zoo.

PROJECT TITLE: Asian Wild Horse Conservation Project

PURPOSE: To monitor wild Asian horses to secure a stable population in their native habitat of
Mongolia and China.

PROJECT OUTLINE:

The Minnesota Zoo and the Smithsonian Conservation Biology Institute (SCBI) are inviting others to join
efforts in conserving the Asian wild horse in Hustai Nuruu National Park (HNNP), Mongolia. The Asian
wild horse is the only truly wild horse species remaining in the world, but went completely extinct in the
wild in the 1960’s. Thankfully, zoos throughout the world were able to rescue this species, breed them in
captivity, and eventually release them back into the wild. HNNP was the first site to receive this
deranged species back into the wild in 1992, and currently holds an approximate population of 300
horses. Yet, the potential exists to greatly increase these numbers to a much higher and more secure level
that can withstand the normal environmental pressures of severe winters and predation within HNNP.
This conservation project will be the initial phase to lay the scientific groundwork necessary to enhance
this population. Five global positioning system (GPS) satellite collars will be placed on horses from five
different harems within key locations of HNNP. The data recorded from these collars over the next winter
and spring will be analyzed to determine the extent of current grassland and water resources used by this
species and help define where future habitat enhancement efforts should be directed within this national
park. For example, these data may help inform possible locations for artificial water holes if they are
deemed to be feasible and beneficial. The long-term goal will be to track all 25 breeding groups in the
park.

BACKGROUND

This project is an expansion of Asian wild horse conservation efforts being conducted in Asia and
supported by zoos that are accredited by the Association of Zoos and Aquariums (AZA), the AZA Asian
Wild Horse Species Survival Plan® (SSP), and the AZA Equid Taxon Advisory Group (TAG). Scientists
at SCBI have been working in the Kalameili Nature Reserve (KNR) of China since 2005 to monitor
released horses, train ranger staff, and identify conflict solutions with local Kazakh nomads. The ultimate
objective is to realize an expanded and stable wild horse population that will secure a future in their native
habitat of Mongolia and China.

GOALS & METHODS

In order to monitor movement patterns and habitat use of Asian wild horse, we plan to capture five
individuals and equip them with GPS-Iridium satellite collars in HNNP. The collars function
continuously on a 24-hr cycle which allows for fine detail data collection. Each Asian wild horse herd has
a different temperament and in some cases they may flee in presence of a vehicle. We may employ
multiple techniques to safely immobilize this species in the wild. Some of the herds are approachable on
foot and we plan to set up a hide 30 to 80 meters from a grazing area or food bait and dart the animals
with a CO2 powered dart rifle. We will also investigate the possibility of utilizing a video-enabled remote
controlled CO2 powered dart rifle for herds that are more difficult to dart. This method has been used
previously with Asian wild horses in Mongolia (Walzer & Boegel 2003). Staff from HNNP trained in
wildlife immobilization will dart the horses with assistance from an attending veterinarian. This fall Dr.
Rasmussen, senior veterinarian at the Minnesota Zoo, will assist with immobilizations. He has over 20 years of experience immobilizing Asian wild horses in a captive environment.

All Asian wild horses will be anesthetized with thiafentanil, medetomidine and ketamine placed in PneuDarts and delivered by dart rifle. Following collaring and collection of biological samples, the horses will be reversed with naltrexone and atipamazole and/or tolazoline. During the procedure animals will have vital signs regularly monitored by physical observation as well as pulse oximetry. Blood samples will be collected for assessment of anesthesia during the procedure as well as for CBC’s, chemistry analysis, mineral analysis, genetic determination, and serum banking. Hair samples will also be collected for possible future analysis. Everyone involved with the field work will be trained in emergency treatment of a person receiving accidental exposure to the anesthetizing agents. A human first aid kit including reversal drugs will be available anytime a person is working with the anesthetic agents. Oxygen tanks with a regulator and a demand valve will be available to supplement oxygen to the anesthetized horses during the procedures. Reversals for the anesthetic drugs will be drawn up and will be available prior to any animal being immobilized in case of anesthetic problems which require immediate reversal.

Location data from collared horses will be remotely downloaded and analyzed, in association with habitat maps, using a Geographic Information System (GIS). SCBI, Minnesota Zoo, and HNHP staff associated with this project are experienced in using GIS to study wild animal habitat usage. A graduate student from the National University of Mongolia has been selected and will also be trained at SCBI to learn computer mapping skills to assist in the analysis of collar data and wildlife record information that the park has.

Winter 2014/Spring 2015
• Monitor collared horses
• Prepare progress reports for funders and AZA community
  - Formal data analysis will occur in 2015

Anticipated date of completion: January 1, 2016

BUDGET

The total budget from the Endangered Species Reserve Fund for this project is $2,000 US.

FUNDING

Endangered Species Reserve Fund Grant $2,000 US
The Grant will be paid upon execution of this Agreement.

REPORT

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

PROJECT CONTACT:

Tony Fisher, Asian Wild Horse SSP Coordinator and Minnesota Zoo Collections Manager
tony.fisher@state.mn.us.

Cheques should be payable to “Minnesota Zoo Foundation”, which manages the Asian Wild Horse SSP’s dedicated fund. The memo line or accompanying letter should state that the funds are for Asian wild horse conservation.
Cheques can be mailed to: Minnesota Zoo Foundation, 13000 Zoo Blvd., Apple Valley, MN 55124
PROJECT SUMMARY

to the Agreement between the Jessica Vitale and
the Board of Management of the Toronto Zoo.

PROJECT TITLE: Conservation of the African large carnivore guild: experimental investigation of interspecific competition involving spotted hyaenas (Crocuta crocuta)

PURPOSE: To investigate the nature of eavesdropping behavior by the most abundant mammalian predator in Africa, spotted hyaenas, as it pertains to potential kleptoparasitic opportunities from sympatric carnivores.

PROJECT OUTLINE: N/A

BACKGROUND

Understanding coexistence and competition between predators is critical for the effective conservation of intact ecosystems (Ginsberg & Woodroffe, 1997; Linnell & Strand, 2000). Groups of species within an ecosystem that compete over shared resources are termed ‘guilds’ (Polis et al., 1989). Within much of sub-Saharan Africa, the large carnivore guild consists of five species: African lions (Panthera leo), leopards (Panthera pardus), cheetahs (Acinonyx jubatus), spotted hyaenas (Crocuta crocuta), and African wild dogs (Lycaon pictus) (Creel and Creel, 1998). Most of these species are listed as threatened by the IUCN, and due to escalating habitat loss, competitors are forced to inhabit smaller wildlife areas, thereby increasing the likelihood of aggressive encounters among predator species (Ginsberg and Woodroffe, 1997; IUCN/SSC, 2007; Cozzi, 2012). It is essential to investigate competition between predators for the development of appropriate and effective conservation and management strategies.

Large carnivores gather information about competitors’ whereabouts through olfactory, acoustic, and visual means, in order to exploit potential opportunities and avoid detrimental encounters (Dall et al., 2005; McComb & Reby, 2005; Webster et al., 2010). Through manipulating these environmental signals, researchers can investigate how, why, and when large carnivores interact with each other. Webster et al. (2010) used experimental playbacks of African wild dog twitters, a commonly heard vocalization between pack members, to investigate whether lions and spotted hyaenas eavesdrop on wild dogs and use this information to initiate an aggressive encounter. Lions consistently approach playbacks of wild dogs, whereas spotted hyaenas displayed greater variation in their responses to acoustic signals of dog presence (Webster et al., 2010). This difference in response indicates the variable nature of interspecific encounters, and the importance of analyzing the range of factors involved in these interactions. The proposed study will investigate the nature of eavesdropping behavior by the most abundant mammalian predator in Africa, spotted hyaenas, as it pertains to potential kleptoparasitic opportunities from sympatric carnivores.

It is clear that hyaenas are formidable competitors (Creel and Creel, 2002; Fanshawe and Fitzgibbon, 1993; Kruuk, 1972; Laurenson, 1995), but previous data on kleptoparasitism have primarily stemmed from reports of hyaena presence at kill sites during studies of a sympatric species, such as wild dogs (Carbone et al., 1997) and lions (Caraco and Wolf, 1975), in the open savanna ecosystems of East Africa. In contrast, this study will experimentally investigate hyaena eavesdropping behaviour involved in resource competition within an intact large predator guild. Since hyaenas are known to approach playbacks of buffalo calf distress calls (Kiffner et al., 2008), this study will test how hyaenas respond to the simulated presence of a food resource (i.e. playback) alongside sympatric carnivore vocalizations. This experimental approach will systematically quantify the impact of a variety of factors (i.e. prey,
habitat, and competing species) on whether hyaenas initiate or avoid an encounter with sympatric carnivores. Through integration with long-term work undertaken by the Botswana Predator Conservation Trust (BPCT), the proposed study will contribute directly to the development of strategies for the conservation of large carnivores in northern Botswana. Approximately 50% of northern Botswana is legally protected in the form of wildlife management areas and national parks (Nijhawan, 2008), and is home to one of the largest remaining contiguous free-ranging populations of endangered wild dogs (Cree, Mills, McNutt, 2004). The BPCT has been studying the Okavango Delta's African wild dog population for over two decades, and all members of the African large carnivore guild have been under study since 2007. This detailed history and continuous monitoring of the entire guild in their natural habitats is unique in the world, and therefore provides an ideal setting for detailed guild research.

**Preliminary Data and Experience**
I worked as a research assistant at the BPCT from January 2011 to November 2012, which prepared me for undertaking this extensive research project. In preparation for the proposed study, I gathered preliminary data on the study site's hyaena population. To date, this includes record of 47 den sites, 53 latrine sites, 65 intraguild interactions involving hyaenas, 46 hours of den observations, and 130 identified individuals from at least four clans. Guidance at the field site will be provided by Dr. J.W. McNutt, the foremost African wild dog researcher in Botswana; Dr. Neil R. Jordan, a leading researcher in mammalian olfactory communication; Dr. Krystyna Golabek, a specialist in animal acoustics and sociality; and Dr. Alan Wilson, Principal Investigator of the Structure and Motion Laboratory at the Royal Veterinary College.

**GOALS & METHODS**

**Research Questions**
I. *How do hyaenas respond to acoustic cues indicating a kleptoparasitic opportunity against each guild member species (lion, cheetah, wild dog, leopard)?*
II. *How do the following factors affect hyaenas' responses to a kleptoparasitic opportunity?*
   a. Habitat
   b. Prey type
   c. Fission-fusion characteristics of hyaena society
III. *Do hyaenas adjust their use of territory to maximize the likelihood of encountering opportunities for successful kleptoparasitism?*

**Methods**
Field research will be conducted in association with the Botswana Predator Conservation Trust (BPCT) at an established field site. The study area is located in Northern Botswana, within the Moremi Game Reserve and its surrounding wildlife management areas and livestock areas to the south. The area has highly seasonal precipitation and is characterized by a mosaic of floodplain, grassland, mixed acacia woodland, riparian woodland, and dense mopane shrubland and woodland (Barlam, 2006; McNutt, 1996).

Experimental playbacks will be used to quantify how competitor species, habitat, prey, and hyaena sociality influence kleptoparasitism (Questions I, IIa-c). Audio recordings of each of the four guild members (e.g. dog twitters, lion roars) will be obtained through observations at the study site and collaboration with other researchers. Each carnivore vocalization will be artificially coupled with the distress call ('death cry') of an impala, a call indicative of a kleptoparasitic opportunity. Recordings will be played within the 90 minutes prior to sunset, when carnivores are naturally hunting and would expect to hear each other, while there is sufficient light for observations (Webster et al., 2010). When a hyaena is located, either as an opportunistic sighting or through radio tracking, identification photos will be taken for verification of identity and clan membership. The playback speaker will be placed 100-300m from the focal hyaena, from which the death cry and carnivore vocalization will be played. The focal hyaena's response will be recorded and subsequently analyzed across the various treatment types. Additionally,
observations of naturally-occurring intraguild interactions will be analysed to determine the role of these factors (Questions I,IIa-c). Direct observations of hyaenas will be combined with sightings of identified individuals from remote camera traps placed at dens, latrines, and large carrion sites such as elephant and giraffe carcasses.

Territory use (Question III) will be investigated by means of current and ongoing advances in radio collar technology through collaboration with Dr. Alan Wilson’s Structure and Motion Laboratory at the Royal Veterinary College (RVC). RVC has developed radio-collars that continuously collect high resolution GPS and activity data to elucidate activities in real time. These collars have recently produced new and unique data revealing the hunting behavior and acceleration capabilities of wild cheetahs at the study site (Wilson et al., 2013). The BPCT currently has RVC radio-collars on all other members of the large carnivore guild; such data will provide highly accurate and frequent information on ranging movements, locations of kill sites, and temporal overlap with the radio-collared hyaenas. Additionally, further collaboration will lead to the deployment of several hyaena RVC collars.

**Anticipated date of completion:** January 1, 2016

**BUDGET**

The total budget from the Endangered Species Reserve Fund for this larger project is $1,500 US

**FUNDING**

Endangered Species Reserve Fund Grant $1,500 US

The Grant will be paid upon execution of this Agreement.

**REPORT:**

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

**PROJECT CONTACT:** Jessica Vitale
2700 Lynn Ave. S.
St. Louis Park, MN
55416, USA
jdt.vitale@gmail.com
(952)237-8378