



Research and Conservation of Hwange's Lions

A FIELD GUIDE ON LIONS (*Panthera Leo*)
Hwange Lion Research Project

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HWANGE LION RESEARCH PROJECT
A conservation project by WildCRU and Oxford University
WILDCRU
Wildlife Conservation Research Unit



VERSION 1

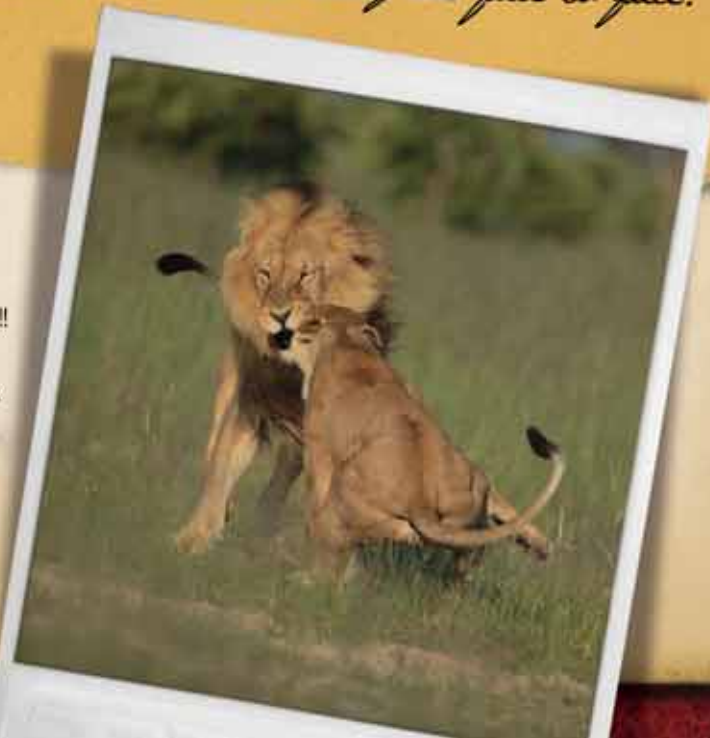


Just to remind me that we have come a long way!

A brave man is scared of a lion three times: first when he sees the tracks; second when he hears the first roar; and third when they are face to face.

- Somali Proverb

Do NOT cross a Mother near her cubs!!!



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Hwange is full of some interesting creatures!

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"wild animals are dangerous! Please respect your guide's advice and instructions!"

VERSION 1

Author's NoteResearch and Conservation of Hwange's Lions

The purpose of this book is to introduce the visitor to the world of lions in Hwange! As visitors to the wonderful national park, we need to explain the reason behind the research. I am often asked why do certain lions have collars ~ are they tame animals? Understandably international tourists do not know the reasons for research, so this book has been designed to give all a better understanding and insight of the research and management of lions in a protected area by wildern/Oxford university in the interest of conservation and the survival of the species.

Hwange National Park is like many other protected areas in Africa ~ it is "managed area", which means that it is an area with clearly defined borders or boundaries but which is not necessarily a physically fenced area. Animals inhabiting such an area therefore need to be managed in such areas and do not identify or understand borders so they will utilize whatever land or area that is available within park borders or outside the park! So we then have an additional problem, the human ~ animal conflict issue! Compounding these problems in a restricted, managed area is that we have an increase in animal populations "breeding" which causes animals to look further afield and outside of the protected area, which in many instances causes conflict with rural people living on the borders of such areas ~ this is no different to other protected areas in Africa where similar problems occur.

This all points back to the importance of managing certain species but in order to manage a species, we need to understand the biology and behavior of such a species. One management tool is to study the species in question so as to be able to make good decisions on the viability of the actions of wild animals.

By fitting radio collars to certain lions, we are able to monitor the movement of these animals and in this way better understand where our study lions move to and for how long. This allows us to identify the area within which the study animals move, especially when they leave the protected area. This also highlights on how the study animals impact predate on domestic livestock in rural community farmlands.



Myself & Jane Hunt
with "Cecil"

Only with such data can we consider an action plan and the collared lions play an important role in the collection of this data. To make a scientific calculated decision, we need to clearly understand the study animals behavior. You, the visitor to Hwange National Park, can help us in our endeavours. On pages 39 and 40 of this book is a pull out form, "spot a Lion", which we ask you to complete if you locate a collared lion. We will communicate with you if you provide us with your email address.

It is a privilege for me to work with Dr. Andy Loveridge, Me Elliot, Jane Hunt and Brent Stapelkamp of Oxford University/wildern, Management of Parks and Wildlife Authority of Zimbabwe, their dedication to this project. A special thank you to Courtney Johnstone and Ron Goatley of Wilderness Safaris, Vic Falls for always providing me with a bed for the night ~ I thank you both.

In anticipation, I thank you most sincerely for your interest and input on the "Research and Conservation of Hwange's Lions" project.

I am a Volunteer Researcher with wildern/Oxford University
Trustee of Endangered Wildlife Trust (EWT)
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Brian Courtenay

Brian Courtenay ~ Author



Western Red
African Butterfly
(Charaxes Cynthia)



Wild animals are
dangerous! Please respect
your guide's advice
and instructions!



"A lion sleeps in the heart
of every brave man."

- Turkish Proverb

WILDERN LION PROJECT

Who is the Project Leader & Principal Investigator on this Project?

Andrew Loveridge was born and raised in Zimbabwe and is currently based in Oxford. He is the Kaplan Research fellow at Lady Margaret Hall, Oxford University. He completed his D.Phil. at Oxford University in 1999 and he and Professor David Macdonald have been running Hwange Lion Research ever since.



Dr. Andy
in the field,
doing what
he loves
best!

Andy's Experience

"I spent the last ten years running a research and conservation project on African lions in north western Zimbabwe giving me extensive field experience working on African carnivores. I am co-editor of 'The Biology and Conservation of Wild Felids' and I have written a number of peer reviewed papers and book chapters on the behavioural ecology and

conservation of African jackals and lions (including co-authoring one of the case study chapters in The Biology and Conservation of Wild Canids).

I am a member of the IUCN/SSC Canid Specialist Group and African Lion working Group and recently contributed to the IUCN working paper on the impact of trophy hunting of African lions. In addition I co edited three volumes of proceedings from a series of Lion Conservation Research workshops (2001, 2002, 2005).



I am a career wildlife biologist and conservationist. My current research includes a study of lion ecology, behaviour and conservation management in Hwange National Park, Zimbabwe and the surrounding safari hunting concessions and a GIS based meta analysis which aims to model lion population dynamics and spatial distribution in sub Saharan Africa.

Recent work, funded by the Panthera Foundation, has focused on understanding the human-lion conflict along the boundary of Hwange National Park to establish the nature and extent of the problem and to help develop practical solutions for those communities that co-exist with wild carnivores.

Since 2008, research in Zimbabwe has been extended to include an investigation into the behavioural ecology of leopards. This work, undertaken as part of the Zimbabwe National Leopard Conservation Programme, will work towards an understanding of the distribution and conservation status of leopards in the country and whether current levels of trophy hunting are sustainable.



Professor David Macdonald
& Dr. Andy Loveridge

Research Interests

- Behavioral ecology & conservation of carnivores
- Sustainable utilisation of wildlife resources
- Community based resource management & conservation

Projects

- Lions in Zimbabwe Mitigating the effects of overhunting
- Hwange human-lion conflict project
- Darwin Initiative for Biodiversity
- Leopard Project

Andy is also the author of numerous scientific publications.

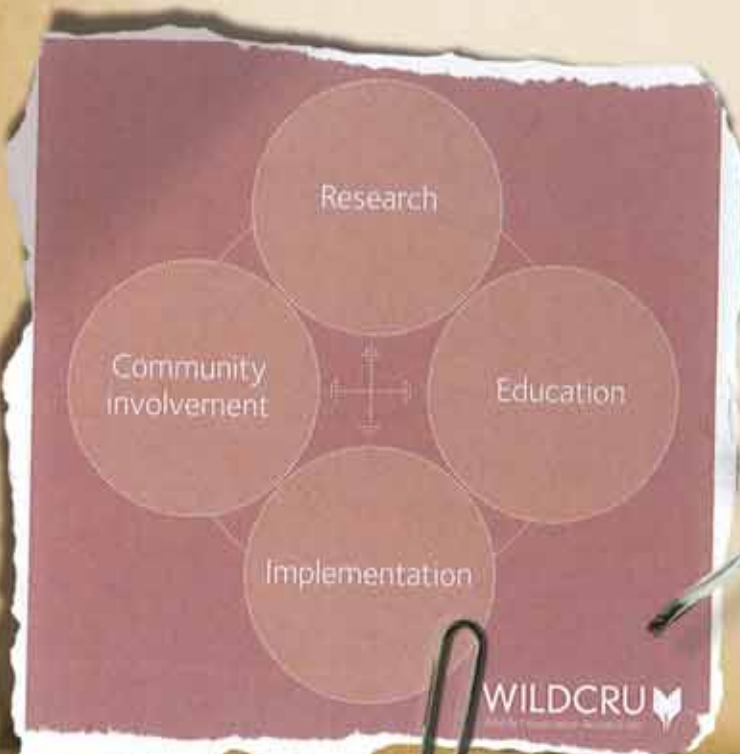


AN INTRODUCTION TO WILDCRU AND OXFORD UNIVERSITY

WildCRU's Mission and Research

The mission of the Wildlife Conservation Research Unit (WildCRU) is to achieve practical solutions to conservation problems through original scientific research. Our research is used worldwide to advise environmental policy makers.

Part of the University of Oxford's Department of Zoology, WildCRU is a pioneering multi disciplinary research unit in a world class academic centre. We underpin solutions to conservation problems through primary scientific research of the highest calibre. Our approach is empirical, inter disciplinary and collaborative, seeking to include all four elements of our 'Conservation quartet': research to understand and address the problem; education to explain it; community involvement to ensure participation and acceptance and implementation of long term solutions.



Guinea Fowl feather
(*Centurus pucherani*)



HWANGE LION RESEARCH

History of the project

The programme was initiated in 1999 to assess the impact of trophy hunting on the lion population in and around Hwange National Park. Since then we have collected scientific data on the conservation status and trends of Hwange's lions. Our study continues to be highly influential in determining sustainable and ethically sound management practices both in and around Hwange and more widely.

The lions of Hwange are part of the Okavango-Hwange sub population, and one of the last strongholds of the lion in Africa. Our study shows that major threats exist. Between 1999 and 2007 we recorded 90 adult lion mortalities. This high level of mortality has a substantial impact on a population that may only number around 350-400 individuals at any one time.

Less than 10% of recorded lion deaths were natural. This is a startling statistic for a population that should be completely protected. The vast majority of mortalities were caused by humans. Trophy hunting accounted for 39% of mortalities, while an equally important cause of mortality is snaring, illegal killing of lions and problem animal control (40% of mortality). This is probably a vast underestimation since illegal killing of lions is invariably concealed.

Since the inception of the project we have radio collared over 100 lions, providing a wealth of information that is unparalleled anywhere else in Africa. Collars allow us to monitor these cryptic animals following their movements as they cross into hunting areas, rural areas and sometimes other countries. Collars enable us to gain detailed information on movement patterns, social structures, reproductive behaviour, causes of mortality, diet and many other aspects of a lion's life that would otherwise be impossible to study. It is only through these collars that we can understand and therefore conserve these magnificent animals.



The future of Hwange's Lions

HWANGE LION RESEARCHMonitoring the impacts of trophy hunting

HWANGE NATIONAL PARK (15,000 km²) in north western Zimbabwe is surrounded by safari hunting concessions and communal lands on three sides (see map on page 9). until 2004 annual hunting quotas were issued with little or no consideration of the ecological information on the lion population, or indeed whether these hunting levels were sustainable.

As a result of early research (1999-2004) we were able to present data to stakeholders demonstrating that sport hunting adjacent to Hwange was having a drastic and negative effect on the lion population. This led to a suspension of lion hunting in all the concessions in western Zimbabwe between 2004 and 2008.

The number of adult male lions increased strikingly in the study area after trophy hunting was suspended: 7-10 individual males between 1999 and 2004 to 10-32 males between 2005 and 2007. The entire population increased in size while being protected from trophy hunting and this in turn influenced their behavioural ecology as the number of lions in the population stabilised.

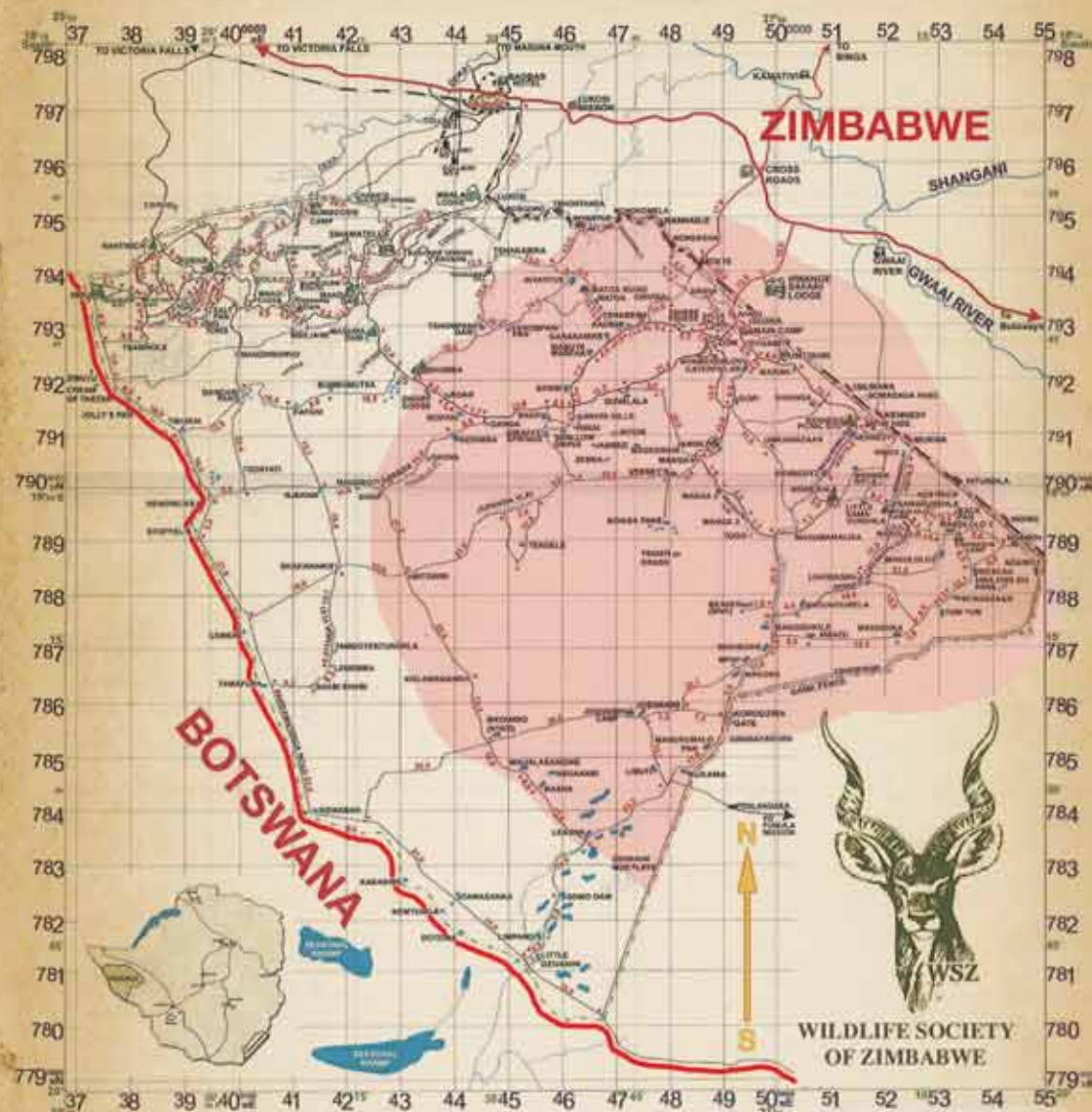
Before 2005 approximately 37 lions were on quota in the areas surrounding the Park, while from 2009 to date the quota is just 2 lions annually. Although this is a significant conservation achievement it is crucial that we continue to monitor this population now trophy hunting is once again occurring.

To hunt a lion in this area costs up to US\$90,000. with so much revenue at stake there is constant pressure to increase the quotas and so it is essential to continue monitoring the population to ensure that sustainable quotas are set.

In this way Hwange Lion Research has made a significant, measurable impact on the survival of the Hwange lion population and, more importantly, has laid the foundations for future sustainable use.

Dops!!!!

Found a few of these porcupine quills today

Map of Hwange National Park showing Core Research Area (Shaded)

Shaded area represents the Core Research Area

More than 12 percent of Zimbabwe's land is taken up by proclaimed parks and safari areas, the habitats ranging from dry Kalahari sandveld in the west, through the woodland savannah and open grasslands of the moister areas to the deep green mountain forests and heaths of the eastern uplands.

HWANGE NATIONAL PARK

HWange is Zimbabwe's oldest national park, proclaimed a game reserve in 1920, largely because this vast wilderness was regarded as "useless" for any other purpose.

HWange National Park is by far the country's largest wildlife area and contains the greatest diversity of animal and bird species. HWange covers 14 540 km² or 1 462 000 hectares - roughly same size as Connecticut, USA. Though the park itself is a vast area of wilderness, the peripheral buffer is the wildlife utilization area, comprising Forestry Commission, hunting and photographic areas.

HWange has no perennial streams but water can be found in the pans and pump supplied waterholes. There are over 52 pumped waterholes in the Park. HWange National Park boasts 115 mammal species, including 25 types of Predator, including Lion, Leopard, Cheetah, Painted Hunting Dog and Hyena and more than 400 bird species.

HWange is best known for its large numbers of elephant. It is one of the few parks where you can enjoy the company of the large herds of free ranging elephants. HWange is the focus of ongoing studies including Elephant, Lion, Wild Dog and Hyena Research. There are various other projects going on that I think are worth mentioning. This is probably a good juncture to praise National Parks for their commitment to research and seeing the need for it. HWange has a long history of research with road counts, aerial counts and pan counts being undertaken for some decades now. The French project CNRS also conducts research on kudu, impala, zebra, buffalo as well as quite expensive work on vegetation. HLR in addition to CNRS conduct work on respective species in relation to the communities outside the park. As such Parks have vital information from a broad spectrum of the ecosystem from which to make management decisions.



was a bit wet today so I had a visitor!

It has the second largest mammal diversity of any park in the world - Chobe in Botswana has the highest mammal diversity.

HWange Lion Research Project is an established conservation programme, run in partnership with the Parks and Wildlife Management Authority - Zimbabwe.

HWange is surrounded by safari hunting concessions on three sides.

Until recently, high hunting quotas (up to 60 lions on quota in all the neighbouring areas) had been issued to "sport hunt" lions each year on neighbouring hunting concessions, with little or no ecological information on the lion population to support these quotas.

In addition no research was being carried out to investigate the impact of these high levels of hunting. Concerns were raised that the levels of hunting were unsustainable and so HWange Lion Research was launched in 1999 in conjunction with

PWMA to monitor the population. They have radio collared many lions in the overall population and monitored movement patterns and causes of mortality.



new collars



"ugly" gets a new collar

HWANGE NATIONAL PARK (Cont'd)

Ted Davison ~ The First Warden of Wankie Game Reserve (Now Hwange National Park)



Ted Davison was appointed as the first game warden in 1928 and spent years wandering around the unmapped interior, of which there was so little information, that when he was asked by his African assistants where he was going, he usually just said "in that direction" so that he was given the name of Dubanyika, which roughly means "through the country".



Wankie Game Reserve
Circa 1928 ~ 1935
All images courtesy of
the Davison Family Archive

Hwange Management and Scientific services Team



Trumber Jura

Area Manager ~ Main Camp

Mr. Jura is a veteran of National Parks who joined in 1982 and attended the Natural Resources College. In 1990 he was promoted to Area Manager of Lake Chivero NP, and in 2010 he transferred to Main Camp.



Godfrey Mtare ~ Senior Ecologist

Mr. Mtare joined National Parks in 2006 as an ecologist based at Main Camp. He is a university of Oxford graduate and has and has an honours degree in wildlife and Rangeland Management from Bindura University. In December 2010 he was promoted to Senior Ecologist.

Edwin Makuwe ~ Ecologist

Mr. Makuwe joined National Parks in 2007 as an ecologist at Main Camp. He has an honours degree in Biological Sciences from the University of Zimbabwe and attained a postgraduate diploma in International wildlife Conservation Practice at the University of Oxford in 2010.



Simeon Mudimba
Senior Ranger



Elias Banda
Ranger II



Bloomer Mafuwa
Ranger III



Philani Dladla
Ranger II



Juliet Banda
Ranger III



HWANGE NATIONAL PARK (cont'd)

The project covers a large study area and lions move large distances within the study site ~ up to 60km a night in the case of some males. The Hwange habitat is heavily vegetated ~ with most of the park being composed of bushy woodland which limits accessibility to many areas. In order to effectively monitor the project's study animals, the project runs a Bushbaby Explorer microlight aircraft. The South African designed aircraft is a two seater, with pilot and co-pilot sitting side by side with short take off and landing (STOL) capabilities and large tundra type wheels to handle rough landing airstrips. Radio collared lions are tracked using radio telemetry. The aircraft has "H" antenna mounted on the wing struts. These link to a radio receiver in the cockpit that can be tuned to the individual frequency on the lions' collar. Using the two aerials alternatively through a switchbox, the position of the collar is triangulated. The lion's position is noted and this relayed to the ground crew who, where possible, can drive to the lion's location for a more detailed observations or to download GPS data stored on board the collars.



The "H" antenna mounted on the wing struts

BIOLOGY OF LIONSMane Development in Lions

Three years:

Mane thicker on sides, facial features more adult



4 Year old male



Two years:

Mane starting on chest, side of neck and ridge on back of neck

A young male
2 years old3 Year old
Males

Four years:

Mane forms a complete ring around the face but the hair is shorter than in an adult. Ears are still prominent.



Adult male
approximately
8 years old,
with fully
developed mane



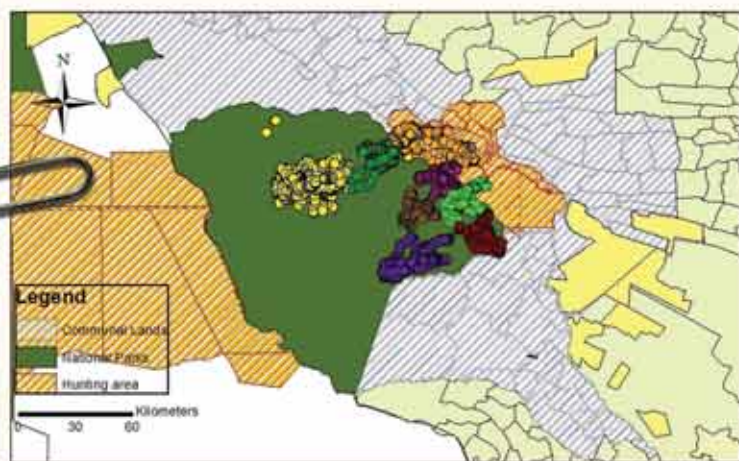
Five years +

A heavy mane, which darkens with age. Central tuft disappears as hair grows between and behind the ears. Ears are no longer noticeable.

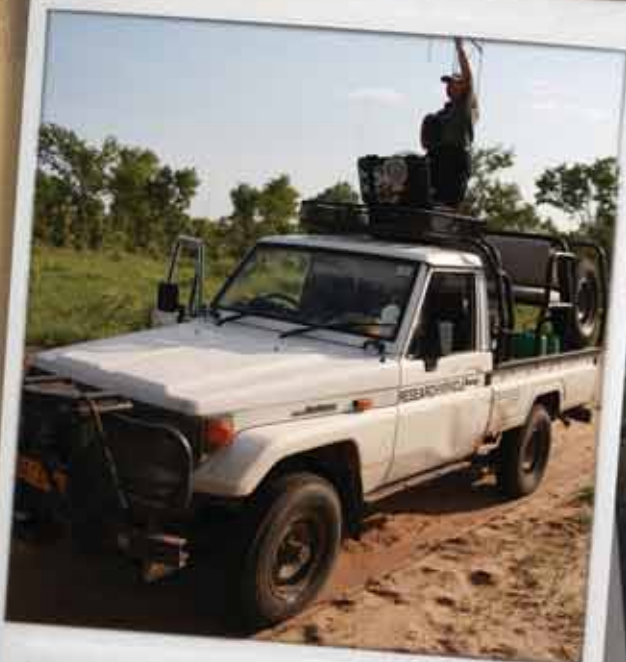
CONSERVATION AND RESEARCH ~ "Collar a Lion's Future"

Tracking Lions using Radio Telemetry for Research Material

MAP OF 2008 MALE TERRITORIES



After the hunting ban, the population quickly recovered and by 2008 there were 21 adult males in 8 territories where before the ban there had been two males in two territories.



Tracking lions with VHF collars using hand held antenna



Getting ready for take-off on a lion tracking mission



A short taxi down the runway and then the "Bush Baby" is in the air



Currently (2011) we have 22 collared lions in our core area, which are represented by 15 GPS collars and 7 VHF collars

A mobile VHF antenna focussed on a lion 30m away doing a download of data from the collar.



GPS / VHF Radio receiver from each antenna to pick up signal

Researcher Brent, and myself scanning for a signal on a VHF collared lion



A research vehicle deep in the field equipped with a "help yourself" lunch

CONSERVATION AND RESEARCH ~ "Collar a Lion's Future"

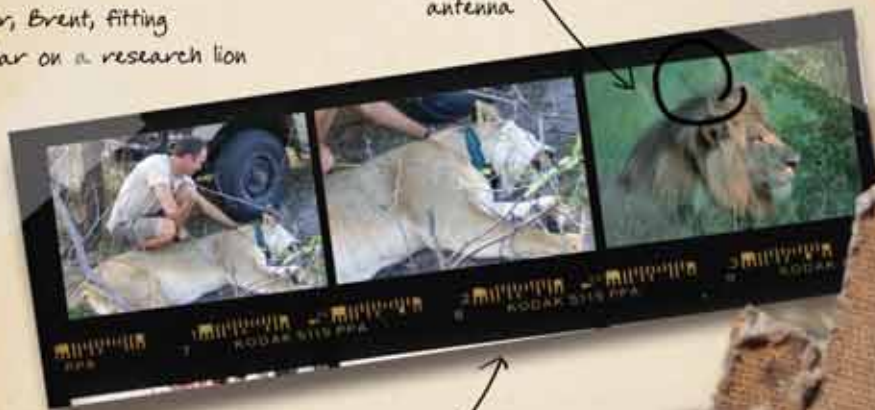
The "Collar and Ear Tag"



These three collared lions formed a coalition.

Sad News! 😞
Heard today that 2 lions had been shot outside park (one on trophy permit) and the other as a "problem animal"

Researcher, Brent, fitting a new collar on a research lion



Large male with VHF collar showing antenna

Fitting the collar to make sure it is not too tight around the neck

A section of the damaged collar as you can see it is quite well worn!

VERSION 1



Researcher Jane, attaching an ear tag and collar



Ear tag and mane hair ripped out following a territorial dispute between two male lions

Researcher Jane, with local wilderness safari guide, examining a destroyed collar as a result of fighting (territory dispute)



Types of collars used!

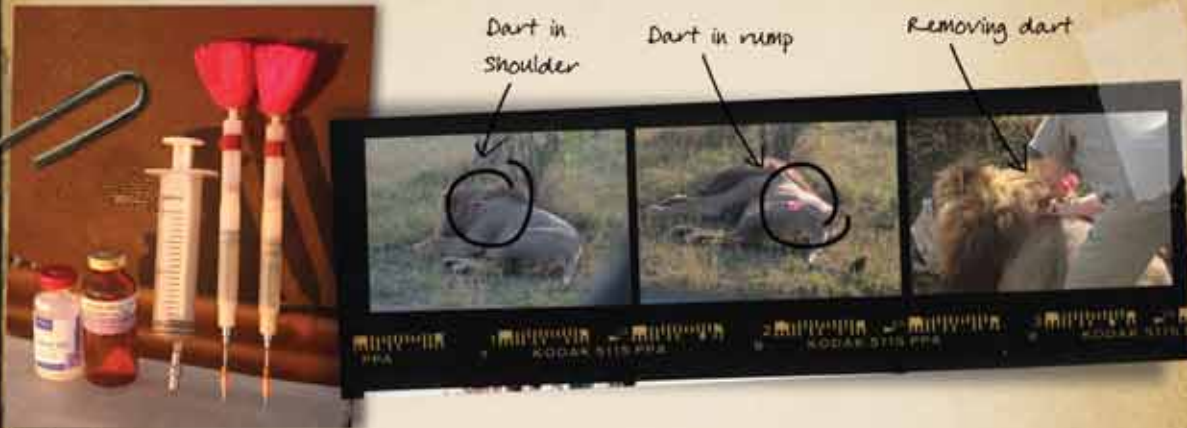


Africa's little miracle worker the dung beetle (family Scarabaeidae)

VERSION 1

CONSERVATION AND RESEARCH ~ "Collar a Lion's Future"

Darting a Lion for Research Material/Data



To dart a lion we use a Dan Inject dart gun. This is powered by compressed air and fires a light plastic dart which injects the lion on impact. The lion starts to go down 5-8 minutes after darting but we wait 20 minutes before approaching just to be sure! The lion will "sleep" for an hour or so during which time we fit the collar, take a blood sample and record various measurements. We also monitor the vital signs of temperature and breathing. Temperature is most important as a drugged lion loses its ability to naturally control its temperature. For this reason we only dart in the cool of the morning or late afternoon. While immobilised the lion can still hear, see, feel and smell so it is important to keep disturbance to a minimum. When the first signs of "life" are observed the reversal is given, but this only reverses one of the two drugs used, and recovery is slow, so we stay with the lion until it is 100% as hyenas, other lions and even elephants can be a threat while the lion is still unable to protect itself.



Preparing the collar

Fitting collar

VERSION 1

Whisker spot
for ID

Nose Pigmentation

Taking Blood samples



RESEARCH DATA

Lion: "Cecil" Date: 24.11.2010
 Location: Back Plains, Hwange NP.
 Age: Approx. 7 years Sex: Male
 Skull Length: 40.5 cm Width: 26 cm
 Length (Nose to Rump): 160 cm
 Tail Length: 85 cm
 Shoulder Height: 114 cm

Front Paw Length: 13.5 cm Width: 12 cmRear Foot (Elbow to Toes): 38 cm

Mane:

At Point Lower Jaw: 20 cmAt Crest Skull: 21 cmBetween Shoulders: 25 cmMid Chest: 32 cmSamples Taken: Blood SmearBlood SampleHair SamplePreparing the
antidoteAdministering the
revival antidoteWalking away
after darting

VERSION 1

CAPTURE DATA

The research data captured by researchers on an immobilised lion is available for future research with this species. To obtain such data from such cryptic animals that are extremely difficult to find we use a combination of GPS and VHF collars ~ this allows us to locate the animal reasonably quickly. A lion capture data sheet is completed with every animal darted.

LION CAPTURE DATA SHEET

DATE	24.11.2010	Sex	Male
TIME		Age (approx.)	Approx. 7 years
Pride ID	Back Pans	Freq./tag	
Video whiskers/nose		Area/ Grid ref.	Back Pans, Hwange N.P.
Skull length		Weight	
Skull width		Mane at point L jaw	
Nose - rump (HB)		Mane at crest skull	
Tail		Mane betw shoulders	
Chest girth		Mane mid chest	
Shoulder height		Palpability spine (3 strong press, 1 easy)	
Canine upper length curve		Degree ear range: (0 none, 1 tips, 5 entire)	
Canine upper base width	29.2 mm	DRUGS	
Canine length straight	60 mm	Initial dose	
Canine lower length	46 mm	Top up dose	
Canine lower base width	26.6 mm	Time dart in	
Wear on Incisors	Sharp, slight wear and chipping	Time to Ataxia	
Wear on Canine tip/rear		Time Recumbency	
Wear on premolars	Sharp, slight chipping	Reversal drug	
Colour teeth		Time to recovery	
Front paw length		Blood sample	
Front paw width		Blood smear	
Rear foot (elbow-toes)		Hair sample	
Base of tail circum.		Comments:	
Testicle length			
Condition mammae			



Taking teeth
measurements
is a risky
business



Researcher, Brent,
collecting data from
a darted lion



Sponsors, Researchers & Parks Management



L to R Deborah & Mike Llewelyn (Sponsors), Brian Courtenay (Author), Jane Hunt (Researcher), Godfrey Mtshali (Ecologist - Zim Parks Authority), Mc Elliot (Researcher), Julian Friemond (SATIB Sponsor),



Mc Elliot (Researcher), preparing a dart



On the right track - fresh lion spoor

Jane Hunt (Researcher) & Brian Courtenay (Author) with "Cecil" and changed collar



Deborah Llewelyn (Sponsor), tracking a collared lion

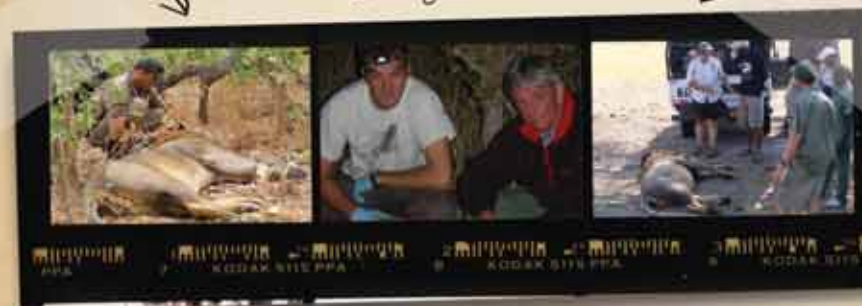
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Lion Capture & Collaring

Andy fitting a collar to "Ugly"

Author and Brent on "Magnum 44"

Jane on capture with locale farmers



Brent and Mc fitting a collar



Dart hits its "target" in nump!

Brent on sleepy lioness

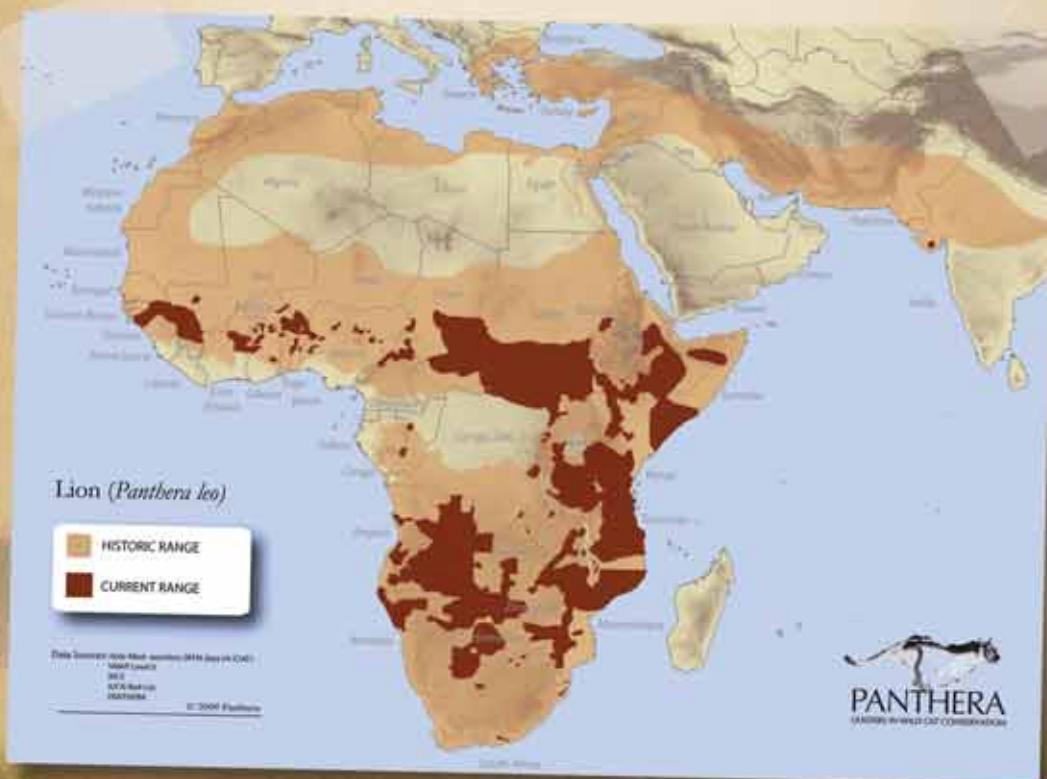


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BIOLOGY OF LIONS

Lions are unmistakable large carnivores belonging to the family Felidae. They are the largest of all African carnivores. Males weigh between 150kg and 225kg and have a shoulder height of 1.2m. Females weigh between 110kg and 152kg with a shoulder height of 1m. The main period of growth is in the first three years with males attaining maximum weight at seven years old and females at 5 to 6 years old. Unlike other felids, lions are social beings and live in groups of often related females and their offspring. Male lions are transient to the pride and often form single sex coalitions of related males during sub adulthood and adulthood. Lions once occurred widely in Europe, the Middle East, Asia and Africa. Today, on the African continent they are now extinct in the north, while in the rest of Africa their range has shrunk with the encroachment of humans and they primarily occur in National Parks and Game Reserves. Lions historically occupied a range of over 22,211,900 km² in Africa, which has been reduced by 83% to a present range of 3,802,873 km².

In Hwange we have a density of around 2.7 lions per 100km². This translates to around 375 lions within the Park, but this is part of a much larger population which stretches up to Victoria Falls as well as into Botswana so the potential gene pool is vast.



A lion's work hours are only when he's hungry; once he's satisfied, the predator and prey live peacefully together.

Chuck Jones



Each individual has prominent markings which make for easier identification at a later stage.

Determining population size is an important part of ecological work on a species. With carnivores, the most effective method of population estimation is by identifying individual animals and estimating population size from the frequency that marked or known individuals are seen compared to the frequency that unknown individuals are sighted. Some animals are unmistakable, such as mature male lions. Others are harder to identify and it is dangerous to make assumptions as to a pride's identity based on group size, as pride composition changes when the pride fragments and reunites.

Natural markings, such as prominent scars and nicks and cuts on ear margins, are often used and lions can be reliably identified by their vibrissae spots. A dark spot can be seen at the base of each whisker. These form a unique pattern that does not change with age. If a photographic record is built up, animals can be retrospectively identified.

The most effective method of identifying individuals is by marking them. Here researchers capture a sample of animals and mark them so they can be reliably and routinely identified. Common marking methods are coloured ear tags and radio collars, although branding or tattooing have sometimes been used in other studies when inconspicuous markings are preferable. Resightings of marked animals are very valuable to researchers.

In an area as large and diverse as Hwange, researchers cannot cover the entire area and while they are busy in one area, they may miss many sightings and behaviours elsewhere. Many researchers rely on reports of sightings of their study animals by tourists and their safari guides and by National Parks staff. A great deal can be learned from safari operators as they cover their own particular areas and concessions more thoroughly and regularly than researchers are able to. Vague accounts of sightings mentioned days later are not as useful as sightings written down soon after the event. It is amazing how quickly the details are forgotten so write those sightings down! In order to help you with this, there is a pull out sighting page at the back of this book.



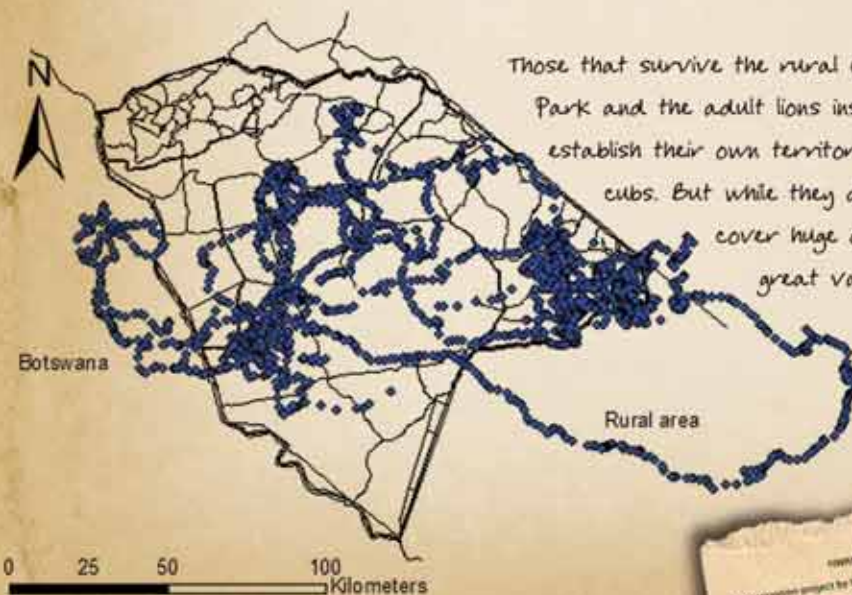
Lion dispersal

Male lions will always leave their natal pride while females sometimes disperse and sometimes remain within their pride depending on social circumstances. There is no typical age that lions in Hwange leave their pride but ranges between 17 and 42 months.

A male lion reaches sexual maturity at around 26 months but is only big enough to challenge for a territory between four and six years old. His dispersal phase is therefore considerable in length and since adult male lions will not tolerate other males in their territory, young males run the gauntlet if they stay within the National Park. Of the 39 dispersers we have monitored so far, 85% have left the park, going into either rural areas or hunting areas.

Dispersing lions are probably the major cause of livestock losses along the eastern boundary of the Park. In 2010 a group of 6 males and 5 females dispersed from the Spice pride on the wilderness concession. They were primarily responsible for the 202 head of livestock that were lost during the year. In retaliation, the majority of these lions were snared or shot with possibly only one male and one female still alive.

The impacts of adult mortality are also felt on dispersers as it appears that the age at which a lion leaves its pride is influenced by whether or not their father is in attendance. If he has been killed, dispersal is premature as the young lion is chased away by incoming males. Early results show that lions which disperse prematurely suffer much higher mortality.



Those that survive the rural communities outside the Park and the adult lions inside the Park go on to establish their own territories and sire their own cubs. But while they disperse they sometimes cover huge distances and cross a great variety of land use types.



As can be seen from this map the Core Study Area extends beyond the boundaries of the Hwange National Park

You can love a lion until it comes home with you

Since 2007 a significant component of the project has focused on the issue of conflict between rural people and lions. The research has sought to gain an understanding of both the ecological factors and the human socioeconomic factors that contribute to conflict situations. We have an intensive reporting system for conflicts and have undertaken a detailed survey to record the baseline data on human-wildlife conflict at the household level. This puts us in a unique position to implement and evaluate any interventions aimed at mitigation of conflicts.

Predation on livestock by large carnivores is a significant problem in the areas surrounding Hwange National Park. Between 2007 and 2010 we recorded 365 predation incidents, 228 of which were caused by lions, 116 by spotted hyaena and the remainder by leopard and cheetah. By themselves, lions killed 425 head of livestock - predominantly cattle, oxen and donkeys - the main source of wealth and draught power in the local communities. Such losses represent a significant proportion of the overall wealth of relatively impoverished rural communities.

Our findings on the Eastern boundary show that 78% of predation incidents occur at night and that only 8% of stock losses occur in protective bomas (corrals). This suggests that improved herding practices such as day time tending of stock and use of protective bomas to protect stock at night are methods that could reduce losses.

One of the consequences of livestock predation is retaliatory killing of lions and other carnivores by the people affected by depredations. Since 2007 a minimum of twenty eight lions have been killed in retaliation for livestock predation because retaliatory killing is illegal lion mortalities are often concealed. This is currently the most significant source of mortality in the Hwange lion population.

Human / Animal Conflict

what is said over
the dead lion's body
could not be said
to him alive

Congolese Proverb



Worldwide, conflict between people and wildlife is a major conservation concern. This is especially true on the periphery of protected areas, where impoverished communities coexist with wild animals. While people's livelihoods can be seriously impacted by wildlife, retaliatory killing by local villagers depletes wildlife populations. This is the case along the remote eastern boundary of Hwange where the illegal killing of lions is a serious threat.

Our experience is that poaching (mostly snaring for bush meat) is rife, indiscriminately killing large numbers of wild animals, including lions. 15% of the marked lions in the study between 1999 and 2009 were killed by snaring. This mortality is much higher for female lions with around 30% of collared lionesses killed in this way. While at least some lion poaching is inadvertent lions are sometimes accidentally caught in snares meant for other animals, much is deliberate.



The results of what happens when a lion gets caught in a snare



VERSION 1

This is a problem that needs to be addressed, not only because conflict leads people to kill lions, but also because people are suffering significant losses. We therefore initiated the human-wildlife conflict project in 2007 to address this issue. We are identifying the aspects

of lion behaviour that cause them to become (problem animals) and investigating the extent to which people impact lion populations in the area. We are conducting a detailed survey of local village households (360 have so far been conducted) to determine the levels of livestock loss to predators, the impact of this on livelihoods and the levels of livestock protection needed to prevent losses to predators. We are working with Animal Life Line For Anti-Poaching (ALL4AP) to alleviate wildlife losses in the boundary areas of the Park.

Predation on livestock is not random and occurs on a seasonal basis. Preliminary analyses show some interesting trends. During the wet season cattle are commonly grazed along the Park fence line. This coincides with times when lions are most likely to be found in this area, which might suggest that lions are responding to the higher availability of domestic stock at a time when wild ungulates are more dispersed. Furthermore, we found that there are more cattle per person at this time, which suggests that any herd protection by people is diluted, and this may make cattle more vulnerable to predation.

Lions
eating
a cow



A "problem" lion killed
on farmland

VERSION 1

Human / Animal Conflict (Cont'd)

Any interventions to improve livestock husbandry need to consider both the seasonal availability of wild prey and the vulnerability of livestock to lion predation at different times of the year. In 2010 we placed 10 GPS collars on cattle in the communal land in order to monitor the fine scale movements of livestock in relation to movements of lions within the National Park.

with insight into both lion behaviour and the needs of local people, we aim to assist local villagers to protect their livestock more effectively, so reducing conflict with lions and removing the need to kill lions illegally.

"Problem" lion shot on rural lands



Darted lion

A vital part of understanding lion behavioural ecology and thus implementing successful conservation management programmes, is understanding how lions disperse from protected areas into the surrounding landscape. A young lion is said to disperse when it leaves its natal pride, often wandering for a considerable time, in search of a territory in which to settle.

Dispersal plays a critical role for many species, as it maintains the social structure of a population and also affects distribution, abundance and gene flow, preventing inbreeding. During the dispersal phase, a lion can range over vast areas, often coming into contact with territorial adults, and also with people as they frequently leave protected areas.

This project was initiated in 2009 and is closely interlinked with the human wildlife conflict project since dispersing lions are probably the major cause of conflict along the eastern boundary of Hwange. In response 46% of monitored dispersing lions have been killed for preying on livestock.

This research is also focusing on whether Hwange is still connected to other lion populations in the region via corridors. A DNA analysis, coupled with a simulated model of lion dispersal will identify where such corridors are in order to protect them.



Lion crossing the fence outside the National Park Corridor



Lion shared and collar returned

WHISKER SPOT IDENTIFICATIONFacial Recognition using Digital Imagery

It is possible to identify individual lions based on certain characteristics. In 1970 Pennycook and Rudnai, studying lions in Kenya, noted that you could individually identify lions based on their whisker spot patterns since no two lions have the same spots. We use this method and for every new lion that is seen a whisker card is created allowing us to record which lions are seen.

To identify a lion based on its whisker spots we first take pictures of the lion, trying to capture each side of its face in profile. We then study only the top two rows of spots. The lower row usually has seven or eight spots with varying numbers in the row above. It is these spots above, in relation to the spots below that we take note of. For example if there is a spot above the second spot (counting away from the nose) on the lower row, you record this as 2. Going along perhaps the next spot is between 4 and 5 of the lower row, so record this as 4½. The right and left side of each lion are different.

By using this method along with noting the natural tears that occur in lion's ears as well as any other distinguishing marks we have built up a library of over 300 lions in the Park with more being added on a regular basis.

We are currently developing software that we hope will be able to recognise individuals based on photos. This has already been made possible with animals such as zebras and cheetahs, but with lions the individual markings are much smaller, making it a real challenge to perfect the software.

This non-invasive experimental technique using digital imagery is producing excellent results using the whisker spots as a positive identification of individual animals. However we have many months of research to perfect this technique so all field work is done on a visual manual identification basis as detailed in the examples.

"see page 38 for examples on how to calculate the whisker spot identification process"



Closeup of whiskers

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This is the Software Development on Grid to identify whisker Spots using Digital Images

Revised Data for month of: January 20 11
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Page: _____

EXAMPLE OF A
DIGITAL IMAGE

FULL FRONTAL FACE FOR GRID (MALE)



Pride: 'ceci' Date of sighting: 10 January 2011
Collar Number: 1SD / 7 / 106.2 GPS sighting co-ords: _____ GPS/VHS: _____

fused

Y.I.T.

These guys designed the Digital Image Grid

VERSION 1

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Wildlife Conservation Research Unit
UNIVERSITY OF OXFORD

WHISKER SPOT IDENTIFICATIONExample of Visual Manual Identification

HOW TO GRID REFERENCE A LION MUG SHOT ~ remember looking directly at the lion
left and right side of lion's head is the lion's left or right side.

EXAMPLESREMARKS:

Right Side of
Lion (female)
Example of
manual visual grid

REMARKS:

Left Side of
Lion (female)
Example of
manual visual grid

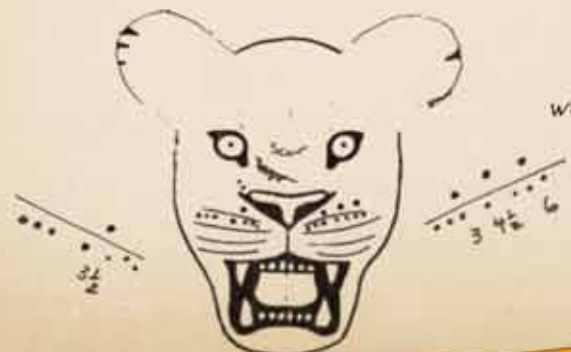
REMARKS: This example of a lioness records right 2 1/2 and 4 1/2 and 3 1/2 Left on our records

WHISKER GRID LEFT: 3 1/2

WHISKER GRID RIGHT: 4 1/2 ~ 2 1/2

REMARKS:

Right Side
Whisker spot 3 1/2
Ear Notches 3
Facial Scar
below right eye
female

REMARKS:

Left Side
Whisker spots 3, 4 1/2 & 6
Ear Notch 1
Facial Scar in
center of eyes
female

GUESTS FIELD GRID ON LION SIGHTINGS IN HWANGE NATIONAL PARK

To all Guests/Visitors/Tourists visiting Hwange National Park - please would you help us. When you sight a lion, please take a few minutes to complete the "sighting grid" below. Ask your guide to assist you with the pride name, location and any other information you may require to complete the grid.

SIGHTING 1

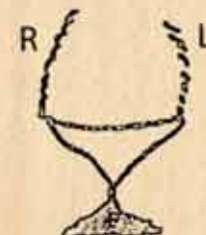
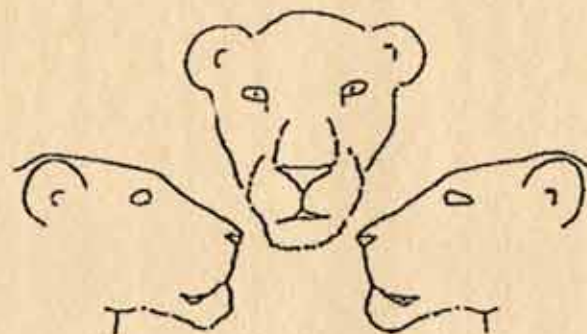
Date: _____ Time: _____ Pride Name: _____

Location: _____ GPS Co-ords: _____

Collared: _____ Gender: _____ Number of lions: _____

Remarks: _____

Insert whisker pattern/scars/markings

SIGHTING 2

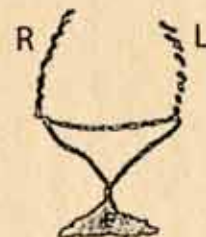
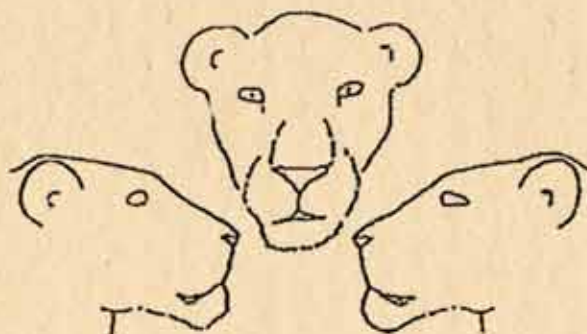
Date: _____ Time: _____ Pride Name: _____

Location: _____ GPS Co-ords: _____

Collared: _____ Gender: _____ Number of lions: _____

Remarks: _____

Insert whisker pattern/scars/markings



SIGHTING 3

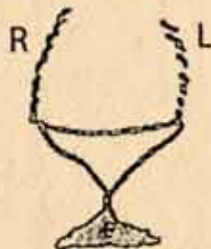
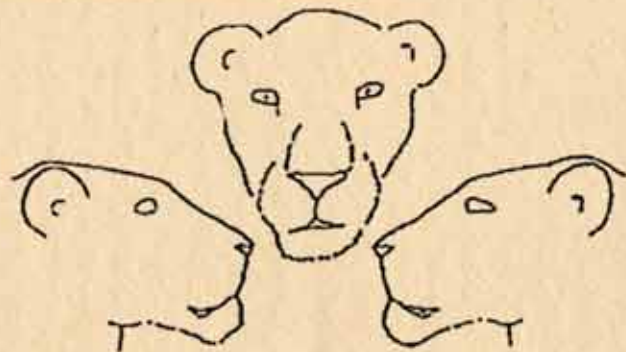
Date: _____ Time: _____ Pride Name: _____

Location: _____ GPS Co-ords: _____

Collared: _____ Gender: _____ Number of lions: _____

Remarks: _____

Insert whisker pattern/scars/markings



SIGHTING 4

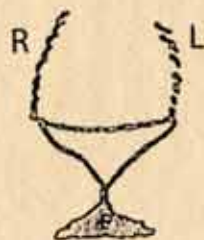
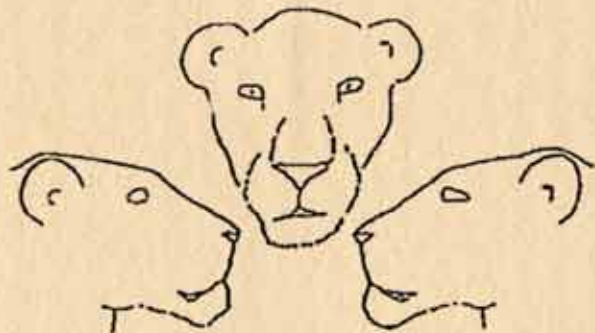
Date: _____ Time: _____ Pride Name: _____

Location: _____ GPS Co-ords: _____

Collared: _____ Gender: _____ Number of lions: _____

Remarks: _____

Insert whisker pattern/scars/markings



Thank you for participating in our "Research and Conservation of Hwange's Lions" project - we appreciate your help and input. Please fill in your details, detach this sheet and hand to your guide or lodge manager. We will collect the form and keep you posted with the research findings on our lions.

Your name: _____ Date: _____

Email address: _____


Brian Courtenay



VERSION 1



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Images supplied by: Jane Hunt, Mc Elliot & Digital Africa Photography



WILDCRU
Wildlife Conservation Research Unit

If we have forgotten anyone, it is not intentional and we duly acknowledge your kind support and contribution ~ THANK YOU!

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