MANA POOLS NATIONAL PARK PREDATOR SURVEY

July – October 2015

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Background

Park management requires accurate estimates of wildlife populations and population trends in order to make appropriate management decisions. Several methods are available ranging from aerial surveys (best for large easily observable species such as elephant and hippo) and sighted line transects (best for large diurnal species). Methods such as camera trapping and spoor surveys provide good estimates of carnivores and smaller less easily observed nocturnal mammal species. These methods are repeatable over time and can provide robust estimates of population trends. If multiple methods are used simultaneously (e.g. camera trapping and spoor transects) then cheaper more easily applied methods can be calibrated for accuracy.

Both lion and leopard are species for which more information is required and surveys are recommended actions in the 'Conservation Strategy and Action Plan for the Lion in Zimbabwe' (PWMAZ 2006) and the 'Preliminary Non-detriment finding assessment for leopards in Zimbabwe' (Lindsey and Chikerema-Mandisodza 2012) respectively for these species. The population sizes, distribution and co-occurrence with other carnivores and mammalian species is critical for long term management. The conservation value of the specially protected cheetah is acknowledged in a national conservation action plan. One of the main objectives within this plan is 'to improve the knowledge and expand research on the conservation biology of cheetah across Zimbabwe'. Based on their

questionnaire based field survey, the Cheetah Conservation Project Zimbabwe (CCPZ), currently estimates the cheetah population in Mana Pools to consist of 10-15 adult cheetah (see annual report CCPZ 2013). Ideally, this estimate would be supported by sightings and pictures received from the area. However, cheetah sightings and pictures from Mana Pools are scarce. Cheetah's have unique coat markings, which allows for the identification of individuals from pictures. Here we provide a report on predator a population survey undertaken between July and October 2015 in Mana Pools National Park (MPNP). This survey was a collaboration between WildCRU / Hwange Lion Research, Cheetah Conservation Project of Zimbabwe, Painted Dog Conservation, The Zambezi Society and Zimbabwe Parks and Wildlife Management.

Objectives

1) To undertake park wide surveys to estimate population density, distribution and habitat occupancy of common predator species in Mana Pools National Park.
2) To contribute to Cheetah Conservation Project Zimbabwe's (CCPZ) cheetah monitoring protocol.
3) To provide presence/absence data on all the larger mammal species.

METHODS

Camera Trap Survey

A pre-planned grid of camera traps was set up covering the national park from the Zambesi River in the North to the foothills of the escarpment in the South. The traps were approximately 4-5kms apart as this appears optimal for effective detection of large and medium sized carnivores and allows comparison with surveys undertaken by the team elsewhere in Zimbabwe. For logistical reasons the survey was conducted as two separate sub-surveys, North and South, with all the data being combined for the subsequent analysis. For statistical purposes and comparability between surveys each sub-survey (41 traps) was run for at least 40 days after the completion of the set-up process. At the end of the 40 day period the traps were removed in the same time frame and order in which they were deployed – as a result each trap was up for at least 48 days.

The basic grid was manipulated so that the position of as high a proportion as possible of the traps coincided with roads and tracks to provide easy access to the trap sites during the survey and also to ensure that subsequent monitoring was easier and more time effective. Prior to the setting up the trap positions are examined on Google Earth and the trap position optimised within a 500m radius of the selected point to maximize the captures of animals, positions along game trails and where trails cross the tracks, etc.

A camera trap station consists of two cameras, approximately six metres apart, facing each other though slightly off-set from one another to limit interference from the flash at night. The cameras were attached mostly to metal fencing standards hammered into the ground and where a suitable tree or stump was available they were strapped to it, all at approximately 60cms above ground level. The cameras and the metal stands were then covered with logs and branches so that they blended in to the background as much as possible, while the area between the cameras was cleared of any obstructions and the tall grass removed. It is important that there is nothing in or near the "capture zone" of each camera that may move in the wind as this will trigger the camera resulting in many unwanted images and the draining the cameras batteries.

Trap covering a road / path crossing

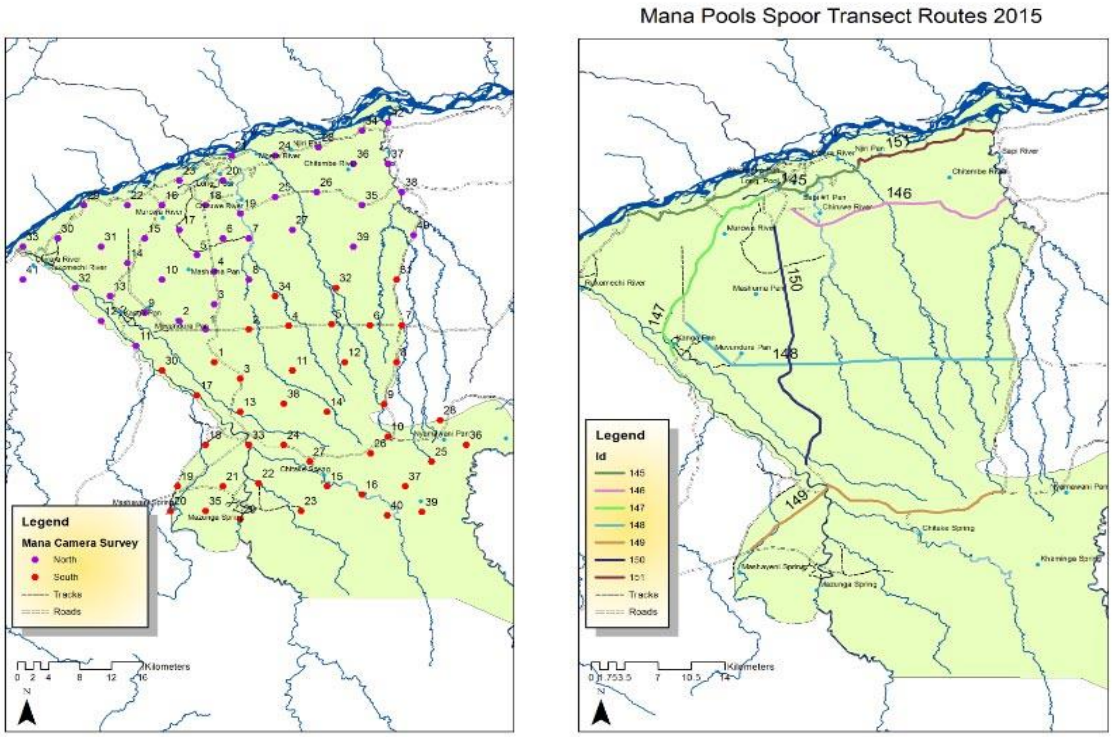
Trap covering intersecting paths

Once the cameras were set up the details of each camera, model, number and SD card, where applicable, were recorded so that it is known which images originate from which SD card or USB

download for each camera and therefore each trap. It is essential that this detailed recording of the origin of all the data images is done so that the "mark recapture" analysis can be undertaken to provide estimates of the population densities.

In the survey five different models of camera were used. Hwange Lion Research provided three different models of Cuddeback cameras (Models 1125, 1149 and C23) as well as some older Panthera cameras while the Cheetah Conservation Project of Zimbabwe and Painted Dog Conservation provided Stealthcam G42NG cameras. All the Cuddeback and Panthera cameras used standard "white or colour" flash for the night images while the Stealthcam cameras used the lower intensity "black" flash – this resulted in some images taken at night with the Stealthcams being "blurred" making the identification of individual animals more difficult. All the Cuddeback cameras were housed in protective metal boxes, primarily to protect them from the attentions of elephants and hyaena.

All the cameras are triggered by a motion sensor when an animal moves across the cleared "capture zone". The recycle interval for all the cameras used on the survey was 30secs, this being standardized as it is the fastest time that the older model Cuddeback cameras can recycle.



Maps of MPNP showing the position of camera stations (left) and spoor transect routes (right).

Spoor Transect Survey

Spoor transects are a standard method used for surveys of large carnivores. These involve a vehicle driven slowly (< 10kms/hr) along the designated transect road with a skilled National Parks tracker seated on the front of the vehicle while the driver or another person acts as the recorder of the data. From spoor encountered along the road the number of animals and the species, with the co-ordinates and distance from the beginning of the transect are recorded. Only spoor of not more than 24 hrs in age is recorded. In the case of lion and leopard the size of the tracks is measured for possible future analysis. Estimates of population densities, where there are sufficient recordings for each species, can then be calculated from this data using standard protocols (Funston et al. 2010).

The seven road transects used were a repeat of those that had been done on previous surveys in 2006 and 2011, these transects total 196 kms. Together they are considered to be representative of all the

major habitat types within the national park. Each transect was driven three times. This survey was conducted during the Camera Trap Survey so that the spoor survey results can be verified and possibly be recalibrated using simultaneously collected population estimates derived from an independent survey method. With the density of animals present it became practical to split Transect 145 and do it over two days, this resulted in each round of the survey taking eight days.

Additional Sightings

To try and improve the robustness of the camera trap survey it was decided to encourage the participation of the visitors and guides working in the national park. Posters were displayed in the Nat Parks offices at Nyamepi, Nyakasikana Gate and at Marongora showing what was required as well as a basic "business card" being distributed to members of the public within MPNP.

A Facebook page was also created for the survey that was regularly updated on the progress of the survey (Facebook.com/Mana Pools Survey 2015).

The information requested –

- Reasonable quality images of any of the five large predators seen. Only if images were taken then the following further details were then needed -
    - Date and time of the sighting
    - Basic details of the group size and composition
    - GPS co-ordinates or accurate description of the position

The above data could then be forwarded to the survey either using the Facebook page or by email using the gmail address set up for the duration of the survey. Details of the sightings where the individuals can be recognized are the fed into the Camera Trap Survey analysis – these extra data points then help improve the robustness of the survey.

RESULTS

Camera Trap Survey

A total of 30 319 data images were captured during the whole survey. The breakdown of the number of images and number of identified individuals for the large predators is as follows : -

Table 1: The total number of images capture for the main five large carnivore species and the number of individuals identified from camera trap images

Species	Images Captured	Individuals identified
Lion	267	67
Leopard	376	Not yet analysed
Cheetah	2	1
Wild Dog	191	51 (to be confirmed)
Spotted Hyaena	2969	Not yet analysed

During the survey five cameras were bitten by hyeana, five damaged to varying degrees by elephant, two destroyed by a bushfire, two removed by elephant and not found and one assumed to have been removed by poachers.

Wild Dog pups near the escarpment

Adult Cheetah near the Zambesi

Spoor Transects

Table 2: showing the number of spoor encounters and density estimates for the five main large carnivores

Species	Spoor Encounters	Estimate of Density/100kms²	Estimated numbers in MPNP
Lion	91	4.5	94
Leopard	51	2.5	55
Cheetah	4	Insufficient data	
Wild Dog	72	Calibration required	
Spotted Hyeana	746	Calibration required	

Lion and Leopard

The number estimated in the national park using the spoor transects is the same as that estimated using additional sightings / photographs / tour operator records, including the peripheral prides. If the peripheral prides are removed the number is 84. The density from the spoor transects is very similar to that of the 2011 survey.

Male lion in the centre of the Nat Park

Female leopard close to the Rukomechi River

Further analysis

Further technical analysis of the data collected in this survey is anticipated. For the main predator species, this will involve identification of individual animals from each camera trap station for each data of the survey and *ad hoc* photographs from researcher, guide and tourist sightings (for which there is accurate location data). The resulting data matrix will be analysed in a Spatially Explicit –Mark-Recapture analysis package (SPACECAP and/or SECR) which allows population density estimates to be derived along with confidence intervals (Gopalaswamy et al. 2012). It will be possible to analyse lion, leopard, spotted hyaena and wild-dog data in this way. There were insufficient cheetah and brown hyaena images captured to allow robust analysis using this method. These estimates will provide robust baseline population estimates for the park.

Additional Sightings

The participation of the public and guides was most disappointing. Only one image was forwarded to the Facebook page, this was not even of one of the large predators. There were eight emails from seven individuals, with 17 images attached, all from people personally known to the researcher-in-charge of the survey.

The researcher-in-charge provided 236 images while other interested parties provided another 157 images. All these additional sightings also assist with the identification of the individual large predators for the Camera Trap Survey.

SPECIES DETECTION

The following species were recorded on the Camera Trap Survey –

Lion	Elephant	Eland	Aardvark	Ground Hornbill
Leopard	Hippo	Kudu	Porcupine	Helmeted Guineafowl
Cheetah	Buffalo	Waterbuck	Chacma Baboon	Crested Guineafowl
Wild Dog	Zebra	Nyala	Vervet Monkey	Swainson's Spurfowl
Spotted Hyeana	Warthog	Impala	Ratel	Double-banded Sandgrouse
Brown Hyeana	Bushpig	Bushbuck	Civet	Red-billed Hornbill
Caracal	Scrub Hare	Grey Duiker	Genet	Yellow-billed Hornbill
Serval		Sharpe's Grysbok	White-tailed Mongoose	Meves' Starling
Wildcat			Bushy-tailed Mongoose	Bats
Side-striped Jackal			Banded Mongoose	
Black-backed Jackal			Slender Mongoose	

CAPTURES OF INTEREST

The capture of Brown hyaena (4 images) in two traps in the foothills of the escarpment and Black-backed Jackal (6 images) in the central areas of the national park are of considerable interest. This is further proof of the spreading of these two species in to the Lower Zambesi Valley, an area from which they have historically been absent.

Bushy-tailed mongoose were captured in five traps indicating a good representation of the species even though it is near the limits of its geographical range.

Brown Hyeana in “black” flash

Black-backed Jackal in colour

Bushy-tailed Mongoose in “black” flash



Porcupine | Wildcat carrying prey | Cararcal

FIELD PERSONNEL

The following people were involved in doing the surveys -

Camera Trap Survey

- WildCRU Justin Seymour-Smith Andrea Sibanda
- National Parks Ranger Samson Siakanoka

Spoor Transect Survey

- Cheetah Conservation Esther van der Meer Hans Dullemont
- ZamSoc Pete Musto Andy Wilkinson
- WildCRU Jane Hunt
- National Parks Ranger Bowers Edmond Zvenyika

We wish to thank the Area Manager, and his staff, for all their assistance and hospitality for the duration of the survey.

References

Funston, P.J., Frank, L., Stephens, T., et al., 2010. Substrate and species constraints on the use of track incidences to estimate African large carnivore abundance. Journal of Zoology 281, 56-65.

Gopalaswamy, A.M., Royle, A.J., Hines, J.E., et al., 2012. Program SPACECAP@ software for estimating animal density using spatially explicit capture-recapture models. Methods in Ecology and Evolution 3, 1067-1072.

Lindsey, P.A., Chikerema-Mandisodza, R., 2012. Preliminary Non-Detriment Finding Assessment:Preliminary report for leopards in Zimbabwe, p. 27. Parks and Wildlife Management Authority, Zimbabwe and Panthera, Harare, December 2012.

PWMAZ, 2006. Conservation Strategy and Action Plan for the lion (*Panthera leo*) in Zimbabwe, p. 21. Ministry of Environment and Tourism, Zimbabwe, Harare.