



Assessing the distribution and status of lions and other large carnivores in South-Eastern Angola

A REPORT ON PRELIMINARY RESULTS FROM THE 2015 SURVEY SEASON



Presented by Panthera/New York.

Contacts: Paul Funston, pfunston@panthera.org
Philipp Henschel, phenschel@panthera.org
Seamus Macleannan seamus.macleannan@gmail.com

Background

ABOUT PANTHERA

Panthera is a US based charity, founded in 2006, and is the world's leading organization devoted exclusively to the in-situ conservation of all 37 species of wild cats and their ecosystems. Utilizing the expertise of the world's premier cat biologists, Panthera develops and implements global conservation strategies for the largest, and some of the most imperiled cats. Representing the most comprehensive effort of its kind, Panthera works in partnership with local and international NGOs, scientific institutions, local communities and governments.

ABOUT THE CONSERVATION STATUS AND NEEDS OF THE LION – WHY WORK ON LIONS?

The lion is the most iconic carnivore in Africa, representing the essence of wildness. Yet lion populations are dwindling fast, with illegal and legal killing, habitat loss and fragmentation, and rampant bushmeat poaching of their prey having led to a >40% decrease in lion numbers over the past 20 years, prompting their new classification on the IUCN Red List of Threatened Species (globally 'Vulnerable' and 'Critically Endangered' in West Africa) (Bauer et al., 2015). To date, lions have vanished from more than 80% of their historic range. Current estimates place the wild lion population at about only 20,000 individuals Africa-wide.

Wild lions require wild areas to survive, which are characterized by intact communities of large herbivores, their principal prey, intact habitats, and low human impact. Lions are thus ideal indicators of the health of ecosystems. By targeting lions in our survey and conservation initiatives, we at Panthera focus on a key species to assess the integrity of wild ecosystems and develop strategies for conserving not only lions, but the entire landscapes they require to survive. In Angola, we aim to assess the status of lions, other large carnivores and key mega-herbivores, while also documenting all human activities that may have adverse effects on the occurrence of these species.

ABOUT THE IMPORTANCE OF KAZA

The Kavango-Zambezi Transfrontier Conservation Area (KAZA) is the world's largest transfrontier conservation area and Africa's largest conservation landscape. It is a stronghold for lions, leopards and cheetah and also boasts Africa's largest populations of buffalo and wild dog as well as half of Africa's elephant population.

JUSTIFICATION FOR SURVEY WORK IN ANGOLA

Angola made an important contribution to global conservation by designating vast tracks of land for inclusion into KAZA. Little is known, however, about the population status of the key species in the Angolan proportion of KAZA. During the first and only aerial surveys of Luiana Partial Reserve (now part of Luiana National Park)

in 2002-2004 researchers detected small populations of elephant, giraffe and buffalos; even several lions and leopards were seen from the air (Chase & Griffin, 2011).

While these results were promising, the aerial survey only covered a small proportion (8,163 km², or <10 %) of the entire KAZA area in Angola; that is, the newly designated Luiana NP, covering a total area of 84,400 km². Furthermore, aerial surveys are generally only suited to count large-bodied, group-living mega-herbivores. Apart from the few chance observations obtained of other species during the 2002-2004 aerial surveys, no data on the presence, distribution and abundance of smaller ungulates and large carnivores exists for Southeast Angola.

On July 25th, 2015, Panthera therefore signed a conservation agreement with Angola's statutory wildlife authorities, committing collaboratively to survey large carnivore populations across the Cuando-Cubango Region of Angola over the next two years, beginning with the Luengue-Luiana NP and surrounding areas in the dry season of 2015. Survey work in Angola started in late July 2015, in partnership with the Ministries of Tourism and Wildlife, and the Angola Carnivore Project run by Angolan national Dr Ezequiel Fabiano. Due to the onset of the rains in Southeast Angola in late September, the survey work was concluded for this current year, and will dry resume when the rains cease in April/May 2016. The results from the 2015 survey period are presented in this report.

Survey objectives

Our specific survey objectives were to:

1. Determine the current distribution of lions, cheetahs, leopards, African wild dogs and hyaenas across the Cuando-Cubango Region and estimate their respective population sizes;
2. Determine the current distribution of main large carnivore prey species as well as elephants across the Cuando-Cubango Region;
3. Collect spatial data on potential threats to large carnivores and other wildlife species (e.g. presence of livestock/herders, settlements, etc.) and biotic factors (presence of water, habitat types, etc.), to assess factors that potentially limit their distribution and densities across the Angolan KAZA areas;
4. Consider and provide information regarding interventions that will mitigate identified threats to large carnivore across the Cuando-Cubango Region.

Brief outline of methods and approach

To meet our objectives, we employed vehicle-based carnivore spoor counts that provide a cost- and time-effective means to establish the distribution and abundance of large carnivores over large spatial scales (Funston et al., 2010; Thorn et al., 2010). Most large carnivores exhibit extensive movements along roads and

other linear features, such as firebreaks and other cutlines, and because prior studies have identified strong linear relationships between large carnivore population densities and the frequency of tracks along spoor transects, spoor transects are a robust means to predict large carnivore densities and population sizes (Funston et al., 2010). Within accessible areas of the Cuando-Cubango Region, we distributed spoor transects as evenly as possible using a grid cell approach, with grid cells measuring 15 x 15km (see maps in Appendix). Within each grid we targeted roads, firebreaks, etc., which have sand suitable for tracking. Surveys were conducted by one field team comprised of experienced researchers and, where available, local wildlife authority staff. The team included two skilled observers seated on custom-made tracker seats fastened to the bull-bars of the survey vehicle. Teams began transects at dawn to provide ideal tracking conditions, and the survey vehicle was driven at a maximum speed of 10 km/h during transects.

We surveyed on transect line of ca 15 km length in each grid, and the survey team usually completed two or sometimes even 3 cells per day. Along each transect, the team recorded tracks of all the large carnivores, as well as those of elephants and other large herbivores. All direct observations of wildlife were also recorded. The team furthermore recorded all observations related to human impact on the area, such as track records and direct observations of people and livestock, as well as the presence of food crops and settlements.

Results

Between July 24 and September 15, 2015, the survey team completed 101 spoor transects, covering 135 of the 15 x 15 km survey cells (see Map 1 in Appendix). The total distance covered was 1,222 km, and the average spoor survey effort expended per cell was 13.7 km. The team obtained 10 spoor records for lion, 46 for cheetah, 223 for leopard, 81 for wild dog, and 448 for spotted hyaena (Table 1). Records of people and livestock were logged 302 and 166 times, respectively. Spoor of elephants, another species of conservation concern, was recorded on 179 occasions, while carcasses of poached elephants were recorded 7 times. The distribution of the above species across the survey area is shown in Map 2 in the Appendix.

Lions were only detected in the Southeast corner of the survey area, near Jamba, while all other large carnivores and also elephants were more widely distributed. Large carnivores and elephants were almost absent, however, in the more densely settled northern and northeastern parts of the survey area, where sign of people and livestock was most frequently recorded (see Map 2 in Appendix).

Table 1 Survey effort and number of track records (see Map 1 for locations of the survey areas).

Park	Area (km ²)	No. of trans.	Distance (km)	Number of records						
				Lion	Cheetah	Leopard	Wild dog	Spotted hyaena	People	Live-stock
SE Luiana Triangle	24,750	86	1,060	10	38	211	78	448	265	139
NW Expedition	5,625	15	162	0	8	12	3	0	37	27
Total	30,375	101	1,222	10	46	223	81	448	302	166

Large carnivore densities were only calculated for the Southeastern Luiana Triangle (see Map 1 in Appendix), as this area had a dense coverage of spoor transects, assuring that the results obtained will be representative for this area. The northwestern part of the survey area could only be covered in one long expedition towards the end of the survey period, and the remainder of this area will be surveyed more comprehensively in the dry season of 2016 (see **Survey Plans for 2016** below). Large carnivore densities were comparatively low for all species (Table 2). For the calculation of carnivore densities based on spoor frequencies (the number of spoor records per 100 km of spoor transect), only independent records of fresh (<24h) tracks can be used (Funston et al., 2010). Due to the low number of fresh tracks recorded for lion and cheetah, the confidence intervals of the estimates of densities and numbers for those two species are high. While the population size of lions and cheetahs is undoubtedly low, their continued presence and the larger number of leopard and wild dogs is certainly extremely promising.

Table 2 Number of individual fresh track records, spoor density, large carnivore population density and population size in the Southeastern Luiana Triangle (24,750 km²).

Species	No. of fresh tracks	Spoor density (tracks/100 km)	Population density (individuals/100 km ²)*	Population size
Lion	3	0.16 (±0.31)	0.14 (±0.09)	36 (±23)
Cheetah	9	0.81 (±0.51)	0.13 (±0.16)	32 (±40)
Leopard	30	2.78 (±1.32)	0.75 (±0.42)	187 (±104)
Wild dog	30	2.80 (±1.88)	0.76 (±0.60)	188 (±148)
Spotted Hyaena	84	7.67 (±2.84)	2.31 (±0.90)	571 (±223)

* Spoor densities were converted to actual carnivore densities according to the equations derived by Funston et al. (2010)

Survey Plans for 2016

Due to the onset of the hot dry season, and impending wet season (summer) survey activities will be halted for now and will resume in mid-May 2016. Prior to the resumption of the survey in May 2016 it would be beneficial to arrange and agree upon the following:

CAPACITY AND TRAINING

It is Panthera's expressed desire to work with INBAC and Ministry of the Environment to train Angolan nationals in the survey methods. We would like to offer training opportunities for:

1. One INBAC biologist
2. Two graduate students
3. Four local community members in the art of tracking

Panthera will rely on our partnership with INBAC and the Ministry of the Environment to identify and transport the biologist and students, and hopefully through Acardir to identify and train four trackers.

COMMUNICATION

Panthera commits to communicate all dates of field sampling trips with the relevant authorities so that our area and timing of work is always known. We would appreciate guidance on how to communicate better – with whom.

VISAS

Panthera requests multiple entry visas for Dr Paul Funston and Mr Seamus Maclellan for the duration of the Cooperation Agreement – three years.

LETTERS OF PERMISSION

Panthera requests from the governors office of Cuando-Cubango a letter of permission/credential giving the Governors support and permission for the survey teams to access all areas of both Luiana-Luengue and Mavinga national parks.

CAMERA TRAP GRIDS

In order to conduct an inventory of wildlife across the Cuando-Cubango region Panthera will use camera traps, targeting areas with concentrations of wildlife, such as pans, saltlicks, and key rivers, which will be mapped in the process.

Camera trapping has been identified as an appropriate tool to assess the overall mammal diversity in tropical and sub-tropical biome. In addition to data on the diversity of mammal communities, camera traps can also deliver indices of abundance for the mammal species recorded, permitting comparisons of mammal abundance across space or over prolonged time periods.

We will place camera trap grids in areas that appear promising in terms of overall mammal diversity and relative abundance. The entire Luengue-Luiana and Mavinga NPs, with their 84,400 km², are too large to be covered with camera traps area-wide. Our first large carnivore spoor transects, commencing in late July 2015,

further established that human settlement within Luengue-Luiana NP are more widespread than we anticipated. Many areas surveyed for carnivore spoor were entirely void of wildlife. Placing camera trap grids in such areas would be poor use of an expensive technology, and we therefore aim to target areas with suspected wildlife concentrations.

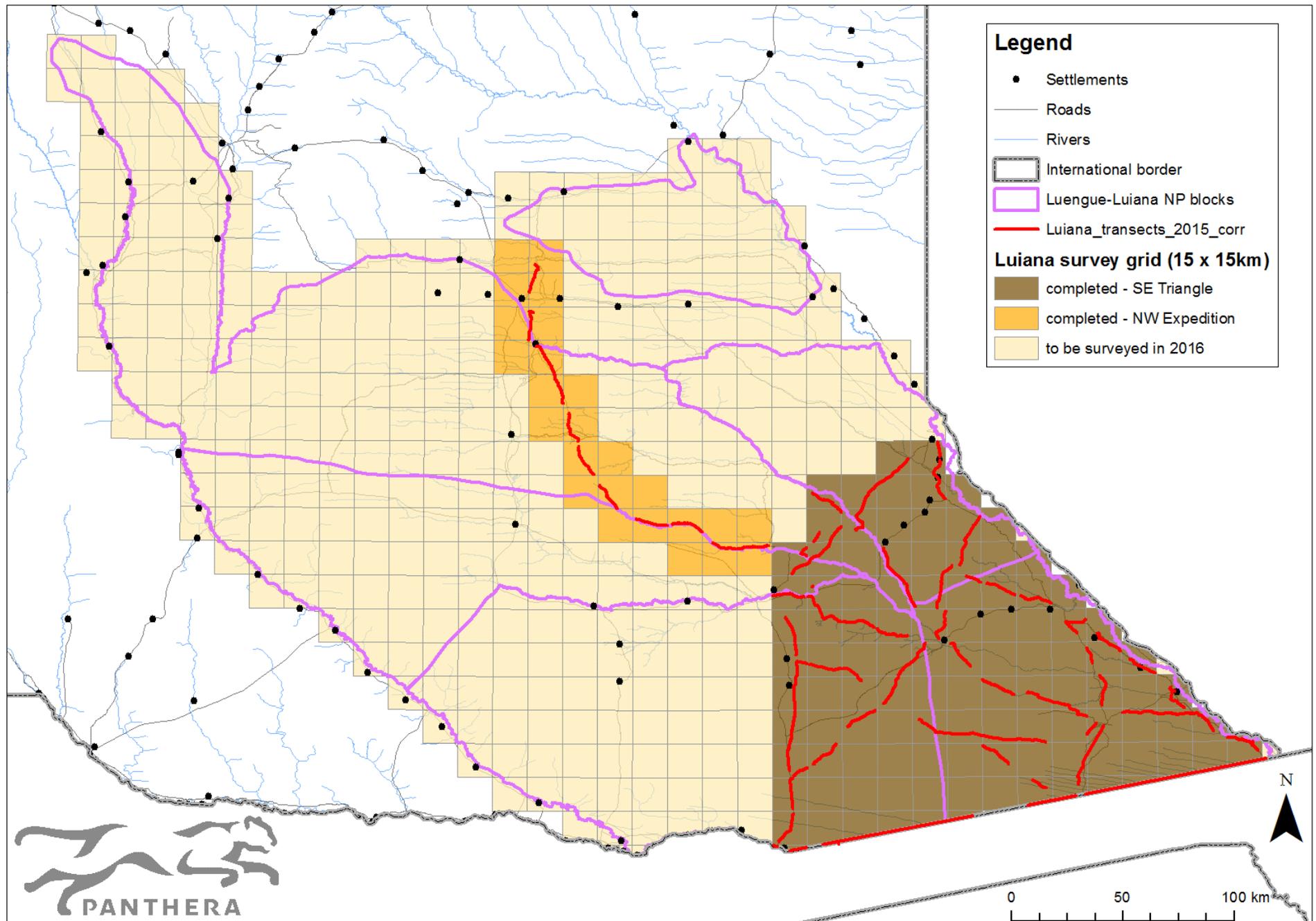
We propose to use three data sources to identify such areas. Firstly, the current Panthera-led spoor surveys (see first objective) that cover very large spatial scales and produce track records and track frequencies (an index of abundance) for large carnivores and large ungulate species. Secondly, the planned Elephants Without Borders (Dr Mike Chase) led aerial survey work, which will cover the entire Luengue-Luiana and Mavinga NPs. Data from this survey will be made accessible to Panthera, and will also reveal concentrations of wildlife. Thirdly, Panthera's Landscape Analysis Lab will provide layers of dry season surface water, which will also be used, predict areas that could support concentrations of wildlife, particularly in the dry season.

The mammal inventories in key wildlife areas across the Cuando-Cubango Region could then be scaled up with additional camera traps in 2016. The below budget contains budget lines for the 2015 camera trapping, which is additive to Panthera's current spoor surveys, and an up scaling of the spoor survey work and camera trapping efforts in 2016, which would cover the remainder of Luengue-Luiana NP (areas not reached in 2015), and the Mavinga NP.

References used

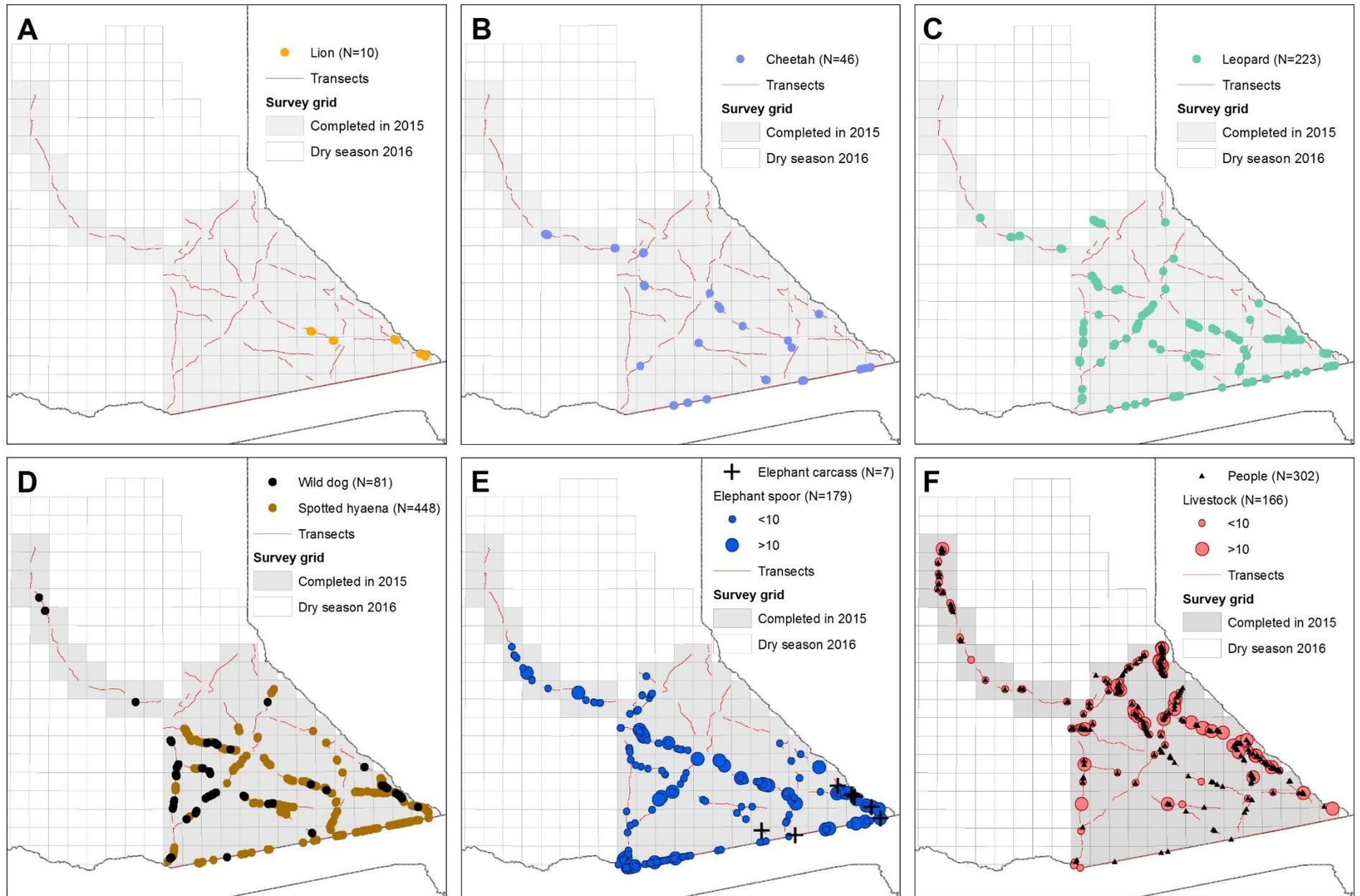
- Bauer, H., Packer, C., Funston, P., Henschel, P. & Nowell, K. (2015) *Panthera leo*. The IUCN Red List of Threatened Species. Version 2015.2., (<http://www.iucnredlist.org/details/15951/0>) and (<http://www.iucnredlist.org/attachments/2309>).
- Chase, M.J. & Griffin, C.R. (2011) Elephants of south-east Angola in war and peace: their decline, re-colonization and recent status. *African Journal of Ecology*, **49**, 353-361.
- Funston, P.J., Frank, L., Stephens, T., Davidson, Z., Loveridge, A., Macdonald, D.M., Durant, S., Packer, C., Mosser, A. & Ferreira, S.M. (2010) Substrate and species constraints on the use of track incidences to estimate African large carnivore abundance. *Journal of Zoology*, **281**, 56-65.
- Thorn, M., Green, M., Bateman, P.W., Cameron, E.Z., Yarnell, R.W. & Scott, D.M. (2010) Comparative efficacy of sign surveys, spotlighting and audio playback in a landscape-scale carnivore survey. *South African Journal of Wildlife Research*, **40**, 77-86.

Appendices



Map 1 Overview of the Luengue-Luiana NP, showing the survey grid, completed cells and the actual spoor transects conducted in the dry season of 2015.

Appendices



Map 2 Distribution of records for lion (A), cheetah (B), leopard (C), wild dog and hyaena (D), elephant (E) and people and livestock (F) in the surveyed areas of Luengue-Luiana NP, in the dry season of 2015.