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# news





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Co-chairs IUCN/SSC  
Cat Specialist Group  
KORA, Thunstrasse 31, 3074 Muri,  
Switzerland  
Tel ++41(31) 951 90 20  
Fax ++41(31) 951 90 40  
<[urs.breitenmoser@vetsuisse.unibe.ch](mailto:urs.breitenmoser@vetsuisse.unibe.ch)>  
<[ch.breitenmoser@kora.ch](mailto:ch.breitenmoser@kora.ch)>

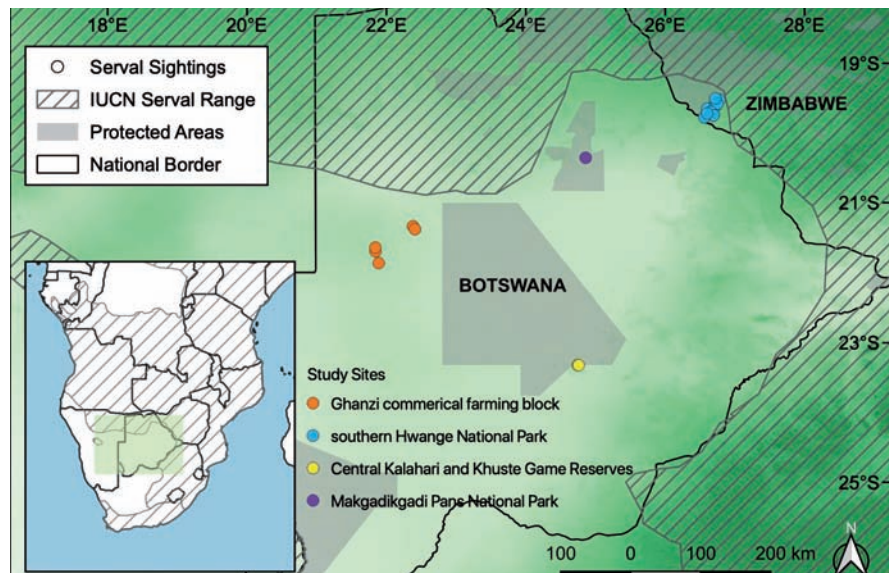
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## Range expansion: Servals spotted in the Kalahari

**Servals *Leptailurus serval* have a widespread distribution across sub-Saharan Africa with two large gaps: one in the tropical forest block of central Africa and one in the arid western block of southern Africa. We present new camera trap records of servals that fall within a large portion of the latter gap, including records from Khutse Game Reserve and Ghanzi that are more than 100 km outside the known range of the serval and may suggest a Kalahari-wide distribution.**



**Fig. 1.** Location of serval records (coloured by study sites) in relation to protected areas in Botswana and Zimbabwe, with inset of Africa-wide serval distribution (Thiel 2015). Camera trap images from each of these study sites are shown in Figs 2–5. Green background represents annual precipitation (mm) from the WorldClim Bioclimatic variables (Fick & Hijmans 2017), showing the gradient from wetter regions in the north and east (darker green) to more arid regions in the south-west (lighter green).

Servals are medium-sized cats with a wide-spread distribution across the savannahs and wetlands of sub-Saharan Africa (Skinner & Smithers 1990, Nowell & Jackson 1996, Thiel 2015). This distribution becomes far narrower in southern Africa and although still widespread throughout Zimbabwe and Mozambique, servals are largely considered absent from the arid south-western parts of the sub region (Skinner & Smithers 1990). Factors described as influential in serval habitat selection typically include permanent water sources and adequate vegetation cover (Van Aarde & Skinner 1986, Skinner & Smithers 1990, Herrmann et al. 2008, Stratford et al. 2016) and they are particularly associated with wetland and riparian vegetation types (Bowland 1990, Ramesh et al. 2016). In Botswana their range includes the Okavango Delta, northeast to the Chobe River and southwards along the Zimbabwe border with a reappearance in the northern Tuli Block farming area (Skinner & Smithers 1990, Nowell & Jackson 1996).

However, species' distribution maps are constantly being updated as people gain more access to remote areas and make advances with technology for surveying wildlife. Elusive species such as servals have become far easier to study with the advent of remotely-triggered camera traps, and their known distribution has been expanded in recent years (e.g. Stratford et al. 2016). Here, we report on camera trap records of servals outside of their known distribution, ranging from tens of kilometres (in southern parts of Hwange National Park, Zimbabwe) to ca. 200 km in the



**Table 1.** Survey details for the four sites. HNP (southern Hwange National Park, Zimbabwe); KGR/CKGR (Khutse Game Reserve & Central Kalahari Game Reserve, Botswana); Ghanzi (farmlands, western Botswana); MPNP (Makgadikgadi Pans National Park, Botswana).

Region	Survey period	Survey setup	Camera trap models	Trap Nights	
				Total	Mean
KGR/ CKGR	Jan. – Apr. 2018	24 cameras at c. 1 km intervals 6m back from the boundary road, facing the inside of the fence	Reconyx HC500	2,064	86
MPNP	Jul. – Aug. 2017	Grid of 100 camera trap stations each with paired cameras spaced at c. 4 km	Cuddeback C1, Panthera V6	4,570	45.7
Ghanzi*	Apr. 2016 – Jul. 2018	Single cameras c. 3 km apart at a total of 264 locations over an area of approx. 1,657 km <sup>2</sup>	Bushnell Agressor	>16,000	50
HNP	Aug. – Oct. 2017	Similar grid to MPNP	Cuddeback 1125, 1149 and C1, Panthera V4	4,051	51.9

\*Final survey is still on-going therefore total/mean trap nights are an estimate.

semi-arid Kalahari region (Khutse Game Reserve, Botswana; Fig. 1).

### Methods

We used by-catch data from several concurrent surveys with differing objectives to record serval detections and opportunistic sightings of servals. The surveys are part of on-going research activities in three regions of Botswana and one in Zimbabwe (see Table 1 for time span and additional details on each survey). In Botswana this included: the south-eastern border fence of the contiguous Khutse Game Reserve KGR and Central Kalahari Game Reserve CKGR, Makgadikgadi Pans National Park MPNP and the Ghanzi commercial farming block. In Zimbabwe we surveyed the Dzibanini and Jozibanini areas of southern Hwange National Park HNP. In addition to the camera trap records, we included one opportunistic sighting from HNP by J. Seymour-Smith, an experienced observer, recorded in 2012 while clearing the roads for spoor surveys.

### Results & Discussion

In Zimbabwe, we recorded servals at ten locations in the Dzibanini area of HNP, just south of the known distribution (Fig. 1, 2). In protected areas of Botswana, we recorded servals at one location in the MPNP (Fig. 1, 3) and at two locations along the boundary of the KGR/CKGR (Fig. 1 & Supporting Online Material SOM F1; ca. 70 and 200 km outside of the known distribution respectively; Table 2). Although the photo quality from the KGR is not high, images are clear enough to confirm that it is the same serval individual at both camera stations. In the commercial farm block (non-protected areas) we recorded five sightings with at least four individuals (SOM F2). For one image it was difficult to confirm if it showed a new individual or not, but based on time between captures, it is likely to be a different one. Servals are generally associated with savannah habitat with permanent water and their known distribution in Botswana has so far been restricted to the north-east (Fig. 1). How-

ever, we now present sightings of servals from the dry south of HNP through MPNP into the Kalahari. The KGR/CKGR complex and nearby Ghanzi farmlands are located in the semi-arid central Kalahari region. The vegetation morphology in the KGR/CKGR area comprises open shrubland, open herbaceous vegetation and pans/bare areas (Mishra et al. 2015). In contrast, the Ghanzi commercial farming area is comprised primarily of low tree and shrub savannah (Cole & Brown 1976) with many areas forming dense thickets as a consequence of overgrazing. In all cases there exist permanent water sources in the form of either artificial waterholes or borehole points. Permanent water is likely to be key in providing support for servals to reside in these Kalahari areas. This claim is further supported by a lack of serval sightings in nearby wildlife management areas, where only seasonal water is generally present (Keeping 2014, Van der Weyde et al. 2018). There have been anecdotal reports of servals in the region, but only now can



**Fig. 2.** Camera trap record of a serval in southern Hwange National Park (2017; Photo Trans-Kalahari Predator Programme). Blue dots in Fig. 1.



**Fig. 3.** Camera trap record of a serval in Makgadikgadi Pans National Park (2018; Photo Trans-Kalahari Predator Programme). Purple dots in Fig. 1.

we confirm that servals are present. Given that there are records from the Kgalagadi Transfrontier Park (KTP; Thiel 2015), which is a more arid area to the south-west extreme of Botswana, it is possible that their range extends across the entire country, where suitable conditions are present. This provides confirmation of seven cat species in the Kalahari (lion *Panthera leo*, leopard *Panthera pardus*, cheetah *Acynonyx jubatus*, caracal *Caracal caracal*, serval, African wild cat *Felis lybica* and black-footed cat *Felis nigripes*) and may represent the most diverse felid guild in Africa.

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**Table 2.** Serval records outside of current range (Thiel 2015). Region abbreviations as in Table 1.

Region	Location (dd)		Number recorded	Distance from current IUCN Range (km)
	Latitude	Longitude		
HNP	-19.52771	26.77534	3	9.9
HNP	-19.58103	26.74971	1	13.9
HNP	-19.57675	26.71704	1	17.1
HNP	-19.50470	26.71942	6	15.1
HNP	-19.62014	26.71772	3	18.1
HNP	-19.74659	26.69446	2	23.1
HNP	-19.69892	26.65626	1	26.3
HNP	-19.65071	26.60285	1	30.6
HNP	-19.72028	26.60142	1	32.5
HNP	-19.77612	26.56146	3	37.4
Ghanzi	-21.33779	22.37973	1	52.9
Ghanzi	-21.38114	22.40840	1	57.1
MPNP	-20.35710	24.85720	1	67.5
Ghanzi	-21.64285	21.83948	1	96.7
Ghanzi	-21.69808	21.84217	1	102.8
Ghanzi	-21.86593	21.88873	1	120.5
KGR	-23.32087	24.75620	1	192.5
KGR	-23.32086	24.74640	1	192.9

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Supporting Online Material Figures F1 and F2 are available at [www.catsg.org](http://www.catsg.org).

<sup>1</sup> Wildlife Conservation Research Unit, Department of Zoology, University of Oxford, Recanati-Kaplan centre, Tubney House, Abingdon Road, Tubney, Oxfordshire OX13 5QL, UK

<sup>2</sup> Leopard Ecology & Conservation, Khutse Game Reserve, Private Bag BR7, Gaborone, Botswana

<sup>3</sup> School of Life Sciences, University of KwaZulu-Natal, Durban 4000, South Africa

<sup>4</sup> Panthera, 8 West 40<sup>th</sup> Street, 18<sup>th</sup> Fl, NY, NY 10018, USA

<sup>5</sup> Animal Ecology and Conservation, Department of Zoology, University of Hamburg, Martin-Luther-King-Platz 3, 20146 Hamburg, Germany

<sup>6</sup> Institute of Zoology, Zoological Society of London, Regents Park, London, NW1 4RY, UK

<sup>7</sup> Cheetah Conservation Botswana, B5 Kgale Sid-ing Office Park, Gaborone, Botswana

<sup>8</sup> San Diego Zoo Institute for Conservation Research, 15600 San Pasqual Valley Rd, Escondido, CA, United States

\*<genevieve.finerty@gmail.com>

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**SOM F1.** Camera trap record of a serval along the southern border of the Central Kalahari Game Reserve (2018; Photo Leopard Ecology & Conservation). Yellow dots in Fig. 1.



**SOM F2.** Camera trap record of a serval in Ghanzi commercial farming block in Ghanzi (2017; Photo Cheetah Conservation Botswana). Orange dots in Fig. 1.