Estimating density of sitatunga in central Uganda using spatially explicit capture recapture (SECR)

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HIGHLIGHTS:

- Preliminary models include human collected and trail camera pictures from 2015

- Composed of 185 sitatunga encounters from human observers and 286 from trail cameras

- Best model shows a density of 4.64 sitatunga / km^2 (95% Confidence interval 2.94 -7.31)

- Future analyses will include individuals sighted in 2016-2017, unknown individuals, habitat and occasion covariates, and maps of appropriate habitat

RESULTS:

Top 3 models ranked by AIC. In the best model, the detection probability of sitatunga is affected by a site-specific learned response. These results suggest a 1:1 sex ratio

Model	Definition	AIC	ΔAIC	Density (Animals / km^2)	95 % Confidence Interval
g0 ~ bk	Detection depends on a site-specific learned response	2545.5	0	4.64	2.94 - 7.31
g0 ~ bk + h2	Detection depends on sex and site-specific learned response	2580.6	-35.15	Males: 4.55, Females: 4.55	Males: 2.80 - 7.40, Females: 2.80 - 7.40
g0 ~ K	Detection based upon the site effectiveness of the preceeding occasion	2783.7	-238.3	2.78	2.84 - 5.46

INTRODUCTION AND METHODS:

In 2010, the Uganda Wildlife Authority (UWA) authorized a trophy hunt for sitatunga. To effectively manage the hunt, UWA needs a density estimate of sitatunga within hunting concessions. Spot patterns on the face and flanks of sitatunga are unique to individual, and the sitatunga are restricted to wetlands; these conditions appear conducive to a spatially explicit capture recapture (SECR) model of density.
This preliminary study tests the usefulness of SECR models of density for a sitatunga population.

Steps to achieve our SECR density estimate:

Collect photographs of sitatunga
(trail cameras and human observer stations)

Identify individual sitatunga in photographs

Note location, date, and individual for all encounters

Analyze data in R using **secr**

Rank competing models according to AIC

Sitatunga individuals have unique spot patterns. These two photos are of different ewes.

Horn shape and characteristics are additonal identifiers for bulls. These pictures show the same bull.

BACKGROUND:

- Sitatunga (*Tragelaphus spekii*) • Distributed across sub-Saharan Africa •
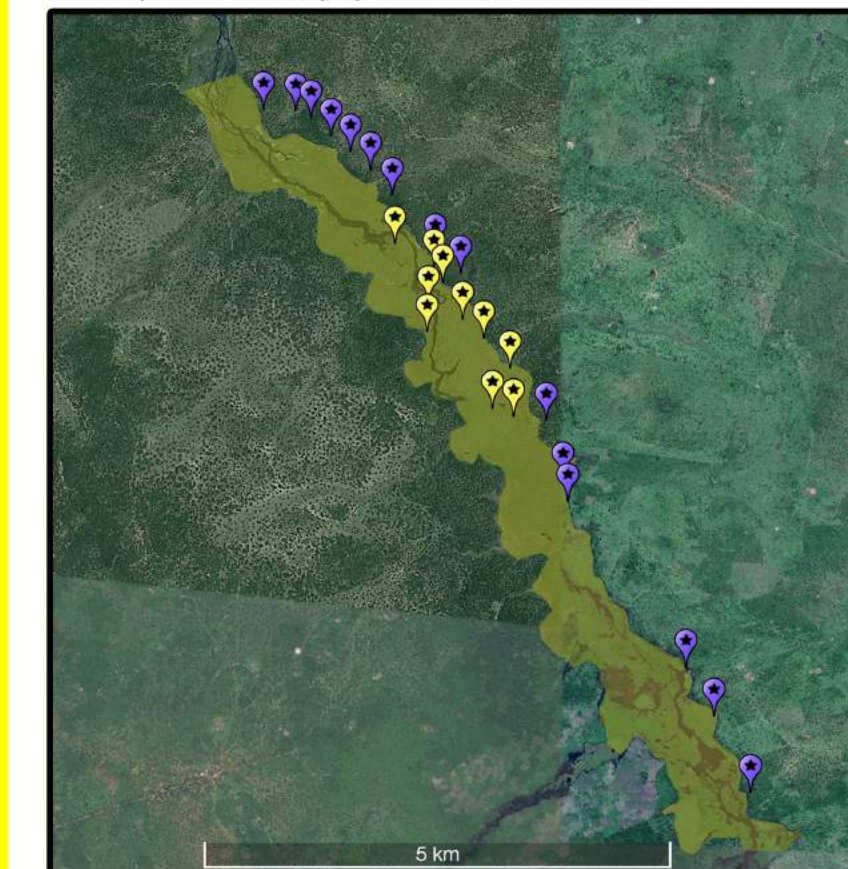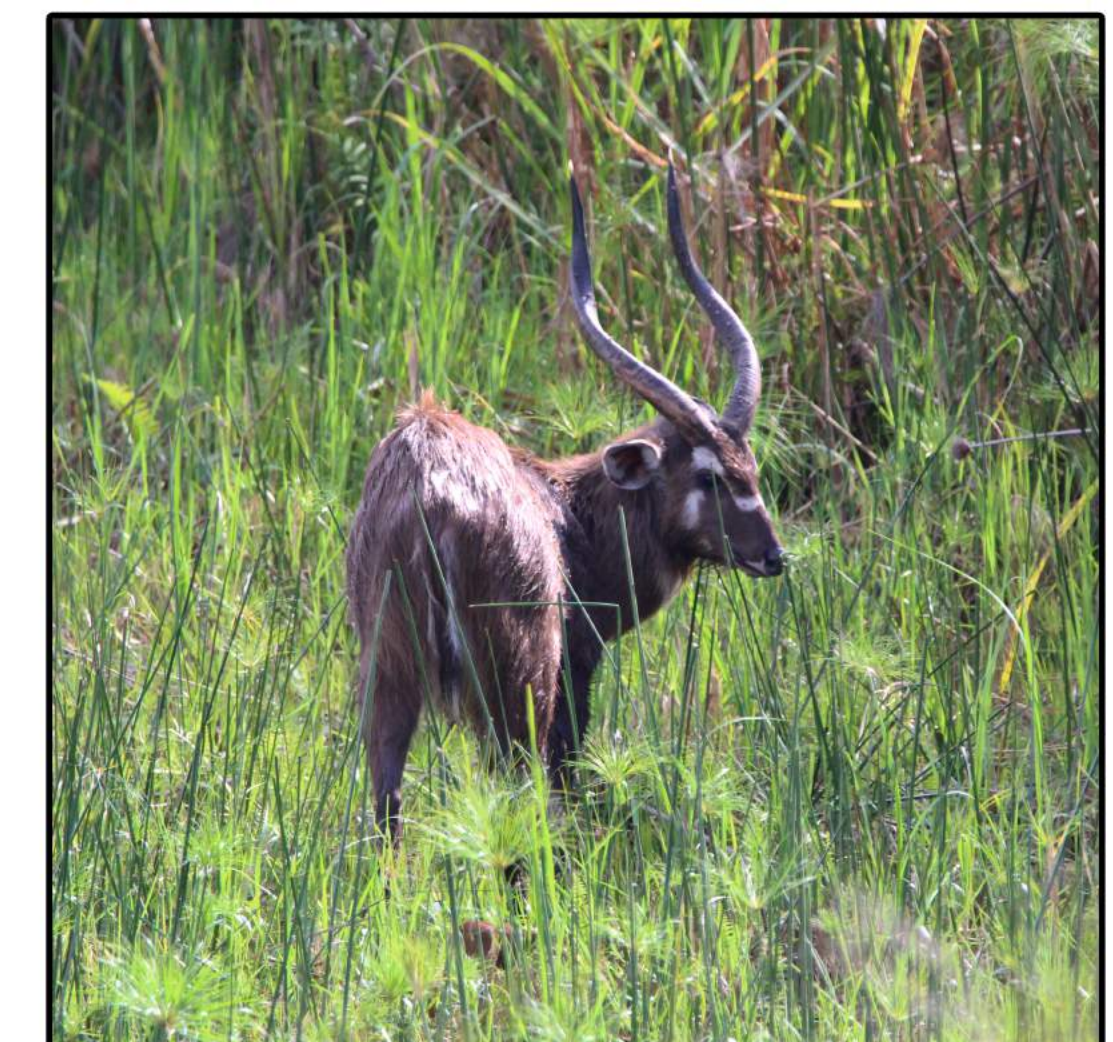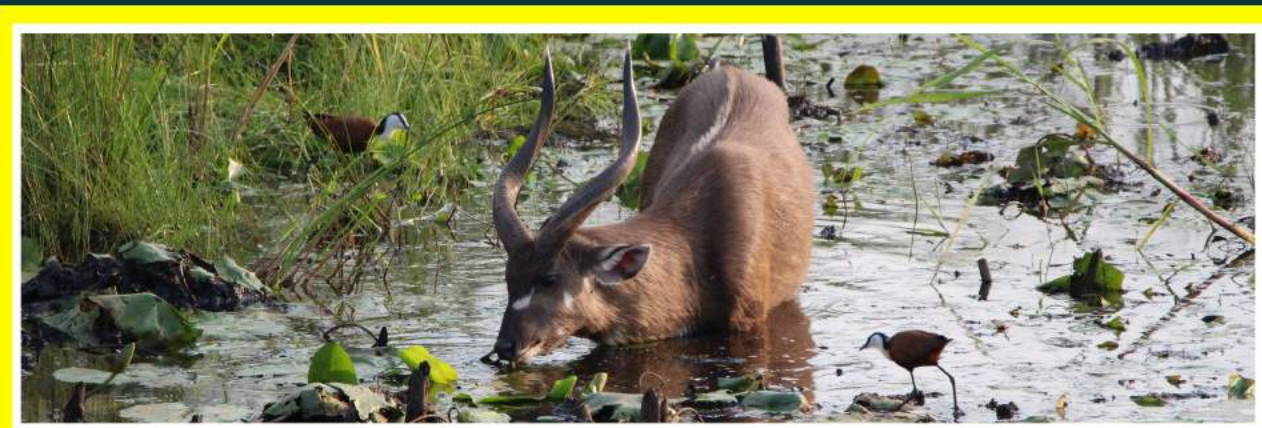- Semi-Aquatic • Sexually dimorphic; Males have spiral horns •
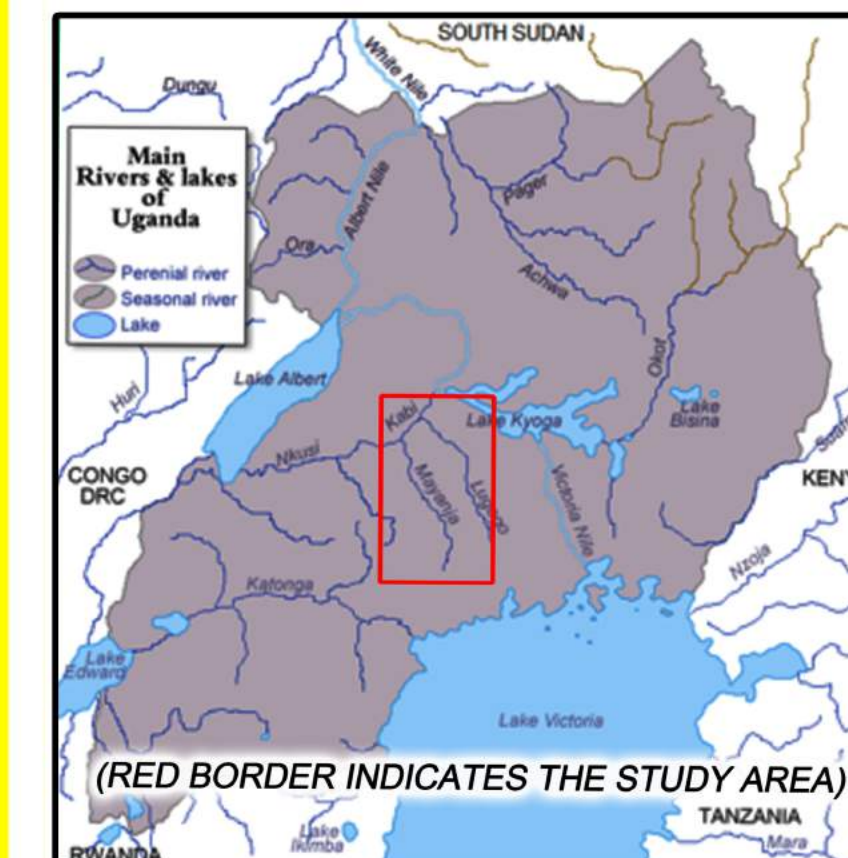
(RED BORDER INDICATES THE STUDY AREA)
Above photo courtesy of Wikimedia Commons

STUDY AREA:

Mayanja River area of central Uganda

26 locations for photographic data collection (yellow markers: trail cameras, purple markers: human observer platforms)

8.35 km^2 of wetlands in the immediate trapping area (yellow-shaded polygon)

Photo created with Google Earth- Camille Warbington

CONCLUSION AND NEXT STEPS:

We will build upon and improve these density models by:

- Inclusion of sitatunga data from 2016 and 2017
- Incorporating a habitat mask to limit sitatunga space-use to landscapes the sitatunga will use (wetlands) versus unsuitable areas (bushland)
- Incorporating covariates of site and occasion into analysis
- Perform density estimation using SECR programs that allow inclusion of unidentified/unidentifiable individuals (i.e. SPACECAP)
- Compare density estimates from **secr** with density estimates from other tests