

Carnivore Diversity and Distribution Along the Park Edge of Volcanoes National Park, Rwanda

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INTRODUCTION

Volcanoes National Park (VNP) is part of the Virunga Massif, known for its **rich, endemic, and rare biodiversity** in the Albertine Rift, of Africa.

The edge of the park has the stone wall to protect the community crops and structures from animals, but the livestock was left exposed to any **attack from carnivores** although not frequently reported by communities.

We hypothesize that **small livestock** from the local community might be affected by carnivores frequently exiting the park including the vulnerable **African golden cat**.

Understanding the carnivore guild category could lead to additional research opportunities for **improved wildlife management**.

The main goal of this study is to **understand the native carnivore community** at the park – local community interface, for improving their conservation.

SPECIFIC OBJECTIVES

- To provide baseline information on existing carnivores using the edge and community land.
- To document the effect of land use and habitat types on the distribution and occurrence of native carnivores.
- To elucidate the interactions between humans, livestock and wildlife along VNP boundary.

MATERIALS AND METHODS

47 sites out of 61 sites reasonable for getting a representation of the occurrences estimates—Linear density of 1 camera trap per 1 km (Fig. 1).

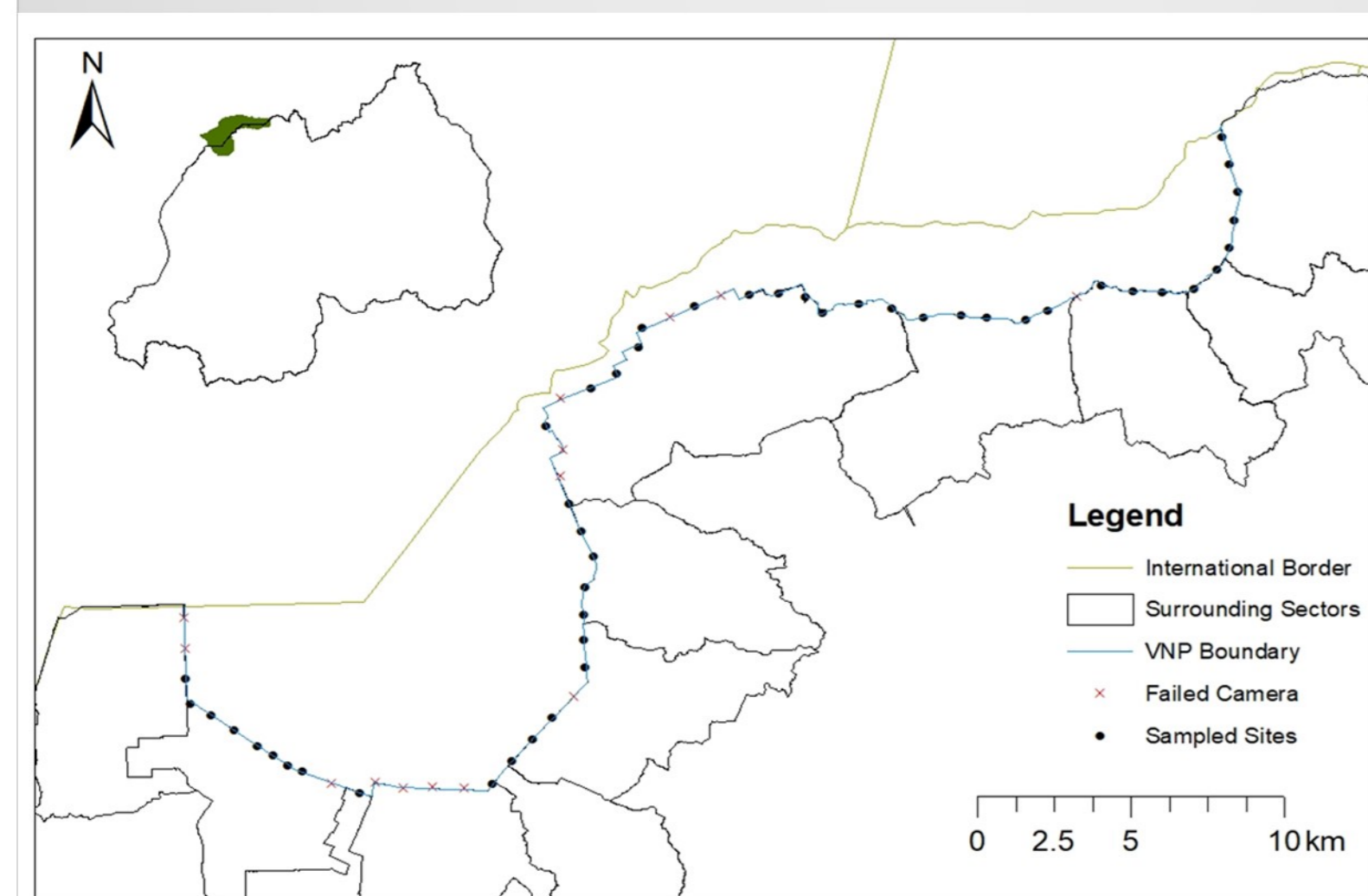


Fig. 1. Location of all sites along the Volcanoes National Park, Rwanda.

- We used 5-day intervals for a total of 10 occasions.
- Multispecies single season occupancy models conducted.
- Model included habitat type inside, habitat outside, distance to settlements and land use as covariates.
- We fitted the model for estimating carnivore interactions with feral dogs, livestock, humans, and other wildlife species.

RESULTS

In 2,125 trap days, we obtained a total of 94,830 photographs of animal species belonging to **16 species** excluding the domestic animals.

Occupancy and detection

- The top model included habitat inside the park on occupancy and habitat outside the park on detection probability.
- High occupancy of **jackal (90.4%)**, followed by serval cat (41.5%) and African golden cat (19.8%).
- The occupancy of the **feral dog** was **63.7%** and that of live-

REFERENCES

Uzabaho, E., Kayijamahe, C. B., Musana, A., Uwingeli, P., Masaba, C., Nyiratuza, M., & Moore, J. F. (2022). What factors affect species richness and distribution dynamics within two Afromontane protected areas? *Wildlife Research*. <https://doi.org/10.1071/WR21171>

Uzabaho, E., Turikunkiko, E., & Moore, J. F. (2022). *Assessing the Mammalian Community of Gishwati-Mukura National Park, Rwanda*.

Native carnivore diversity and distribution

We identified **six native** carnivores and one non-native carnivore.

A high site-specific distribution in jackal, followed by the serval cat, and golden cat and very few sites for the genet, slender mongoose, and hyena (Fig. 2).

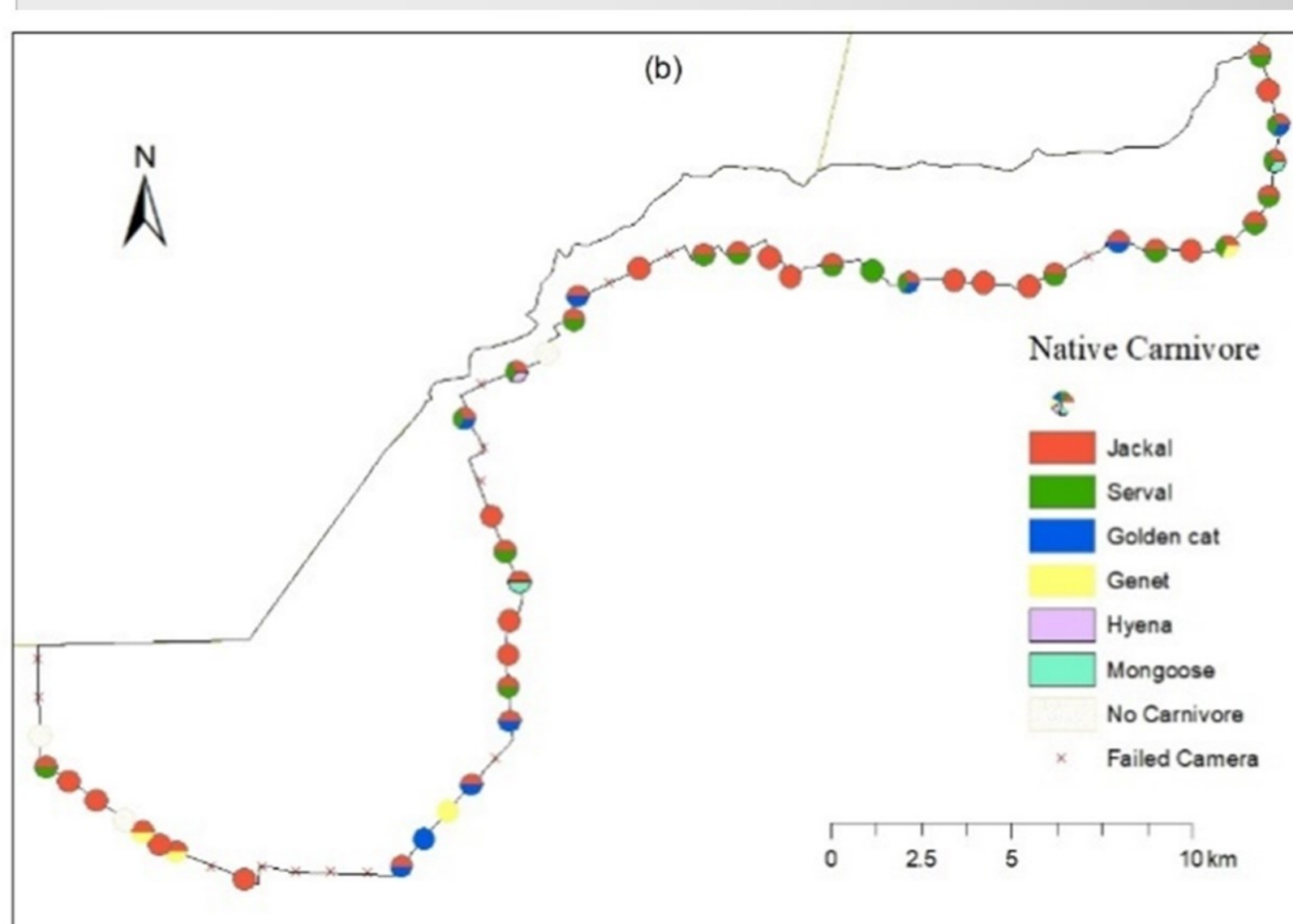
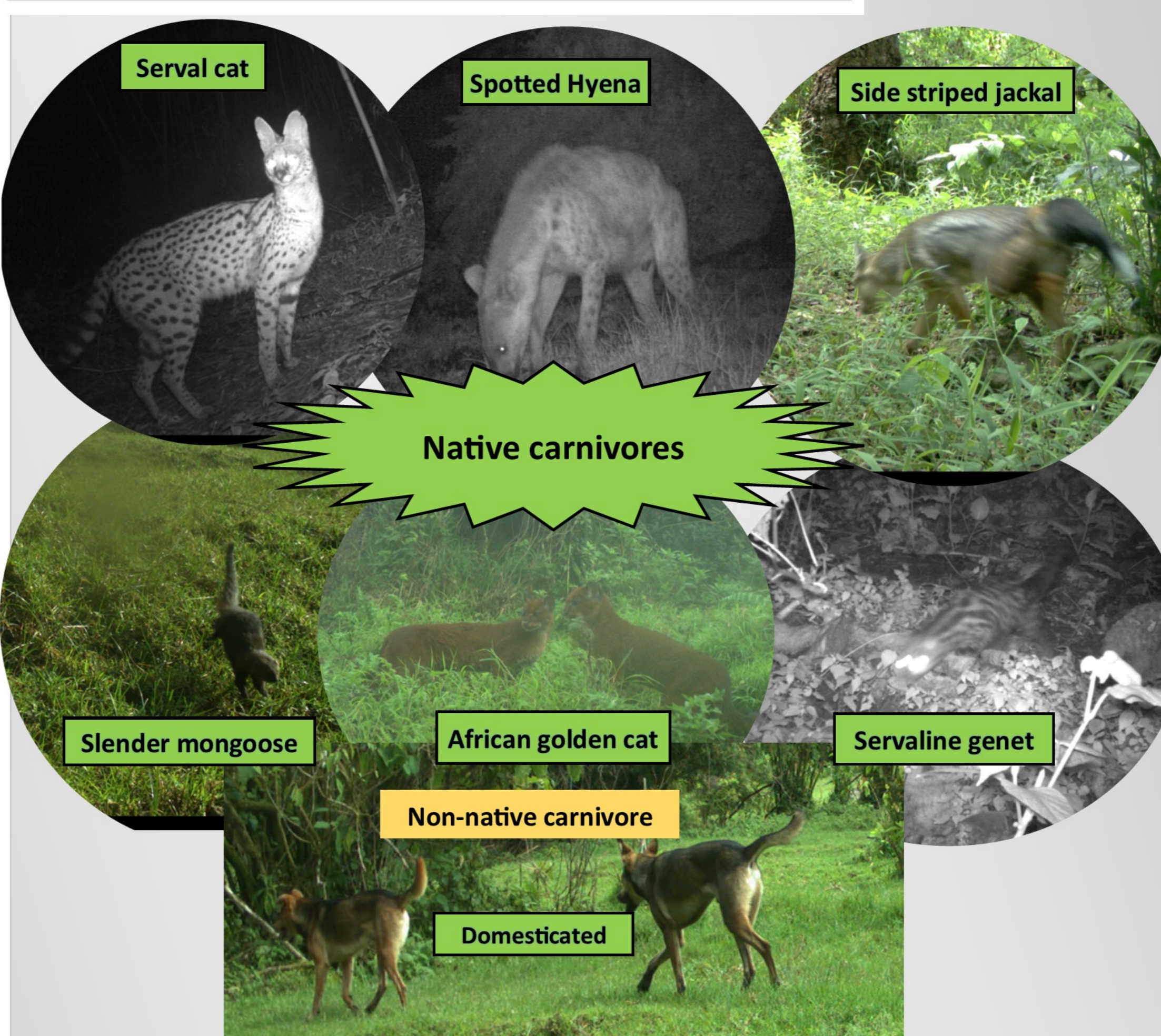


Fig. 2. Species richness per site of native carnivores along the VNP edge



Evidence images of recorded carnivores along the park edge

Effect of habitat and land use

Occupancy was slightly high in the areas used for farming, followed by the grazing area while the forested stand is poorly occupied. The areas used for livestock keeping are highly attracting native carnivores compared to areas covered by crops, and agroforestry (Fig. 3).

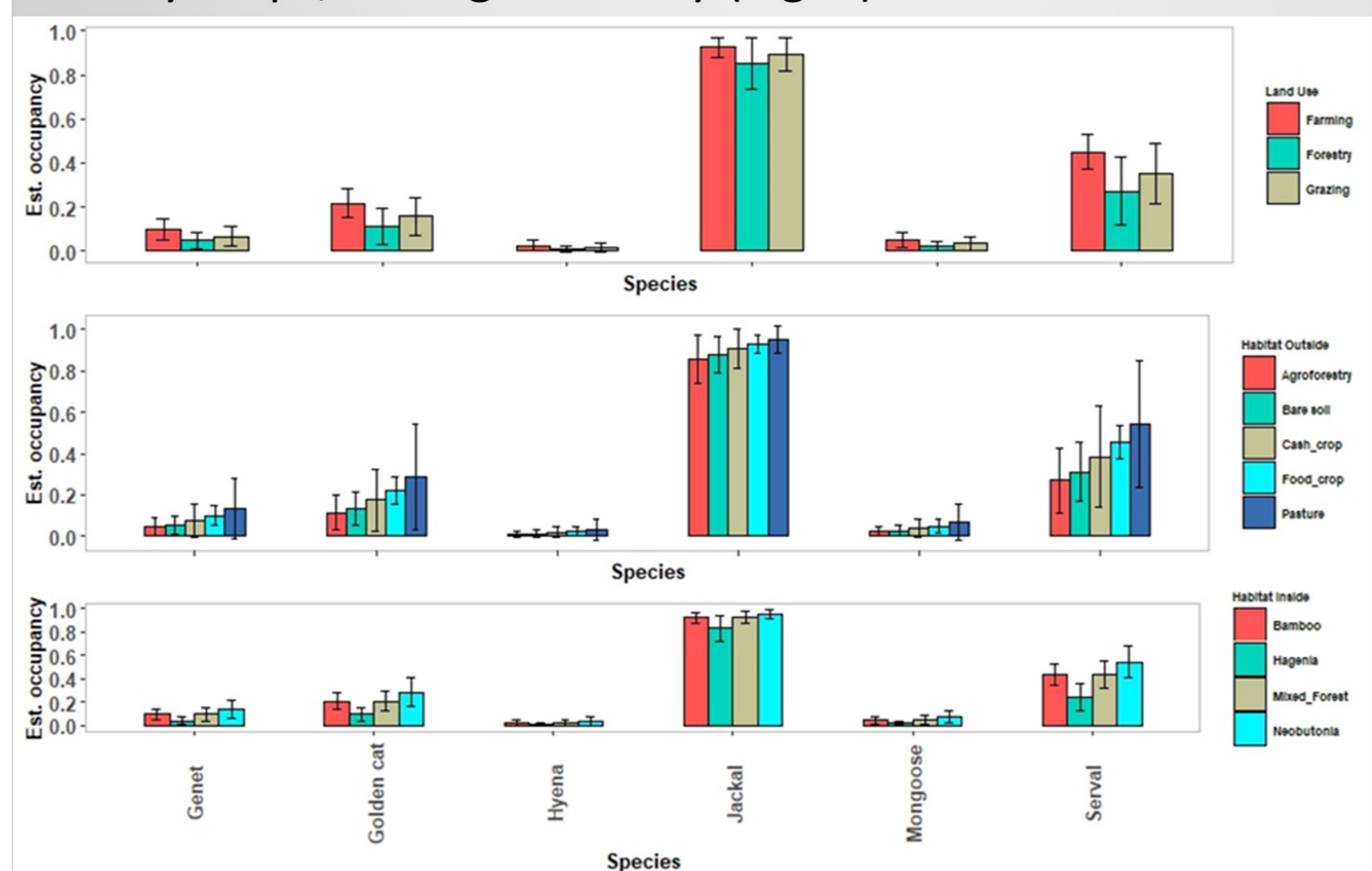


Fig. 3. Occupancy estimates in different habitat types and land use for six identified native carnivores found along the park edge – community land interface.

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Species interactions

The graph below (Fig.4) shows interactions between native carnivores with the rest of wildlife.

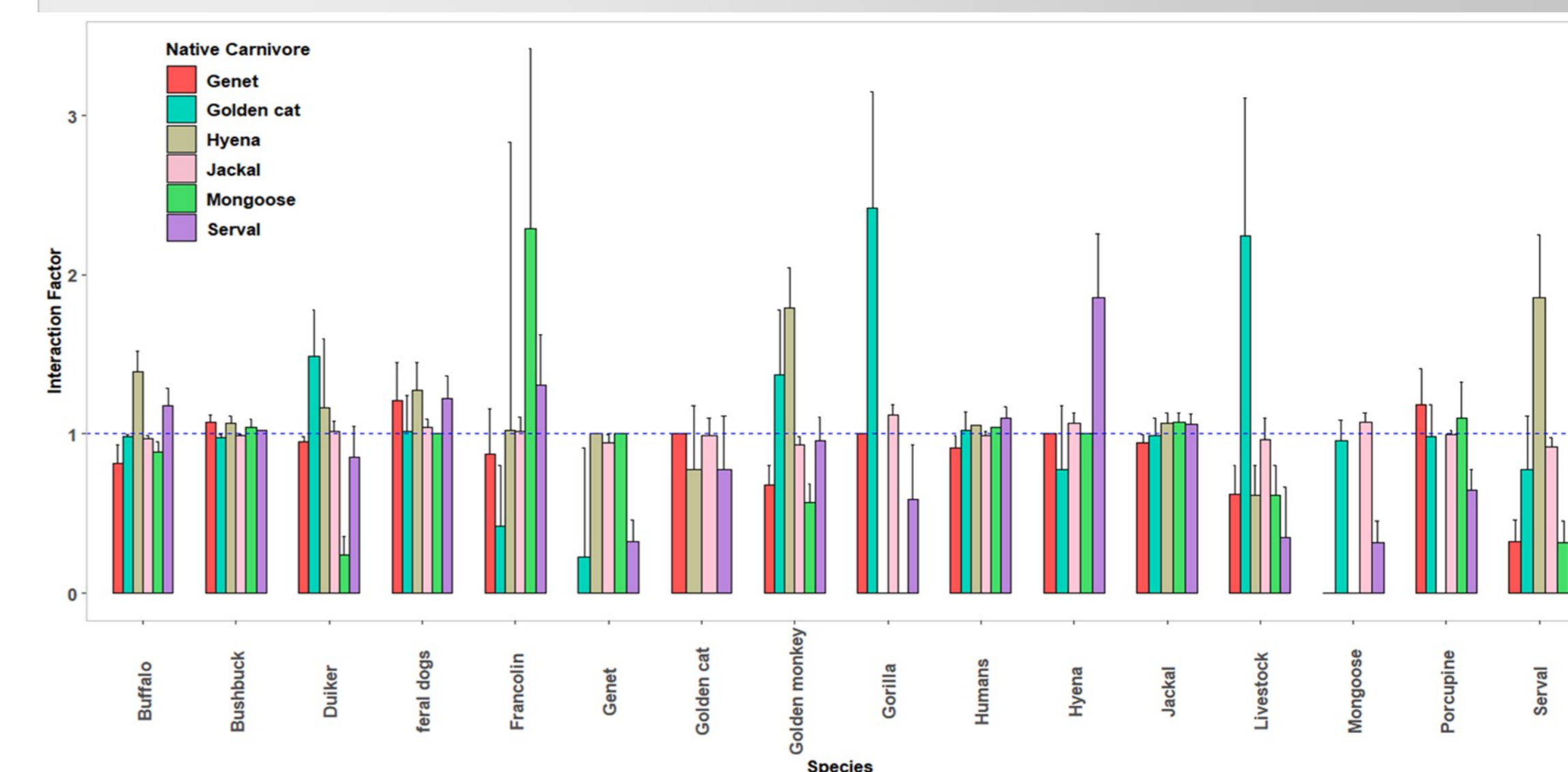


Fig. 4 Species interaction factor between native carnivores and other species – the coefficient greater than one shows an attraction or co-occurrence while the values below one is considered as an avoidance

DISCUSSION

Camera trap data provide baseline information on understanding native carnivore using the park edge and insights on their interactions with other wildlife, livestock, and human activities.

The covariates are important predictors of species occurrence.

The study helped to detect more species compared to the species published by Uzabaho *et al.* (2022a), e.g.: spotted hyena, and the porcupine.

The spotted hyena is believed to have been involved in killing livestock around protected areas including the recent problem reported around Gishwati-Mukura National Park (Uzabaho *et al.*, 2022b).

The co-occurrence of livestock, feral dogs, humans and native wildlife is a challenge for both wildlife conservation inside the protected area and local communities.

The loss of livestock due to predation is not commonly reported but there is a high probability of this happening.

Low disturbance level coupled with distant settlements in the Eastern part of the VNP might be the reasons for high species richness of native carnivores compared to the Western and central parts of the park, that are busy with tourism activities and human illegal activities (Fig. 5).

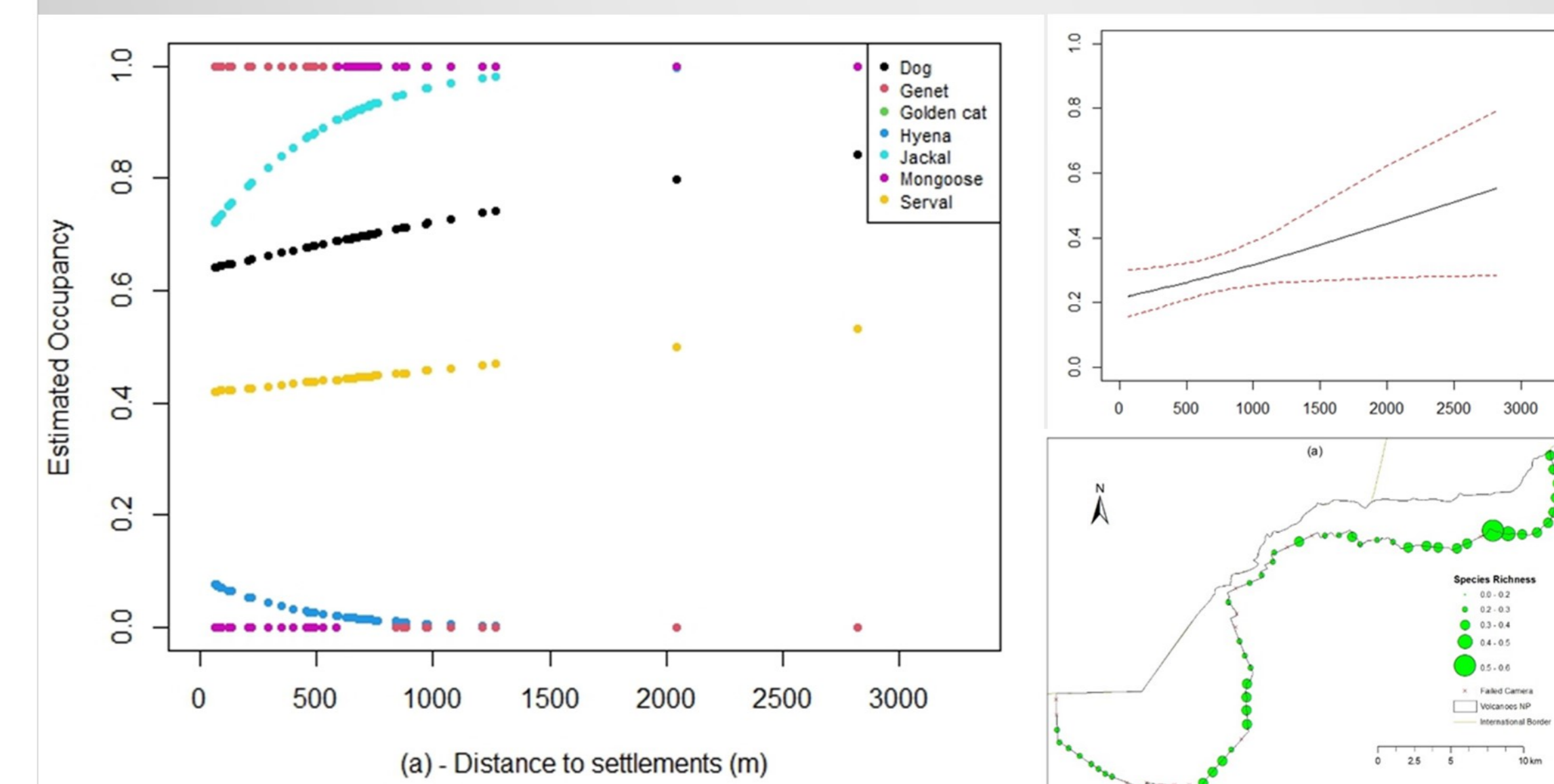


Fig. 5. Effect of distance to settlements on carnivore estimated occupancy and species richness

These predation events are sometimes attributed to feral dogs or local native carnivores that are hard to identify and recognize.

CONCLUSION AND RECOMMENDATIONS

- This is the first study assessing the native carnivore diversity, distribution, and effect of site covariates.
- Solutions to free roaming dogs need to be found
- Community to make strong defensive structures for keeping livestock for avoiding carnivore – livestock conflicts.