

## MSc Opportunity Internship

Project: "Monitoring of Spotted Hyena *Crocuta crocuta* Populations using Spatially Explicit Capture-Recapture methods"

### Project description:

Apex predators are critical components of ecosystem functioning and balance and can contribute to conservation outcomes for a wider network of co-occurring species (Dalerum et al. 2008; Ripple et al. 2014). Developing sustainable management methods for their conservation is therefore essential in nature reserve management and requires an understanding of the underlying patterns and determinants of their densities and distributions. Spatially explicit capture-recapture approaches are commonly used to understand the population dynamics of apex predators, and emerging models allow the inclusion of mixed data sources, such as citizen science and camera trapping surveys (Manzo et al. 2011; Anile et al. 2014, Carter et al. 2019). Of the capture-recapture methods described in the literature, individual identification based on photographic identification represents one of the least invasive and most cost-efficient method. The development of Artificial Intelligence (AI) software assists scientists in the identification process by offering powerful recognition tools, and online platforms to connect scientific teams and enable the monitoring of individuals over larger areas. Since August 2023, Transfrontier Africa has designed and launched a program to monitor apex predators (incl. lions (*Panthera leo*), spotted hyenas (*Crocuta crocuta*), leopards (*Panthera pardus*), African wild dogs (*Lycaon pictus*) and cheetahs (*Acinonyx jubatus*)) in Olifants West Nature Reserve (OWNR – 9,000 hectares), Greater Kruger Park, South Africa. The main objective of the program is to gain a better understanding of the dynamics, demography, movements, and density of their population, by identifying each individual using camera trap surveys, citizen science and the technology offered by African Carnivore Wildbook (ACW). This data will complement the information collected annually in the reserve on prey densities, veld condition, and predator diet to help management authorities make informed decisions (e.g., annual burning plans, water points distribution).

This research seeks to improve our understanding of spotted hyena population dynamics within OWR and aims to achieve the following objectives:

1. Collect and extract individual identifications of spotted hyenas from on-going camera trap surveys and citizen science data.
2. Modelling the demographics of spotted hyenas using the data collected on identifiable photos.

The research will follow a systematic approach comprising the following steps:

1. Model identification:

Conduct a brief literature review to better understand the context of the project and identify an appropriate model to assess spotted hyena population density and distribution in Olifants West Nature Reserve, using the available resources (camera trap surveys and citizen science data, access to ACW).

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2. Data collection:

Collect camera trap data and citizen science data on spotted hyenas and identify each individual, where possible, using ACW. Depending on the findings of the successful candidate, a dedicated camera trapping survey may be organised to collect data according to a specific sampling design for a given period, but the data available is sufficient to enable the intern to achieve the research objectives.

3. Data analysis & interpretation:

Build and run the models identified to assess the demography and density of spotted hyenas in Olifants West Nature Reserve, and their distribution across the landscape. Produce a scientific report to help document the project and a popularised version of the research findings to share the knowledge gained with reserve managers and landowners.

4. Extended outcome n°1 – Identification of biotic and abiotic factors influencing the distribution of spotted hyenas in OWNR (if time permits):

If time permits, the identification of factors influencing the distribution of spotted hyenas in the reserve would be an added value to the project.

5. Extended outcome n°2 – Creation of an ID kit for the identified individuals:

The creation of an identification kit for the individuals identified would help to pursue and develop the project, promote it in the reserve and demonstrate its value to participating citizens.

## **Transfrontier Africa NPC:**

Transfrontier Africa (TA) is a non-profit environmental conservation organisation founded in 2006. The organisation aims to improve wildlife conservation and ecosystem sustainability by combining research, ecological monitoring, landscape security, community and women empowerment, and environmental awareness. TA is based in Olifants West Nature Reserve, in the Greater Kruger National Park and extends its actions to the Blyde Olifants Confluency Conservation Area and neighbouring communities.

For more information, please visit our website: <https://transfrontierafrica.org/> and consult the attached Interns / Students Information Package.

## **Position Details**

**Role title:** MSc Intern.

**Reporting to:** Paul Allin, Research Coordinator, and Elwenn Le Magoarou, Research Assistant.

**Duration of position:** 6 (up to 9) months – ideally from July to December 2024.

**Deadline:** 31 March 2024.

**Location:** Transfrontier Africa NPC, Nonwane Research Centre, Olifants West Nature Reserve, R40, Hoedspruit 1380, South Africa.

**Accommodation:** Shared accommodation with private room in Nonwane Research Facility (Olifants West Nature Reserve). Interns have the opportunity to buy their own food in town once a week or twice a month, depending on needs and

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availability of vehicles. Transport from and to O.R. Tambo Airport (Johannesburg) and a night in an hotel near the airport can be arranged at the expense of the intern. **Cost:** R33,975 for 3 months and R11,250 per additional months (prices are indicative and subject to change from April 2024) – Covers accommodation in Nonwane, two TA t-shirts, supervision in the field (fuel & labour costs) and internship supervision **(food remains at the charge of the student).**

### **Minimum requirements:**

To apply for participation in this research, the minimum requirements include:

- BSc or higher degree in a relevant field, such as Ecology, Wildlife Biology, Conservation Science, Environmental Science, or a related discipline.
- Strong coursework and understanding of ecological principles and statistical analysis.
- Prior experience or coursework in ecological research methodologies and data analysis.
- Proficiency in conducting thorough literature reviews to gather relevant information on spotted hyena ecology and the use of advanced and appropriate modelling technics.
- Strong knowledge of using R statistical software program, or similar statistical software, for data analysis and ability to identify appropriate statistical tests independently.
- Prior experience using Artificial Intelligence software used for individual identification of wildlife species preferred.
- Great attention to detail and rigor in the work.
- Familiarity with Geographic Information System (GIS) software, such as ArcGIS or QGIS, for basic spatial analysis and mapping.
- Strong written and verbal communication skills to effectively present research findings in English.
- Ability to write scientific reports or research papers and contribute to project documentation.
- Ability to work independently as well as collaboratively with research team members as part of a multi-cultural and multi-disciplinary team.
- Ability and willingness to learn independently and proactively acquire new knowledge and skills necessary for the research project.
- Capacity to adapt to new methodologies, software, and analytical techniques as required by the study.
- High motivation and capability of working under remote field conditions.
- Ability to apply safety rules to ensure a safe working environment in the field and research station.

## Application:

Application documents, including a Curriculum Vitae and a cover letter, should be submitted before 31 March 2024 to Paul Allin([research@transfrontierafrica.org](mailto:research@transfrontierafrica.org)) and Elwenn Le Magoarou ([ecology@transfrontierafrica.org](mailto:ecology@transfrontierafrica.org)), with the subject 'Application – Monitoring of Spotted Hyena *Crocuta crocuta* Populations'. For any further information, please do not hesitate to contact us. Shortlisted candidates will be contacted for an interview during the week following the application deadline.

## References:

**Anile, S., Ragni, B., Mattuci, F. and Rovero, F.** (2014). Wildcat population density on the Etna volcano, Italy: a comparison of density estimation methods. *Journal of Zoology* **293**(4), 252–261.

**Carter, A., Potts, J. M. and Roshier, D. A.** (2019). Toward reliable population density estimates of partially marked populations using spatially explicit mark-resight methods. *Ecology and Evolution* **9**(4), 2131–2141.

**Dalerum, F., Somers, M. J., Kunkel, K. E. and Cameron, E. Z.** (2008). The potential for large carnivores to act as biodiversity surrogates in southern Africa. *Biodiversity and Conservation* **17**, 2939–2949.

**Manzo, E., Bartolommei, P., Rowcliffe, J. M. and Cozzolino, R.** (2012). Estimation of population density of European pine marten in central Italy using camera trapping. *Acta Theriol* **57**, 165–172.

**Ripple, W. J., Estes, J. A., Beschta, R. L., Wilmers, C. C., Ritchie, E. G., Hebblewhite, M., Berger, J., Elmhagen, B., Letnic, M., Nelson, M. P., Schmitz, O. J., Smith, D. W., Wallach, A. D. and Wirsing, A. J.** (2014). Status and ecological effects of the world's largest carnivores. *Science* **343**, 1241484.