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## Introduction

- Spotted hyenas are one of the top predators of many southern African ecosystems, along with African lions and leopards.
- Historically, Northern Tuli had a low density of predators but spotted hyena numbers slowly recovered since 1960s (McKenzie, 1990).
- Due to an ongoing lion project, spotted hyena surveys were first conducted in 2008 - 2009.
- Spotted hyenas are often persecuted by humans and will be slow to recolonize areas where eradicated (Kruuk, 1972; Henschel, 1986; Smuts, 1982).

## Spotted Hyena (*Crocuta crocuta*)

- One of the most successful large carnivores in Africa
- Portrayed as cowardly scavenger or villains in most wildlife documentaries
- Wide dietary range and high tolerance levels towards diseases
- Listed as Least Concern by International Union for Conservation of Nature (IUCN) Red List (Bohm, 2015)



## Results

- 19 Calling stations ~70% of the reserve
- 101 Spotted Hyenas counted
- 7 Lions, 2 Leopards, & 42 Black backed Jackals counted
- Most Hyenas attracted: 13 Hyenas
- 2015 Hyena abundance estimate ( $150 \pm 33$  95% CI); 2008-2009 ( $99 \pm 44$ ;  $136 \pm 41$ )
- Average clan size at calling station (Mean  $\pm$  SE):  $5.3 \pm 0.96$
- Average Hyena response time (min) (Mean  $\pm$  SE):  $1.31 \pm 3.2$

## Objectives

- Determine whether spotted hyena distribution is relative to human activity and habitat
- Determine whether spotted hyena abundance has changed since 2008-2009 and how this compares to the rapidly changing lion abundance and distribution
- Determine if proximity to human activity affects spotted hyena behavior to calling stations
- Determine distribution and abundance within the reserve

## Methods

Calling stations were conducted across the study area with a total of 19 calling stations at least 3.2 km apart covering 72% of land area.

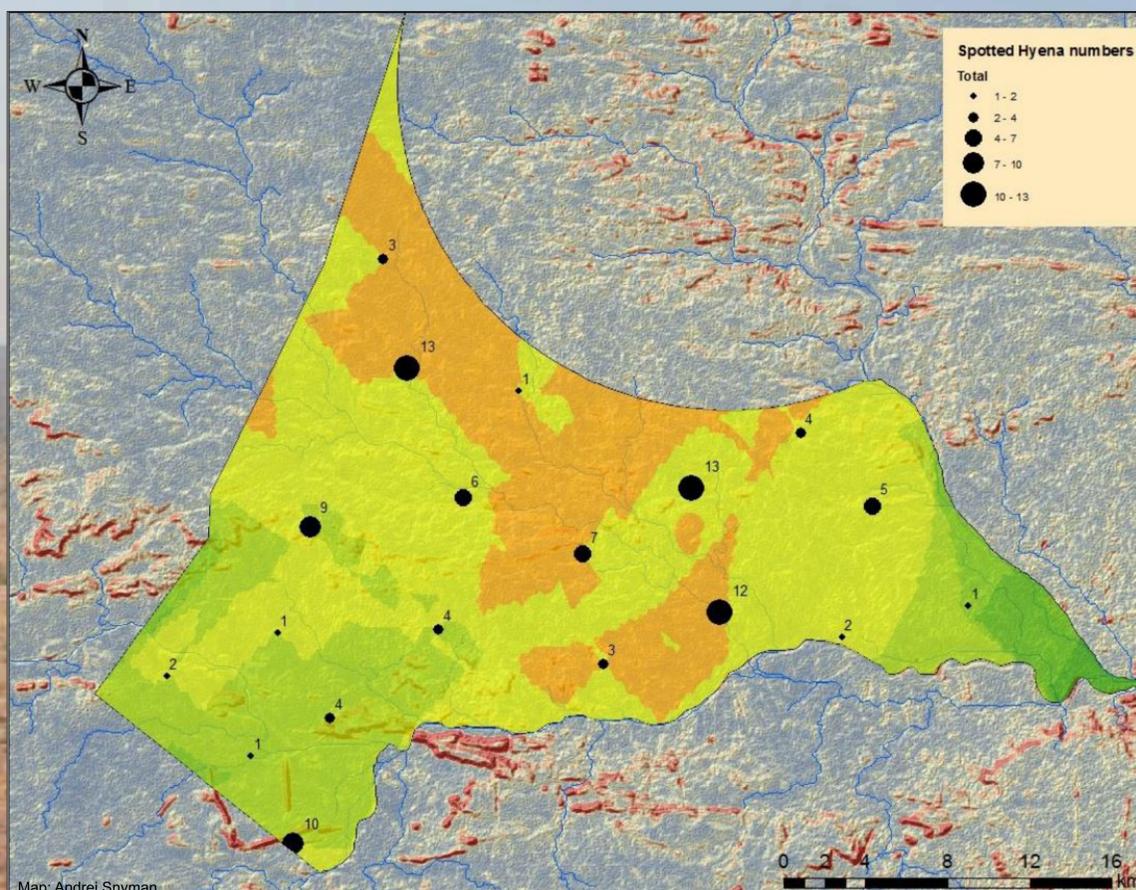


Each Calling station recorded:

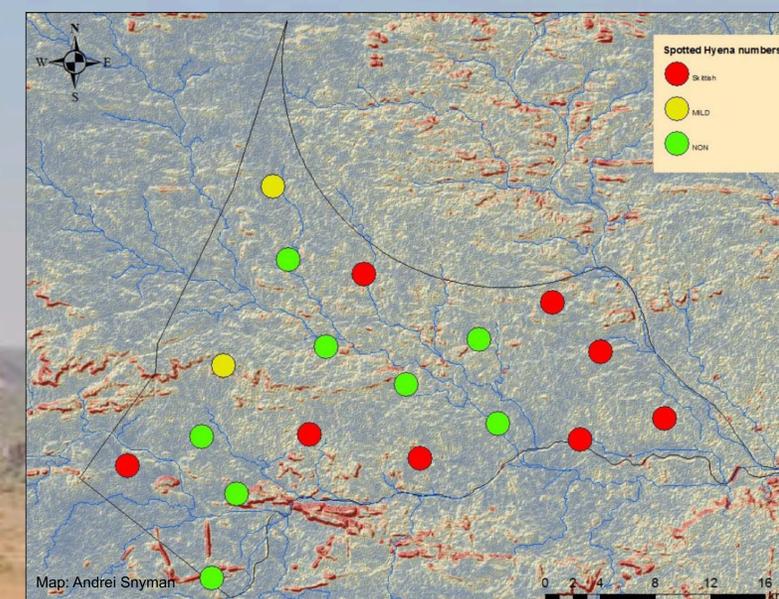
- GPS location
- Number of individuals
- Time of arrival or vocalization
- Date and time station began
- Species attracted
- Habitat type
- Environmental conditions
- Age & sex (if possible)

## Data Analysis:

- Use of Ordinary Kriging to create prediction map of spotted hyena density across reserve.
- Point transect and occupancy analysis techniques to determine abundance and distribution estimates (Conroy and Carroll 2009).



**Figure 1:** Ordinary Kriging prediction map showing the distribution of Spotted Hyenas throughout the reserve with orange depicting high density and green depicting low density. A total of 19 calling stations were conducted, each labeled with the amount of hyenas at each station.



**Figure 2:** Behavioral Responses map showing the distribution of calling stations with color-scheme indicating the skittishness of Spotted Hyenas attracted during the survey.

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## Conclusions

- Population estimates suggest stable populations
- Regions with higher Spotted Hyena densities typically found in central parts of Mashatu and Uitspan
- Lowest Spotted Hyena densities along Shashe-Limpopo river, Loensa and Fairfield's western border

## Future Work

- Increase understanding of Spotted Hyena spatial-temporal movement
- Determine impact of clan sizes to predators and prey within the reserve