# How do large mammals adjust their scanning patterns across space and time?

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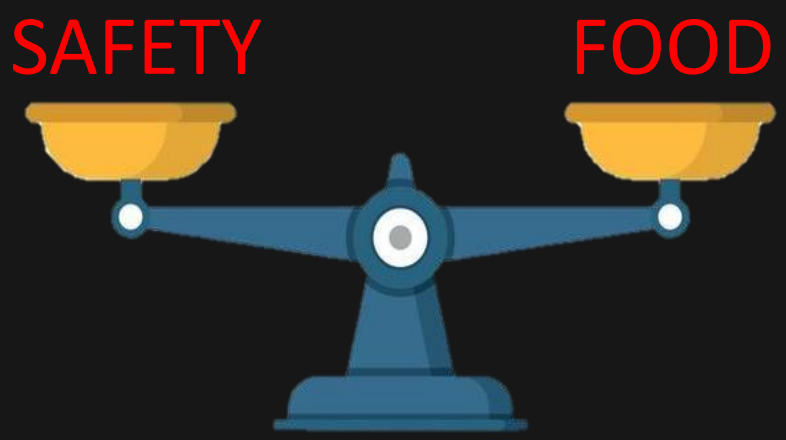
# Anti-predator vigilance

Prey visually monitor their surroundings for threats


**To balance:**

- Perceive variations in risk
- Adjust vigilance behaviours accordingly

# Problem?

- Most common metric:

**Overall time spent vigilant**

**BUT…**

**Scans**


**Interscan intervals**

# Scanning patterns

**Lengthen scans:**

- Hidden predators
- Visually complex
- **Strongly** reduces food intake rates

# Scanning patterns

**Shorten interscan intervals:**


- Attacking predators
- Blocked sight lines
- **Weakly** reduces food intake rates

# Scanning patterns

- Adjust relative to each other:

1) Time spent vigilant
2) Scan rate

↑S + ↓ISI = ↑OTSV + ↑SR

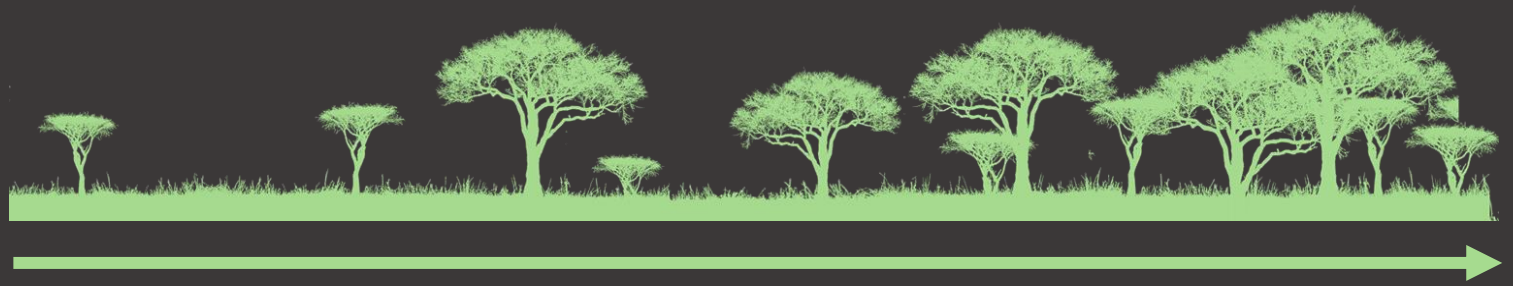
↓S + ↓ISI = ↑OTSV + ↑SR

# Aim was to investigate:

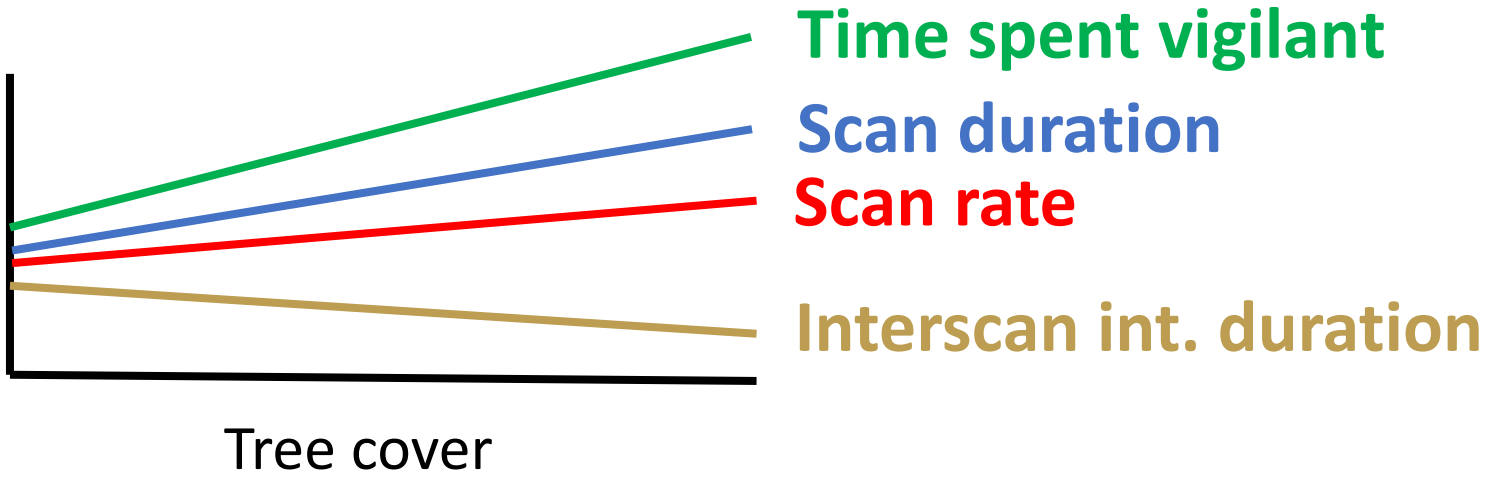
How a large mammalian prey species adjusts its **time spent vigilant** and **scanning patterns** across space and time

# Predictions:

Spatial variations in risk: **Tree cover**



↑ predators; ↑ complexity; ↓ sight lines



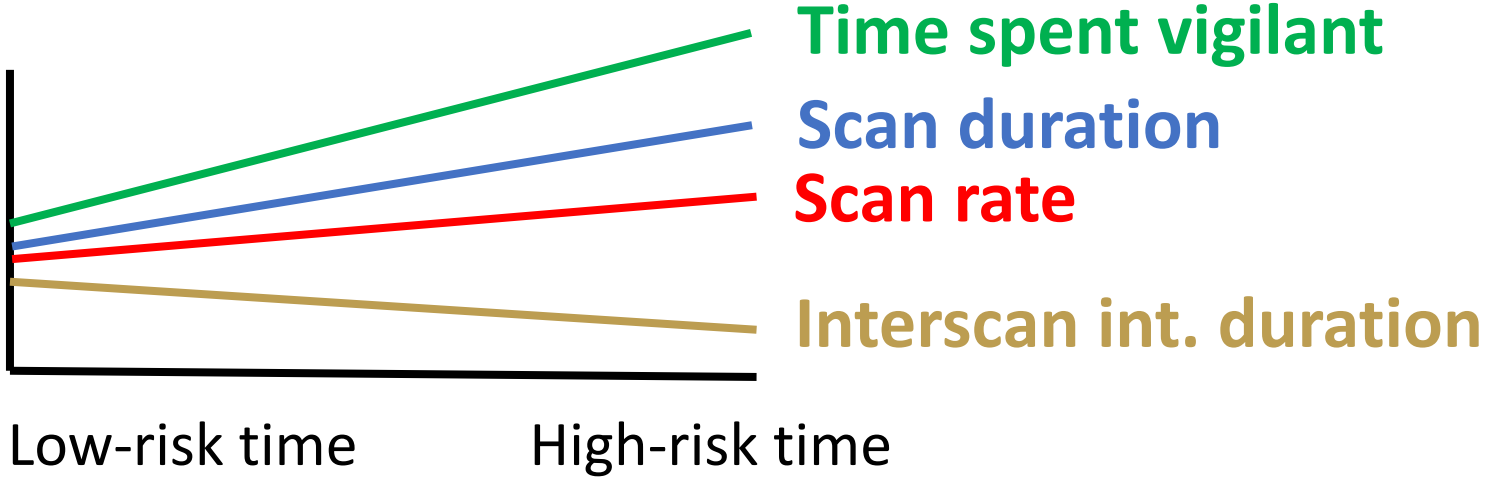
# Predictions:

Temporal variations in risk: **Time of day**

Middays
Low-risk

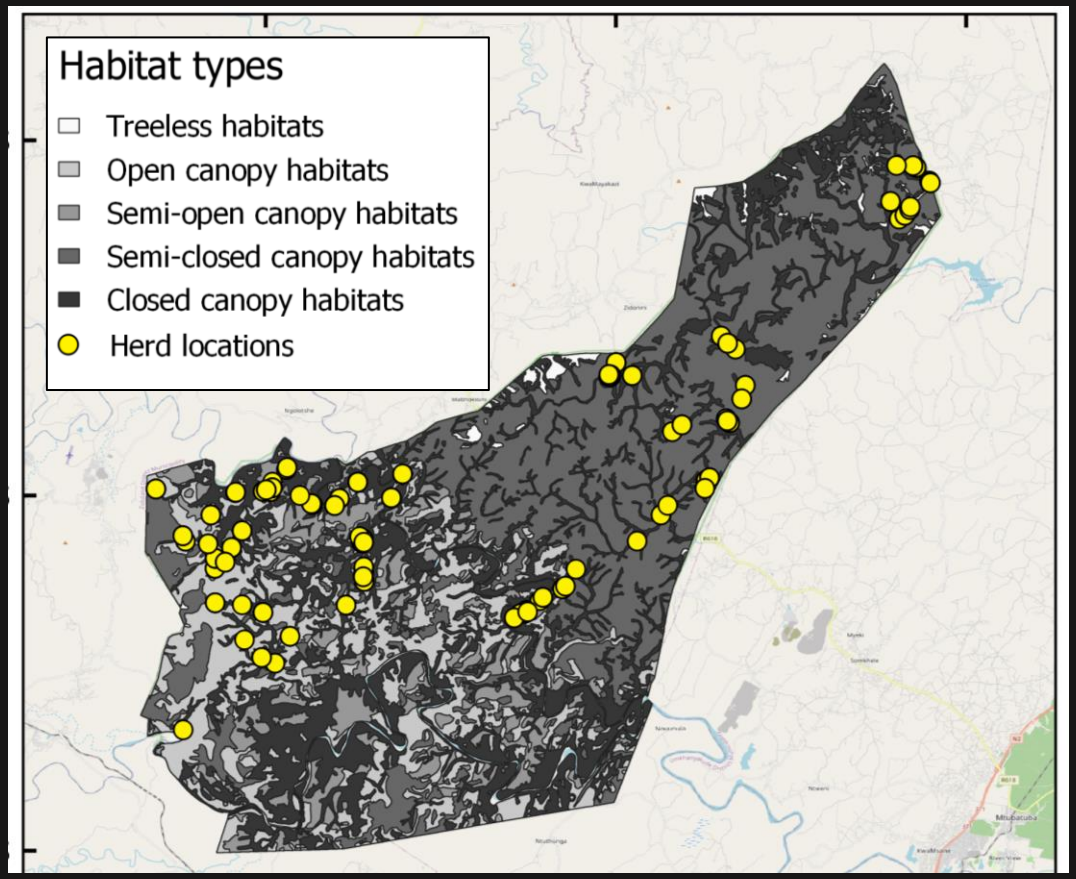
↑ active predators

Mornings &
afternoons
High-risk



# Study site and data collection

## Hluhluwe-iMfolozi Park
## September 2021




Times of day based on predator activity:

High-risk times

sunrise-10:00

15:00-sunset

Low-risk times

10:00-15:00

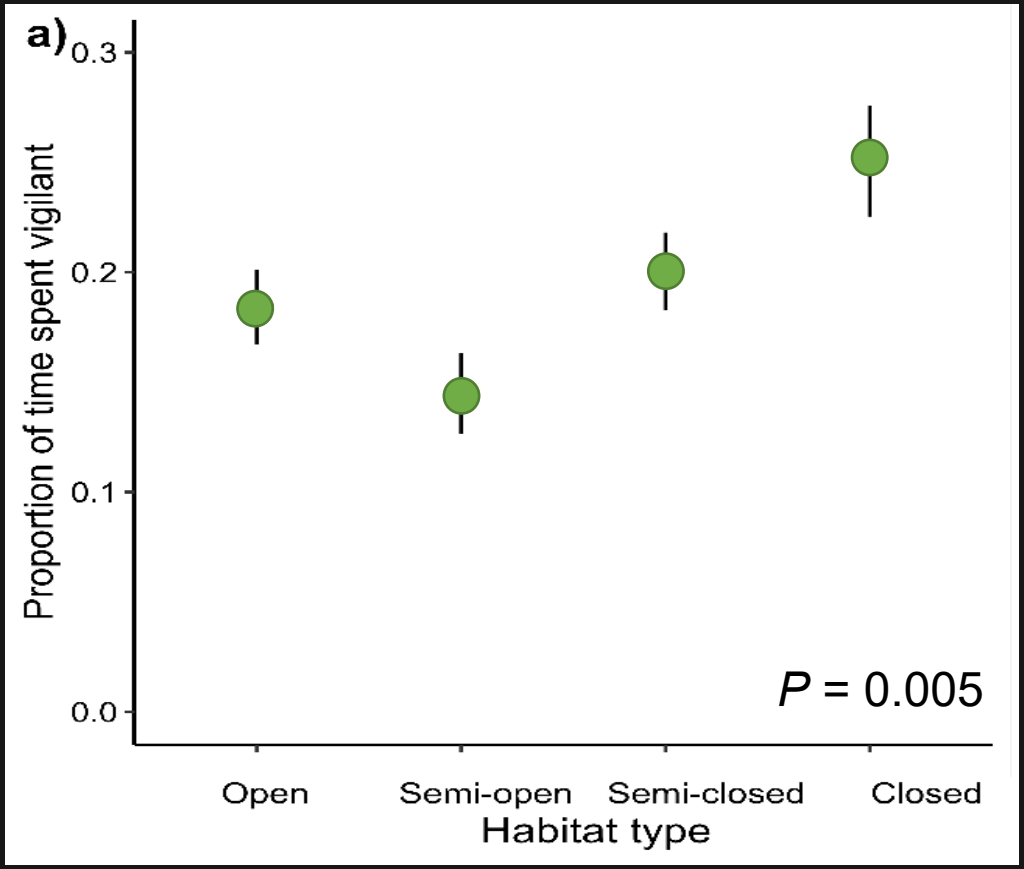
# Data Analysis

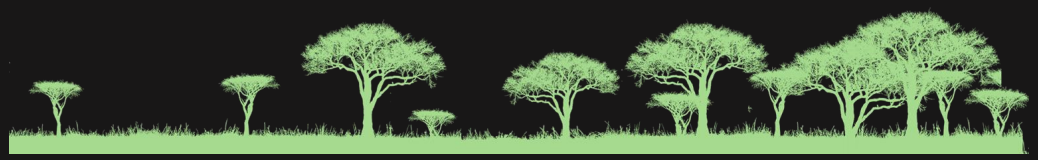
Used the recordings to obtain data on:

1) Proportion of time spent vigilant
2) Scan duration
3) Interscan interval duration
4) Scan rate

Ran GLMMs to test whether varied between habitat types and times of day

# Overall time spent vigilant



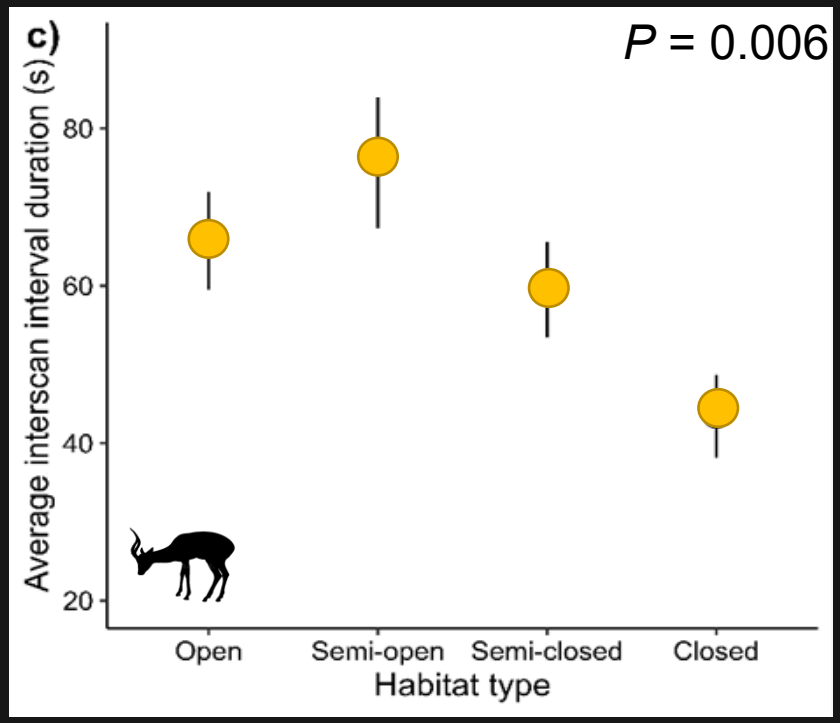



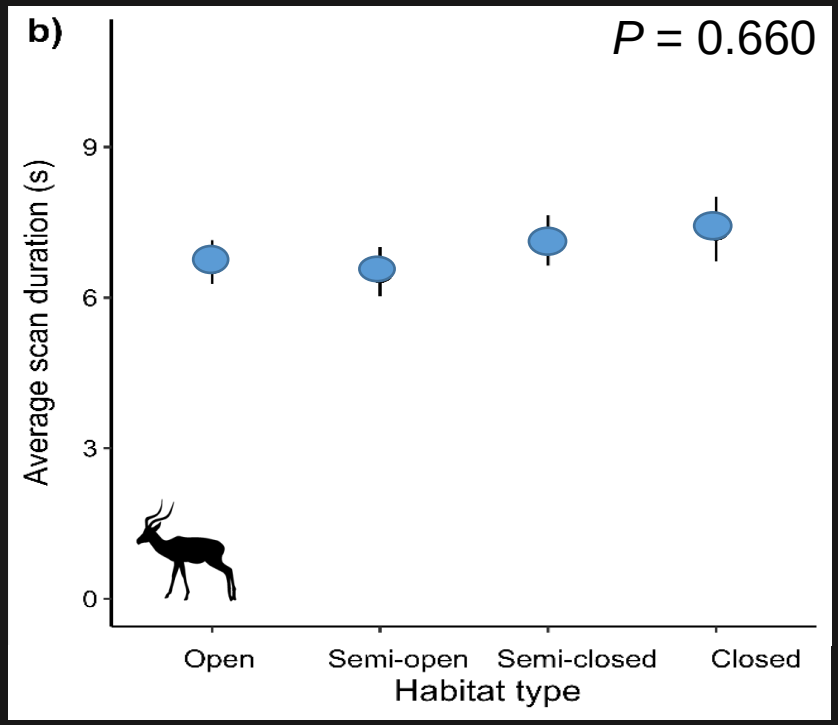
**Time spent vigilant:** decreased and then increased.

## Combo of 2 factors:

1) More predators in wooded habitats
2) Escape better in semi-open habitats

# interscan intervals and scans




Time spent vigilant adjusted by adjusting **interscan interval durations** & keeping **scan durations** constant

# Why?

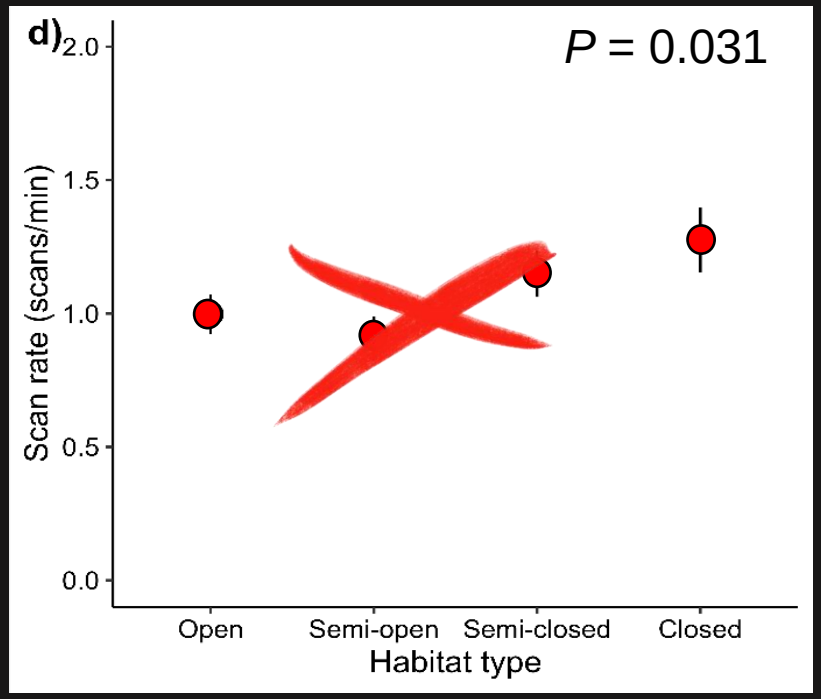
2 possible answers:

- Strongly vary scan rate with time spent vigilant

**But diff = 0.4 scans/min**

- Doesn't affect chew-scan overlap

**Maintained low cost vigilance**




# Temporal variations

| Vigilance variable | $X^2$ | Df | *P*-value |
|---|---|---|---|
| • Proportion of time spent vigilant | 3.8 | 1 | 0.052 |
| • Scan duration | 1.4 | 1 | 0.237 |
| • Interscan interval duration | 1.9 | 1 | 0.174 |
| • Scans rate | 0.6 | 1 | 0.429 |

- Impala **did not** adjust their vigilance behaviours throughout day

**Other behaviours?**

Low-risk times:


High-risk times:

# Summary

- Increased time spent vigilant non-linearly with tree cover
- Adjust interscan intervals, keep scan durations constant, scan rates vary slightly
- Did not adjust throughout day

**More to vigilance than overall time spent vigilant**


Questions?
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