

Hunting Effect on Individual Deer Stress Level

P15.2 Fortgeschrittenes Praxisprojekt

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Summary

Introduction

Background

Hunting activities have long been recognized to have a numerical effect on animal populations through individuals removal.

More recently a larger focus was brought on the non-lethal effect hunting can have through behaviour change (e.g., space use, vigilance or fleeing behaviour).

Numerous studies highlight such process, however, little is known about the physiological response preceeding and driving the behaviour changes in wildlife.

A measurement of faecal cortisol metabolites (FCMs) as a non-invasive, physiological parameter reflecting hypothalamus–pituitary–adrenal (HPA) axis activity is a growing method to assess stress response towards stimulus.

In this project, we aim to assess red deer short-term stress response towards hunting events at the Bavarian Forest National Park, using FCMs methods, and test the effect of spatial and temporal distances on this response. We expect the FCM to be higher when being closer in space and time to a hunting event.

Location of the Bavarian Forest National Park (Green Area)



Figure 1: Bavarian Forest National Park

Data Generating Process

- Hunting activities have a numerical effect on animal populations
- Additionally, hunting can have non-lethal effects
- **Goal:** assess short-term stress response in red deer towards hunting events at the Bavarian Forest National Park
- A deer roams freely in the Bavarian Forest National Park
- Its **movement is tracked** by a GPS collar
- A **hunting event** happens
- After some time, the deer defecates. The **defecation event**
- Subsequently, Researchers go to the defecation location and collect a **faecal sample**

Huber et al. (2003) showed the following:

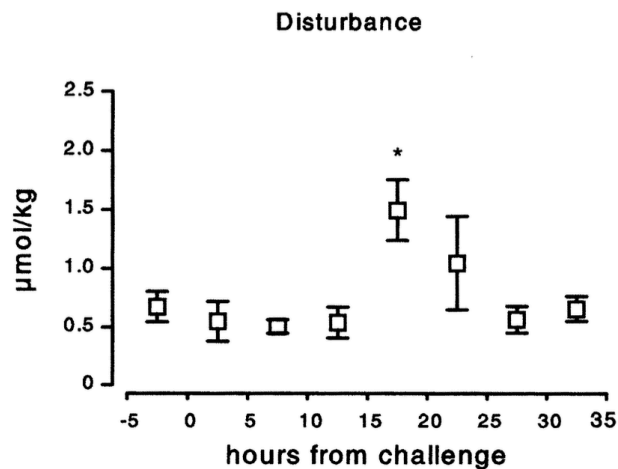


Figure 2: FCM Levels

Research Question

- What is the effect of temporal and spatial distance on FCM levels?
- Does the time between defecation event and sample collection affect FCM levels?
- Model FCM levels on spatial and temporal distance to hunting activities
- **Expectations:**
 - FCM levels higher when closer in time and space
 - FCM levels lower, the more time passes between defecating and sampling

Data Analysis

We were provided with different three Datasets:

- i) Data containing information about the various hunting events
- ii) Data concerning the location of the collared deer over time
- iii) Data about the faecal samples, collected by the researchers

In the following three subchapters we are going to describe the main features of each data set and address any anomalies.

Hunting Events

- Contains location and time of ≥ 700 hunting events from 2020 to 2022.
- **519** hunting events have complete location and time information.

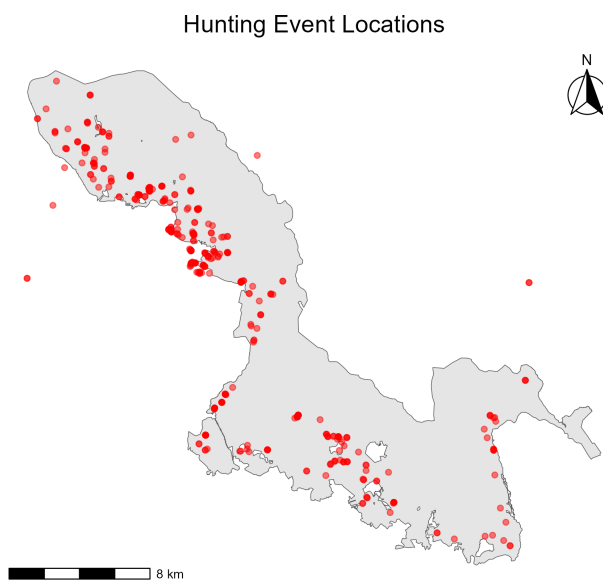


Figure 3: Hunting Events

Movement Data

- Contains the location of the **40** collared deer from Feb. 2020 to Feb. 2023.
- Movement is tracked at **hourly** intervals.

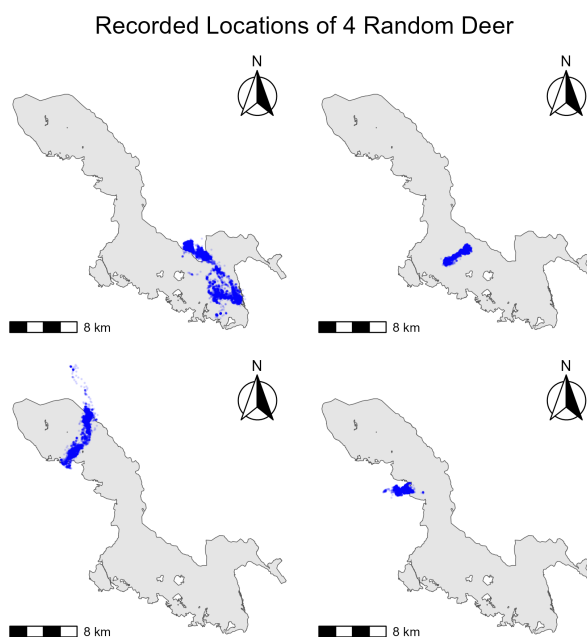


Figure 4: Deer Locations

Faecal Sample Data

Contains information of **809 faecal samples**, including: - the FCM level [ng/g], - the time and location of sampling, - to which deer the sample belongs, - when the defecation happened. Samples were taken at irregular time intervals from 2020 to 2022.

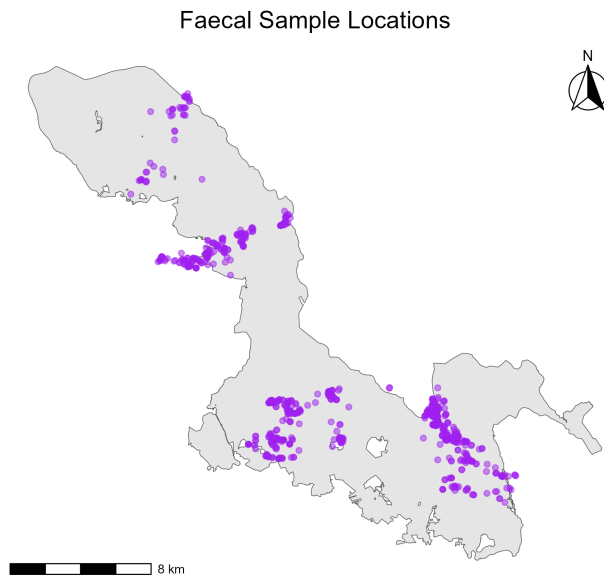


Figure 5: Sample Locations

Data Preprocessing

subtopic 1

subtopic 2

Model Selection

subtopic 1

subtopic 2

Model Evaluation

subtopic 1

subtopic 2

Conclusion & Outlook

subtopic 1

subtopic 2

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Huber, Susanne, Rupert Palme, Wolfgang Zenker, and Erich Möstl. 2003. "Non-Invasive Monitoring of the Adrenocortical Response in Red Deer." *Journal of Wildlife Management* 67 (April): 258–66. <https://doi.org/10.2307/3802767>.