

# HOW HUNTERS' HARVEST RATE VARIES IN RESPONSE TO POPULATION DENSITIES OF FALLOW DEER (*DAMA DAMA*), ROE DEER (*CAPREOLUS CAPREOLUS*), AND WILD BOAR (*SUS SCROFA*)

Felicia Skorsdal

Supervisor: Tom Lindström

## INTRODUCTION

The population of fallow deer, roe deer, and wild boar has increased in numbers over the last years in Europe, including Sweden. Estimation of population densities is crucial for ungulate management since there are no data over the absolute population densities. Therefore, ungulate management is heavily dependent on data from the number of ungulate-vehicle collisions (UVCs), harvests, and observations as they are often used as an index for estimating population densities and distribution.

Hunters' harvest rates vary in response to a game species population size. Therefore, hunting can be considered a form of predator-prey interaction. If a species increases in population density or is extremely abundant (to begin with), it is less likely that hunters are limited by time or continue hunting a species after felling a certain number, which would reduce the overall hunting effort. Therefore, hunters may be expected to reach a threshold despite an increase in game abundance (functional response type II), where the threshold does not vary with population density (Figure 2).

The aim of the present study is to see how hunters' harvest rates vary in response to population densities of roe deer, wild boar, and fallow deer in Sweden.

## RESULT & DISCUSSION

Both hunters' harvest and UVC showed a sublinear response for all three species, indicating a type-II functional response to population densities. Temporally, the sublinear response for roe deer is more evident in comparison to fallow deer and wild boar. Additionally, for roe deer, the sublinearity is more evident for UVC than it is for harvest. One plausible reason could be that the parameter takes both spatial and temporal factors into consideration. The results indicate that hunters' harvest reaches a threshold despite increasing population sizes.

Trends regarding UVCs with roe deer do not seem to follow the population density (observations in Figure 3), furthermore, hunters' harvest seems to follow the population densities but lessen at high population densities (Figure 3). The harvest for fallow deer appears to increase more over time compared to the index of observations, on the contrary, UVC seems to increase steadily over time and then plateau (Figure 3). For wild boar, both UVC and hunters' harvest follow the observations (Figure 3), indicating that the difference in linearity instead is explained by spatial factors e.g., that HMPs or counties with high population densities hunt less per individual.

## METHOD

A hierarchical Bayesian model made it possible to consider different trends regarding hunting, observations, UVCs, traffic, and roads across Sweden, such as temporal differences. To observe fluctuations over time, all parameters were analyzed each year from 2011 to 2020.

In the study the parameters were analyzed at hunting management level (HMP) (Figure 1), since that is the scale hunting is reported in which allowed us to analyze how hunting communities responded to prey availability.



Figure 1. Hunting management precincts in Sweden hunting year 2020/2021 (n = 297).

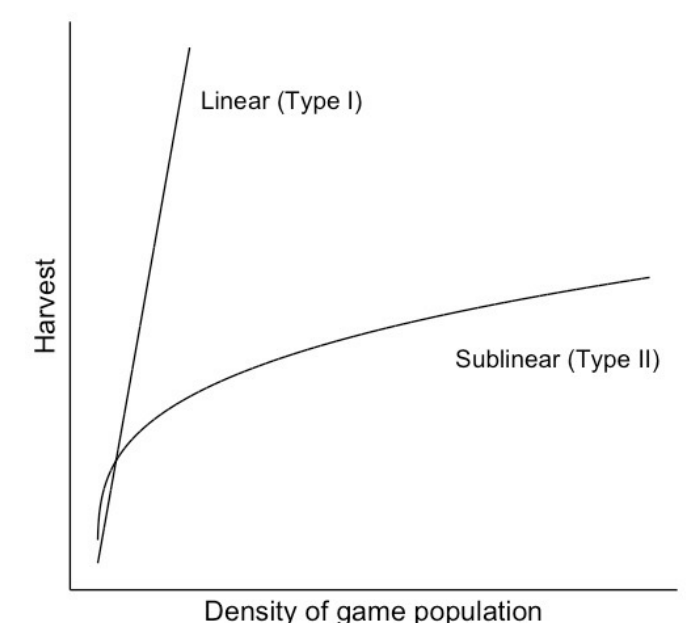


Figure 2. Hunters' harvest rates in response to a game species population size.

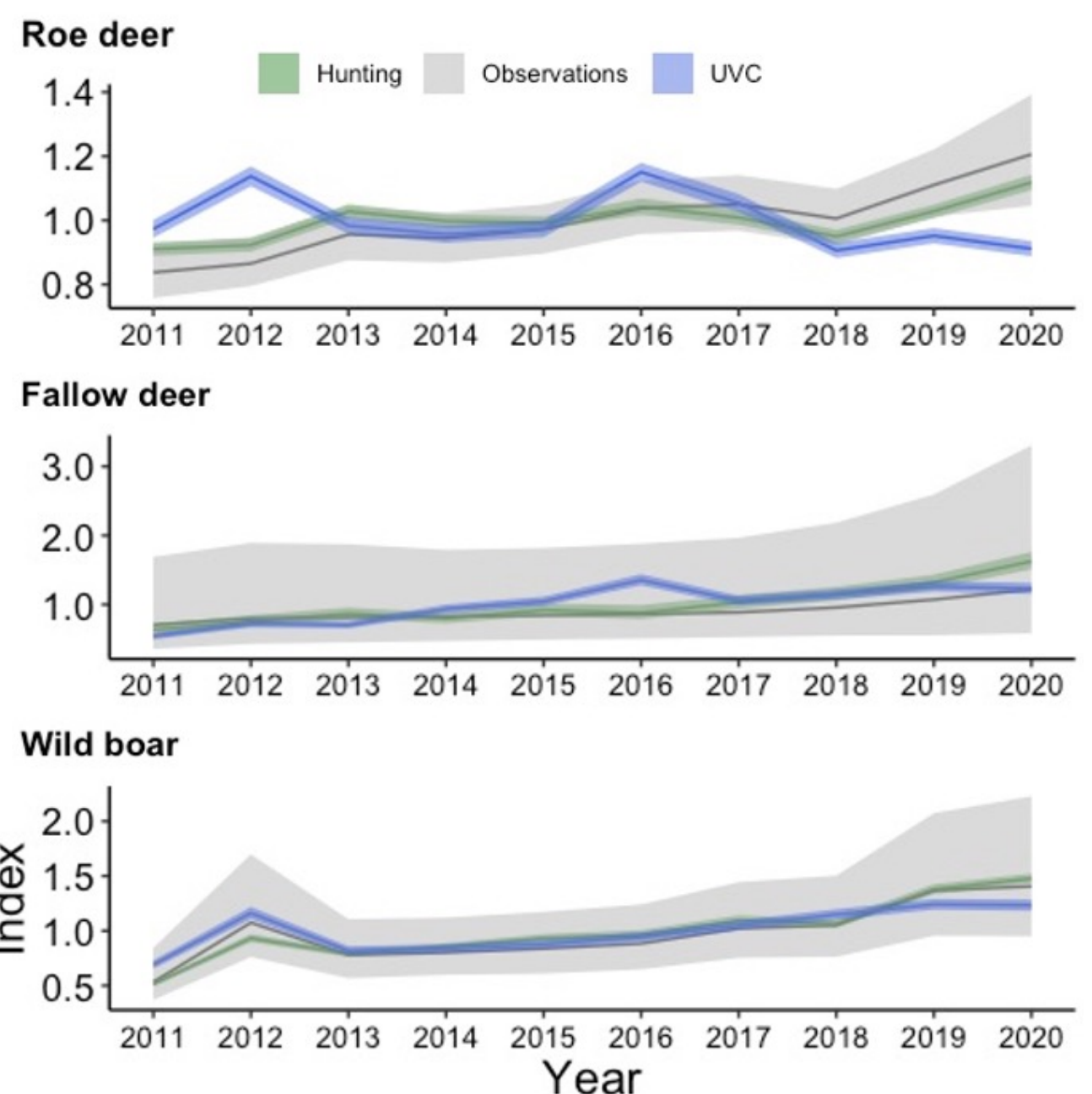


Figure 3. Index showing trends regarding hunting (harvest), observations, and ungulate-vehicle collisions (UVC) for top) roe deer, middle) fallow deer, and bottom) functional response.jpeg wild boar in Sweden. The 95% credibility interval is shown with a 50% median and a lower and upper percentile at 2.5% and 97.5% respectively.

## CONCLUSION

- Our model in observing hunters' response to population densities could help improve predict trends and monitoring of ungulate management
- Additionally, our model can help understand fluctuation in species abundance and how hunting trends for game species affect population densities
- Can be applied to other game species as well and is interesting for different stakeholders (e.g., agencies and other organizations in wildlife management)

