

## Dissertation

On 24 May Therese Ramberg Sivertsen successfully defended her PhD thesis on “*Risk of brown bear predation on semi-domesticated reindeer calves – Predation patterns, brown bear–reindeer interactions and landscape heterogeneity*” at the Swedish University of Agricultural Sciences (SLU) in Uppsala. The opponent was professor Chris Johnson from University of Northern British Columbia, Prince George, Canada.

Therese R. Sivertsen has a MSc in biology (ecology) from the University of Oslo, Norway, and started her PhD studies within the Reindeer Husbandry group at SLU, Department of Animal Nutrition and Management, in the summer 2011. Her supervisors were Prof. Birgitta Åhman, Dr. Anna Skarin, Dr. Ole-Gunnar Støen (NMBU, Norway) and Prof. Lars Rönnegård (Dalarna Univ., Sweden). Therese soon got involved in a large ongoing project on brown bear predation on reindeer calves, run by SLU in collaboration with the Scandinavian Brown Bear Research Project. Her main field work was made during the spring 2012, when she spent several months in the field tracking bears to find out when and where reindeer calves had been killed by brown bears. Using GPS data from bears and reindeer females she analysed their spatial interactions during and after the reindeer calving period. Four papers based on this research are included in the thesis, using some additional data for one of the papers. So far, one paper has been published (in *Ecosphere* 2016, Vol. 7[11]: e01583).

The research by Therese Sivertsen is of great importance for reindeer husbandry for several reasons. Because of earlier lack of knowledge on kill rates, remuneration from the state has not compensated for the real losses caused by bears.



New knowledge presented in the thesis provides a far better foundation for fair compensation than has been earlier available. Knowledge on where and when reindeer calves are killed is also essential for the authorities to take informed decisions on protective culling of bears and may make it possible to implement other protective measures to prevent bears from killing reindeer calves.

### Thesis

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*Abstract:* As large carnivore populations are recovering in northern boreal ecosystems of Europe and North America, there is a need to understand how these changes in predator communities influence prey populations and ecosystems. Moreover, human-wildlife conflicts are frequently causing challenges where large carnivores coexist with humans, often due to predation on livestock. In Sweden, the

brown bear (*Ursus arctos*) distributional range largely overlaps with the reindeer (*Rangifer tarandus tarandus*) herding area, but knowledge of potential losses to bear predation has been scarce. Also, little information exists on the behavioural interactions between semi-domesticated reindeer and brown bears in Fennoscandia. In this thesis, I present data from two forest reindeer herding districts in Northern Sweden, showing that brown bear predation on reindeer neonates can be considerable on forested calving grounds. Also, brown bear predation was very limited in time, concentrated to the first weeks following birth of the reindeer calves. Moreover, using GPS location data to compare brown bear and reindeer resource selection on the reindeer calving ground, indicated that brown bear behavioural adjustments to search for reindeer possibly dominate over antipredator responses by reindeer in terms of altered resource selection on a daily and seasonal ba-

sis. Nevertheless, a closer investigation of the spatial distributions of reindeer calf kill sites suggested that use of clear-cuts, higher elevations and areas closer to large roads may reduce risk of bear predation. However, even though clear-cuts may provide advantages for survival in the short term, logging may eventually yield negative effects for the reindeer, as abundance of young forest increase, which is a preferred habitat by brown bears. Finally, using data on reindeer movements and brown bear density from seven herding districts in Sweden I show that reindeer females experiencing higher risk of bear predation, deviate more from optimal foraging and increase movement rates, which may lead to lower body condition and in turn, possible consequences for population dynamics.