

Wild reindeer interactions with recreationists: estimating spatiotemporal habitat use and potential conflict areas in two national parks in Norway

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Rondane national park (RNP) and Dovre-Sunnalsfjella national park (DSNP), covering respectively 963 km² and 1693 km², are two popular parks for recreationists in Norway. The year-around recreational use in the two national parks may overlap and conflict with the spatial use of wild reindeer (*Rangifer tarandus tarandus*) throughout the year (Vistnes et al. 2004, Nellemann et al. 2009).

To monitor the amount of recreational use during summer season 2009 (July-October), 36 Eco-counters (<http://www.eco-compteur.com/>) were installed along the main tracks: 20 in DSNP and 16 in RNP. We used pyroelectric double-sensors, sensitive to the infrared radiation emitted by the human body, which also allows the discrimination of the walking direction. The counters were activated in first of July 2009. Some of the counters were located on sites considered as vulnerable wild reindeer habitats during the summer period from primo July until mid October. In addition, self-registration checkpoints (boxes with a short questionnaire) were placed along the same tracks, but not far away (with a few exceptions) from the counter locations. We obtained a total of 44066 counts in DSNP and 76259 counts in RNP along the main tracks. Almost 4000 persons, 15 years age and older, registered through questionnaires in DSNP and with the same figure in RNP, 5500 persons. When answering the questionnaire, visitors drew their planned route on a map and answered a few questions related to the purpose of their trip, the number of days they will stay and the number of people they are travelling with. Surprisingly, 90 per cent reported that they never walked outside the tracks. The digitalized map-drawings enable us to estimate spatial use, also outside tracks, in addition to temporal variation. The recreational use will be further investigated through an e-mail survey to the users registered at the self-registration checkpoints.

RNP and DSNP are located inside 2 (of a total of 23) management areas for wild reindeer, and are the only 2 management areas keeping remnants of the original European mountain wild reindeer population in Norway (The Wild Reindeer Council 2009). Earlier, wild reindeer used both areas as one biogeographic and topographic unit, but they are now split into several subpopulations after the construction of a railway (Dovrebanen, in 1926) and a road (also built in the same decade, now upgraded to highway E6) over the Dovrefjell plateau (Bevanger & Jordhøy 2004). In all, 20 wild reindeer in DSNP and 6 reindeer in RNP were captured and tagged with GPS collars in the spring 2009 to monitor spatiotemporal habitat use. 1 radio-collared reindeer in RNP was shot during hunting season. GPS collars are programmed to plot the location every 3rd hour in general and with intervals of 15 minutes if reindeer is located in areas of special interest; and to send SMS to a open-access database for GPS-collared game in Norway (www.dyreposisjon.no) for every 6th plot.

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Spatiotemporal data from wild reindeer will be analyzed in a resource selection function (RSF) model, which is a GIS-based model, containing data from snow-conditions, topography vegetation type (food availability). The RSF model can then be combined with data from the spatiotemporal recreational use, to identify areas with potential for conflicts.

The aim of the project is to:

- Estimate the volume and geographical dispersion of recreational use in DSNP and RNP in the summer season 2009;
- Link the spatiotemporal recreational use with data from the RSF-model, obtained from 25 GPS-collared wild reindeer in DSNP and RNP;
- Look for relationships between habitat use of wild reindeer and recreational activity.

Preliminary results from RNP show a negative interaction effect between recreational use and habitat use of wild reindeer. The average weekly range size for wild reindeer was smaller in the high season for recreational use, than in the low and hunting season. Average step length between each 3 hour GPS fix was longer in the high season, compared to low season. The closest distance to trails/roads was negatively correlated to increasing number of visitors during season. The same pattern was found for use of areas with high density of trails/roads during the season. We also found that the frequency of trail crossings was negatively correlated with the number of visitors (Fig. 1, results from GAM-smoothing). However, we underline that this results are preliminary because we still lack data on habitat availability of natural conditions, e.g. food availability in the summer season.

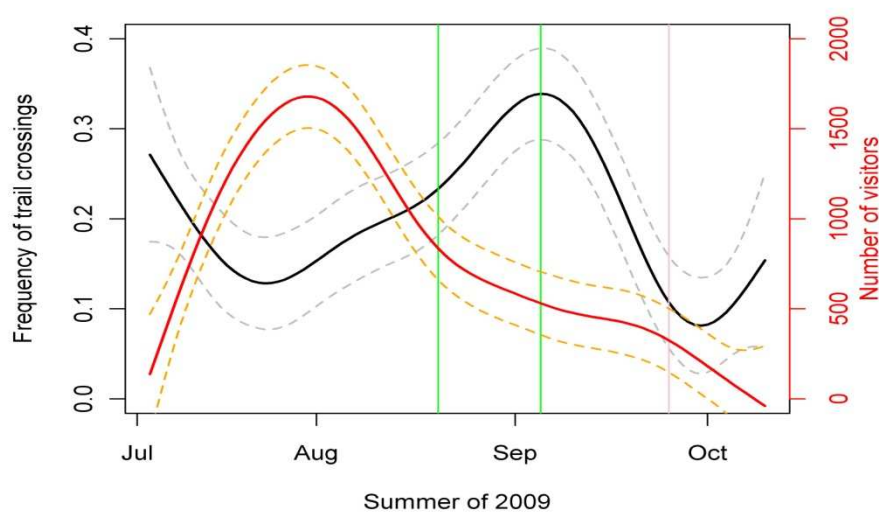


Figure 1: Frequency of trail crossings and number of visitors in Rondane from July 1st-October 15th. Green vertical lines indicate the start and the end of the first 2 weeks of the hunting season for wild reindeer. The pink vertical line shows start of the reindeer rut.

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