

Dialogmøte konseptvalgutredning Helgeland 8.mars

Tom Lifjell

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Background

What are cumulative effects and how can they be measured and tested? In cooperation with the Ildgruben reindeer herding district in Nordland county, we are investigating how cumulative and progressively increasing amounts of human activities and infrastructure influence reindeer behavior and area use, as well as the herding activities such as choice of grazing lands, migration routes and potential gathering locations.

The project began in 2015 (but have reindeer area use data from 2011) and will continue throughout 2017+.

Methodology

Using GPS-data spanning from 2011, modeled together with other variables in GIS, and information of the herdsman's herding activities, we tested the effect of a 420 kV power line crossing three separate mountain ridges.

Main hypothesis: Reindeer area use (and the herding practices) are fundamentally linked to optimizing pasture access, but deviations may occur where the animals are experiencing increased predation and/or disturbances.

A power line may lead to disturbance due to several reasons. The animal may react to the visual impression of the power line in itself or varying UV-discharge or corona noise. The disturbance may also depend on topography, weather, season or cumulative effects of all of these factors.

To investigate the effects from power lines, with special focus on the UV-light theory, we studied the area use of reindeer during winter close to (<8 km) a 420 kV-power line crossing the western part of Ildgruben reindeer district. Specifically, we studied the area use on three different ridges. And also tested the use during day vs night (due to that the effects of UV-light would be larger during night).

This study constitutes the first steps towards investigating the causes of these differences. For instance, since UV is depended on both air pressure, electricity load and even distance from the powerlines to the ground, these factors must be included before interpreting results.

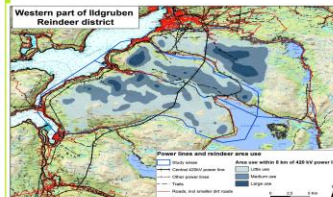


Figure 1. Overview for the reindeers' space use during winter (November-April) along the three mountain plateaus comprising the entire study area. The existing 420 kV powerline transects all three mountain ranges in relatively similar fashion, yet is still perceived differently in the landscape. Reindeers' space use varies considerably in relation to the same high voltage powerline (Fig 3).

Methods and Results

The area use on the three ridges varied, with one ridge in general having less use nearby and/or on the western side of the power line, while the area use seemingly did not depend on distance to the power line on the two other ridges. There was no difference in reindeer area use between nighttime and daytime for any of the ridges (Fig 2). The area use on all three ridges also differed between years, even within the same seasons, underlining the importance of replication in both time and space.

Quantitative analyses

Quantify barrier effects during crossing of different types of linear features, including both anthropogenic and natural (i.e. snow banks, fences, reservoirs, roads, rivers).

Qualitative analyses

Interviews with the reindeer herders will be conducted on a regular basis. Documentation will also be gathered from diaries used from the start of the project. For the time being, the herdsman experience is that the animals on the northern most ridge (Fig 3.) stop up, or slow down, when getting close to the power line, making use of the area on the western part of the power line less effective. Furthermore, on the middle ridge (Fig. 3) the herdsman experience trouble when herding the animals back east, but no apparent disturbance on free ranging animals. On the southern ridge (Fig. 3), the herdsman do not experience any obvious problems at all.

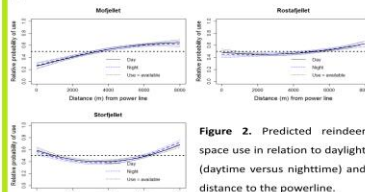
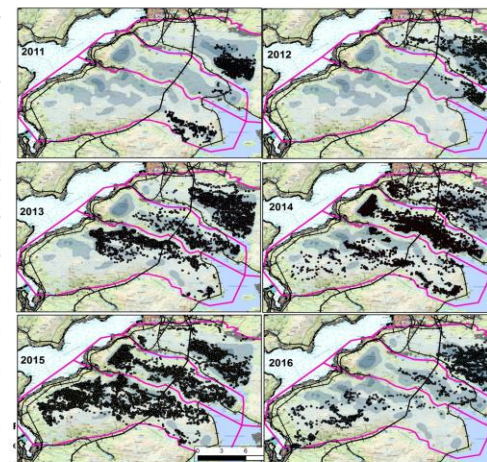


Figure 2. Predicted reindeer space use in relation to daylight (daytime versus nighttime) and distance to the powerline.



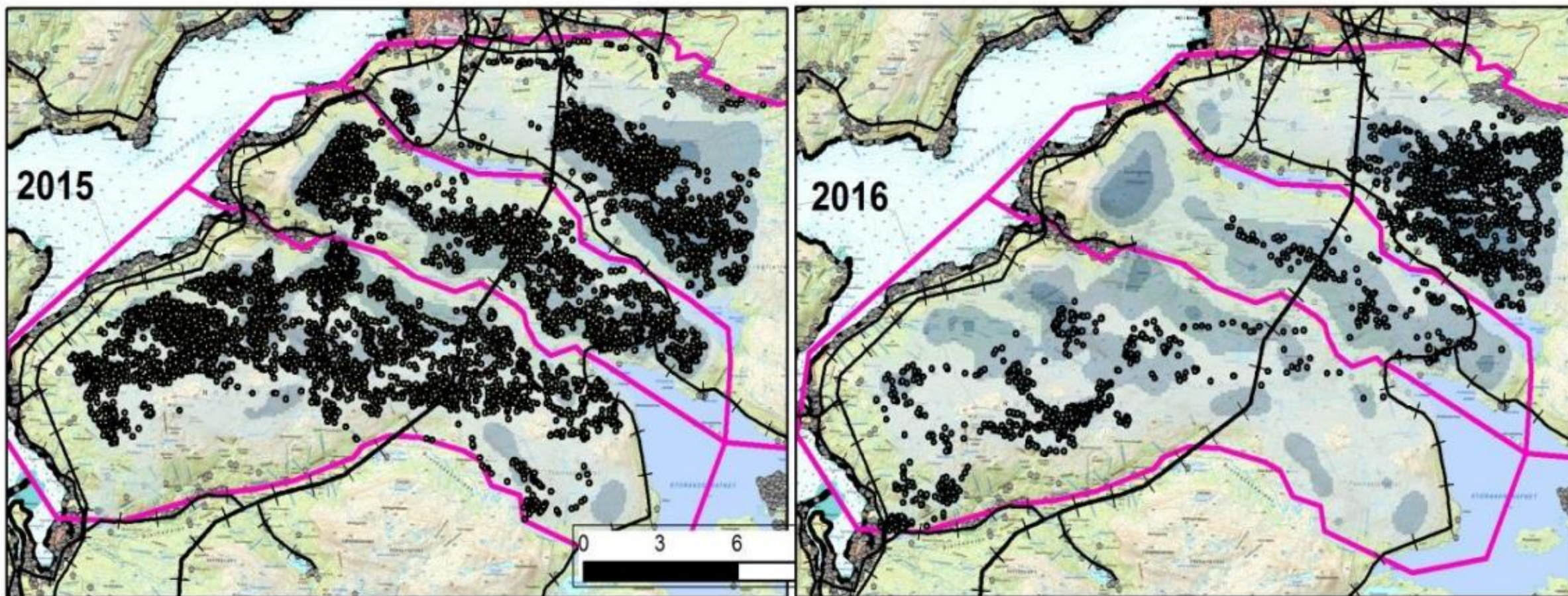
combined is the same for all years (the pink line, and same as Fig. 1).

- Are the effects for the power line crossing this one ridge, and the herding problems on the central ridge, real, and if so, are they caused by the power line in itself, topography, weather/noise, herding practices, varying UV-discharge or cumulative effects?
- Our results support other studies showing overall limited or no negative effects for reindeer area use and movement patterns towards high voltage power lines when studied over a time period of more than 4-5 years.
- Our results also show that there are situations where there will be less use near power lines. Further analyses, which also include other variables, will help us understand these patterns better. Future studies will include measuring UV under variable conditions, as well as visibility for the reindeer in the landscape.

Main project goal

Using a holistic approach, as well as data from the herders and progressive history of development in the area, we expect to decipher key points of change and major influential stimuli affecting the reindeers' area use and herding practices at various spatial and temporal scales. We will also compare and quantify the degree of impact from specific sources of disturbances, such as high voltage power line in this study, along with the herders' ability to counteract or adapt to such impacts. Finally, we will define "cumulative effects" and manage to test these.

Dersom man sammenligner arealbruken i perioden november – april 2014/15 med 2015/16 ser en tydelig forskjell mellom årene og mellom de tre aktuelle fjellryggene. GPS-posisjoner (svarte punkter) til reinsdyr for perioden november-april for 2015 og 2016 innenfor en radius på 8 km fra 420 kV kraftlinja som passerer over tre fjellrygger øst for Mo i Rana.



kraftledningen som krysser over
Storfjellet (foto: Sindre Efterstøl)



kraftledningen som krysser over Mofjellet (foto: Sindre Efterstøl)



kraftledningen som krysser over Rostafjellet (foto: Sindre Efterstøl)

Resultater fra prosjektet «Ildgruben reinbeitedistrikt samlet belastning»

GPS-posisjonene (svarte punkter) til reinsdyr for perioden november-april for 2013 viste samme adferd hos reinen som i 2015 og 2016.

