Dynamics of high-altitude environments as a life-support system to wild herbivores (M1b Hardangervidda)

Tessa Bargmann
tessa.bargmann@uib.no
Ole Reidar Vetaas
ole.vetaas@uib.no

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Reindeer population trends — Population dynamics, Process-based model — Population structure, Human disturbance — Hunting data, Abundance data, Mortality data, Tourism statistics, Reindeer GPS data

Availability of winter grazing — Multivariate model — Species richness, Lichen biomass, Topography — Presence/absence data, NDLI/NDMI, Vegetation cover

Availability of summer grazing — Multivariate model — Habitat extent, Temperature/Snow distribution, Net primary productivity — Snow cover, Temperature, NDVI

ECOPOTENTIAL: Main Aims

Identify important ecosystem services, and indicators for the state of the ecosystem, functions and processes (biotic, abiotic + human pressures).

Identify what EO (remote sensing and in-situ) data is available to estimate these indicators.

Assess the current state and estimate future changes.

Develop conservation and management policy options.

Make all results available to stakeholders!

Assess the current state and estimate future changes.

What are the temporal changes in vegetation and climate in relation to reindeer presence/ abundance?

1. Wild reindeer location & population trends
2. Primary producers: dwarf shrubs, forbs, grasses/sedges, lichens → **summer and winter fodder**
3. Physical and climate variables: **snow-depth and duration, temperature**
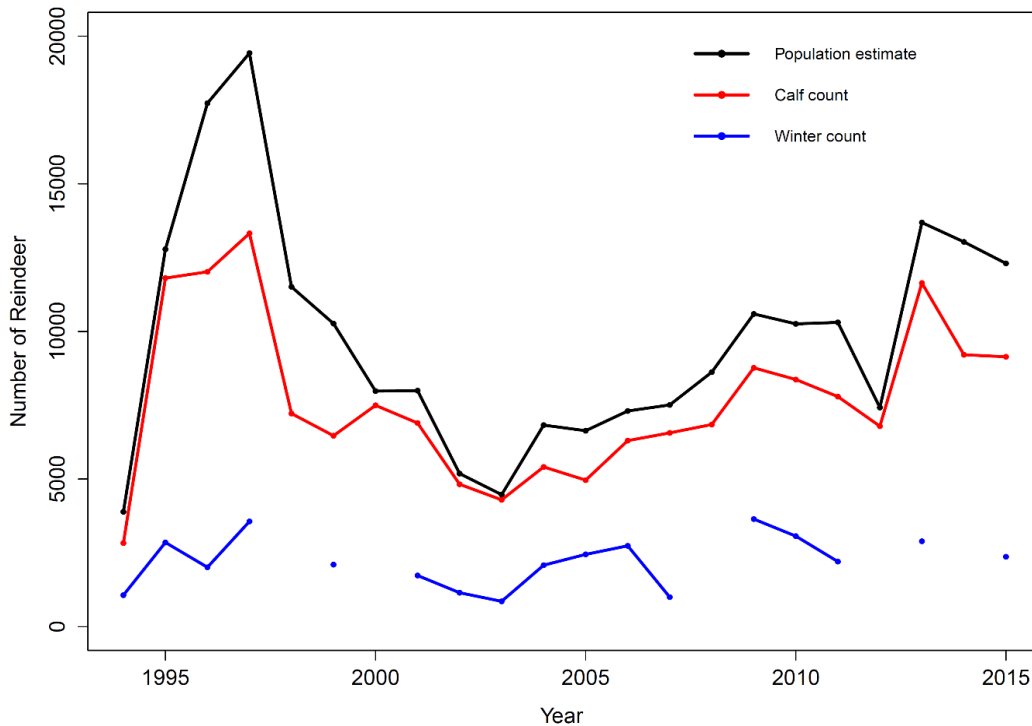

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Results: Reindeer Population Trends

Using a variation of the Ricker model → Test for the effect of climatic conditions:
1. Mean temperature in Jan and Feb
2. Mean temperature in July and Aug
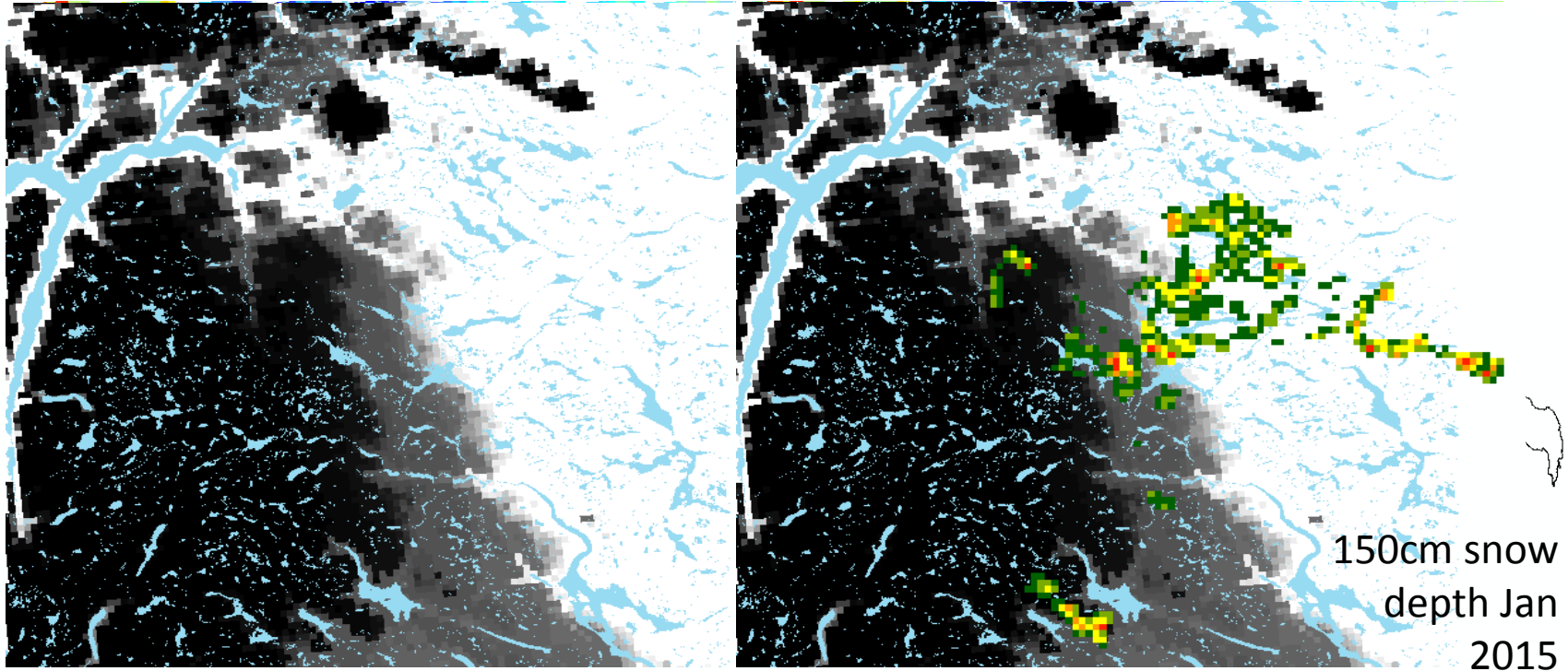3. Growing degree days (GDD) from June – Sept

Results:
- Reindeer most affected by winter temperature and hunting → cold temperature and low harvest rate = low growth rate
- Weak correlation between GDD and population → fewer GDD had a positive effect
- High summer temperature was an explanatory variable in one of our top performing models → important in combination with other factors

Collaborators: Ed Wheatcroft (LSE) & Simona Imperio (CNR)

150cm snow depth Jan 2015

What are the costs of avoiding humans?

Reindeer GPS data → Relative abundance data per month (1km resolution), Brownian bridge, interpolating the movement trajectory → best estimate space use of an individual. Use in conjunction with vegetation and climate data (e.g. snow depth, GDD), and human factors (tourism, roads etc.)

Collaborators: Bram van Moorter (NINA), Manuela Panzacchi (NINA) & Rebecca Viejou (U. Guelph)
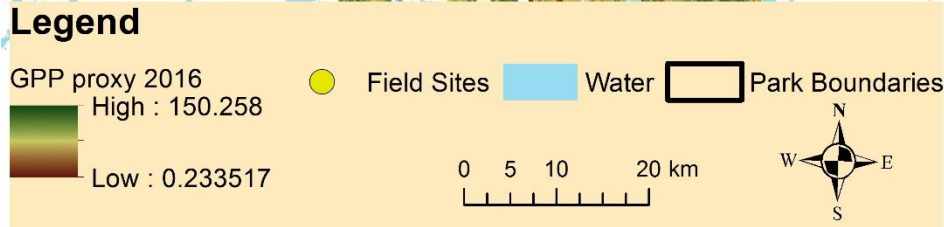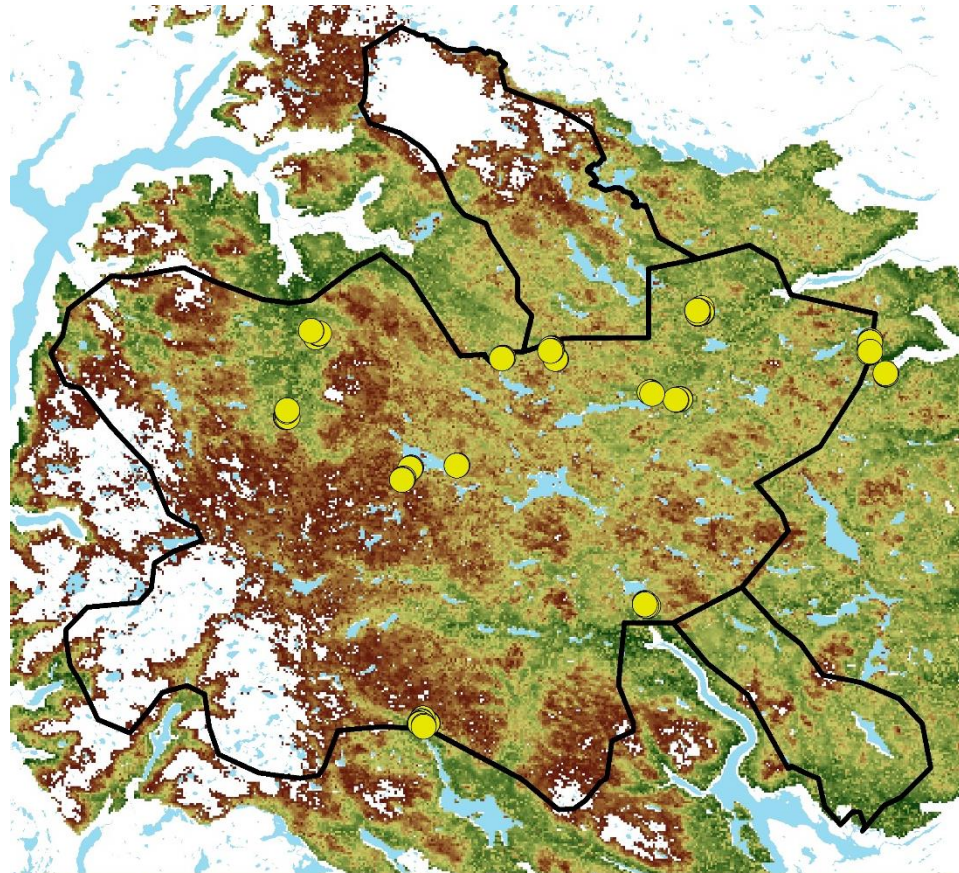
Why do the reindeer return to the same summer pasture?

Available summer grazing cover and biomass.

30 x 30 meter plots
Biodiversity & vegetation cover
Dataset → 76 plots, 192 species

Legend

GPP proxy 2016
High : 150.258

Low : 0.233517

Field Sites   Water   Park Boundaries

0   5   10   20 km

N
W   E
S

Contacts: Ole Reidar Vetaas, ole.vetaas@uib.no
Tessa Bargmann, tessa.bargmann@uib.no