University of British Columbia and Biodiversity Pathways

Movement Ecology of Caribou During a Period of Reduced Human Activity

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Introduction

We compared the movement ecology of southern mountain caribou (*Rangifer tarandus caribou*) between 3 years of normal heli-ski operations (2019, 2020, 2022) to a year of reduced heli-ski activity due to COVID-19 related travel restrictions (2021).

The travel restrictions imposed in 2021 resulted in an 84% reduction in skier days[1], leading to vastly reduced human and helicopter presence within these ranges.

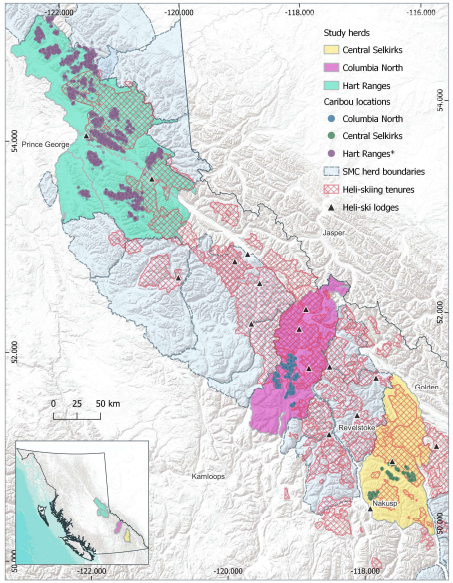
We specifically investigated changes in home range size, movement rates and resource selection during the period when caribou are range resident in their late-winter habitat as a result of this reduction.

Methods

Home ranges and movement rates during the late-winter period were calculated for 120 animals from 3 sub-populations using an autocorrelated kernel density estimate from the ctmm package[2].

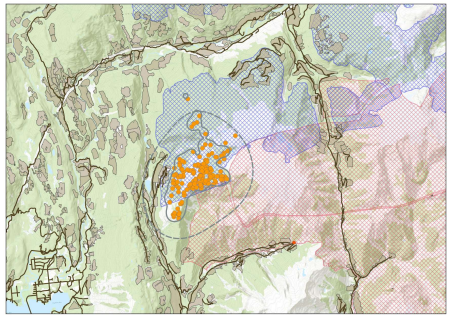
Home range sizes, movement rates and resource selection were compared among years using a generalized linear mixed effects model with individual and herd as random effects.

Resource selection was compared among years to evaluate for differences in habitat use as a function of reduced heli-ski activity.



Study Area

We examined the space use of three sub-populations of southern mountain caribou – Central Selkirks (yellow), Columbia North (pink) and Hart Ranges (teal). Hart Ranges caribou included 3 neighbouring, minor sub-populations. Caribou locations within each sub-population are shown as the coloured points.

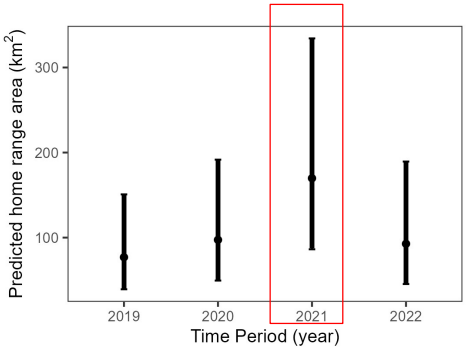


Space Use

Caribou locations are plotted in orange, the occurrence distribution is the solid line polygon, the dashed polygon is the home range. Snowmobile closures (blue hatched), heli-ski tenure (red hatched), cutblocks (brown) and resource roads (black) are also plotted.

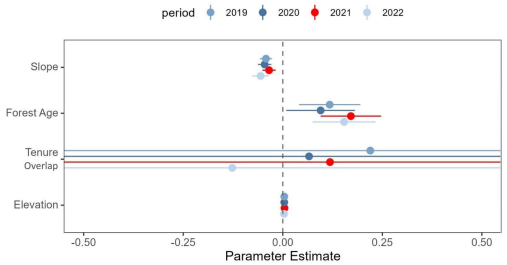
Results

Caribou home ranges increased by 80-120% during the late-winter period of 2021, the year of reduced heli-skiing.



Home Ranges Increased

There was a substantial increase in home range size for the period that helii-skiing was not occurring (2021 – red box). Home ranges almost doubled in size on average.

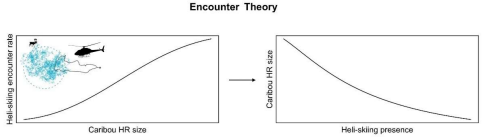


No Change in Resource Selection

Values to the right of the dashed line indicate selection for that resource, while values to the left indicate avoidance.The selection of resources (or habitat) did not change among periods, with caribou selecting for higher elevations, lower-angle slopes and older forests consistently. There was large variability in the proportion of home range that overlapped heli-ski tenure

Conclusions

During years of normal heli-ski operations, and likely by extension, other forms of human, back-country recreation, southern mountain caribou experience substantial home range reductions in an effort to reduce their interactions with these activities. Caribou are thus living in a "Landscape of Fear', whereby they likely perceive these activities as predators, and reduce their movements to limit encounters.



Landscape of Fear

Under normal heli-ski operations caribou reduce their home ranges to reduce encounters with helicopters. When heli-skiing is paused, caribou home ranges expanded (top panel).

Resource selection among years did not change, despite the increase in home range size. This suggests that caribou may be experiencing limited access to resources during normal years of heli-ski operations.

Caribou are a species of concern with most sub-populations experiencing declines across their ranges. Here we demonstrate that human recreation may be exacerbating these declines by reducing access to resources during an energetically limited time.

References

1. Helicat Canada (2022). HeliCat Canada Annual Report 2022.
2. Fleming, C.H., Calabrese, J.M., Dong, X., Winner, K., Reineking, B., Péron, G., Noonan, M.J., Kranstauber, B., Gurarie, E., Safi, K., et al. (2022). ctmm: Continuous-Time Movement Modeling.

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