

Brief communication

Multi-scale habitat selection by mountain caribou in West Central Alberta

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Introduction

Woodland caribou (*Rangifer tarandus caribou*) populations in Alberta are in decline, which may be partially attributed to habitat loss and alteration resulting from industrial activities, such as timber harvesting. These effects may be direct (e.g., loss of forage), or indirect (e.g., through changing the abundance and distribution of predators). An understanding of caribou habitat requirements is a fundamental first step towards conservation of the species. In this study, we analysed winter habitat selection by mountain caribou, a migratory ecotype of woodland caribou, in west central Alberta (1998-2001). The habitat requirements of these caribou have been identified as a knowledge gap by government and industry. Since habitat needs may differ over space (e.g., locally and regionally) and over time (e.g., as snow conditions change over the winter), selection was analysed at multiple spatial and temporal scales.

Study area

This study was conducted within the Redrock/ Prairie Creek caribou winter range (54°N, 119°W), which runs along the eastern slopes of the Rocky Mountains. This upper foothills landscape is intersected by ridges and many small drainages. The forest is composed primarily of black spruce (*Picea mariana*), Engelmann spruce (*Picea engelmannii*), white spruce (*Picea glauca*), subalpine fir (*Abies lasiocarpa*), and lodgepole pine (*Pinus contorta*). Wolves (*Canis lupus*) are present in the study area. Industrial use includes timber harvesting, oil & gas exploration and development, and coal mining. Recreational use of linear features associated with

development activities, by ATV's (all terrain vehicles) and snowmobiles, is widespread.

Methods

Global Positioning System (GPS) collars, deployed on adult female caribou over three winters (for 21 caribou-years), were used to collect locations that were both accurate (within 14-100 m, 95% of the time), and frequent (1-24 locations/day). Using digital forest inventory maps, and a Geographic Information System (GIS), we determined the forest characteristics within a study area (defined by the minimum convex polygon of historic caribou locations), within caribou home ranges, and at GPS caribou locations (referred to as general habitat use). Caribou home ranges were created by buffering daily locations by 2.8 km (the 90th percentile of the daily distance travelled by caribou, averaged across all animals). Using multiple logistic regression and compositional analyses, we analysed selection for home ranges within the larger study area, and for general habitat use within home ranges. We also used snow tracking over two winters to collect data on habitat and snow conditions, as well as on foraging strategies. Caribou in this area use two strategies to feed: they either dig through the snow for terrestrial forage (referred to as "cratering"), or they feed on arboreal lichens, which are suspended from tree branches. Multiple linear regression was used to determine how caribou foraged over a range of snow conditions, and multiple logistic regression was used to associate habitat and snow conditions with foraging sites.

Results

For their home ranges, caribou selected stands over 80 years old, with the highest preference for 120-160 year old stands. They also preferred stands with 71-100% crown closure relative to all other stands. At a finer scale, for general habitat use within their home ranges, caribou showed an even greater preference for older stands: stands under 120 years were avoided relative to stands over 160 years old, which were most preferred (on average, 21% of caribou locations were in these 160 year old stands). Again, caribou preferred denser stands, but to a lesser extent, since only stands with less than 30% canopy closure were avoided relative to stands with 71-100% canopy closure (the most preferred category). At the finest scale, cratering sites were associated with moderately dense stands (around 50% canopy closure). Arboreal feeding sites were associated with old stands containing greater amounts of spruce. Caribou selected many of the same habitat attributes at multiple scales, reinforcing their importance. For example, older stands were selected at all scales, even though older forest was abundant at each level (because it had been selected for at coarser scales).

Snow conditions also influenced habitat selection. For home range selection and general habitat use, caribou showed a greater preference for older stands in the late winter, when snow conditions were generally harsher (deeper and harder) than in the early winter. This is consistent with greater arboreal feeding during harsh snow conditions, since arboreal lichens were found to be more abundant in older

stands. In addition, caribou fed on arboreal lichens more when snow was harder, and selected areas of relatively shallow, soft snow for cratering.

Conclusions

This research suggests that mountain caribou select a suite of winter habitats, at multiple spatial scales, and under a range of snow conditions. Our findings lead to several management recommendations. In general, habitat selection by caribou necessitates management over large spatial and temporal scales. Specifically, there must be management at multiple spatial scales to maintain older stands and a range of stand densities, as density requirements vary among scales. Patches of old spruce forest must be maintained with good dispersion across ranges, and in proximity to areas of suitable habitat, in case harsh snow conditions necessitate their use for arboreal lichen feeding. Such harsh conditions could limit the caribou population in this area if critical habitat is not available. Our research provides useful information for government and industry to make knowledge-based decisions when planning for the long-term conservation of caribou habitat.

Source

Szkorupa, T. S. 2002. Multi-scale Habitat Selection by Mountain Caribou in West Central Alberta. MSc thesis. University of Alberta, Edmonton, Alberta, Canada.