CARIBOU HABITAT USE ON THE LEVEL MOUNTAIN AND HORSERANCH RANGES, BRITISH COLUMBIA

Ministry of
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CARIBOU HABITAT USE

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BRITISH COLUMBIA

by

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PREFACE

An objective of the studies carried out by the Wildlife Branch is to estimate the potential abundance and probable distribution of wildlife habitat available in British Columbia. Such estimates depend on the availability of information concerning wildlife and its use of habitat. In this report the habitat (physical landscape and vegetation) and seasonal use by caribou (Rangifer tarandus) on two separate mountain ranges in northwestern British Columbia is described. The data were collected primarily in 1977-1981 as part of a predation study on caribou.

This report and accompanying maps will have direct application only to those working in northwestern British Columbia; however, they serve as an example of habitat mapping and seasonal use mapping to others who may benefit directly.

The findings of this study and some general steps involved in mapping habitat were presented at a workshop on caribou held at Kamloops on November 5th and 6th, 1985, in a paper by:

Fenger, M.A. (in preparation). Caribou Habitat Mapping in British Columbia. Evolution Towards a Standard Approach.

All papers from this workshop will be available in proceedings to be published jointly by the Ministries of Environment and Forestry.

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SUMMARY

Two caribou (Rangifer tarandus) ranges in northern British Columbia are described in terms of vegetation, general terrain, soil characteristics, geology, and climate. Vegetation, general terrain, and soil characteristics important to caribou (habitat) were mapped and described at a scale of 1:100 000 for each range (Clement and Fenger 1981a,b). Caribou sightings from caribou census flights (Elliott et al. 1984; Page 1985) are related to various habitat map units. A separate caribou habitat use map (Page and Eastman 1984a,b), which shows areas most heavily used during the rut, calving, post-calving, summer, and winter periods, is presented. The problems of relating caribou sightings to specific habitat types are detailed. Both the Habitat Map and the Seasonal Habitat Use by Caribou Map for each area accompany this report.

The two ranges studied, Level Mountain and Horseranch Range, differed physiographically and geologically. Level Mountain, a shield volcano of alkaline basalt, rises above the surrounding forested lowlands much like an inverted plate. Extensive, gently undulating alpine areas surround the steeper central peaks. Streams that originate from those peaks drain across the plateau in a pinwheel-like fashion. The Horseranch Range is a long, abruptly rising ridge of metasedimentary, coarse-grained bedrock. From this ridge, steep streams flow away from the central axis, forming a pattern much like a fish skeleton. The eastern flank of the Horseranch Range has the gentle, uniform slopes similar to those on Level Mountain. The alpine area is approximately six times larger on Level Mountain than on the Horseranch Range, and of the twelve alpine vegetation landscapes described and mapped, only two are common to both ranges. Consequently, caribou use of alpine habitat during calving, post-calving, summer, and rut differs between the ranges.

Two calving habitats were identified on Level Mountain, one with bog birch (Betula glandulosa)-fescue (Festuca altaica)-dominated vegetation on gently undulating terrain located around the perimeter of the plateau, and the second at higher elevations in sedge (Carex spp.)-dominated vegetation on rubbly, steep slopes, on the central peaks. Only the more rugged area in which the cinquefoil (Potentilla spp.)-dwarf willow (Salix spp.)-mountain heather (Cassiope spp.) fescue (Festuca spp.)-dominated vegetation associated with the central axis was identified as calving habitat on the Horseranch Range.

Post-calving aggregation sites appeared to be in a restricted habitat type, and could represent a limiting habitat factor to caribou. Caribou selected a single, small habitat unit of fescue and bog birch-fescue on shallow moraine during the two years of observations on Level Mountain, and remained within an area of less than 100 ha for a two- to three-week period at a critical time for calf survival (Page 1985). Similar restricted areas were available in only four locations within the Horseranch Range.

Summer range habitat on both study areas was more extensive than calving or post-calving habitat. On both the Horseranch Range and Level Mountain areas, summer range overlapped the areas used for rutting habitat but not calving habitat.

Areas suitable for rutting were considered to be those that provided caribou with a relatively unobstructed line-of-sight to facilitate group interactions. Such open habitat, composed of kobresia (Kobresia myosuroides) -fescue, sedge, sedge-willow, and dwarf willow dominated vegetation on gently undulating areas, was three times as abundant on Level Mountain as on the Horseranch Range. Only the eastern flank of the Horseranch Range provided suitable rutting habitat, with gently undulating, deep moraines that were vegetated by willow-moss, mountain avens (Dryas integrifolia), mountain heather and fescue, provided suitable rutting habitat.

Winter habitat was widely distributed within the boreal forests surrounding both ranges. Mature stands of white spruce (Picea glauca) and lodgepole pine (Pinus contorta) capable of producing lichen appeared to be favoured. Winter habitat apparently was not limiting, although accessibility and availability doubtlessly varied with snow cover.

The key to a better understanding of the use of habitat by caribou and other ungulates will only be achieved when habitat information and animal information are considered in any data gathering program.

To overcome the problems of determining in which habitat types the caribou (wildlife) were sighted, the following are recommended:

1. Animal sightings should be recorded on a national topographic series base, using a system such as that used for winter flying (Demarchi et al. 1983) for accurate geographic locations that can be related to habitat in the future.

2. Successful wildlife censuses must contain observations on the habitats where the animals were sighted to develop a better understanding of habitat use. These observations can be either plotted on habitat maps or noted on tape. Ideally, census observations or radio-collaring observations should be plotted directly onto habitat maps prepared prior to animal census surveys.

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ACKNOWLEDGEMENTS

We wish to acknowledge the following individuals for their assistance in the project; John Elliott and Bryan Webster conducted all wildlife surveys for the Horseranch Range; David Hatler conducted most surveys for the Level Mountain Range with assistance from Keith Hodson, Don Eastman, and Rick Page; Laura Friis drafted the landscape unit maps; Liz Stanlake helped in compilation of the caribou data; vascular plant verification was done by Adolf Ceska (Provincial Museum); Larry Wells drafted the caribou use maps. We also thank Dennis Demarchi whose steady encouragement helped see this study to completion. Thanks also goes to Bob Marsh for his summary and comparison of climates between the study areas.

1.0 INTRODUCTION

1.1 Background

The purposes of this report are to describe caribou habitats for two ranges in northern British Columbia, and to evaluate habitat units and seasonal caribou distribution.

This report is an accompanying report to a project initiated to assess the impact of wolf (Canis lupus) predation on the production and survival of caribou. This initial project design called for two ecologically similar, yet geographically distinct study areas (Fig. 1). On the untreated area, the Level Mountain Range, caribou, wolves, and moose (Alces alces andersoni) were monitored but otherwise left undisturbed. On the treatment area, the Horseranch Range, caribou and moose were monitored while wolves were reduced (for details, see Elliott et al. 1984). To assess the ecological similarity between these two areas, habitat maps at a scale of 1:100 000 were prepared for each, consisting of soils, landforms, and vegetation information (Clement and Fenger 1981a, b).

1.2 Objectives

1. Describe and map habitat units (generalized terrain, soils, and vegetation landscapes) for the two study areas.
2. Describe the distribution of caribou in relation to habitat map units used during calving, rut, and late winter.
3. Compare the habitat map units of the two study areas.
4. Compare use by caribou of habitat map units in the two study areas.
5. Produce a caribou habitat use map based on caribou observations.
6. Discuss shortcomings of the approach used to establish caribou habitat use and recommend improvements to others studying caribou and habitat use.

We stress that these results must be regarded as preliminary and tentative, due to the scanty data-base, the low intensity of sampling, and the different scales of recording data. Despite these limitations, we believe the information is useful for an area and species that have received comparatively little previous study. The experience gained and the methods used should be of particular interest to others relating wildlife observations to habitat types and habitat use.

1.3 Study Period

The predation study was conducted primarily from 1977-1981; however, less intensive monitoring of the Horseranch Range caribou and wolves, to follow trends in numbers, has continued to the present. Vegetation, soils, and landscape mapping and site descriptions were collected in the summer of 1980.

1.4 General Description of Areas

1.4.1 The Level Mountain Study Area

The two study areas were initially selected so that no intermixing of caribou between the two areas was likely to occur. The Level Mountain study area is centred 65 km north of Telegraph Creek in northern British Columbia (Fig. 1). The study area approximates the seasonal distribution of the caribou herd that ruts on the mountain, but does not include northerly extensions of the winter range. The Level Mountain plateau covers 3000 km^2 in an oval shape, oriented north-south. The plateau is 70 km by 45 km.

There is no road access to the study area, but the road from Dease Lake to Telegraph Creek approaches within 50 km. A number of lakes around the base of the shield volcano provide float plane access, with Hatin, Granite, and Ketchum Lakes most commonly used. In the southwest of the study area, there is a landing strip at Shesley. The area is also accessible overland by the old Telegraph Trail of 1890's fame. The Trail is still passable to the north through Hatin Lake and beyond the study area. The alpine plateau is easily travelled by horse or on foot during the snow-free period from June to September. The exception is the southern portion where poorly-drained fens make much of this area impassable.

Level Mountain Range caribou are part of a population that ranges west of the Dease River and north of the Stikine River into the Yukon. Caribou collared in 1980 on the Level Mountain Range were found the following winter in the Teslin and Jennings valleys, 120 km to the north. The caribou group that calve on Level Mountain will be referred to by that area name. The home range of the Level Mountain herd overlaps extensively with that of the Kawdy and Jennings Plateaux herds. At high population levels, interchange probably occurs with the Stikine Plateau caribou population herd to the southeast through the Tanzilla Plateau. The Level Mountain caribou range over an area estimated to be five times greater than that of the Horseranch herd.

In 1978, over 400 caribou were counted on Level Mountain but the herd was considered to be declining due to poor recruitment. Calf percentages averaged less than 10%. About 350 caribou were estimated in 1980, though only half that number were actually counted.

Level Mountain is home to many animals other than caribou, including caribou predators. Wolf density was estimated at about 1/100 km^2, and considered to be similar to the initial density of the Horseranch Range (Elliott et al. 1984). Wolf predation is considered to be an instrumental factor in producing the current pattern of caribou habitat use. Wolves were most commonly observed in 1980 in the valleys, but alpine areas were also used for denning and hunting. Grizzly bears (Ursus arctos) were also common in the alpine and are potentially significant predators of newborn caribou calves. Other ungulates included mountain goat (Oreamnus americanus), Stone's sheep, (Ovis dalli stonei), and moose.

The extent and flatness of the alpine on Level Mountain has produced many arctic affinities that are particularly striking in the avifauna. All

Figure 1. Location of the study areas.

three species of ptarmigan (Lagopus mutus, L. lagopus, and L. leucurus) were abundant in 1980. Oldsquaw Ducks (Clangula hyemalis) were frequently sighted in spring and are suspected to be nesting (D. Hatler, pers. comm.). Two Long-tailed Jaegers (Stercorarius longicaudus) were repeatedly seen in the summer of 1980, 1500 km south of their known breeding range.

1.4.2 The Horseranch Range Study Area

The Horseranch Range is located in the Cassiar Mountains, 75 km east of Cassiar in northeastern British Columbia (Fig. 1). The study area boundary approximates the seasonal distribution of the Horseranch caribou herd. The Horseranch Range is a sharply defined physiographic unit, 45 km long and 15 km wide, with its long axis oriented in a north-northwest trend (Holland 1976). The western flank of the range rises steeply from the Dease and Rapid Rivers, at an elevation of 760 m, to 2000 to 2225 m along the ridge crest. The eastern flank has a gentler slope that falls uniformly to the Red River valley at 1050 m.

The study area is accessible by several means. The Stewart-Cassiar road passes 20 km to the west of the area. The Beryl Lake road provides access as far as the west side of the Dease River, a few kilometres from the study area. Pack trails provide access to cabins on lakes at the north and south ends of the range, from which the alpine areas are easily accessible during June to September. These lakes can also be reached by float plane.

The Horseranch Range herd appears to be one of the few in B.C. that is isolated from surrounding populations (J. Elliott, pers. comm.). There are no recorded movements of caribou to the west through the Dease Valley, and no other herds exist to the northeast, in the direction that Horseranch caribou are believed to migrate (Bergerud 1978). There may be interchange of individuals with populations to the south, eliminating genetic isolation, but, in terms of the population dynamics, the Horseranch Range herd is considered discrete.

The herd size was estimated at about 300 in 1980 when the intensive ground work was conducted, and at 350 in 1983. Average age of the herd should be low, consistent with an increasing population size and good juvenile survival. Since 1978, the herd has probably increased at an average of 6% per annum, with 15% calves recorded in October surveys during 1979-81.

Besides caribou, the Horseranch Range supports other large mammals. Mountain goats and Stone's sheep are scarce (<50 of each), and occupy the central alpine peaks. Moose are common in the valleys surrounding the Horseranch Range, but were rarely seen above the tree line. A variety of mammalian predators occur in the area including wolves, coyote (Canis latrans), grizzly and black bears (Ursus americanus), wolverine (Gulo gulo), lynx (Lynx canadensis), and bobcat (L. rufus). Further information on mammals and birds of the Horseranch Range can be found in Elliott et al. (1984) and Page (1985).

2.0 METHODS

2.1 Caribou

2.1.1 Defining a habitat use legend

Seasonal categories of habitat use were based upon general caribou activity patterns, dividing the year into winter, calving, post-calving, summer/fall, and rut. These periods were designed to reflect understanding of shifts in habitat use, so the length of each season is variable (see maps Appendices for definitions).

Seasons chosen were based on the experience of two of the authors (Page and Eastman) with caribou on the study areas (Elliott et al. 1984; Bergerud and Elliot, in press; Bergerud and Page, in press), and experience with other caribou herds in British Columbia, the Northwest Territories, and Ontario. Specific knowledge was far greater for Level Mountain, as 23 radio-collared calves were monitored there as a part of a calf mortality study by Page (1985) during 1980 and 1981.

Characteristics of habitat units (vegetation, soils, and terrain) described for both ranges by Clement and Fenger (1981a,b) were incorporated into the column entitled "General Description of Habitat on the Caribou Use Legend of the maps by Page and Eastman (1984a,b) for each season. The types of habitat units used were determined by plotting animal sightings on maps and overlaying these with habitat maps.

The caribou use units defined for Level Mountain were extrapolated to the Horseranch Range, with modifications due to the different spatial organization of that area.

2.1.2 Census and observations

Most information about caribou habitat use was derived from sightings during aerial surveys conducted by a variety of observers. Spring surveys were flown by helicopter in June to estimate sex and age of the herd, and to measure early calf survival. Fall surveys were conducted in late September or early October coinciding with the rutting period. Winter surveys concentrated mainly on moose and wolf populations; caribou observations were minimal. Locations of all ungulate and wolf observations were recorded on 1:250 000 maps (Elliott et al. 1984).

During ground work in 1980, recent caribou use of a site was determined by direct observation of animals, observation of fecal pellets, and evidence of grazing. Observation of animals on Level Mountain was facilitated by the presence of a number of radio-collared calves that were frequently relocated from the air (Page 1985).

Caribou sightings were assigned to vegetation - landscape units by transferring their estimated locations on the 1:250 000 scale flight record maps to the 1:100 000 scale habitat maps produced by Clement and Fenger (1981a,b).

Since caribou surveys were flown without the prior knowledge that locations would be subsequently related to habitat types, it was not always possible to link a sighting to a specific habitat unit. Some locations on the original flight maps were recorded with a circle, in which case, the centre of the circle was used as the location. Additional information recorded on the flight maps, such as elevation, helped to place sightings more precisely. The error in the location was estimated approximately by recording the number of other map types within 300 m of the point chosen to represent the location. If the number of map polygons into which the caribou observation could be placed was greater than three, the observation was not used. If two polygons occurred within the 300 m circle, the location was assigned to that polygon closest to the circle's centre.

The number of groups of animals and total number of animals in each habitat type in each season were tabulated. The resulting correlations did not meet the assumptions necessary for statistical analysis but provided approximate indications of use.

2.2 Terrain and Soils

The study areas were mapped on 1:60 000 and 1:72 000 scale, black and white aerial photographs, using both Abrahams and Mirror stereoscopes. Changes in tone and surface expression were used to delineate changes in materials and vegetation types. Symbols were placed on the photos using the terrain classification system of the Environment and Land Use (E.L.U.C.) Secretariat (1976) and ecological moisture estimates after Walmsley et al. (1980). Concurrently, a study was made of existing geology reports and maps to increase the mappers' familiarity with the area. Terrain, soil, and vegetation mapping was carried out for the area surrounding the Level Mountain Range in the summer of 1981 and a series of 1:250 000 scale maps were produced by Ryder (1983), Fenger (1984), Rafiq (1983), and Stewart (1985).

Sites were selected to include the largest zonal patterns and units along an elevational gradient. Sites and soils were described using the Ministries of Environment and Forests sampling methods (Walmsley et al. 1980). To verify photointerpretations, approximately 14 days were spent in the field, one week on each range. Six days were spent walking preselected transects and eight days were spent in aerial observations from a helicopter. Twenty-seven site, soils, and vegetation descriptions were collected for the Level Mountain Range, and 25 descriptions for the Horseranch Range. The site, soil, and laboratory analyses were subsequently stored within the B. C. Soil Information system. At selected sites, soils were sampled for soil reaction (pH), organic carbon percent, total nitrogen, pyrophosphate, extractable iron and aluminum, and exchangeable cations.

Field observations recorded on the aerial photos and on site, soil, and vegetation descriptions were incorporated when mapping symbols and boundaries were finalized. Both the vegetation ecologist (C. Clement) and pedologist (M. Fenger) finalized boundaries and unit symbols using a set of Delft stereoscopes. The complexity of the terrain symbols was reduced, and many