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Issues of Caribou Management in Northeastern British Columbia

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Abstract: Woodland caribou inhabit most of Northeastern British Columbia. They live across a variety of climatic and geographic gradients and in areas with as many as seven other ungulate species and seven predatory species. This apparent variability in habitat use may suggest that caribou in the Northeast are wide ranging and ecologically plastic. Conversely, caribou in Northeastern B.C. may live in discrete groups that have adapted to local conditions. There are few published data of woodland caribou in Northeastern B.C. Information is lacking on the number of caribou, their seasonal movements, their habitat requirements, and their interactions with other species. Logging, seismic activity, pipeline construction, oil and natural gas drilling, hydro-electric dams, and prescribed burning have all impacted habitat in previously undeveloped areas. The manner and rate at which these activities are changing habitats far exceeds our growth in knowledge of caribou ecology. Given this combination of few data and rapid habitat alteration, resource managers cannot know the impact of these habitat changes. We believe that this jeopardises the conservation of viable caribou populations.

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Introduction

This paper discusses management issues relating to woodland caribou (*Rangifer tarandus caribou*) in Northeastern B.C. We define a "group" as a geographically distinct association of caribou with limited genetic exchange with other groups. We use "population" to refer to the collection of all caribou in Northeastern B.C.

The first section, *Northeastern B.C.*, is an overview of the area and its physiographic and forest variability. Next, we discuss some of the distinct habitat features of the Northeast. *Caribou in Northeastern B.C.* presents caribou numbers and potential herd distributions and discusses some of factors that influence their ecology. Finally, we consider the *Issues of Caribou and Resource Management.*

Northeastern British Columbia

We refer to Northeastern B.C. as that area of B.C. drained by the Liard and Peace Rivers (including those rivers collected by Williston Lake). This area represents approximately 25% of the Provincial land-base, has approximately 25% of the ecoregions (10 of 43), and 25% of the ecosections (26 of 110) described for the Province (Demarchi, 1993). These figures indicate the high physiographic variation in Northeastern B.C. For example, peaks in the Rocky Mountains are at 2900 m, and the Alberta Plateau is at 350 m.

Meidinger & Pojar (1991) describe five biogeoclimatic zones for the Northeast: Boreal White and Black Spruce (BWBS), Spruce-Willow-Birch (SWB), Engelmann Spruce-Subalpine Fir (ESSF), Sub-Boreal Spruce (SBS), and Alpine Tundra (AT).

Predominant tree species in the BWBS are white spruce (*Picea glauca*), black spruce (*Picea mariana*), trembling aspen (*Populous tremuloides*), or lodgepole pine (*Pinus contorta*) depending on site conditions. Wide, meandering rivers are a prominent feature of the BWBS landscape. The alluvial habitats along these rivers are often 75 m lower than the surrounding uplands creating a separation of "alluvial" and "upland" forest systems. White spruce and balsam poplar (*Populous balsamifera balsamifera*) predominate the nutrient rich alluvial sites, and trembling aspen, pine, white spruce, and black spruce form mixed forests on the uplands.

In the north, there is a transition from the BWBS in the valleys to the SWB upslope. The SWB is characterised by open white spruce, lodgepole pine, subalpine fir (*Abies lasiocarpa*) forests with large areas of willow (*Salix* spp.) and scrub birch (*Betula glandulosa*) (Meidinger & Pojar, 1991). The

SWB has a history of extensive burning both by wildfires and by fires prescribed to convert areas of conifers to grasslands.

The ESSF occurs in the south above the BWBS valley bottoms. Lower and mid-elevational forests of Engelmann spruce (*Picea engelmannii*) are more continuous than forests in the SWB (Meidinger & Pojar, 1991). In contrast to the SWB, fire occurs infrequently in the ESSF; hence, the ESSF has older stands which support arboreal lichens - an important winter food for caribou.

A portion of the SBS reaches northward from central B.C. along Williston Lake to adjoin the BWBS. Hybrid white spruce (*P. engelmannii* x *glauca*) and subalpine fir predominate the forests of this zone (Meidinger & Pojar, 1991).

Distinctive Habitats

There are a number of habitats that are distinctive because caribou use them (data from projects listed below) or because these habitats are scarce in the Northeastern and their importance to caribou is not known. Examples of these distinctive habitats include the following:

- large, undeveloped landscape units (>120 000 ha);
- patches of white spruce surrounded by extensive areas of black spruce or mixedwood;
- large, alluvial systems;
- older, coniferous stands with arboreal lichens;
- dry pine sites with terrestrial lichens;
- remote alpine caribou calving areas, and
- wind-blown alpine tundra with terrestrial lichens.

The large, undeveloped landscape units are a particularly noteworthy habitat in Northeastern B.C. Only four landscapes that have timber that is considered "commercially viable" by today's economic standards remain "undeveloped" (Ministry of Forests, 1992). All the other landscapes classified as undeveloped occur in the SWB, are sparsely forested, and have extensive burn patterns from wildfires or from fires prescribed to create grasslands. The undeveloped, forested landscapes provide a valuable opportunity to examine caribou ecology and broader conservation issues relating to landscape ecology, ecosystem function, faunal interactions, and the habitat connectivity.

Caribou in Northeastern B.C.

Child (1987) commented about caribou in the Northeast that "status unfortunately cannot be accurately described, as inventory generally is largely lacking for most [caribou] groups and too infrequent on some to establish reliable trends." With this limited information, he estimated that there were 4700 caribou in Northeastern B.C. and presented population trends for the three administrative units used by B.C. Environment:

Northeast Peace	-decreasing
South Peace	-increasing
Omineca	-stable

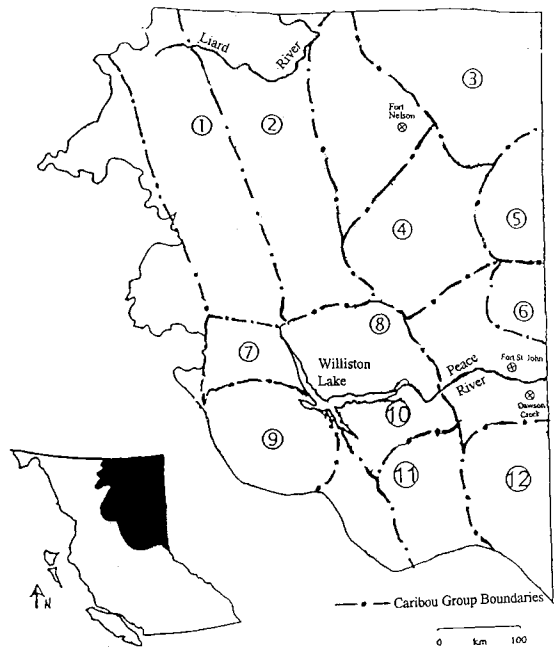

Fig. 1. Caribou Groups in Northeastern British Columbia. Group bondaries are estimated from radio-collar data and from field reports of caribou movment.

Four radio-collaring projects have gathered information about caribou groups in specific areas. In 1988, 10 collars were placed on caribou in the Graham River area (Group 8, Fig. 1), and in the following year, 10 caribou were collared in the Tumbler Ridge area (Group 12, Fig. 1). Twenty caribou in the Sikanni Chief and Profit River drainages were collared in the winter of 1990-91 (Group 4, Fig. 1). The fourth project began during the winter of 1990/1991 under the Peace-Williston Fish and Wildlife Compensation Program. Twenty-nine caribou in the Omineca Mountains were collared (Group 7 and Group 9, Fig. 1).

Movement patterns of Northeast caribou appear to be variable. The three classes of movement patterns described by Terry (1992) for caribou in east-central B.C. apply in the Northeast: migrators, non-migrators, and wanderers. Progress reports (B.C. Environment, unpubl.; Williston Wildlife Compensation Program, unpubl.) and information from people involved with the projects (R. Backmeyer, pers. comm.) suggest that there may be as many as 12 caribou groups in Northeastern B.C. (Fig. 1). The bounding of these 12 groups is subjec-

tive and should be tested with an expanded radio-collaring program.

Knowing which groups are distinct and how the caribou move throughout the Northeast has implications for resource management. For example, if the estimate of 12 groups is accurate, all caribou habitat requirements should be maintained in each of the 12 areas. If, on the other hand, there are fewer groups and caribou make long movements among areas, management should maintain connectivity and habitat on a broader scale.

An understanding of the ecology of different caribou groups also is important for management. Stevenson (1990) describes two ecotypes of woodland caribou in B.C.: Northern and Mountain. The Northern ecotype lives where snowfall is low and winter either in mature lodgepole pine and lodgepole pine/black spruce/white spruce forests or on wind-blown slopes in the alpine. In the winter, these caribou crater for terrestrial lichens. The Mountain ecotype occurs where snowfall is high and feeds primarily on arboreal lichens in the ESSF (Stevenson, 1990).

The Northeast may have both ecotypes. Some caribou groups winter on high elevation ESSF and alpine ranges while others use lower elevation lodgepole pine and lodgepole pine/black spruce/white spruce forests (B.C. Environment, unpubl.; Peace/Williston Compensation Program, unpubl.). Northeast caribou feed on arboreal lichens, terrestrial lichens, or a combination of both. The implications for management with the different ecotypes are discussed by Stevenson (1990).

Interactions with other species also are part of caribou ecology. In some areas of the Northeast, caribou live with 7 ungulate species and 7 predatory species. Competition or predation undoubtedly are important, but it is not clear as to their role as regulating or limiting factors in caribou populations (see Boutin, 1992). Unlike other areas of B.C., moose have long been present in the Northeast (Hatter, 1950 in Bergerud & Elliot, 1986). This is in contrast to other areas of the Province where wolf predation associated with changing moose populations is suggested as a limiting factor on caribou (Bergerud & Elliot, 1986). Regardless of the specific interaction between caribou and other species, the reduction of habitat and the increase in human access intensify those interspecific interactions by concentrating species in smaller areas or by increasing predator's search efficiencies.

Issues of Caribou and Resource Management

There are many resource-based industries in Northeastern B.C. that impact caribou habitat: forestry, oil and gas, pipeline and utility corridor construction, agriculture, mining, and hydro-electric. There have also been management activities that affect caribou populations such as access development, prescribed burning and wolf removal. Current concerns of caribou management focus on logging, access development, seismic activity, and pipeline construction because of the rapid and continual expansion of these operations across the land-base.

Caribou populations are at risk of decline in Northeast B.C. because the rate of habitat change is greater than the rate at which managers are gaining knowledge about caribou. This means that managers have insufficient local information upon which to base resource decisions. The aim of the four radio-collaring projects has been to get data on caribou seasonal movements and habitat use. Project sites were chosen because of previous or pending habitat losses from hydro-electric dams, logging, mining, or oil and gas development. However, poor funding limited the scope of most projects.

Clearly, if viable populations of caribou (and other fauna) are to be conserved, resource managers must improve their knowledge of local ecology. This should be done with a combination of monitoring projects to track population numbers and distributions and research that investigates the impacts of human activities on caribou ecology.

Research is part of the solution for improved caribou management. Another part should come from the implementation of innovative and adaptive resource management strategies. Adaptive management means that a variety of management strategies are employed as part of industrial operations. The aim is to learn how disturbances, such as resource extraction, affect ecological systems by setting defined, measurable goals, trying different management actions and monitoring the outcomes (Peterman, 1979). The types of disturbances are varied to observe changes in the results. For example with logging, of all the silvicultural systems available, clear-cutting has been used extensively. On appropriate sites, other silvicultural systems should be used to increase the variability of management actions on the land-base. As the results are monitored, practices are adapted to achieve management objectives. This is done to provide greater options in the future by mitigating against the possible negative consequences of having nothing but clear-cuts and even-aged plantations.

Conclusion

The issues of caribou management in Northeastern B.C. are similar to management concerns in other jurisdictions; however, advancements in the under-

standing of Northeastern B.C.'s ecosystems are not keeping pace with the rate of industrial development. A combination of approaches is required that includes scientific studies and innovative, adaptive resource management.

Government agencies, industry, and other interested parties should be working to understand and manage the habitat for woodland caribou (and other flora and fauna) rather than hoping the species will adapt to the changes because of some inherent ecological plasticity.

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