

## Caribou in British Columbia: A 1996 status report

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*Abstract:* Caribou (*Rangifer tarandus*) in British Columbia are classified into mountain, northern and boreal ecotypes based on behavioural and ecological characteristics. We recognized 12 mountain caribou herds, 27 northern caribou herds, and an area occupied by low density boreal caribou dispersed in the boreal forests of the northeast portion of the province. Abundance estimates were usually based on attempts at total counts made from the air. Trends were based on repeated population estimates or the difference between recruitment and mortality rates for each herd. In 1996 there were approximately 18 000 caribou in British Columbia; 2300 mountain and 15 600 northern and boreal. These estimates suggest a slight increase in the numbers of both ecotypes over the last 18 years. Fifteen percent of the herds were reportedly increasing, 10% were decreasing, 31% were stable, but for 44% of the herds the trend was unknown. Historically caribou were found throughout 8 of the 14 biogeoclimatic zones in B.C. Caribou are now rarely found in the Sub-Boreal Spruce zone, likely due to increased predation from wolves that increased in response to increasing moose numbers. Ranges of several herds in the Engelmann Spruce – Subalpine Fir and Alpine Tundra zones of south-eastern British Columbia are also reduced relative to historic conditions, probably because of habitat loss, habitat fragmentation, predation and hunting. Forest harvesting represents the greatest threat to caribou habitat and current research focuses on the mitigation of forest harvesting impacts.

**Key words:** *Rangifer tarandus*, caribou, demography, forestry impacts, distribution, habitat, biogeoclimatic zones.

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### Introduction

Caribou (*Rangifer tarandus*) in British Columbia are classified into mountain, northern and boreal ecotypes (Bergerud, 1978; Edmonds, 1991; Stevenson, 1991) based on behavioural and ecological differences. Mountain caribou are found in the rugged mountains in the south-eastern portion of the province (Fig. 1). They winter at high elevations and rely almost exclusively on arboreal lichens because the deep snowpack restricts access to terrestrial foods (Stevenson & Hatler, 1985). Mountain caribou have been designated as a blue-listed species by the British Columbia Conservation Data Centre because of past declines in distribution and abundance. As a blue-listed species, these caribou are considered vulnerable or sensitive, and need special management to ensure their survival.

Northern caribou, on the other hand, occur in the mountainous western and northern parts of the pro-

vince where snowfall is low, relative to mountain caribou habitat (Bergerud, 1978). They winter in either mature low elevation lodgepole pine or black spruce forests where they feed primarily on terrestrial lichen and to some extent on arboreal lichen, or also on high wind-swept slopes where there is access to terrestrial lichens (Bergerud, 1978; Stevenson & Hatler, 1985).

The boreal ecotype occurs in the relatively flat boreal forests of the northeastern portion of the province. They do not appear to occur in discrete herds, but live in small, dispersed, relatively sedentary bands throughout the year (Edmonds, 1991; Stevenson, 1991). The boreal ecotype is sometimes lumped with northern caribou (e.g., Seip & Cichowski, 1996) and because neither are considered vulnerable or sensitive, are yellow-listed.

The status of caribou in the province has been reviewed in whole or in part by Bergerud (1978),

Table 1. Status of British Columbia caribou herds in 1996.

Herd number	Herd name	Estimate	Trend	Other names	Source
<u>Mountain Caribou Herds</u>					
1	South Selkirk*	50	stable	Kootenay Pass; Salmo-Creston	Simpson <i>et al.</i> , 1997
2	South Purcell	100	declining		Simpson <i>et al.</i> , 1997
3	Central Selkirk	220	declining		Simpson <i>et al.</i> , 1997
4	Monashee	20	declining		Simpson <i>et al.</i> , 1997
5	Revelstoke*	400	stable		Simpson <i>et al.</i> , 1997
6	Central Rockies	50	stable		Simpson <i>et al.</i> , 1997
7	Wells Gray*	350	stable	North Thompson; Wells Gray North and Wells Gray South	B. Shear, pers. comm.
8	Quesnel Lake*	125	increasing	Cariboo Mountains	J. Young, pers. comm.
9	Barkerville	40	declining		J. Young, pers. comm.
10	George Mountain*	50	unknown		G. Watts, pers. comm.
11	Narrow Lake*	20	increasing		G. Watts, pers. comm.
12	Yellowhead*	875	increasing	McGregor; Hagen; Sugar Bowl; Hart Ranges	D. Heard, unpubl. data
<b>TOTAL</b>		<b>2,300</b>			
<u>Northern Caribou Herds</u>					
13	Charlotte Lake	50-100	stable		J. Young, pers. comm.
14	Itcha-Ilgachuz-Rainbow*	1700	stable		D. Cichowski, pers. comm.
15	Twedsmuir-Entiako*	500	stable		D. Cichowski, pers. comm.
16	Telkwa*	9	declining		R. Marshall, pers. comm.
17	Quintette*	200	unknown	includes Tumbler Ridge	J. Elliott, pers. comm.
18	Kennedy Siding*	100	unknown		D. Heard, unpubl. data
19	Moberly	200-400	unknown		J. Elliott, pers. comm.
20	Wolverine*	300-500	unknown	Omineca Mts; Germansen Lake	M. Wood, pers. comm.
21	Takla*	100	unknown		D. Heard, unpubl. data
22	Chase*	500-900	unknown	Omineca Mrs; Axelgold-Sikanni	Wood, 1996
23	Graham*	800	unknown	Halfway-Prophet	J. Elliott, pers. comm.
24	Pink Mountain*	1300	stable	Sikanni Chief; Cypress River; Prophet River; Cameron-Chowade; Beaton-Blueberry	J. Elliott, pers. comm.
25	Finlay	200-400	unknown		J. Elliott, pers. comm.
26	Spatsizi*	2200	stable	Lawyer's Pass; Edozadelly; Tomias; Caribou Mt.; Pitman River	D. Cichowski, pers. comm.
27	Edziza	<200	unknown		R. Marshall, pers. comm.
28	Level-Kawdy	1400	unknown		R. Marshall, pers. comm.

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29	Cry Lake*	>150	unknown		
30	Frog	150	unknown		
31	Gataga	250	unknown		
32	Muskwa	1250	unknown	Mt. Deli; Crest; Toad; MacDonald-Racing	
33	Rabbit	800	unknown	Kechika	
34	Liard Plateau	150	stable		
35	Horse Ranch	300	increasing	Deadwood	
36	Little Rancheria*	450	declining	Blue-Rancheria	
37	Jenning	200	unknown		
38	Atlin East	500	unknown		
39	Atlin West	300-400	stable	Carcross	
40	Boreal caribou	725	unknown	Northeast	
	TOTAL	15,559			

\* Herd ranges shown in Fig. 1 were based primarily on the movement of radio-collared caribou.

Stevenson & Hatler (1985), Williams & Heard (1986), Edmonds (1991), Seip & Cichowski (1996) and Simpson *et al.* (1997). This paper maps the distribution of all caribou herds in the province and summarizes recent estimates of herd sizes and trends.

## Methods

We asked biologists in the province to supply us with their most recent population estimates and range boundaries. Mapped ranges include the year-round distribution of all animals and for 22 of the herds, boundaries were based primarily on the movements of radio-collared caribou (Table 1). Abundance estimates included calves and were usually based on attempts at total counts made from the air. Trends were based on repeated population estimates or the difference between recruitment and mortality rates.

## Results and discussion

### *Distribution*

Two systems of classification have been used to describe the major ecosystems of British Columbia. The Biogeoclimatic Ecosystem Classification system (BEC) classifies areas by climate and vegetation, whereas the Ecoregion Classification system (EC) defines major climate and physiographic regions (Meidinger & Pojar, 1991). There was no correlation between caribou distribution and ecoregions possibly because the EC classifies the landscape into contiguous geographic units that circumscribe all elevations. The historical and current distribution of caribou is closely related to biogeoclimatic zones, probably because the BEC delineates altitudinal belts within geographic units (Meidinger & Pojar, 1991), which are important components of caribou foraging and anti-predator strategies (Bergerud *et al.*, 1984).

Historically, caribou were found in 7 forested biogeoclimatic zones: Sub-Boreal Spruce (SBS), Engelmann Spruce-Subalpine Fir (ESSF), Interior Cedar-Hemlock (ICH), Montane Spruce (MS), Sub-Boreal Pine Spruce (SBPS), Spruce-Willow-Birch (SWB) and Boreal White and Black Spruce (BWBS) and the adjacent Alpine Tundra (AT) (Fig. 2). Caribou no longer occupy about 15% of their historic ranges (Seip & Cichowski, 1996). Caribou are now rarely found in the Sub-Boreal Spruce zone, likely due to increased predation from wolves that

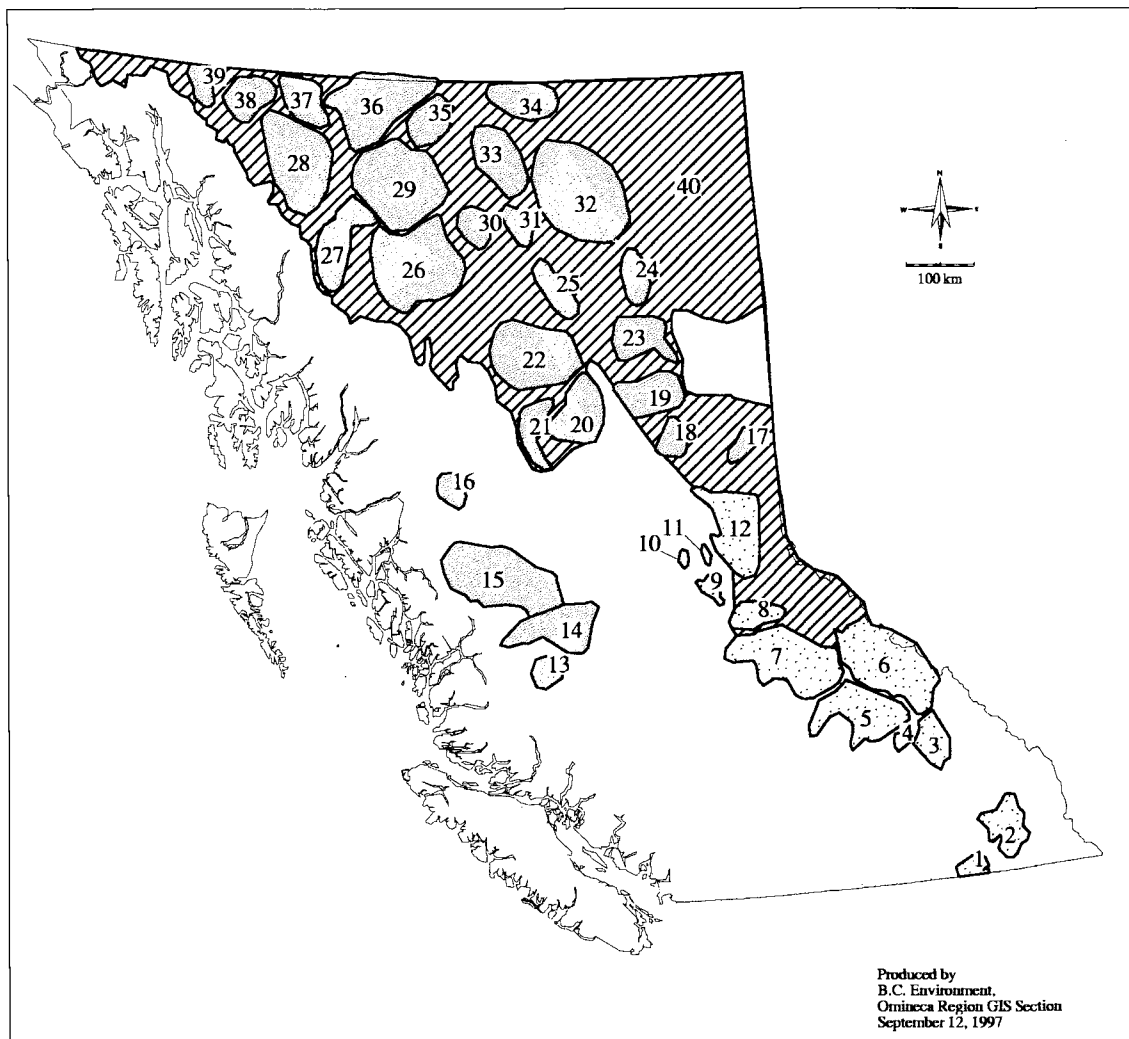


Fig. 1. Distribution and range boundaries of mountain, northern and boreal caribou ecotypes in British Columbia. Stippling represents the mountain caribou herds, shading the northern caribou herds, and diagonal lines the areas of low caribou density and, in the northeast, where caribou do not appear to occur in defined herds (i.e., the boreal caribou).

increased in response to increasing moose numbers. Caribou are absent from the alpine and adjacent forested areas south of the Spatsizi and Edziza herds, and their range has shrunk, relative to historic conditions, within the other previously occupied biogeoclimatic zones in the southern half of the province (Figs. 1 and 2), probably because of habitat loss, habitat fragmentation, predation and hunting. Caribou have never occurred in the Interior Douglas-fir (IDF), Bunchgrass (BG), Ponderosa Pine (PP), Coastal Douglas-fir (CDF), Coastal Western Hemlock (CWH) or Mountain Hemlock (MH) biogeoclimatic zones to any great extent.

We recognized 39 discrete herds; 12 mountain and 27 northern caribou herds (Fig. 1, Table 1). Where herd boundaries were based on the movements of radio-collared animals, there was little interchange between adjacent herds. The boreal caribou in the northeast do not appear to occur in discrete herds (represented by the number 40 on Fig. 1).

#### Abundance

In 1996 there were about 18 000 caribou in British Columbia; approximately 2300 mountain caribou and 16 000 northern and boreal caribou (Table 1).

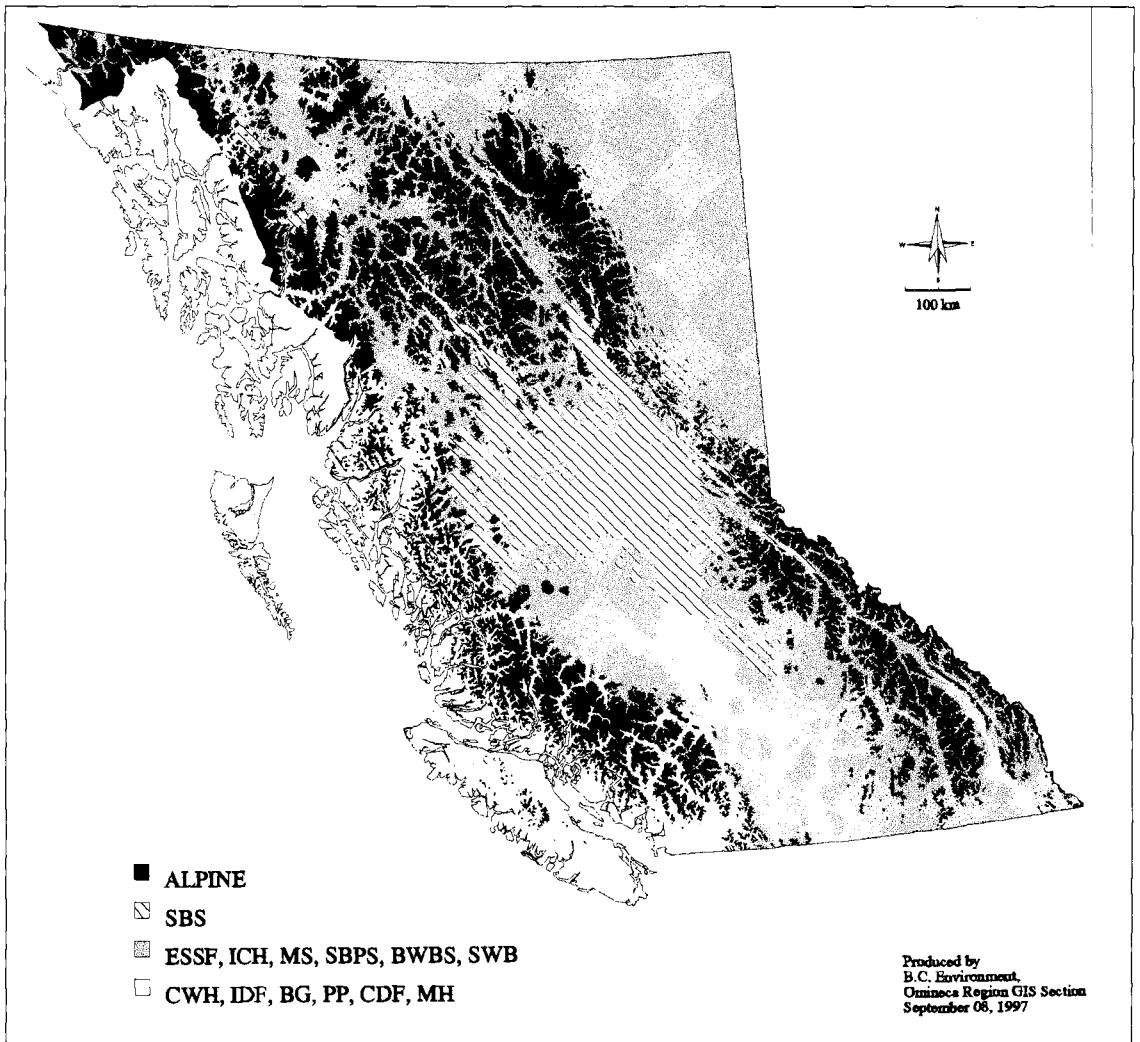


Fig. 2. Groupings of biogeoclimatic zones by relative importance as caribou habitat. Caribou occupy most of the ESSF, ICH, MS, SBPS BWBS SWB and the adjacent Alpine Tundra and, formerly, also occupied the SBS. See the text for names of the biogeoclimatic zones.

This provincial total is slightly higher than the 1991 estimate of 13 800 to 17 000 animals, of which 1900 - 2000 were mountain caribou (Edmonds, 1991), and substantially higher than Bergerud's provincial estimate of 10 500 - 13 000 (Bergerud, 1978). Both Bergerud (1978) and Stevenson & Hatler (1985) estimated the number of mountain caribou to be about 1500. There appears to have been an increase in the number of both mountain and northern ecotypes over the last 18 years based on those reports. More intensive survey effort may have contributed to the apparent increase in numbers of the northern ecotype.

Of the 39 herds, 15% (6) are increasing, 10% (4) are decreasing, 31% (12) are stable, and the trend for the remaining 44% (17) of the herds is unknown (Table 1). The trend for boreal caribou is unknown.

#### *Population Dynamics*

The status of the following herds has changed relative to previous reports. In 1996, a total of 19 caribou was translocated from the Yellowhead and Wells Gray herds to the range of the South Selkirk herd that extends into Washington State. Those animals may make a substantial contribution to a herd of only 50 individuals.

Simpson *et al.* (1997) concluded that caribou numbers were stable in the Wells Gray and Quesnel Lake herds in 1996, but both of those herds now appear to be increasing based on recent counts and Seip & Cichowski's (1996) analysis of birth and death rates.

Even though Simpson *et al.* (1997) considered the George Mountain herd part of the increasing Yellowhead herd, we considered it a separate herd because no radio-collared animals have left the mountain and conversely no radio-collared animals from the Yellowhead or Narrow Lake herds have traveled there. The trend for the George Mountain herd is unknown.

The Yellowhead and Itcha-Ilgachuz-Rainbow Mountains herds have increased as expected based on analysis of birth and death rates (Seip & Cichowski, 1996). But contrary to their prediction of a decline, the Tweedsmuir-Entiako herd population estimates have not changed.

The Telkwa herd has continued its long decline and with only 9 individuals remaining, is clearly in danger of extinction.

The abundance of most caribou populations appears to be primarily a function of their ability to avoid wolf predation (Bergerud, 1978; Bergerud *et al.*, 1984; Seip & Cichowski, 1996). Caribou numbers declined, following the range expansion by moose in the early 1990's into central BC. Because moose provide alternative prey for wolves, this leads to a wolf population that is not only larger, but shows no negative feedback to declining numbers of caribou.

The expansion of moose range may not only explain the decline in caribou abundance, but may also explain changes in their distribution. Increased predation was likely responsible for the elimination of caribou from their former range in the Sub-Boreal Spruce biogeoclimatic zone because caribou were too far from the relative safety of alpine and subalpine refugia.

Increased moose and wolf numbers are most pronounced where moose take advantage of the early seral habitats created by logging. Industrial development (primarily logging, but also mining and oil development, and associated road building for all three) also contributes to population declines and reduced home ranges. Logging eliminates old growth forest stands which bear arboreal lichens. Roads provide access for people, which increases the potential for disturbance from increased recreational activities such as snowmobiling and hunting

(Stevenson & Hatler, 1985; Simpson, 1988). The resulting reduced foraging options force caribou to seek food elsewhere which may make them more vulnerable to wolf predation. Plowed roads, skidoo trails and snowshoe trails also increase access by wolves to caribou winter ranges with concomitant increase in predation. Development may also isolate and fragment small herds which then become more susceptible to extirpation from random variation in population processes.

#### *Current Research*

Many landscapes in the province are currently being managed at a variety of spatial scales which may mitigate the adverse effects on caribou habitat. Forest companies have had to avoid some areas, plan for extended rotations, change the size and shape of cut-blocks and retain movement corridors (Seip, 1998). An interconnecting mosaic of temporary and permanent reserves and integrated management areas are recommended to maintain the long-term viability of this species (Simpson *et al.*, 1997).

Most current research is designed to increase our understanding of caribou ecology in order to mitigate the impacts of forest development. Specific studies are being carried out to determine habitat selection at various scales (landscape, forest stand and feeding site) and for various behavioural purposes (feeding, migration and calving), relationships between predators and prey, the impact of logging practices on the growth of arboreal and terrestrial lichen and calf and adult mortality.

Several projects across the province continue to use radiotelemetry or trailing studies to review caribou behaviour, ecology, and habitat relationships in order to assist in setting management recommendations for land use. Future research should test those operational recommendations.

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