

PROPOSAL
TO DESIGNATE ALBERTA'S CARIBOU AS A THREATENED SPECIES

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1. INTRODUCTION

The size and distribution of provincial caribou herds have decreased considerably in recent years. This conclusion is supported by dissimilarities between the size and distribution of current and historic populations. Although the status of caribou herds in different locations probably became diminished for dissimilar reasons, populations throughout the province have declined. Furthermore, several components of caribou biology and behavior greatly increase their susceptibility to overharvests and industrial pressure. Traditional habitats, reliance on mature forests, learned behavior, gregariousness and low levels of reproduction are the most notable characteristics which make caribou quite sensitive to large scale habitat changes and more vulnerable to hunting than any other North American cervid. Consequently, development of a comprehensive management plan based on upgraded inventories, biological studies and a review of current industrial and recreational activities is critical to prevent additional reductions in caribou numbers and distributions. Failure to adopt preventative measures and a suitable management strategy ultimately could result in disappearance of caribou from much of their traditionally important range.

II. NEW ZEALAND NUMERICAL INDEX: CARIBOU STATUS IN ALBERTA

Using a numerical index based on eight criteria developed from work in New Zealand, the status of caribou in Alberta is defined (Appendix 1.) for each criterion the rank, name, and number will be given.

I.	Taxonomy	-	genus (7)
II.	Abundance	-	< 5,000 (1)
III.	Distribution	-	restricted (7)
IV.	Distribution of habitat	-	localized (4)
V.	Stability of habitat	-	unstable (4)
VI.	Population trend	-	decreasing (7)
VII.	Reproductive potential	-	low (7)
VIII.	International standing	-	shared (1)

TOTAL SCORE: 38

Based on these results, caribou in Alberta should be placed in the "Threatened" category (Appendix 1).

III. Taxonomy

Specific nomenclature for caribou is considerably varied and the subject of some controversy. Their taxonomic status has changed repeatedly because of a changing focus on various characteristics. After comprehensive systematic studies, Banfield (1961) concluded that caribou and reindeer belong to a single polytypic

species *Rangifer tarandus*. Favoring synthesis and simplification, this system classified all forest-dwelling North American caribou under one sub-species, *Rangifer tarandus caribou*. Caribou populations previously described as *Rangifer montanus* (mountain caribou) are treated only as a deme by Banfield(1961).

However, Banfield's description heavily emphasized anatomy and physiology and overlooked important ecological features. Furthermore, isolation of various caribou bands from other caribou populations for thousands of years resulted in a divergence sufficient to cause treatment of mountain caribou at various taxonomic levels in the past and should have greater bearing on current taxonomy. Ecological differences including food habits, habitat selection, movements and migration patterns, banding patterns and geographic location provide reasons to disagree with Banfield's classification. An overemphasis of physical characteristics at the expense of ecological differences underestimates the variability existent between local populations. Furthermore, clines exist in size, antler conformation, coloration, behavior and patterns of resource utilization. The mountain caribou of the Cordilleran region of Western Canada are part of a well defined deme (Banfield 1961). They are generally larger, darker and more robustly antlered than other populations in the woodland caribou series. Mountain caribou also exhibit several major differences in patterns of resource use. To some extent these characteristics may represent polymorphism, but these divergent habits may be attributable to a differential selection process and geographical isolation. These characteristics are significant ecologically and may provide sufficient evidence to warrant distinct nomenclature.

To date information regarding the taxonomy of caribou in Alberta is unclear. Further work in this area is essential in order to classify our caribou properly. Preliminary studies demonstrate a high likelihood that two ecotypes, mountain and woodland caribou exist. Although, the number of woodland caribou has declined, our mountain caribou populations have experienced an even higher rate of depletion. The caribou in Alberta are in the only members of the genus *Rangifer* (a rank of 7) and based on the most current (albeit incomplete) data the species *tarandus* and subspecies *caribou*.

IV. ABUNDANCE: POPULATION SIZE

Current estimates of caribou populations for Alberta, based on the best available information, have decreased at least 50% over the last 15 years and probably do not exceed 3500 animals (Bloomfield 1980). However, it is generally recognized that inventories are imprecise and require considerable upgrading to evaluate the status and distribution of the remaining herds.

V. ACTUAL DISTRIBUTION

Because of incomplete inventories the actual distribution of caribou populations, particularly during snow free months remains somewhat unclear. However, many biologists agree that winter forage is a population limiting factor and is an important control on the upper limit of caribou population (Bloomfield 1979; Edwards and

Ritcey 1960; Freddy 1974; Henshaw 1964; Klein 1968). Furthermore, caribou tend to form larger, more easily located groups during winter, particularly under adverse conditions. This behavior favors survival in a number of ways. Consequently, the distributions of provincial populations during the season of greatest concentration have been more effectively defined and although further surveys are required to determine winter patterns and critical areas, it is clear that distributions are restricted and caribou winter in less than 25 locations (see distribution map).

VI. DISTRIBUTION OF HABITAT

Range use and population success for caribou (*Rangifer tarandus caribou*) have been tied to the availability of lichen forage (Wein and Speer 1975). The significance of arboreal lichen winter forage (Bloomfield 1979; Freddy 1974; Bergerud 1972; Ahti and Hepburn 1967; Scotter 1962; Edwards and Ritcey 1960) and terrestrial lichen forage (Parker 1975; Bergerud 1972; Ahti 1962; Scotter 1965) is well documented. Mature and overmature forest stands are necessary for caribou winter survival (Bloomfield 1979; Freddy 1973; Scotter 1965; Edwards and Ritcey 1960); and provide other seasonally important sites such as migration routes and calving areas. However, the key requirement for successful caribou management is maintenance of traditionally important sites with a large, flexible home range. Unfortunately, indiscriminate development within critical areas have destroyed the integrity of many traditionally important habitats.

Furthermore, barriers resulting from various industrial and recreational activities have effectively caused range discontinuity (disrupted movements) and effectively reduced intergroup contacts and restricted the ability of caribou to fully utilize their range. Examples may include poorly designed roads, railroads, seismic lines and impassable walls of debris created by logging activities. The overall results may have included breakdowns in social structure, increased hunting, overutilization of portions of caribou range and reduced reproduction. Those results were probably major contributors to the decline of the populations. Although preliminary range evaluations have been conducted, further capability assessments should be a major component of continued management studies. In any case, recovery of the caribou populations in Alberta will be intimately linked to the availability of suitable range for population expansion. Consequently, traditionally important but currently underutilized range must continue to be managed for caribou. The known distribution of caribou habitat has been identified on the accompanying map.

VII. STABILITY OF HABITAT

Caribou are a nomadic and migratory species whose survival is contingent upon the maintenance of critical habitat and suitable travel corridors interconnecting areas of special significance. Lichen regeneration rates are slow and, therefore, range rotation by caribou also is instrumental to survival as it prevents overutilization of their range. Therefore, it is important that caribou

have a proportionately large and flexible home range.

Oil and gas exploration is increasing in known caribou range areas. Seismic lines and associated activity, as well as drilling operations, can disrupt movements of caribou and cause band fragmentation (Banfield 1974). Wintering caribou are dependent on mature and over-mature lichen-producing forests for cover, food and shelter (Bloomfield 1979; Edwards 1956; Edwards and Ritcey 1959, 1960; Freddy 1974). As such, intensive logging which rapidly reduces the mature forest cover is in direct conflict with sustained caribou production. Programs aimed at maintaining young forests or those involving the removal of large tracts of timber over a relatively short time period disrupt normal movement patterns and destroy important lichen-bearing forests. Consequences of this logging expansion can include range discontinuity, barriers to movement and increased human access. This will lead to an unstable habitat and a general attrition of critical caribou range. Numerous sites are liable to be destroyed within ten years and the status of many others is uncertain.

VIII. POPULATION TREND

During 1966 the caribou population in northern Alberta was estimated to consist of 6860 - 9060 animals (Stelfox 1966) whereas by 1973 estimates for the same area were reduced to 4800 - 5200 caribou (Lynch and Pall 1973). Although, additional population data is required, current numbers (based on the best available information and liberally estimated) probably do not exceed 1500 - 3500 caribou. This represents a decline of caribou populations in

Alberta by at least 50% within 15 years. The decline both in distribution and population size has been steady and continual.

IX. REPRODUCTIVE POTENTIAL

Females occasionally are mature as yearlings but the majority do not reach maturity before two years and quite commonly are not bred until approximately 28 or 40 months (Bergerud 1971; McEwan 1963; Parker 1972; Skoog 1968). Male maturity follows a similar pattern. Mature sperm are first produced at about 18-20 months (McEwan 1963). However, bulls often are not sexually active prior to two years and most activity is restricted to the four to seven year old age class because of the highly socialized group structure of caribou (Bergerud 1967; Espmark 1964; Pruitt 1960; Skoog 1968). Animals under four years are typically subordinate (Bubenik 1975; Espmark 1964; McEwan 1963). Males become most sexually active around four years of age, and females, around 28 or 40 months. Consequently, the reproductive potential of caribou in Alberta is "low" (first young produced at three years of age).

An additional factor which can have a negative impact on caribou reproduction is the activity associated with land-use programs. During much of the year caribou travel in large and conspicuous groups. In their wanderings they cover large areas using traditional routes and they exhibit traditional behavior in their use of seasonally important areas including calving, rutting and wintering grounds. Caribou may avoid areas where there is a

high level of human activity. These alienated areas may provide important calving sites. Barriers such as pipelines, seismic lines and roads may also prevent caribou from reaching calving and breeding areas. Company and service personnel involved in industrial programs have been known to use firearms and snowmobiles for recreation. Hunting activity is common and the large number of people active in a given area can exert considerable pressure. In addition noises associated with this high level of activity harass wildlife and may cause injury, reductions in productivity or death.

Furthermore, the social structure and traditional habits of caribou allow them to be easily exploited. Caribou are the only ungulates with the female growing antlers. These females retain their antlers until after they give birth. As such, antlers facilitate foraging during winter months and provide survival advantages to a cow and her offspring during winter. Conversely, antlered cows are often shot during cow hunting season or are shot by hunters unable to distinguish between antlered cows and bulls during a male only season. This phenomenon leads to a selection for unantlered cows which is in contrast to natural selection processes which favor the more successful antlered cows. Furthermore, alpha and beta males are dominant in a herd and their presence increases sexual activity within the group. These bulls are preferred by hunters because of their large antler size. Loss of this cohort leaves only subordinate males, less capable of sexual activity for various reasons (Bloomfield 1979).

Another factor which allows caribou to be easily exploited and overhunted is the fact that caribou do not perceive danger at great distances and, particularly when in large groups, are curious and not wary of man. All in all, the normally low productivity of caribou, a fine balance between mortality and recruitment, has diminished further because of various human activities and has reached a level at which gains cannot offset losses and a major decline occurred.

X. INTERNATIONAL STANDING

International standing is strongly related to taxonomy. Consequently, because of the need to further analyze the taxonomy of Alberta's caribou populations the international standing of our caribou remains unclear. However, sufficient information is available to strongly suggest that Alberta supports both woodland and mountain caribou. Although both varieties have experienced population declines, the mountain caribou have declined most dramatically, a development which causes greater concern because of their comparatively smaller distribution and their historic prominence in western Canada. Furthermore, the disappearance of a local population may have little global influence but would represent a decline in environmental quality and the diversity of Alberta's wildlife community.

XI. SUMMARY AND CONCLUSIONS: MANAGEMENT STRATEGY

Caribou populations probably have declined because of the cumulative effect of recreational and industrial activities. A total hunting closure for both sexes is necessary to prevent further declines in the size, reproduction and social organization of Alberta's remaining populations and should be continued until a sizeable population increase has been realized. However, caribou survival also is contingent upon maintenance of critical habitats and suitable travel corridors which interconnect these areas. Further habitat alienation resulting from indiscriminate land development will exacerbate an already serious problem through loss of critical areas, range discontinuity, increased access, creation of barriers to movement, reductions in carrying capacity and disruption of normal patterns of social interaction and resource use. Although the hunting closure is urgently needed (and overdue) successful caribou management largely will be dependent on intensive, longterm population and habitat studies, a review of current land-use practices, the subsequent development of a comprehensive management plan and implementation of guidelines for industrial and recreational activity in caribou range (Bloomfield 1980). The technological and professional expertise is available. Therefore, all that is required is the resolve and inter-departmental commitment to solve the problem. Failure to implement those measures necessary to prevent additional reductions in caribou numbers and distributions ultimately could result in disappearance of viable populations in many parts of Alberta.

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APPENDIX I

PROPOSED SYSTEM FOR DESIGNATION OF

THREATENED AND ENDANGERED

SPECIES IN ALBERTA

PROPOSED SYSTEM FOR DESIGNATION OF
THREATENED AND ENDANGERED SPECIES

The status of species can be determined objectively using a numerical index based on eight criteria developed from work in New Zealand.* Each criterion has four ranks in descending order of 10, 7, 4 and 1 (Table 1).

A species rating is established as follows. First, its rank in each criterion is established and the appropriate value assigned. Second, those values are summed for a status score and the designation of the species assigned as follows:

Endangered - status score of 40 or greater.

Threatened - status score of 35 to 39.

Rare - considered when status score is 30 to 34.

Not in jeopardy - status score of 29 or less.

* Bill, B.D. 1974. The rare and endangered species of the New Zealand Region and the policies that exist for their management. Presented at the XII, ICBP World Conference, Canberra.

Table 1. KEY TO DESIGNATION OF SPECIES

CRITERIA	RANK			
	10	7	4	1
I TAXONOMY (the only representative in B.C. of a:)	FAMILY	GENUS	SPECIES	SUB-SPECIES
II ABUNDANCE (number of individuals — times 10 for fish)	<100	<500	<1,000	<5,000
III DISTRIBUTION, ACTUAL (at season of greatest concentration)	VERY RESTRICTED (one location if colonial species — <5 locations if non-colonial)	RESTRICTED (<5 locations if colonial species — <25 locations if non-colonial)	LOCALIZED (a portion of one biogeoclimatic zone)	GENERAL BUT LOCALIZED (over much of B.C. but in clusters)
IV DISTRIBUTION OF HABITAT	VERY RESTRICTED*	RESTRICTED*	LOCALIZED*	GENERAL BUT LOCALIZED*
V STABILITY OF HABITAT (including food sources)	SERIOUSLY THREATENED (all sites liable to be destroyed within 10 years)	THREATENED (most sites liable to be destroyed within 10 years)	UNSTABLE (general attrition of most sites or some sites liable to be destroyed within 10 years)	DOUBTFUL (general attrition of several sites within 10 years)
VI POPULATION TREND (over time-period spanning at least 3 generations)	RAPIDLY DECREASING OR POSSIBLY EXTINCT	DECREASING	STABLE	INCREASING
VII REPRODUCTIVE POTENTIAL	VERY LOW (1st young produced at 4 years of age or older)	LOW (1st young produced at 3 years of age)	MODERATE (1st young produced at 2 years of age)	HIGH (1st young produced at 1 year of age)
VIII INTERNATIONAL STANDING	UNIQUE (only population in world found in B.C.)	MAJOR (centre of world abundance in B.C., less than 500 elsewhere or endangered everywhere else)	UNIQUE IN CANADA (only Canadian population, may be common elsewhere)	SHARED (centre of world abundance in B.C. viable population elsewhere)

APPENDIX II

CATEGORIES DEVELOPED BY THE

ALBERTA COMMITTEE

CATEGORIES AND DEFINITIONS OF SPECIES
TO BE CONSIDERED BY THE ALBERTA COMMITTEE
ON "RARE AND ENDANGERED" SPECIES

1. EXTINCT - A species or subspecies which occurred in Alberta in historical time, but which has since disappeared over its entire range.
2. EXTIRPATED - A species or subspecies which occurred in Alberta in historical time, but which has disappeared from the province, though it survives elsewhere.
3. ENDANGERED - A species or subspecies whose prospects for survival and reproduction within Alberta are in immediate jeopardy.
4. THREATENED - A species or subspecies that is likely to become endangered within Alberta with continued deterioration of its environment.
5. RARE - A species or subspecies that occurs in small numbers in Alberta and may become threatened if its environment deteriorates.
6. NOT IN JEOPARDY - All other species or subspecies which are not included in any of the above categories.
7. STATUS UNDETERMINED - A species or subspecies which may be endangered, threatened, rare or not in jeopardy within Alberta but for which information is inconclusive.

NOTE: These categories will normally apply to indigeneous species but introduced species whose survival in the province is considered desirable will be included, at the discretion of the Committee.