

FOODS OF CARIBOU IN WELLS GRAY PARK,  
BRITISH COLUMBIA

R. Yorke Edwards and Ralph W. Ritcey  
Parks Branch, Department of Recreation and Conservation,  
Victoria, British Columbia

Caribou (*Rangifer arcticus*) in Wells Gray Park, British Columbia, live in a wide variety of habitats. Through the year these caribou use all elevations, roaming from permanent snow high in the mountains to dense forests in the valley bottomlands, and they encounter many kinds of plants potentially suitable as food. The purpose of this study was to determine those species of plants selected by caribou from the profusion of species available to them.

Since 1951, biological investigations in this park have included the collection of data on the foods of caribou. This was not intensive study. In most cases data were gathered on reconnaissance trips through the mountains. It is difficult to be intensive in the study of these animals. Their numbers are small with the result that an intensive program of taking animals for stomach analysis might be reflected in decreased abundance of the caribou. Observations of living animals have provided most information, and here each fragment of data accumulated is the result of good fortune. It is good fortune, in this rough terrain, to find caribou undisturbed and feeding, and further good fortune to be able to observe what species of plant is eaten or, later, to find evidence of plants eaten where a caribou was observed feeding.

Most data on foods eaten in fall and winter were gathered by R. G. Miller, who spent two winters on caribou winter range and made observations from valley floor to timberline in this area of severe winters with deep snow.

## Description of Area

The topography, climate and vegetation of Wells Gray Park (Lat. 52°N, Long. 120°W) have been described elsewhere (Edwards, 1954; Miller, Ritcey and Edwards, 1955; Ritcey and Edwards, 1958). The terrain inhabited by caribou in this area has a subdued mountainous topography with wide, heavily glaciated valleys at 3500 feet, and steep sided foothill elevations reaching up to 8000 feet. The climate is wet in an area where air masses from the Pacific are cooled by mountains after crossing the warm Interior Plateau of British Columbia. Winters are cold and snowfalls are heavy. Snow fields persist through summer in high, sheltered places. Higher mountains to the north have extensive glaciers.

The vegetation in this area is divided altitudinally into three major zones. Treeless alplands occur above timberline. Vegetation here is quite variable from place to place, depending upon soil depths and water conditions. Lush areas, supporting luxuriant mats of sedges and flowering herbs, occur in areas of water seepage near timberline and in the openings among the highest forest. Below the alplands, a subalpine forest of alpine fir (*Abies lasiocarpa*) and Engelmann spruce (*Picea engelmannii*) extends down from about 7000 feet to 4000 feet. This forest becomes increasingly dense, with higher canopy, as elevation decreases. Below the subalpine forest is the Columbia Forest (Halliday, 1937), characterized by western

red cedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*) with some alpine fir and Engelmann spruce. This is a mature forest with trees of large size, a forest closely allied to the forests of giant trees found on the wet Pacific Coast.

### Foods and Feeding

Caribou, as we know them and as described by many authors, do not eat browse nearly so much as do moose (*Alces alces*) or mule deer (*Odocoileus hemionus*). Moose and deer feed predominantly on twigs in winter. Caribou in this area feed on softer material, taking leaves from shrubs it is true, but rarely taking twigs. Repeated attempts to detect evidence of feeding on coarse, woody vegetation have failed. These caribou do feed extensively upon certain dwarf, woody plants such as the dwarf dogwood (*Cornus canadensis*). This is perhaps browsing of a sort, but it is probably better described as grazing.

Winter droppings of these caribou are mostly blackish in color and contain no coarse material whatsoever. In our experience all winter pellets have these characteristics. They are quite different from the brown winter pellets of deer and moose, which normally contain large amounts of recognizable wood fiber. Further, of 13 caribou stomachs examined none had material which could be classified as browse. Those few woody stems found were twigs of spruce and fir which, along with some needles from these same species, were probably eaten accidentally with other foods. Coarse material in moose and deer stomachs collected in fall and winter contrasts markedly with the fine contents of these caribou stomachs.

Ninety-three observations of identified plants observed to be eaten may be divided seasonally, as listed in Table 1. Observations from January to April were made near timberline, those from May to August were made in alpine meadows and adjacent forest, while those for October to December (there being no data for September) were made in lowland forests.

Table 1. Ninety-Three Observations of Plants Being Eaten by Caribou

Species	Number of Observation		
	Jan. to April	May to Aug.	Oct. to Dec.
Black Arboreal Lichen ( <i>Alectoria spp.*</i> )	9	3	14
Green Arboreal Lichen ( <i>Alectoria sarmentosa</i> )	2		11
Boxwood ( <i>Pachystima myrsinites</i> )	1		11
Foam Flower ( <i>Tiarella unifoliata</i> )			9
Bunchberry ( <i>Cornus canadensis</i> )			8
Twinflower ( <i>Linnaea borealis</i> )			5
Horsetail ( <i>Equisetum arvense</i> )			3
Grass		2	2

Species	Number of Observation		
	Jan. to April	May to Aug.	Oct. to Dec.
Bracken Fern ( <i>Pteridium aquilinum</i> )			2
Lichen ( <i>Lobaria pulmonaria</i> )			1
Lichen ( <i>Cetraria sp.</i> )			1
Lichen ( <i>Cladonia bellidiflora</i> )		1	
Moss		1	
Sedge		1	1
Willow ( <i>Salix sp.</i> )			1
Trailing Rubus ( <i>Rubus pedatus</i> )			1
Elephant Head ( <i>Pedicularis groenlandicum</i> )		1	
Valerian <i>sp.</i>		1	
Slide Lily ( <i>Erythronium grandiflorum</i> )		1	

\*Four darkly pigmented species in Wells Gray Park are difficult to separate: *Alectoria fremontii*, *A. oreghana*, *A. chalybeiformis* and *A. jubata*.

In winter the food of caribou is mainly arboreal lichens. Within their winter habitat when snow is deep there is little else available, except for the foliage of conifers. Deep snow makes all low-growing vegetation more or less inaccessible. There is no evidence that coniferous plants are eaten, except for fragments ingested accidentally with lichens.

In late autumn and early winter, and again in early spring, caribou seek out several evergreen plants in the forest, favoring such dwarf shrubs among them as *Cornus canadensis*, *Pachystima myrsinites*, and *Linnaea borealis*.

Data from 13 caribou stomachs have augmented observations of feeding. Of these, five stomachs were collected in October, two in November, three in December, and one in each of September, January and May. Contents identified are shown in Table 2. Caution must be exercised in interpreting this table. Less than five percent of contents were identifiable macroscopically; microscopic techniques were not used. Also, it appears that certain fibrous foods remain intact longer in caribou stomachs than do softer foods. Note especially the abundance of parts of coniferous trees, mainly needles and twigs but including some bark, which are considered to be debris taken accidentally while feeding from the ground, or while taking lichen from trees. As Norris (1943) concluded after a study of the stomach contents of domestic sheep, it seems doubtful that the contents of the stomachs of ungulates can be used as more than a general source of information on foods eaten.

Table 2. Plants Found in 13 Caribou Stomachs from Wells Gray Park, British Columbia

Food	Number of stomachs in which occurred	Number of stomachs in which common
Lichen ( <i>Alectoria</i> spp.)	12	3
Lichen ( <i>Alectoria sarmentosa</i> )	1	1
Lichen ( <i>Lobaria pulmonaria</i> )	2	2
Other Foliose Lichen (unidentified)	11	0
Lichen ( <i>Cladonia</i> sp.)	4	0
Fungus	1	0
Moss	1	0
Grasses	12	2
Sedges	7	3
Horsetail ( <i>Equisetum</i> spp.)	2	0
Lady Fern ( <i>Athyrium filix-femina</i> )	1	0
Twinflower ( <i>Linnaea borealis</i> )	7	1
Foamflower ( <i>Tiarella unifoliata</i> )	7	1
Bunchberry ( <i>Cornus canadensis</i> )	5	2
Trailing Rubus ( <i>Rubus pedatus</i> )	5	0
Huckleberry ( <i>Vaccinium membranaceum</i> )	4	1
Dwarf Huckleberry ( <i>Vaccinium caespitosum</i> )	1	0
Boxwood ( <i>Pachystima myrsinites</i> )	4	1
Willow ( <i>Salix</i> sp.)	2	0
Lupine ( <i>Lupinus</i> sp.)	1	0
Debris from Conifers	13	7

Table 2 substantiates field observations; both suggest that winter food consists predominantly of arboreal lichen and low evergreen plants. The debris indicated consisted mainly of twigs and

leaves from alpine fir (*Abies lasiocarpa*), Engelmann, spruce (*Picea engelmannii*), western red cedar (*Thuja plicata*) and lodgepole pine (*Pinus contorta*).

In hot summer weather these caribou are attracted to patches of snow where they loaf and play. We have noticed that snow is eaten frequently on such occasions. In winter they paw at snow on the ice of lakes, presumably to obtain water. This habit has been noted most frequently in December when caribou are in the lowlands. One area especially favored was on the slushy ice of a lake where caribou dug into the slush over an area 200 yards across. The ice and slush in this area were quite yellow, possibly indicating a mineralized spring entering the lake below. Perhaps the colored slush was eaten for its chemical content.

#### Comparison with Caribous Elsewhere

Conclusions from these data that caribou in summer feed on a wide variety of succulent plants are supported by studies in Alaska (Murie, 1935; Dixon, 1938), in the central arctic of Canada (Banfield, 1954), and in Newfoundland (Dugmore, 1913). Reindeer (*Rangifer tarandus*) in the Canadian arctic have similarly varied tastes (Porsild, 1954).

Cabot (1939) recorded that caribou ate slush on lakes in Maine. His observations were similar to those recorded in this study.

The importance of lichens as food for the genus *Rangifer* has been noted by many authors (Pike, 1917; Hadwin and Palmer, 1922; Palmer, 1926; Murie, 1935, 1944; Banfield, 1954). Porsild (1954) has noted that lichens are not essential, but the fact remains, as the same author points out, that survival in winter is usually dependent upon an adequate lichen supply. Usually the lichens mentioned as most important in arctic regions are terrestrial fruticose species typified by a number of species of *Cladonia*. These are popularly grouped under the term "reindeer moss".

Terrestrial lichens are scarce in Wells Gray Park. Perhaps as a result of this scarcity, and also because of deep snow, caribou in that area feed upon arboreal lichens in winter to a degree mentioned in no account of caribou foods elsewhere. With few exceptions other studies of food habits either do not mention caribou feeding upon arboreal lichens, or mention it only casually, presumably as relatively unimportant behavior. Use of these lichens in winter in arctic Canada is noted by Banfield (1954) and Harper (1955), in Alaska by Lutz (1956), and in the Gaspé by Moisan (1956); for reindeer in arctic Canada by Porsild (1954) and in Lapland by Perez-Llano (1944). Pike (1917) places considerable importance upon arboreal lichens as winter food for caribou in northern Canada, as does Cringan (1957) for caribou in western Ontario. Both of these authors describe conditions approaching those observed in Wells Gray Park.

These arboreal lichens appear to be nutritious. Smith (1921), quoting other sources, recorded that in northern Eurasia lichens were gathered as cattle fodder, and that when the terrestrial *Cladonia rangiferina* was not available, the arboreal *Alectoria jubata* was the principal alternative.

The importance of arboreal lichens as a factor in the winter survival of caribou may vary in time and space, depending upon other foods present and their availability in winter. Where winter ranges are more or less forested, however, arboreal lichens may be the key to the successful wintering of caribou. This appears to be the case in Wells Gray Park.

### Summary

Foods eaten by caribou inhabiting mountainous range in central British Columbia have been noted in 93 observations of feeding, and from examination of 13 stomachs.

A variety of foods is eaten in summer, but in winter the main food is provided by arboreal lichens of the genus *Alectoria*. Five species of these lichens are present in Wells Gray Park.

These lichens appear to be essential for survival of caribou in winter.

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