

# An Evaluation of Big Game Winter Range in Southwestern Alberta<sup>1</sup>

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In southwestern Alberta, topographic and climatic features impose a heavy concentration of elk (*Cervus canadensis nelsoni*) and mule deer (*Odocoileus hemionus hemionus*) on undersized winter ranges. The problem of managing game herds in this region is further complicated by the fact that these same winter ranges must support large numbers of cattle and sheep during

the spring and summer months.

The study reported herein was initiated in the summer of 1955.

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<sup>1</sup>*This range study was made under the supervision of Mr. E. S. Huestis, Director of Forestry, Alberta Department of Lands and Forests. The writers wish to acknowledge the cooperation of the numerous forest officers in the Crowsnest Forest Reserve who assisted with the range census in certain locales and/*

It is a follow-up of information gained from ground and aerial counts made during the winters of 1953 and 1954 in the Crowsnest Forest Reserve by the senior author. The study consisted essentially of the determination of the density and composition of range grasses and forbs on heavily utilized big game winter ranges and the evaluation of these ranges in terms of their climax status.

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*or submitted winter big game distribution maps and census figures for elk, moose, deer and bighorn sheep.*

*We also wish to thank Mr. J. A. Campbell, Department of Lands and Forests, for identifying certain grass specimens.*

### Description of Area

The Crowsnest Forest Reserve is a 1,318 square mile tract of land situated in the southwest corner of Alberta, (Figure 1), east of the Alberta-British Columbia boundary and north of Waterton National Park. The rugged western half of this forested, semi-wilderness area is dominated by the main range of the Rocky Mountains and the Livingstone range to the east, where individual peaks rise to heights of 8,000 and 9,000 feet. In the eastern half, the mountainous terrain falls away abruptly to rolling hills and open prairie. While it extends approximately 85 miles in a north to south direction its width never exceeds 32 miles and the greater part of the reserve is less than 18 miles wide. This extreme narrowness is an important consideration in the management of big game summer and winter ranges. The region is well watered and three major branches of the Oldman River serve to drain all portions of the reserve.

Coniferous forests in varying stages of development occupy a large part of the reserve (Dwight, 1913; Cormack, 1949, 1953). Although many mountains exhibit rocky and timbered slopes above 7,000 feet, the actual proportion of land surface bare of trees due to elevation, soil and slope is rather small.

The characteristic trees and shrubs of this region include: Engelmann spruce (*Picea engelmanni*), white spruce (*Picea glauca*), Douglas fir (*Pseudotsuga mucronata*), limber pine (*Pinus flexilis*), lodgepole pine (*Pinus contorta*), alpine fir (*Abies lasiocarpa*), white bark pine (*Pinus albicaulis*), alpine larch (*Larix lyallii*) balsam poplar (*Populus balsamifera*), aspen (*Populus tremuloides*), white birch (*Betula papyrifera*), saskatoon berry (*Amelanchier alnifolia*), bearberry (*Arctostaphylos uva-ursi*), pincherry

(*Prunus pennsylvanica*), shrub-by cinquefoil (*Potentilla fruticosa*), prickly rose (*Rosa acicularis*), elderberry (*Sambucus melanocarpa*), snowberry (*Symphoricarpos occidentalis*), raspberry (*Rubus* sp.) and blueberry (*Vaccinium* sp.). Other common woody plants in the reserve are willow (*Salix* spp.), and creeping juniper (*Juniperus horizontalis*).

Although spruce is the climax tree species for the region (Cormack, 1953), repeated fires have prevented the attainment of the climax type in many instances and have encouraged the development of a lodgepole pine sub-

climax community. Grasses and sedges are common everywhere on suitable soil in the more mixed stands and on many south exposed slopes where repeated fires have discouraged or destroyed tree regeneration. The predominance of grassland along the eastern border of the reserve as well as on the higher slopes of the mountain ranges is an important factor in the winter distribution of elk and deer.

During six years, 1950 to 1955 inclusive, temperatures reached a minimum of 51°F. below zero in January 1950. Below freezing temperatures can be expected even in the summer and below

FIGURE 1. Crowsnest Forest Reserve

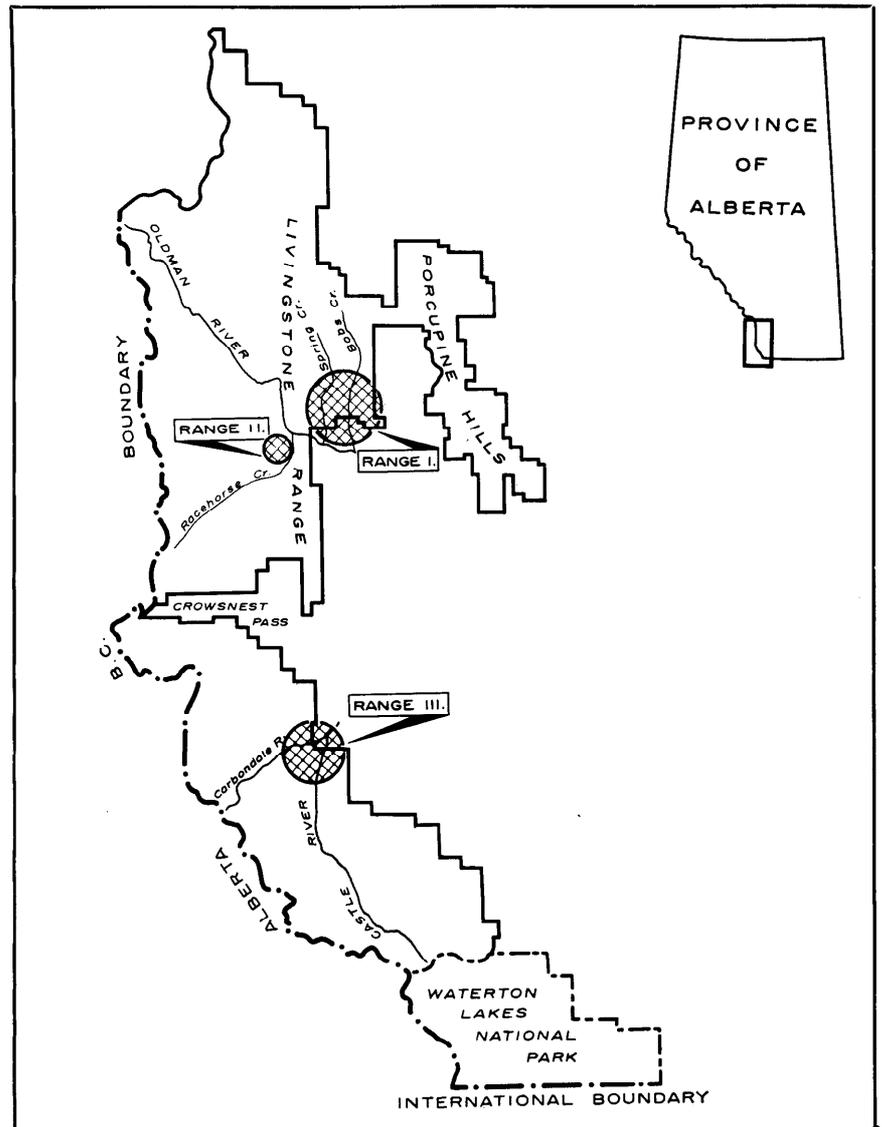




FIGURE 2. Elk winter range (Range I) showing several typical treeless slopes.

zero temperatures may occur during four to six months of the year. The average annual precipitation at one weather station for six years (1950-1955) was 24.71 inches.

Range I, (Figure 1), encompassing the valleys of Spring and Bob's Creeks, is situated below timberline. The hills rise to 1,000 feet above the valleys at elevations under 6,500 feet above sea level. Many of the gently undulating hills run in a north-south direction as a series of ridges paralleling the Livingstone range to the west (Figure 2). A large proportion of the slopes are treeless or virtually so and support various densities of grassy and herbaceous vegetation. The important elk and deer wintering areas center around these grassy slopes which are kept free of snow for an appreciable length of time each winter by the warm chinook winds.

Range II, situated along Racehorse Creek on the west side of the Livingstone range, lies between 5,000 and 6,500 feet in elevation and supports heavy stands of spruce and lodgepole pine except on some south slopes where an open park-like Douglas fir association occurs.

Range III is situated along the valleys of the Carbondale and Castle Rivers south of the Crowsnest Pass. This elk wintering area has an undulating topography and most of the hills are

lower than 6,000 feet. Tree growth is mostly confined to the river bottoms and the north and east facing slopes. Lodgepole pine, white spruce and aspen are the most abundant tree species with Douglas fir appearing sporadically on suitable sites. Willow is abundant along the two main water courses.

#### Methods of Study

The Point Sampler Method described by Clark, et al (1942) was used to measure the composition and density of vegetation on these elk winter ranges. A plant was recorded as hit when any pin of the point sampler hit the main stock of the plant as it emerged from the soil. Plants so hit were recorded as to species and location on field data sheets. This made it possible to determine an individual plant density and composition on each unit of range sampled. A total of 8,400 points was registered on the three major elk winter concentration areas. Photographs were taken to record visual aspects of range vegetative growth, general topography and slope.

#### Range Use

Range I, both in and outside the reserve, is grazed annually by large numbers of wild and domestic stock. More than 1,100 cattle graze the forest reserve portion of this range for 4½ to 5 months each year. Big game

aerial and ground counts have shown that the size of elk herd varies from 350 to more than 1,000 animals. Mule deer are very abundant too and exhibit similar distribution to elk. This range is also used by a few moose (*Alces americana andersoni*) and bighorn sheep (*Ovis canadensis canadensis*).

Even though only about 100 elk winter on Range II, sections of it show the effects of prolonged, continuous over-utilization. Moose are present but not abundant at the higher elevation. Approximately 900 cattle each summer exert additional pressure on this range.

The Castle-Carbondale region is grazed by over 1,100 cattle each summer but not all of these are confined to key elk winter range areas. Recently, elk use of Range III has been very heavy. Aerial surveys in 1954 showed nearly 1,000 elk wintering on the area. Later that year, and again in 1955 extensive "either" sex seasons resulted in a 70 percent reduction of this herd.

#### Results

Originally the Crowsnest Forest Reserve supported a climax grass vegetation dominated by rough fescue (*Festuca scabrella*, (Moss and Campbell, 1947). Prolonged use of the grassland in Range I has decreased the rough fescue and increased the secondary grasses such as bluebunch wheat grass (*Agropyron spicatum*), Parry oat grass (*Danthonia parryi*), June grass (*Koeleria cristata*) and bluebunch fescue (*Festuca idahoensis*). Overgrazing is clearly evident in several local areas. In two of the areas sampled prairie selaginella (*Selaginella densa*) was noticeably more abundant than elsewhere on the range. Four of the sample areas showed an inverse relationship between densities of grasses and prairie selaginella. Those units having the highest grass densities showed the lowest densities of selaginella and,

**Table 1. Vegetative Density and Composition on Ranges I, II and III.**

	Percent density			Percent composition		
	I	II	III	I	II	III
Grasses	24.9	15.0	19.1	45.0	31.7	51.3
Forbs	8.7	14.3	6.7	15.8	30.2	18.0
Shrubs	1.9	8.1	1.6	3.4	17.0	4.2
Sedges, rushes	9.6	8.5	5.5	17.4	17.9	14.8
Selaginella, moss, lichens	10.2	1.5	4.4	18.4	3.2	11.7
All vegetation	55.4	47.4	37.3	100.0	100.0	100.0
Bare ground	44.6	52.6	62.7			
Totals	100.0	100.0	100.0	100.0	100.0	100.0

vice-versa, and the unit showing the lowest grass density showed the highest occurrence of sedges (*Carex heliophila* and *Carex* spp.) and rushes (*Juncus* spp.). This suggests that on this area at least, sedges, rushes and selaginella were replacing the grasses. Willows and aspen showed signs of browsing but were too uncommon to rank as important winter forage species.

Bare soil and low vegetative density on Range II indicated marked modification of the rough fescue association. This grass was recorded only 69 times in 1,500 points and ranked second in abundance to June grass. Low sedge was hit the greatest number of times while bearberry, prairie selaginella and pasture sage (*Artemisia frigida*), made impressive showings. All along the higher reaches of this range, willows showed signs of extreme browsing and bunch grasses were heavily grazed. Although the greater proportion of this wintering area showed average densities for grasses and forbs, the eastern section was in very poor condition as evidenced by the excessive amount of bare eroded ground (72 percent), and the extremely low density of the grasses (7 percent).

Range III had the lowest vegetation density of any range sampled. Even though grass densities were higher than those in Range II, the low occurrence of sedges, forbs and shrubs substantially reduced the vegetation cover per unit area. Rough fescue was the dominant grass in two of the areas examined but

ranked second to June grass in another.

### Discussion

Density and composition of the different plant groups plus some consideration of plant utilization were estimated in assaying the various ranges. Range in satisfactory condition had a high density of grasses and grass-like plants, little bare ground, no evidence of accelerated erosion, and a low incidence of over-grazing indicator plants such as selaginella, pasture sage, and rosy everlasting. Departures from these criteria indicate poor range condition.

By these guides Range I was found in healthier condition than either Range II or III. It exhibited the highest grass density and was the only major elk wintering area with more than 50 percent of the soil surface vegetated. This is the most important big game winter range in the Crowsnest Forest Reserve in terms of the numbers of game animals it supports. Although current trend in range condition was not established, the range vegetation is clearly sub-climax and increases in range use are not desirable at this time.

Range II exhibited a low grass density and relatively high occurrence of undesirable plants. Undoubtedly the eastern section of Range II is in a critical condition. If there is to be any improvement of vegetative density and erosion control on this range, future grazing must be extremely light.

Range III had a higher grass

density but less cover over-all than the other ranges. Cowan (1944) found similar conditions on Henry House Flats in Jasper National Park. Although in poor condition these areas ranged much better than those sampled by Cowan in the Athabasca Valley of Jasper National Park (1943) where grass and sedge densities did not exceed 10 percent of the vegetational cover.

Although elk are primarily responsible for the unsatisfactory condition of Ranges II and III, there is strong evidence that domestic stock has contributed appreciably to the obvious misuse of these ranges. At the present time the elk population is being held to a level which will permit improvement in the reserve provided additional livestock pressure is restricted. Although the degree of interaction between elk and cattle for forage is unknown, it is believed to be a real factor on Ranges II and III. These key forest reserve areas should receive only light livestock and elk grazing until they show marked improvement and the ability to support heavier utilization. An attempt to improve range conditions has already been made south of the Crowsnest Pass by reducing the elk population by some 70 percent. Reduction in the number of cattle on all key elk wintering areas is the next step toward improving range conditions.

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