CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

GEOGRAPHICAL BRANCH

MEMOIR 4

RANCHING IN THE SOUTHERN INTERIOR PLATEAU OF BRITISH COLUMBIA

BY

Thomas R. Weir

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
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PREFACE

This memoir presents the results of a survey of part of the arid zone in Canada, conducted by the Geographical Branch in connection with Canada's participation in the arid zone programs of the United Nations Economic, Social, and Cultural Organization and the International Geographical Union.

The UNESCO program had its origins in 1947, when it was proposed to establish comprehensive international laboratories for arid zone studies as part of a United Nations system of international laboratories[1]. This proposal ultimately led to the formation, by UNESCO, of an interim Arid Zone Research Council, which in 1951 became the Advisory Committee on Arid Zone Research. Canada is represented on one of the technical panels of this Advisory Committee. In 1952, at its Seventeenth International Geographical Congress, the International Geographical Union set up a commission on the arid zones[2].

Projects that cover specific arid and semi-arid areas or topics concerning them are planned, from time to time, by these organizations. But, in addition, both are concerned with the systematic collection of data on all the arid areas of the world, and have recognized that in this connection we need "a greater store of economic and social facts"[3].

The Geographical Branch considered this situation with respect to Canada and established the following aims for a complete survey of the arid and semi-arid areas in this country:

(i) to determine and map the geographical boundaries of the arid and semi-arid areas of Canada;

(ii) to determine the nature and extent of their influence on occupation and settlement;

(iii) to record their geographical relationships with other districts.

Not only does this memoir help to achieve these objectives, but it is also hoped that it will serve as a pattern and a stimulus for similar investigations elsewhere.

N. L. NICHOLSON,
Acting Director, Geographical Branch

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[1] UNESCO document NS/115.
[2] Bulletin of the International Geographical Union, vol. V, July 1954, p. 7.
[3] UNESCO document NS/AZ/83, p. 1.

Ranching in the Southern Interior Plateau of British Columbia

CHAPTER I

INTRODUCTION

GENERAL STATEMENT

This memoir is a study in economic geography. It is concerned with the area of ranching in the southern part of the Interior Plateau of British Columbia, with the exception of the Okanagan Valley and the Boundary district. The point of view of the text concerns ranching as the leading industry and type of land use. Specifically, the objectives are to show the relative importance of physical controls underlying ranching practices; to describe and analyse such basic patterns as the distribution of cattle, sheep, range types, and ranchsteads; to analyse the historic and economic factors responsible for the form of settlement and to analyse, finally, the ranch as a functioning unit.

This is also the study of a region, and as such the emphasis is on the relation of all the forces present in the area to its predominant economic activity—ranching. Such an elementary economy reveals close integration with the physical factors of environment, particularly relief, drainage, climate, vegetation and soils. This is especially true of central British Columbia because it lies at the northern extremity of the elongated intermontane arid zone of western North America where both frost and drought must be contended with. It is, in fact, by nature an area where slight changes in relief bring marked variations in the physical elements which, in turn, are sharply reflected in changing techniques and forms of land use.

Not alone, however, do we attribute variation in man's use of land to the physical aspects. History, too, had a part to play when gold was discovered in the bars of the Fraser thereby touching off a "rush", described by a contemporary as "sudden and vast" (R. C. L. Brown, 1863), to this unpenetrated frontier. Trails became roads; hostelries spread into villages; erstwhile miners became ranchers.

This integration of physical and cultural, of time and place fashioned a landscape predominantly rural with an elementary economy. To analyse the interaction of man and nature, to describe and explain the resulting patterns of land use and settlement is, therefore, the ultimate purpose in the study of this region.

PREVIOUS WORK

Although it has been settled for over 90 years, little information has been correlated and published about the geography of the southern part of the Interior Plateau of British Columbia. Much scattered information exists in the Provincial Government files in Victoria, but only two field surveys covering any large part of the region were conducted prior to 1949.

In 1928 a physical resources inventory of parts of the Cariboo and Chilcotin was made under the direction of the Pacific Great Eastern Railway. However, the reports submitted were not published, and some of the information is now

obsolete. A comparative economic study under the auspices of the Federal Department of Agriculture was carried out in 1946 (Vrooman and Chattaway, 1946)[1]; this was mainly concerned with a general analysis of the comparative cost of producing beef in four areas, including southern British Columbia.

FIELD WORK AND ACKNOWLEDGMENTS

The need for further geographical information on the southern Interior Plateau was stimulated by the increased attention being paid to the arid and semi-arid parts of Canada by various national and international groups. Consequently, field surveys were carried out by the writer in 1949 and 1950 to secure such information.

A reconnaissance was conducted by automobile, traversing 4,000 miles of road from West Chilcotin to East Cariboo and from Soda Creek to Princeton. By personal interview and the use of a questionnaire, data were obtained from over one hundred individual ranches. The selection was based on size of the operation and location in order to ensure representative samples from all parts of the ranching area. Local government offices were visited to obtain additional data. A vegetation and land-use traverse was conducted along the routes of travel. The Okanagan Highlands were selected as the southeast limit of the reconnaissance area because they form an economic divide.

During the course of this work the writer was assisted by A. Crittenden while he was a student at the University of British Columbia, and by numerous officials in the Provincial Government offices in Victoria, particularly W. C. Pendray, Forest Agrologist for the Grazing Division of the Department of Lands and Forests. The staff of the Department of Geography at the University of Wisconsin were also most helpful, particularly with regard to the preparation of the manuscript itself. For such aid the writer wishes to express grateful thanks.

[1] Names of authors and/or dates in parentheses are those of authors and dates of publication of reports listed in References, Chapter VIII.

CHAPTER II

THE PHYSICAL ENVIRONMENT

LOCATION AND EXTENT OF RANCHING

Ranching of both sheep and cattle in British Columbia is co-extensive, except in detail, with the southern half of the Interior Plateau physiographic region. Figure 1 shows the total area grazed in British Columbia, with the exception of a few outlying districts in the East Kootenay trench, the Nechako River basin, and the Peace River district to the north. The total area within the limits shown is approximately 31,000 square miles or 8·7 per cent of the area of British Columbia.

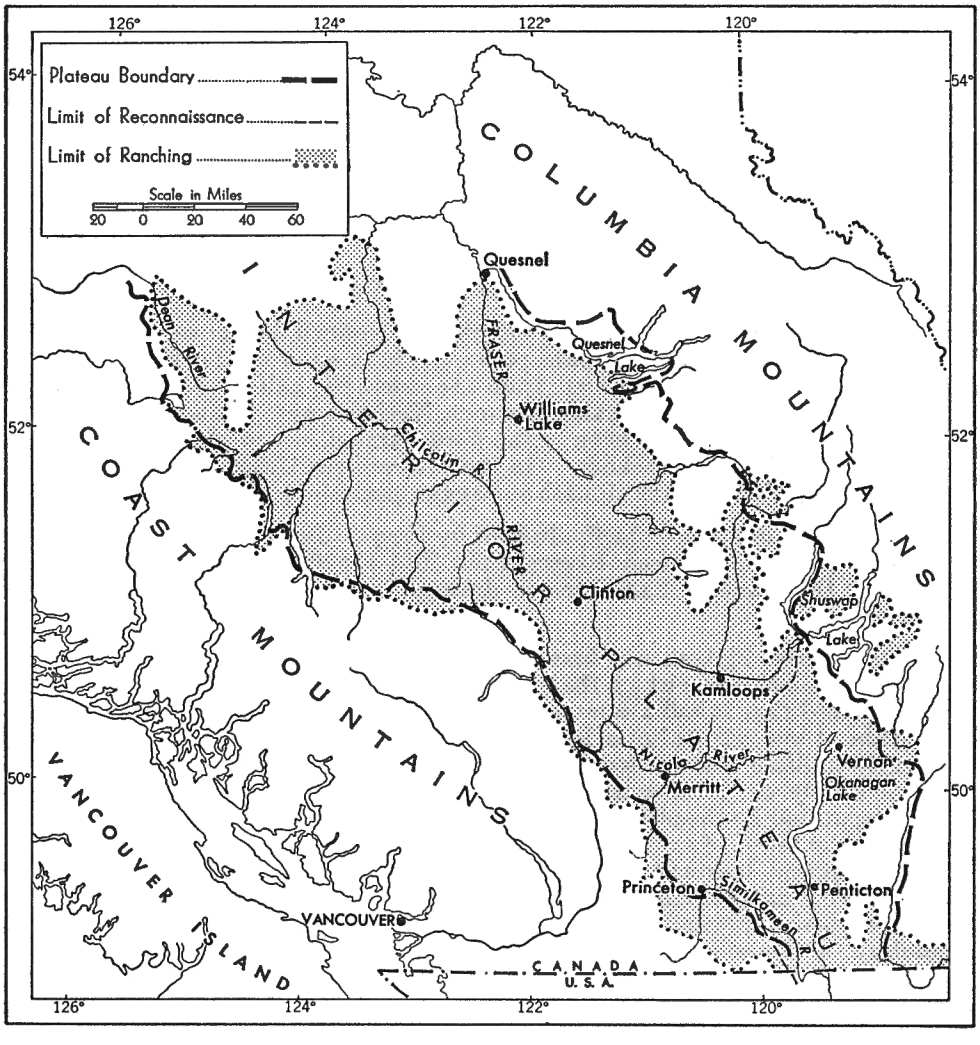

Figure 1. The Ranching area of British Columbia, showing the limit of the part surveyed.

With the exception of certain districts lying east of the reconnaissance limit, ranching is the predominant form of land-use throughout the southern Interior Plateau. Along the margins lumbering and mining become more important, and in some districts trapping and recreation are frequently combined with ranching.

The ranching area thus defined corresponds to the occurrence of certain factors favourable to the raising of live stock by range methods. Open and semi-open grassland or swamp meadow land must be present in sufficient amounts to provide range, especially in the spring and autumn. Hay land, whether natural meadows or irrigated valley bottoms and terraces, must be available to provide winter feed for a varying period, up to 6 months in some localities. Access to government-owned summer range, usually forested upland, is a necessity for 4 or 5 months each year. Undulating to rolling topography is preferable to steep slopes and rough land, which have an adverse effect on the calf crop. Relatively short winters are of utmost importance in reducing the feeding period.

Certain other factors, although less important, are significant in accounting for the more favoured areas. Proximity to a shipping point eliminates the expense of trucking stock great distances and lessens the need for the long, weight-reducing, cattle drives, which in remote districts may take a month or more. Although watering places are in abundance in most parts of the plateau some ranges in the south suffer from the lack of water in late summer. Closeness to supply points, schools, and cultural centres is not a necessity, but these factors have influenced the lines of settlement.

RELIEF AND DRAINAGE

The ranching area of British Columbia is confined to the southern half of the Interior Plateau physiographic province, designated as the Fraser Plateau (Bostock, 1948). It is separated from the northern half or Nechako Plateau by the ill-defined drainage divide between Nechako and Chilcotin Rivers. A more convenient line of division is the 53rd parallel, which also serves as the northern limit of cattle ranching. On the west are the Coast Mountains and to the east lie the Cariboo and Monashee Ranges, part of the Columbia Mountains.

The Fraser Plateau is chiefly drained by Fraser River; however, in the south Okanagan and Similkameen Rivers drain into the Columbia, and in the far northwest the Anahim Lake area is drained by Dean River directly to the Pacific Ocean.

The Interior Plateau was first recognized by Dawson as one of three broad physiographic belts into which the mainland of British Columbia may be divided. He recognized that it had a common physiographic history, having been reduced to a plain of low relief after a long period of denudation and having been subsequently uplifted and eroded (Dawson, 1889). Daly sought to designate the plateau purely on a topographic basis, whereby he recognized many plateau blocks separated by deeply incised streams (Daly, 1912). His delineation of the boundaries in terms of continuous structural valleys has been accepted generally. It would appear, however, that a more accurate definition in terms of relative relief and similarity of landforms (which do not necessarily conform to a pattern of entrenched drainage) will await detailed topographic mapping. Daly's boundary of the southern part of the Interior Plateau province is shown on Figure 4. As the term "plateau" is understood in relation to the bordering mountains, it would seem that a transition zone rather than drainage channels would serve as a more acceptable means of appreciating the changing nature of the surface in terms of relative relief.

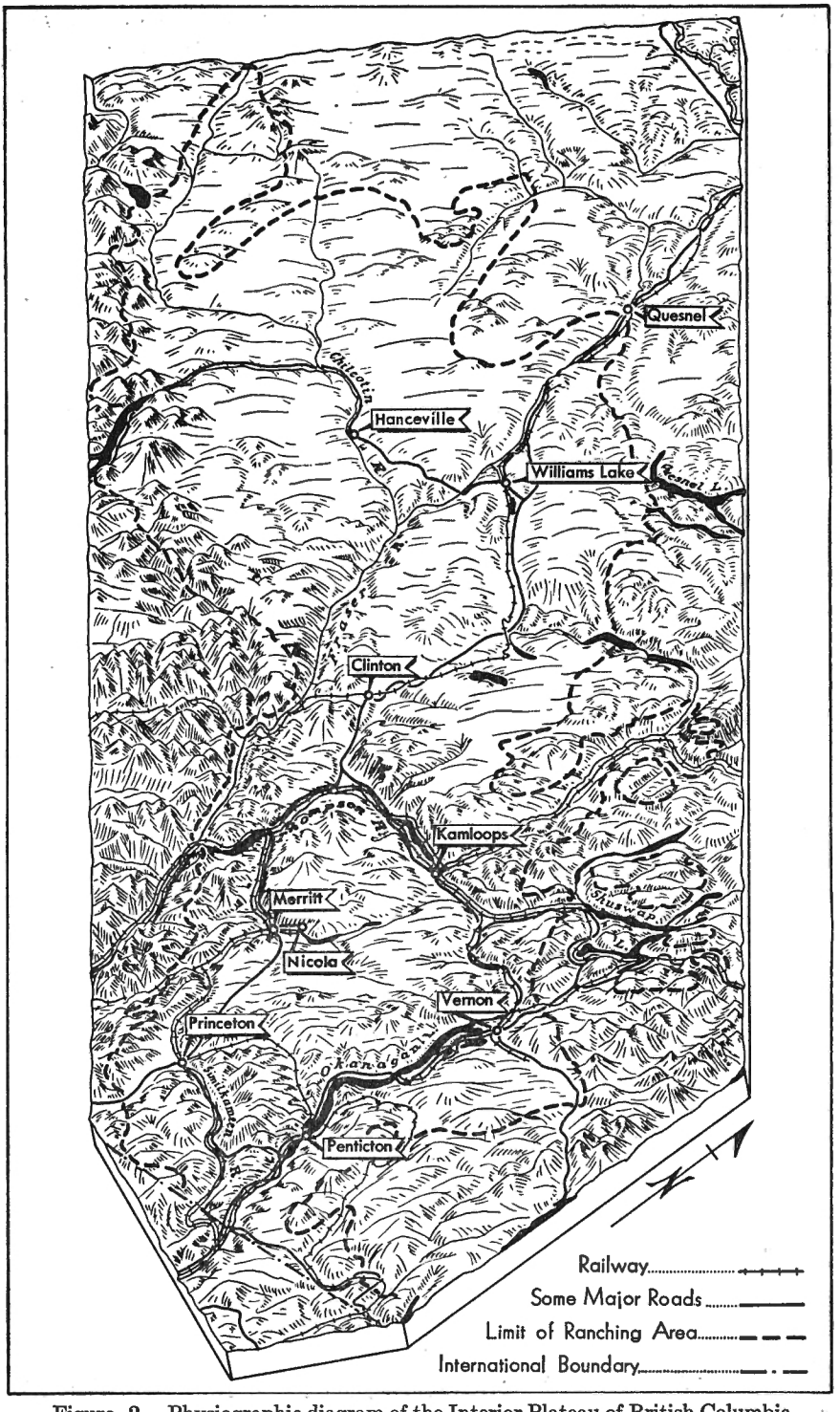

Figure 2. Physiographic diagram of the Interior Plateau of British Columbia.

The Interior Plateau is from 30 to 40 miles wide in the south between the Monashee and Cascade Ranges and widens gradually northwestward until at latitude 52 degrees 30 minutes it is about 170 miles wide. Those features that set it apart as a plateau are bordering mountains, high elevation, deeply entrenched drainage, and relatively flat-topped inter-stream areas. The plateau is rimmed by rugged mountains of great relief, namely, the Cascades and Coast mountains on the west and the Monashee and Cariboo mountains (parts of the Columbia Mountains) on the east. As such it is properly classified as an intermontane plateau.

The average elevation in the south is close to 4,500 feet above sea-level, only 1,500 feet below that of the average for the Coast mountains. The plateau slopes gradually northward until its average elevation in the vicinity of the Nechako divide is approximately 3,500 feet (Figure 2).

From the profiles showing relative relief in the southern part of the Fraser Plateau (Figure 3), it will be observed that the region consists of tabular uplands separated by deeply incised streams. The main valleys lie from a few hundred to over 4,000 feet below the uplands. Kamloops Lake (elevation 1,123 feet) is 4,500 feet below the Tranquille Plateau no more than 10 miles distant. Major stream valleys south of Chilcotin River reach 1,500 feet below the general level of the country and Fraser River for much of its middle course through the plateau is from 900 to 3,000 feet below the upland. Such a system of deeply entrenched streams has divided the plateau surface into blocks of varying size. In the south, the areal relation of upland to valley is about three to one (Brink, 1949), and in the north the ratio is many times greater.

The profiles (Figure 3) show that the interfluves within the plateau are rounded and subdued in relief, whereas those of the adjoining Coast Range are ridged, with a high percentage of upland in steep slopes. This difference is even more striking in the Cariboo-Chilcotin region[1]. Above 4,500 feet hills are

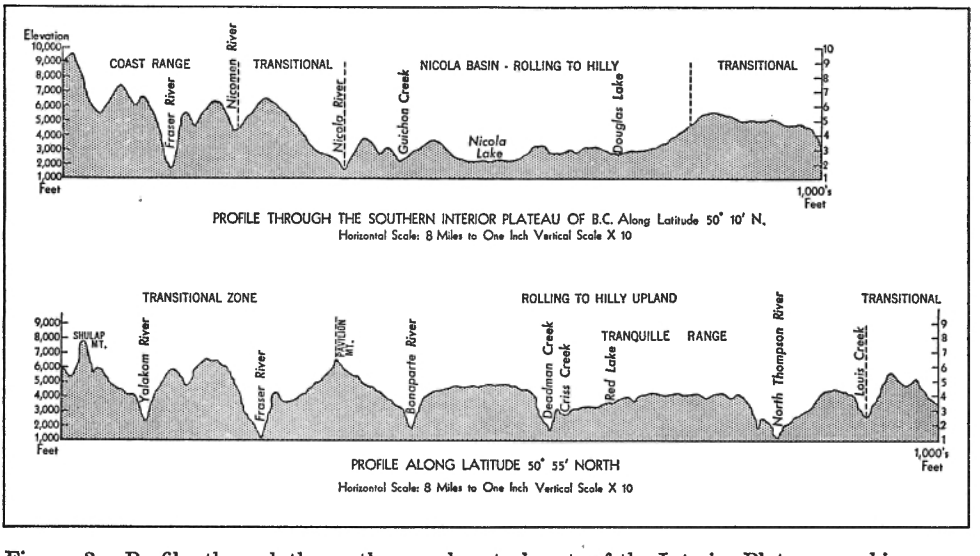

Figure 3. Profiles through the southern and central parts of the Interior Plateau ranching area. The upper one shows the Nicola basin, an erosional feature of subdued relief and lower elevation. The lower profile shows the rolling interfluves separated by deeply entrenched valleys and the greater relief of the transitional zone.

[1] The Chilcotin district lies to the west of the middle Fraser River and is roughly coincident with the drainage basin of the Chilcotin. The Cariboo may be considered as including most of the area east of the middle Fraser and north of Thompson River.

rolling, with gentle slopes and broad valleys; below this slopes are steep, often cliffed, and valleys deeply incised (Rice, 1947). In the north the relief within the upland surface is considerably less than in the south, owing in part to structural differences, elevation, and erosional history.

ORIGIN OF THE PRESENT SURFACE

In order to appreciate differences in land forms and relief in various sections of the plateau, it is necessary to understand certain events of significance in past geologic time. The earliest outcrops within the plateau proper date from the Carboniferous. Large areas of the southern plateau consist of sedimentary rocks interbedded with volcanics of the late Palæozoic and early and middle Triassic periods.

Early in the Jurassic the plateau generally was uplifted and subjected to folding and faulting. Anticlines and synclines with a general north-south trend have been mapped in the southern part of the plateau as evidence of widespread diastrophism. Occurring at the same time were intrusions of granitic rocks over large areas, especially in the south. A segment of upland west of Guichon Creek as well as numerous mountain inliers throughout the Chilcotin and along the east borders of the Cariboo are of this origin. These intrusions correspond in age with parts of the Coast Range batholith.

Of great significance to present relief was a long interval of erosion generally regarded as occurring throughout much of Cretaceous and Eocene time. During this period, the area of the Interior Plateau became reduced by prolonged denudation to the condition of a nearly uniform plain (Dawson, 1894). Although subject to elevation and depression and repeated deformation, this old erosion surface is represented today in the gently rounded interfluves at about 4,500 feet in the south and by a condition, general throughout the entire plateau, of accordant summit levels.

The next event of far-reaching effect on the present surface was the extrusion during the Miocene of immense thicknesses of lava, found throughout the whole of the plateau north of Thompson River. This event coincided with the formation of the vast lava plateau in Columbia River basin to the south. In consequence, much of the old subdued surface was covered with volcanic rocks, which served to diminish the relief still farther, producing a nearly flat lava plain except where broken by cones and intrusives. During the late Pliocene the region underwent uplift, attaining an elevation higher than the present, with the result that many old streams were rejuvenated and the entrenchment of many of the present valleys was begun.

In the Pleistocene the entire plateau was covered with an ice-sheet that, according to Dawson, was 2,000 to 3,000 feet thick in many places. During retreat, a mantle of glacial drift was unevenly but completely distributed up to an elevation of 5,000 feet, resulting in a wide variety of depositional forms. The ice moved generally in a southeast direction and appears to have followed the trend of large valleys. As a result, the north-south valleys show ample evidence of widening and over-deepening by glacial erosion. By contrast, many east-west valleys at right angles to the direction of movement, such as the Thompson Valley, were filled with drift.

Uplift followed the main retreat of the ice, resulting in the excavating of the higher terraces. A second partial advance, referred to as "valley glaciation", followed. It was during this event that lacustrine deposits of white silt were laid down on partly dissected valley terraces. These were the "white silts", according to Dawson, (*see* Plate VI B).

Post-glacial uplift implemented a new cycle of erosion, which has been responsible for an elaborate system of terraces along the major valleys, frequently hundreds of feet above the present flood plain.

PATTERN OF RELIEF FEATURES

Although relatively homogeneous in respect to its broad character, the southern Interior Plateau lends itself to subdivision on the basis of general relief. From an examination of existing topographic maps, four categories of relief become apparent. They are undulating to rolling, rolling to hilly, hilly to mountainous, and rugged mountains.

Undulating to Rolling Relief

Vast tracts of upland found within the Cariboo-Chilcotin may be termed "undulating to rolling". The plateau blocks are set apart by a few deeply entrenched, pre-glacial streams such as Big Creek, and Chilko and Taseko Rivers, whereas the upland surfaces are only slightly dissected. Here the relief is seldom more than 500 feet, except where low mountains interpose.

Major relief elements in the Cariboo-Chilcotin are described below as: (1) steep, canyon-like valleys, such as those of the Fraser and the Chilcotin with their major tributaries; (2) broad upland or plateau surface; and (3) low mountains.

Steep, Canyon-like Valleys. Fraser River from Quesnel to its entrance into the mountainous transition zone (Figure 2) flows through a steep-walled valley varying in depth from 900 to 1,500 feet below the surface of the plateau. North of Soda Creek the valley becomes wider, with floodplains and cultivated terraces. Below Soda Creek, the valley contracts to canyon-like proportions. Near its confluence with the Chilcotin, the valley opens again. Tier upon tier of broad, sweeping terraces, often assuming fantastic shapes, rise hundreds of feet from the torrent below to the rolling upland, a thousand or more feet above (*see* Plate I A).

The Chilcotin district is bisected by the river from which it derives its name. Chilcotin Valley, like that of the Fraser, narrows at intervals to a canyon, but generally it is broad and lined with a complex array of partly dissected terraces. The terrace walls are frequently very steep, even precipitous. Only on the upper slopes do terraces give way to outcrops of rock, generally basalt, often more than 100 feet in thickness. These rim the upper slopes of the valley for miles and are locally called "rim rock". Such outcrops as that at Bull Canyon north of Alexis Creek are often more effective in controlling the movements of cattle than are fences.

The plateau south of Chilcotin River has been more deeply trenched than the segment lying to the north. Chilko River, and Big, Gaspard, and Churn Creeks have beds in many places several hundred feet below the gently rolling interfluves. The Chilko and its tributary the Taseko flow through canyons cut deeply into lava beds that cover most of the plateau. Churn and Gaspard Creeks become rushing torrents as they approach Fraser River, with valleys near their mouths 2,500 feet deep. At intervals rivers in the south Chilcotin emerge from between walls of basalt and develop wide meanders and other mature features. Tributary streams in the north and west of the Chilcotin area and generally throughout the Cariboo are not deeply incised.

Plateau Surface. The upland surface is by far the most extensive feature in the Cariboo-Chilcotin section of the Fraser Plateau. From almost any high point in the transition zone across the plateau, the effect is one of a comparatively level plain, broken in only a few places by low rolling hills or an occasional sharp

volcanic cone of recent origin. In general the relief is not more than 500 feet on the surface itself, which stands on an average 1,500 feet above the deeply entrenched streams described above. This gentle relief, referred to as "undulating to rolling", is directly related to two elements in its composition: the extensive lava beds covering most of the region and the surficial deposits of glacial drift. The underlying bedrock consists of deeply buried sedimentary series overlain by horizontal lavas of varying age and composition. The lava beds extend for great distances over the northern part of the plateau to the valley of South Thompson River, and even beyond that in broken tracts. The most important factor in explaining the difference in relief between the rolling Cariboo-Chilcotin section of the plateau and the hilly character of the surface to the south must be ascribed to the widespread distribution of the lava beds in the former, in contrast with their spotty occurrence in the hilly upland in the south.

Superimposed on the lavas, numerous forms of glacial deposition, both morainal and lacustrine, are to be found over the upland surface to an elevation of at least 5,000 feet. Owing to the uneven distribution of glacial drift, several kinds of water-filled depressions result, many of which play a vital role in range practices. Recessional moraines have frequently caused damming of streams and the formation of lakes such as Tatla Lake in the West Chilcotin. Such water bodies act as storage reservoirs and provide an even flow for irrigation, besides affording water for cattle. The filling of former stream channels and the resulting irregularities from the uneven distribution of ground moraine have resulted in derangement of drainage. Accordingly, streams wind circuitously through minor depressions, often issuing in ponds and tiny lakes, or become lost in marshes. Such conditions favour the growth of sedges and other grass-like vegetation important as sources of hay. The swamp meadow is located characteristically on gently rolling divides of the timbered uplands.

Another form of natural water storage is the pond or kettle lake, called locally "pothole", which gathers its supply from the spring run-off. Such water-filled depressions in ground moraine seldom have a surface outlet, so that some become strongly saline, as indicated by encrustations around their margins (*see* Plate II A). Others have a sufficiently rapid seepage to remain sweet, and these provide watering places for cattle. Typically, the pothole is found at lower elevations than the swamp meadow, where climatic conditions are drier.

Certain glacial deposits have had an adverse effect on the use of some areas. Large stretches of very stony ground, as in the west Chilcotin, yield nothing but lodgepole pine (*see* Plate IV B). Some areas such as that around Riske Creek, are so thickly strewn with erratics that their use except for grazing is impracticable.

Low Mountains. Isolated hills or low mountains constitute the third element composing the major relief features of the Cariboo-Chilcotin. These are usually found in groups irregularly distributed over the uplands, and frequently rise from 500 to 1,500 feet above the general level of the plateau. South of Chilcotin River, such forms reach 2,500 feet. In the vicinity of Big Creek they extend in a broken line to the foothills of the Coast Range (Figure 4). They are found also in considerable numbers north of the river and along the margins of the eastern Cariboo districts. These rounded, dome-like masses stand like islands above the gentle relief of the plateau. They may be grouped in three classes, depending on their origin: batholithic intrusions, remnants of once-active volcanoes, and structural features resulting from deformation of the older lavas. Some forms remain from the peneplanation of the old surface and may properly be referred to as monadnocks. Frequently remnants of old lava flows stand higher than the general level of the upland, producing flat-topped features of great extent.

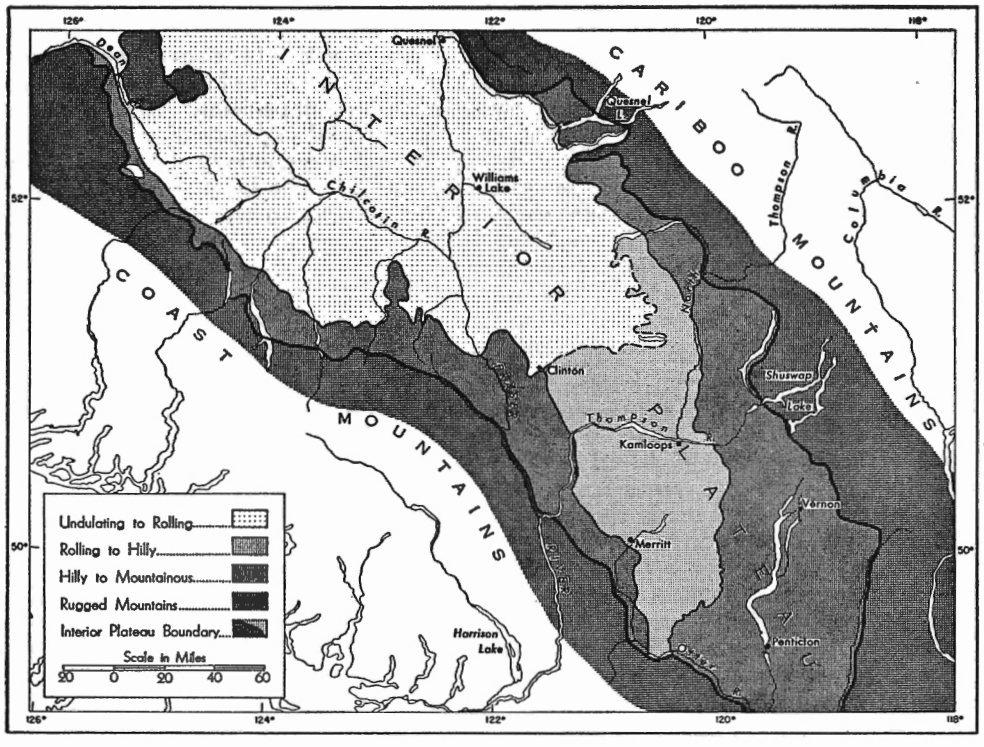

Figure 4. Generalized relief of the Interior Plateau of British Columbia.

Rolling to Hilly Relief

Characteristic of the southern part of the plateau is a second category of relief that may be described as rolling to hilly, or hilly upland (Figure 4). On its west, south, and east borders it merges with the third or transitional zone (hilly to mountainous) and on the north with that of undulating to rolling terrain described above.

The lack of adequate topographic maps has made it difficult to establish a satisfactory boundary between the first and second relief categories. The present line between Bonaparte and Loon Lakes must be regarded as suggestive. In all probability, a fairly wide transition zone intervenes between this line and Thompson River. A prolongation of the second zone extends along the east side of the Cariboo section to the vicinity of Canim Lake. South of Thompson River the zone is gradually wedged in by the transition to rugged mountains.

In addition to an increase in relative relief over that of the Cariboo-Chilcotin section of the plateau, the zone of rolling to hilly terrain is characterized further by at least three topographic differences. In the first place, dissection of the upland has progressed to a point where much of the surface is in steep slopes, with the result that rolling topography merges into low hills. The second point of contrast lies in the much smaller area at summit level in the southern zone. Thirdly, in the north the interfluves are of vast extent, with river valleys occupying a relatively small percentage of the total area, while in the southern zone about one-third of the total area is occupied by broad valleys. These are wider and deeper than those to the north excepting the middle course of Fraser River (Plate I A). The drainage pattern provides a third contrast in relief. Such

major east-west valleys as the South Thompson and Nicola are intersected by deeply entrenched north-south valleys such as those of Deadman, Bonaparte, and Guichon Rivers. A similar pattern is recognizable in the Princeton basin to the south. As a result, the interfluves are rectangular in shape and elevated 1,500 feet or more above the adjacent valley bottoms. It is, in fact, one plateau carved into several distinct blocks. In contrast, the individual segments of the plateau in the Cariboo-Chilcotin region are less regular in shape and of much greater extent, as the rivers there are generally less deeply trenched and the pattern typically dendritic.

The greater relief of the southern section may be accounted for by reference to two facts: elevation above sea-level and the heterogeneous character of the bedrock. As elevation in the southern part of the Interior Plateau is 1,000 feet above the average for the northern part, it follows that erosion of the uplands and entrenchment of the streams in the former would proceed at a more rapid rate.

Unlike the Cariboo-Chilcotin region where surface rock is chiefly basalt, that of the southern section varies greatly both in structure and in kind, with resulting complexity of type. Here volcanics are closely associated with sedimentary series from late Palæozoic to Pleistocene and have been intruded by enormous quantities of granite and diorite of Jurassic age. In consequence, differential weathering and erosion of unlike rocks have produced a hilly terrain rather than the more undulating surface to the north. As in the Cariboo-Chilcotin region, minor relief features were produced by unequal deposition of glacial drift such as moraines, kettles, outwash plains, drumlins, and eskers. As in the northern region again, the damming of the drainage by moraine has resulted in swale lakes, ponds, and water-holes, as well as larger lakes serving as storage reservoirs. As the uplands in the south are better drained on the whole, the occurrence of minor water-filled depressions, notably the swamp meadow, is less frequent in this region. In consequence, the ranching economy of the south centres around the use of cultivated hay rather than wild hay for winter feeding.

Hilly to Mountainous Relief

The third category of relief within the Interior Plateau may be described as hilly to mountainous. Occupying a position between the plateau proper and the bordering alpine ranges, it becomes a zone of transition between rolling to hilly country and rugged peaks carved by ice into jagged forms. The relief throughout the zone exceeds 1,500 feet and in mountainous areas such as the southeast margin of the Chilcotin it averages 3,000 feet.

Interfluves are less rounded in the transition zone and summit areas are much reduced in extent. The average slope in the upland areas in the vicinity of Tulameen River is 6 per cent, whereas slopes in the rolling to hilly zone around Kamloops average 3 per cent. The outer boundary of the transition zone follows deep structural valleys, as described by Daly, but north of 51 degrees the boundary has been adjusted according to changes in relief and character of bedrock.

The zone reaches its greatest width in the southeast. In the vicinity of Shuswap Lake numerous deep ramifying valleys have carved the plateau surface into blocks standing 1,500 feet above the lake. Slopes become increasingly steep, so that ranching gives way to lumbering and alpine meadows afford summer grazing for sheep.

Along the Cascades to the southwest and extending north to the Fraser the transition zone parallels rugged mountains with narrow divides and deep V-shaped valleys. Within the transition zone itself, although altitudes are only a

little lower than the bordering ranges, the forms are rounded and the divides broad by comparison. Grazing actually extends beyond the plateau into the Cascades, where alpine conditions favour sheep.

That sector of the transition zone extending from Fraser River around the southern edge of the Chilcotin Valley to Anahim Mountain is by far the most rugged as well as the most remote part of the Fraser Plateau. Immense glacial valleys broadened by ice-scour are flanked by individual mountain peaks that rise from 8,000 to 10,000 feet. Although relief is measured in thousands of feet, the mountains are rounded, even flat-topped. This is related to the character of the rock formations, which in contrast with the resistant granites of the rugged Coast Range are mainly sedimentary. Soft rocks of the Cretaceous underlie rolling uplands, and volcanic flows have produced flat-topped summits such as Card Table Mountain. Many upland surfaces lie between the summer snow-line and the timber, so conditions favourable to the development of alpine vegetation obtain. Potato Mountain, standing high above the waters of Tatla-yoko Lake, provides alpine pasture for cattle. Still other ranges nearer Fraser River have vast expanses of alpine meadow allocated to great herds of sheep.

Along the eastern margin of the plateau, the transition zone has a relief of 1,500 to 2,500 feet. Extending in a band south of Horsefly Lake, rough topography due to numerous granitic intrusives and volcanic remnants interposes between the undulating plateau and the glaciated peaks of the Cariboo Range. The batholithic intrusions have been eroded to dome-shaped hills standing 2,500 feet above the neighbouring plateau. Such hill country provides little to attract cattlemen. High elevations, steep, rough topography, and heavy timber have marked the zone of transition as a boundary area.

On the other hand, the transition zone performs a useful function as a catchment area, as many of the adjacent areas of the plateau are irrigated from streams originating within it. Moreover, where high, rounded summits extend above timber-line into the zone of grasses, there is range for sheep.

Rugged Mountains

The fourth category is that of rugged mountains. Serrated peaks, narrow V-shaped valleys, and slopes that ascend steeply to knife-edged interfluves are the distinguishing features that mark the change from the transition zone. Except where alpine conditions favour summer range for sheep, the zone of rugged mountains lies beyond the outer limits of the ranching area.

CLIMATE

Differing ranching practices and inequalities in the cattle distribution pattern may be attributed in considerable part to varying climatic conditions. These conditions in the Interior Plateau are a function of latitude, altitude, local topography, and air masses.

THE CLIMATIC SETTING

Lying between 49 and 53 degrees north, the Interior Plateau manifests the effects of location in the higher middle latitudes. At the height of the growing season the sun's angle of inclination is around 60 degrees, so that solar heating, except where affected by local exposure of land surfaces, is not intense. The clear, dry air and long hours of bright summer sunshine partly compensate for this. Thus, on June 21 at latitude 52 degrees there may be sunlight for 16 hours 23 minutes, whereas from May 22 to July 24 twilight lasts all night.

Altitude effects are most pronounced on the plateau surface, much of which is 4,000 feet above sea-level. The hazard of summer frost at this height is very real, so that almost all cultivation is confined to the lowlands, where the frost-free period is two and even three times longer. However, topographic irregularities common to rough areas result in temperature inversions, leaving the valley floors at night even colder than the upland slopes.

The effects of both major and minor topographic differences may be spectacular in their relation to climatic variations. Although the Interior Plateau is located at an average distance of 100 miles from the sea, its climate is continental rather than marine. The intervening Coast Range, whose average elevation is 6,000 feet, acts as a barrier to the passage of maritime influences eastward, producing semi-arid conditions below elevations of 3,000 to 3,500 feet. The Columbia Range on the east protects the region from occasional westward thrusts of polar continental air from the Great Plains. Unfortunately, no such orographic barrier interposes itself on the north to shield the area from frequent invasions during mid-winter of cold polar air from the Yukon high-pressure centre. As a result of the predominantly continental conditions in higher middle latitudes, the Interior Plateau upland conforms to Koppen's "snow-forest" climatic type Dfb, and on higher elevations the subarctic type Dfc (Figure 5).

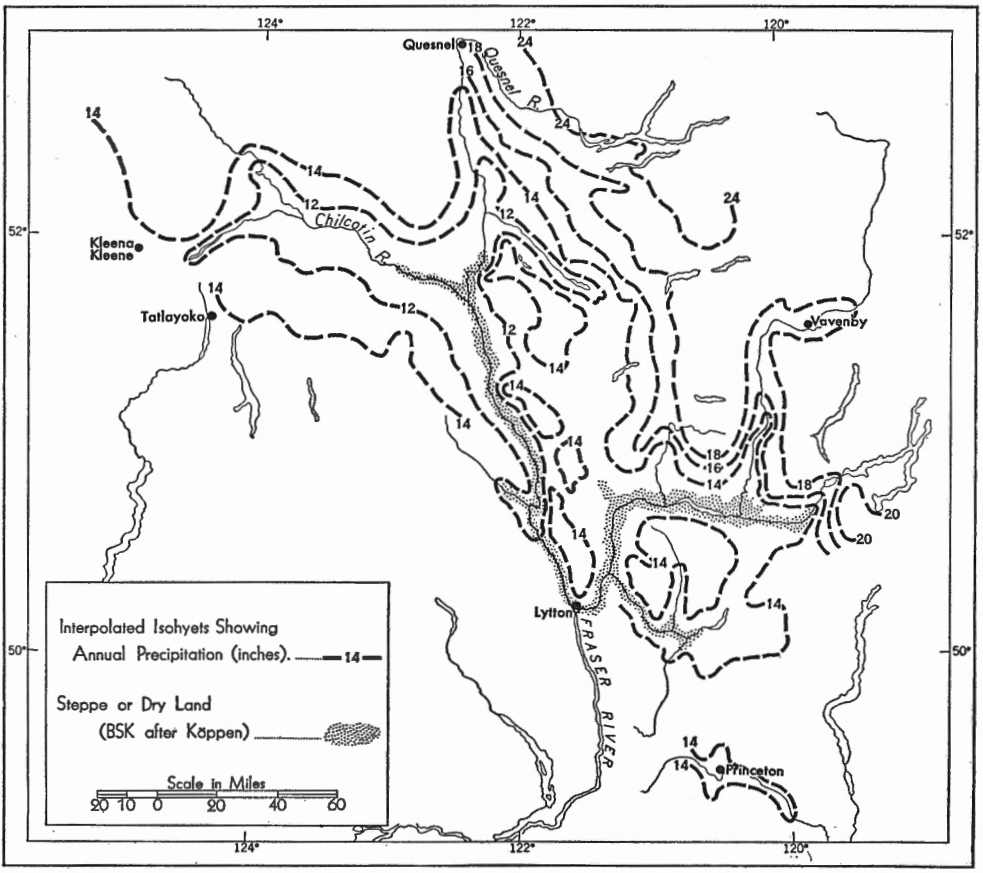

Figure 5. Precipitation in the Interior Plateau. Isohyets are interpolations based on the records of scattered stations.

Minor topographic features in the form of shallow basins, or deeply eroded valleys such as the main Fraser channel and its several major tributaries, give rise to numerous climatic irregularities characteristic of hilly to mountainous topography. Air drainage at night, föhn winds, and wide variations in exposure to solar heating by day combine to introduce numerous micro-climatic differences. In the major valleys aridity combines with high summer temperatures to produce a steppe climate such as is general in the intermontane region of Washington and Oregon. Potential evaporation exceeds actual precipitation, with the result that crops must have irrigation throughout most of the region.

The Nicola Valley, an old erosional basin with an elevation of 1,940 feet, serves as an example of climatic transition. Here the climatic type lies just within the limits of the steppe, whereas a few miles distant on all sides the plateau rises for 2,000 feet and supports a heavy stand of conifers typical of the snow-forest type. Many similar areas of low elevation, such as the depression between Kamloops and Merritt, are also transitional in character. According to the Köppen formulæ, such areas fall just outside the steppe category. However, the very low winter month averages serve to depress the annual temperature to such an extent that it loses significance as a fair indicator of the evaporation factor. It would appear logical, therefore, to include within the steppe such borderline areas as the old erosional depression extending south of Kamloops as far as Merritt.

Of great significance to daily weather is the interplay of air masses and related cyclonic storms. Three types of air may be distinguished in the plateau region: modified dry interior air found in the valleys and basins; maritime polar air modified by ascent and descent over the Coast Mountains; and unmodified polar continental air originating in the cell of high pressure over the Yukon. First one, then another may dominate the plateau, producing variable conditions. In general, however, the air comes from the Pacific both in summer and in winter.

During the winter unstable air from Bering Sea and adjacent coasts, modified by passage over the open waters of the Pacific, reaches the British Columbia coast. The upper levels are usually very cold and dry in contrast with the moist, warm, lower strata. This fresh polar air encounters mild air lying along the coast. Acting like a wedge, it lifts the mild air across the mountains to the plateau, where it forms a front with the rather warm dry valley air long stagnant in the depressions and low levels of the plateau (Connor, 1949). Such an influx of warm humid air from the Pacific frequently carries precipitation to the interior and often results in sudden increases in temperature. Such a wind is referred to locally as a chinook.

As Pacific air descends the lee side of the Coast Range it is warmed. Such a situation occurring in mid-winter sometimes produces maximum temperatures of 50 to 55 degrees F., which are not uncommon in the weather reports for January and February. Where the snowfall has not been heavy and where the land surface has been exposed to the direct rays of the sun, thawing occasionally results in uncovering the ground and permitting cattle to "rustle" for possibly a week or two at a time. Such conditions, confined to deep valleys, vary greatly from locality to locality and from year to year.

When cooler Pacific air follows the warm lifted air, temperatures fall markedly. During invasions of unmodified polar continental air southward through the valleys of the Yukon and northern British Columbia, prolonged cold conditions prevail over the plateau, accompanied by sharp plunges of the mercury to below zero.

During the summer warm relatively dry air originating from the Pacific anticyclonic cell reaches the Pacific coast in a stable condition. Such air is further warmed and dried in its descent over the Coast Range. This is reflected in high temperatures and low humidities, characteristic of the plateau during the summer. As the Yukon cell has dissolved at this season, air movements from this source are much diminished.

Occasional summers in the Cariboo-Chilcotin section are wet and cloudy. Unstable air moving in from the Alaska Gulf region probably accounts for such conditions.

TEMPERATURE

Twenty-two stations within the area under study have recorded temperature for varying lengths of time. Most of the stations are located in river valleys, sometimes hundreds of feet below the plateau surface, with the result that records usually reflect atypical conditions. In fact, only two stations (Big Creek and Williams Lake) are located on the upland, and thus may be regarded as the only sources from which anything like typical conditions for over two-thirds of the area may be deduced. Records at Williams Lake have been kept for 6 or 7 years only.

According to records kept at Big Creek (3,100 feet) the long-term January average over most of the Chilcotin is about 13 degrees. This is the lowest average monthly temperature of any station in the southern Interior Plateau. If we may rely on the short record at Williams Lake (1,945 feet) the January average is 8 degrees higher than at Big Creek. This compares favourably with temperatures throughout the Kamloops-Nicola-Princeton districts to the south where averages range from 17 degrees at Princeton to 30 degrees at Tranquille, the highest January average in the entire region.

A characteristic of the Interior Plateau shared with the Great Plains in the same latitude is the large variability in average temperatures from winter to winter. For example, in 1936 the February average at Big Creek was −4 degrees compared with a 35-year average of 19 degrees. Again, in 1947 the average was 24 degrees.

Absolute minimum temperatures on the plateau surface occasionally go as low as −50 degrees, but never in sheltered valleys of the southern plateau. The average maximum temperature for January over 35 years at Big Creek is 25 degrees, whereas the average minimum temperature is 1 degree. The daily march of January temperatures reveals that in most plateau stations periods of several days may enjoy mild, above-freezing temperatures and then be followed by sub-zero weather for much longer periods.

Conditions appear milder in the Thompson-Nicola district[1], largely because stations are in deep valleys. Thus, Kamloops (1,133 feet) has a January average of 22 degrees, an average maximum of 28 degrees, and an average minimum of 16 degrees. An occasional day in January experiences an absolute minimum of −27 degrees and a maximum of 50 degrees. Although temperatures at Kamloops represent typical conditions in sheltered valleys in the southern part of the plateau, the adjacent upland surfaces appear to have conditions similar to the Cariboo-Chilcotin section.

July temperatures throughout the Cariboo-Chilcotin upland average 58 to 64 degrees, using Big Creek and Williams Lake stations as representative. Even at elevations of 3,000 feet temperatures may rise to 90 degrees. Daily ranges are high owing to strong nocturnal cooling in the presence of a dry clear atmosphere.

[1] Thompson-Nicola district comprises that part of the Interior Plateau south of and including the Thompson Valley.

In the valleys, July averages vary from 64 degrees (Vavenby, Merritt, Westwold) to 70 degrees (Kamloops, Spences Bridge). It will be recognized that the latter stations nearly qualify as "long summer" types within the humid microthermal group (Trewartha). Average monthly temperatures fail to indicate the unusually intense, dry heat that characterizes the valley bottoms during July and August. For example, the average maximum temperature at Kamloops in July is 84 degrees and at Lillooet (one of the hottest districts in Canada) 88 degrees. There are days at Kamloops every summer when the mercury climbs to over 100 degrees and in one year at least it reached 104 degrees.

One of the aspects of temperature most critical for ranching is the occurrence of damaging frost in the late spring and early autumn. On the upland surfaces, such frosts are associated with surges of unusually cold unmodified polar air moving overland from high latitudes. Such frosts may affect areas above 3,000 feet at any time, even during July and August. For example, a killing frost early in July 1949 destroyed many gardens throughout the Cariboo-Chilcotin area.

On other occasions, movements of fresh polar air from the Pacific, after crossing the Coast Mountains, may displace the warm, rather dry air of the valleys by a process of convection. Thus the removal of old valley air in parcels often becomes of great magnitude when started and the new cold air frequently descends the mountains with a gusty rush, accompanied by a sharp drop in the temperature of the valley bottoms (Connor, 1949). Such an invasion occurring in the spring or autumn brings with it a very serious frost hazard.

Still another cause of frosts is strong radiation under conditions in which dry air and clear skies favour the loss of heat from the ground followed by a rapid cooling of the lower air in contact with it. Valley floors in the hilly to mountainous part of the plateau are indirectly affected by frost from this source. The rapid loss of heat from ground surfaces at high elevations during the evening frequently causes air in contact with such surfaces to become denser than air in the valley below. Movement down-slope by gravity takes place and the warmer air of the depressions is displaced. In this manner pools of cold air may grow and spread over large expanses of valley floor and only those terraces sufficiently elevated to avoid the upper levels of the pool will escape the effects. Tributary dry watercourses, called "draws", act as channels for streams of cold air draining into valleys in the late afternoon and evening.

RELATIVE HUMIDITY

The average relative humidity at Kamloops for July is 65 per cent, the P/E index is 24 based on the average annual temperature but drops to 4·5 for summer months. Plateau stations in the Cariboo-Chilcotin differ little in humidity from the southern valleys. The P/E ratio for Big Creek is only 32 for the year and 7·1 for the summer months. Unusually high summer temperatures in enclosed valleys combined with a high evaporation rate and a dry atmosphere make ideal conditions for growth, provided that adequate quantities of water are supplied to the land by irrigation. The high evaporation rate affects adversely the water supply available for cattle on the lower ranges. Potholes once brimming from the spring run-off are much reduced in size, as indicated by their salt-encrusted margins glistening like new snow.

PRECIPITATION

Data from forty-one stations within and on the margins of the region have been plotted to show total annual precipitation (Figure 5). There are several significant features in the distribution pattern.

Annual precipitation throughout most of the Interior Plateau south of latitude 53 degrees varies generally from 12 to 14 inches on the upland surface depending on elevation and distance from the Coast Mountains. The Chilcotin section of the plateau is somewhat drier than the Cariboo because of its position in the lee of the Coast Range.

Precipitation increases along the periphery of the plateau, both in the foothills of the Coast Mountains and on the more gradual slopes of the Columbia Mountains. The plateau physiographic boundary on the east coincides with the 18-inch rainfall line as far south as the Okanagan Valley. Areas receiving more than this amount have too much snow and are too heavily timbered to permit a further extension of grazing eastward.

Changes in topography and elevation are very significant in influencing the trend of the isohyets. Lee positions are drier than windward slopes. Valley bottoms frequently get only 50 to 70 per cent of the rain falling on the upland [1].

According to the Köppen system, true steppe conditions follow the valley of Fraser River and its major tributaries through the plateaus. The precipitation pattern conforms, therefore, to the major drainage pattern (*see* Plate VI B).

The distribution, like that of any intermontane region, has a vertical as well as a horizontal component. On the windward side of the Coast Range air is first subjected to cooling and condensation and then on the lee slopes to heating, with consequent decrease in both absolute and relative humidity. Further descent into the valleys accentuates the tendency to evaporate moisture, as increased heating further decreases the relative humidity. On the uplands, elevation of 1,000 or more feet above the general level has the effect of lifting and frequently precipitating moisture. The transition from grassland to timber found along the slopes of the major valleys is explained not only by some slight absolute increase in moisture but also by the lower evaporation rate imposed by cooler temperatures.

The seasonal distribution of rainfall shows a strong tendency to conform to the coastal regime on the west side of the plateau and to the continental regime on the east side. The precipitation curve, therefore, has two maxima, one occurring in the summer, usually in June, and the other in mid-winter. Without exception, all stations within the plateau region conform to this pattern. In some, however, the primary maximum is in mid-winter, usually December, as indicated by Big Creek (Chilcotin), 150 Mile House (Cariboo), and Kamloops (South Thompson Valley). In others, particularly in the southern half of the plateau, the primary maximum is in midsummer as indicated by Merritt, Spences Bridge, and Westwold. In others again the maxima are almost identical in amount, as in the case of Vavenby and Chinook Cove (North Thompson Valley) and Princeton (Similkameen Valley). The average for all stations indicates that in general the total precipitation received in the summer exceeds that of the winter. Spring and autumn receive the least.

The significance of the precipitation regime is twofold. The summer maximum comes at a time critical for the growth of range grasses and forage crops. The winter maximum means that somewhat less than 50 per cent of the annual total occurs in the form of snow. Where the precipitation increases to 14 inches or more the snow cover is too deep for winter grazing and may continue late into the spring, prolonging the critical period of winter feeding.

[1] Tisdale found by actual measurement of precipitation and temperature on the Tranquille range from April to September that both elements varied with elevation. Between 1,300 and 3,200 feet the precipitation increased 181 per cent, and the average temperature decreased by 117 per cent. The P/E ratio showed an increase from 6·4 to 28, or 4·3 times through the same vertical distances.

That part of the total precipitation falling as snow varies from 19 per cent (Lillooet) to 35 per cent (Big Creek). In general the percentage of snow increases with elevation, so that in contrast with the upland surfaces deep valleys receive considerably less snow.

The total amount of snow falling in various parts of the plateau is shown for twenty-four stations in Figure 6. From the data given a distribution pattern involving three categories based on the annual snowfall becomes apparent. The margins of the plateau receive from 45 to over 100 inches; the uplands generally 35 to 45 inches; and the lowlands and valleys 14 to 35 inches. These variations have a direct bearing on the length of winter feeding, a subject discussed in a later section.

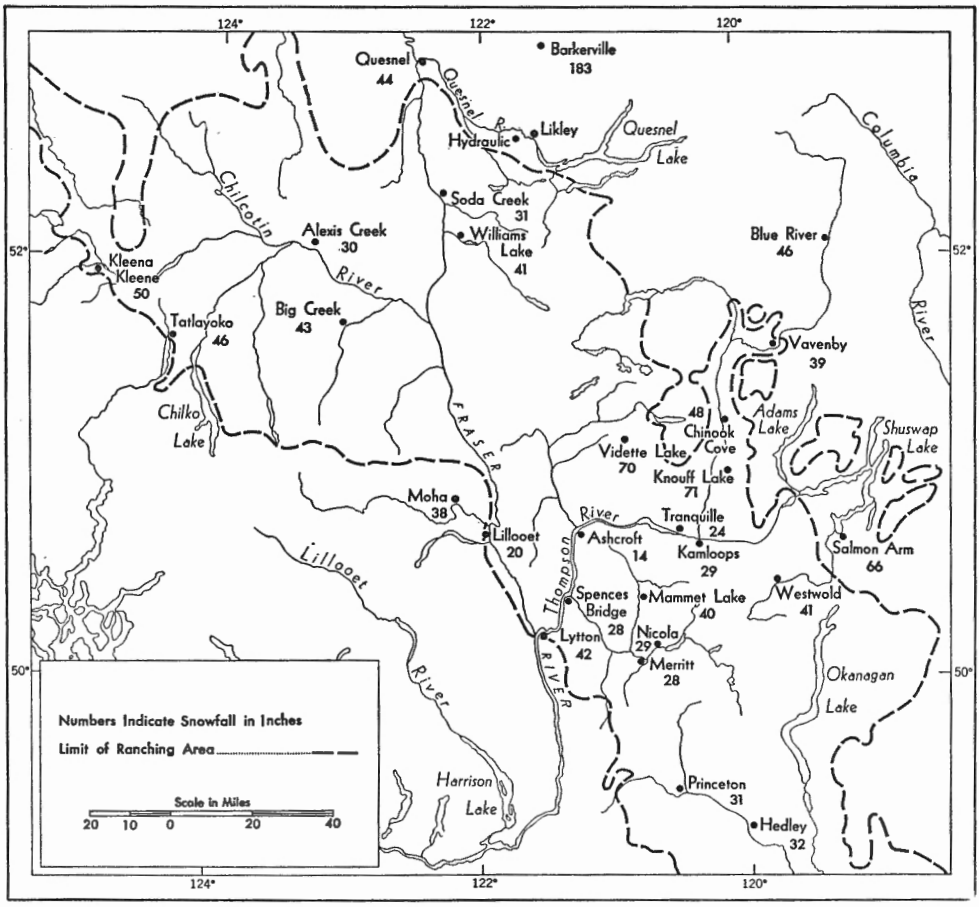

Figure 6. Average annual snowfall.

SEVERITY OF WINTER CONDITIONS

Severity of winter conditions is the most important single climatic factor related to ranching in this area, as it bears directly on the length of the winter feeding period. By correlating temperature and the depth of snow as factors in the duration of winter conditions it is possible to indicate objectively the relative length of winters in the various districts throughout the plateau. This is seen in

Figure 7, where "inches of snow" and "frost-free days" (used inversely as an indicator of the length of winters) are shown for various points.

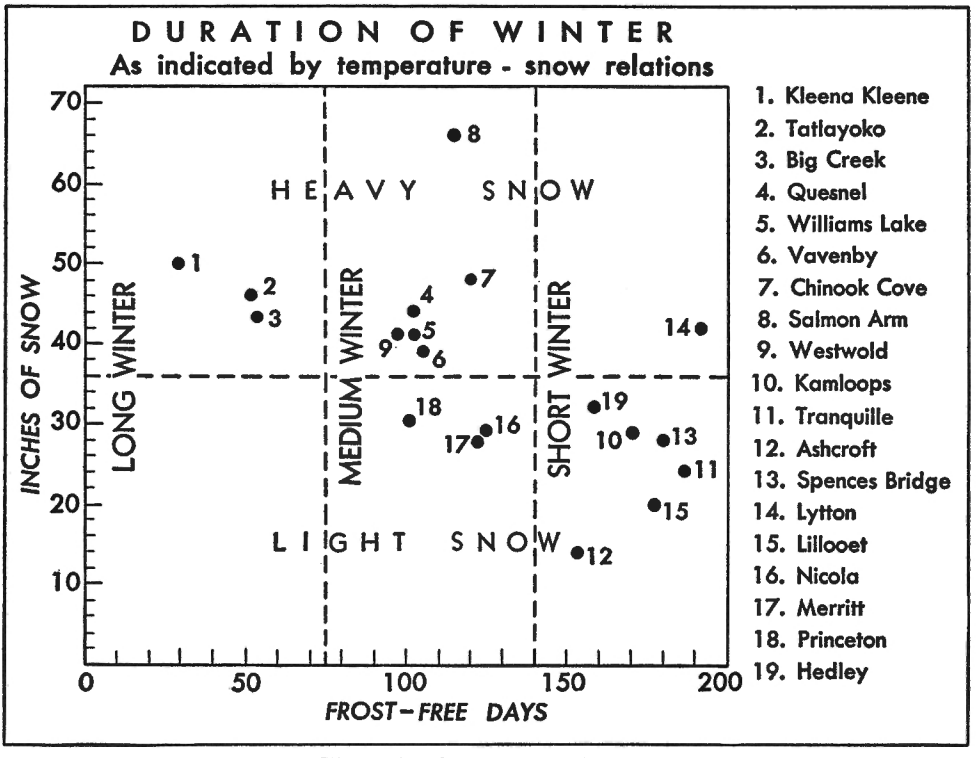

Figure 7. Duration of winter.

The result indicates three main station clusters representing optimum, good, and fair conditions for winter feeding. The Nicola and South Thompson districts enjoy a comparatively short winter; the Cariboo, North Thompson, and Princeton districts reflect an intermediate position; and the uplands of the Chilcotin suffer long-continued winter conditions. These results correspond closely with the map of "winter feeding periods" (*see* Figure 31).

NATIVE VEGETATION AND SOILS

As native forage is the basis of the ranching industry, various types of natural vegetation assume a place of great importance in explaining the kind of range practices employed and the pattern of occupation and land use within the southern Interior Plateau. The effect of soil on ranch practices is generally less direct, but soils are included in the discussion of vegetation because soil types and plant cover are closely related.

VEGETATION AND SOIL PATTERNS

The two major divisions of native vegetation that comprise the plant cover of the ranching area within the plateau are the grasslands and the forests or timberland (Figure 8).

It has been adequately demonstrated that these broad divisions have component types that, when logically arranged, assume a pattern of vertical

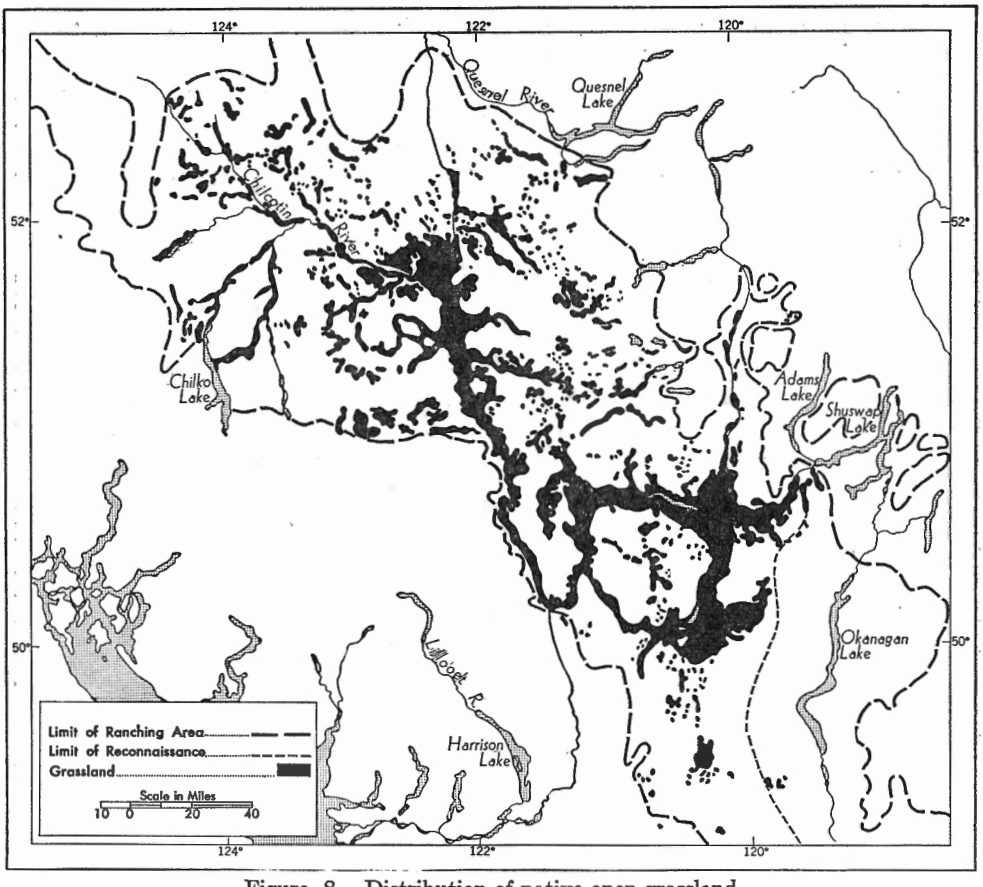

Figure 8. Distribution of native open grassland.

zones in response to marked changes of climate with elevation (Tisdale, 1944, 1947). At the same time the soils, being in large part the product of the climate and vegetation factors, conform in arrangement to the vegetation zones, as indicated in Table I.

TABLE I

The Relationship of Altitude, Soils, and Vegetation in the Interior Plateau

Altitude (feet)	Plant zone	Soil zone
1,100 – 2,300	Lower grassland	Brown earth
2,300 – 2,800	Middle grassland	Dark brown earth
2,800 – 3,200	Upper grassland	Black earth
3,200 – 4,000	Montane forest	Lower podsol
4,000 – 5,800	Subalpine forest	Middle podsol
5,800 – 6,100	Upper subalpine	Upper podsol

Although this system of classification cannot be ignored in any logical arrangement of vegetation and soil types within the intermontane region, the

pattern of vertical zones does not take into account the horizontal distribution pattern, which is fundamental to an understanding of ranching practices. This is especially true of the Cariboo-Chilcotin region, where deep valleys comprise a very small percentage of the total area. As relief differences are relatively small over large areas in the northern region, local edaphic factors and latitudinal changes in climate are more significant to the vegetation pattern than changes in elevation. As a purely vertical classification based on deep valleys fails to account for vast tracts of rolling upland, the horizontal pattern has been described below as follows:

1. Grasslands
   (a) Types
   (b) Horizontal distribution
   (c) Vertical distribution
2. Forest or timberlands
   (a) Types
   (b) Horizontal distribution
   (c) Vertical distribution
3. Transition zones
   (a) Yellow pine park
   (b) Fir aspen park
   (c) Subalpine
4. Meadows
   (a) Occurrence
   (b) Meadow types

GRASSLANDS

The term "grasslands" is used loosely to include not only the grasses but other associates such as forbs[1] and shrubs, some of which, like sagebrush, are xerophytic. Not included in this class are meadow grasses; because of their association with sedges in timber openings these have been included with the meadow types.

Dominant Species

As the grasslands of British Columbia are merely the extension northward of the intermontane grasslands of Idaho, Oregon, and Washington, the characteristic type throughout the lowlands is bunchgrass. The various "hard grass"[2] associations correspond closely with the Palouse prairie formation. Of several species of bunchgrass, the blue-bunch wheat-grass *(Agropyron inerme)* is dominant. This grass cures well, is highly nutritious, and matures early in the spring, thus being available for forage long before the "soft" grasses of the timbered upland and long after they have been killed by frost. Other species of bunchgrass such as spear-grass or needle-grass *(Stipa)* and dwarf blue-grass *(Poa secunda)* are well represented. Whereas these types are dominant in the climax vegetation, overgrazing has led to the invasion of less palatable annuals such as downy brome-grass and has permitted the ascendancy in parts of unpalatable types like sagebrush and rabbit bush as well as certain forbs.

Horizontal Distribution

As indicated on Figure 8, the broad pattern formed by open and semi-open grasslands is one of "fingerings" leading along the major drainage lines of the plateau. The effect of increasing latitude, resulting in more moisture and a decline in average summer temperature, is apparent in a gradual narrowing of the finger-like extensions.

A distinction may be drawn between the northern region and the southern or Thompson-Nicola-Princeton area. In the former, grassland comprises less than one-fifth of the area; in the latter approximately two-fifths is in open or semi-open range. The Princeton area, by reason of its location in a lowland, stands as an island of grass amid a vast expanse of unproductive timber. In the Nicola lowland open grassland reaches its greatest extent, proclaiming this district the heart of the cattle country. In the deep trough carved by Thompson

[1] A non-grass like herb; in stockman's parlance, a weed.

[2] The term "hard grasses" is used to refer to grasses that cure on the ground, such as bunchgrasses.

River, grasslands predominate up to 3,200 feet. Between Spences Bridge and Lytton increasing moisture narrows the zone of grasses until it is found only at the valley bottom. Upstream from Lytton along the main channel of the Fraser precipitous walls confine the grasslands to a narrow belt. From Big Bar Creek northward, the zone of grassland widens at intervals where lateral valleys enter the main one. At Riske Creek in the fork between the Fraser and Chilcotin, the grasslands fan out to provide some of the finest range in the Cariboo-Chilcotin region. From here northward the Fraser narrows to a canyon, but above Soda Creek it becomes wider again. However, at this latitude increasing precipitation has favoured the encroachment of timber on the valley terraces and at Quesnel even the river flood plain is tree covered. The zone of open grasslands carries along the terraced sides of the Chilcotin to Alexis Creek, where the hard grasses have been crowded onto the flood plain, marking the upstream limit of any considerable expanse of bunchgrass. In the deeply entrenched tributaries of the Chilcotin, long thin tendrils of open grassland follow the valley bottoms.

Away from the main valley of the Fraser and its principal tributaries the area of open grassland becomes much reduced. Where factors favour its occurrence on the plateau surface, it is much restricted in area although it may possess strategic importance out of proportion to its extent. Such an area of limited grassland follows a line of minor drainage from Williams Lake southward to the vicinity of 100 Mile House, and another extends westward from 70 Mile House. Here and there scattered through the timber numerous hard grass openings occur in response to such factors as porous soil or southern exposure.

Open grassland range guided settlement in the past and has perpetuated the early established pattern of occupation to the present. In addition, it has set a ceiling on total cattle numbers and is the most important factor in explaining cattle density and distribution.

Vertical Distribution

The distribution of vegetation types according to vertical zones is very apparent in the grasslands and has direct effects on seasonal movements of cattle and the periodic use of the range.

Lower Grasslands. The lower grasslands in the Kamloops area, as observed at Tranquille, are found typically between elevations of 1,100 and 2,300 feet (Tisdale). Precipitation at this level averages 6 to 9 inches and the evaporation factor is very high, with the result that the P/E ratio is low (6·4).

This zone is characterized by bunchgrasses, particularly the blue-bunch wheat-grass and sagebrush *(Artemisia tridentata)* (*see* Plate II B). The former is highly palatable and for at least seven decades has been heavily grazed. As a result it has declined in amount and less desirable annuals introduced from the south have encroached on the range. A most conspicuous result of overgrazing is the dominance of sagebrush, which gives the whole area of lower grassland the appearance of a desert (Plate VI B). Other types of xerophytic shrub are rabbit bush, an aromatic plant that grows from 1 foot to 5 feet high, and an inconspicuous variety of cactus.

Because of the arid environment, the vegetation cover of palatable plants is sparse, with the result that both the yield of forage and the carrying capacity of the range is lowest of the three grassland zones. Overgrazing for many years has further reduced the carrying capacity.

Notwithstanding these disadvantages, the lower grasslands are highly prized as early spring, autumn, and particularly winter range. Species common

to the arid grasslands start growth early in the spring, develop rapidly, and cure early. Autumn rains generally bring a renewal of growth, so that they may be grazed again in the late autumn or winter. Because the snowfall is light in this zone and winters are short, it becomes the winter range *par excellence*. Winter thaws frequently leave this section of the grasslands without snow most of the winter.

Unfortunately for the ranching economy as a whole, the distribution of the lower grasslands is restricted to the valley of Thompson River and the middle Fraser River from Lillooet to the vicinity of Canoe Creek.

The brown soil type is characteristic of the lower grasslands. Where irrigation has been made available, it produces a luxurious hay crop. The bottom-lands around Kamloops have been utilized particularly for high-value crops such as fruit, hops, and vegetables.

Middle Grasslands (Tranquille elevation 2,300–2,800 feet). The middle grasslands, as the term suggests, are intermediate between the arid lower grasslands and the mesic upper grasslands. Precipitation ranges from 10 to 12 inches, which together with a fairly high evaporation factor results in a P/E ratio of 10.

Perennial bunchgrasses and dwarf perennial forbs are the principal vegetation types. In the climax stage the middle grasslands are characterized by a dominance of blue-bunch wheat-grass and dwarf blue-grass. With overgrazing the palatable spear-grass *(Stipa comata)* is now dominant, with undesirable annuals such as downy brome-grass *(Bromus tectorum)* becoming common. Xerophytic shrub typical of the lower grasslands has small representation in the middle zone although it is present along the lower margins (*see* Plate IX B).

A more favourable climate has increased both yield of forage per unit area and the carrying capacity over those of the lower grasslands. The increase in the number of species as well as the size of the plants themselves reflect more favourable moisture conditions.

The middle grasslands are used as spring and autumn range. Wherever they are extensive the necessity of winter feeding is reduced by 2 to 3 months. The distribution of this middle zone is generally throughout the Nicola and North Thompson Valleys and along Fraser River and the Chilcotin as far as Hanceville. In the Riske Creek district at the confluence of the two rivers, as well as in many sections of the main Fraser Valley south of this point, it may be used as winter range if snow conditions are favourable.

The zonal soil associated with the middle grassland is the dark brown or chestnut-brown type. Being somewhat higher in humus than the brown soil of the lower zone, it is very productive under irrigation. Climate limits its use to the hay crops, generally alfalfa and alsike, although hardy fruits can be grown on a non-commercial basis.

Upper Grasslands (Tranquille elevation 2,800-3,200 feet). In the zone of upper grasslands the altitudinal range is from 2,700 to 3,500 feet. This zone is characterized by a greater ground cover per unit area, higher productivity, and a richer flora than is found in the lower zones (*see* Plate III A).

The climate of the upper grasslands is moister and cooler, with P/E index of 20. Precipitation is usually above 12 inches in the south but somewhat lower in the upper Cariboo-Chilcotin. Conditions generally are optimum for grasses and just at or below the minimum for trees on a long-term average. Climatically it is a zone of tension where edaphic factors are often critical in swinging the balance either toward or away from tree growth. As a result, it is this zone which is frayed along the upper margin by fingerings of tree growth described under "Transition Zones".

As in the case of the lower zones, bunchgrasses with blue-bunch wheat-grass dominant constitute the climax vegetation. Over most of the area, heavy grazing has replaced the climax by other dominants, namely, spear-grass *(Stipa columbiana)* and Kentucky blue-grass *(Poa pratensis)*, and in parts of the Nicola and middle Fraser by downy brome-grass. Except for the last-mentioned, all the grasses are grazed readily. Kentucky blue-grass, unlike most of the associates, is a sod-forming grass. The cover is so much heavier in the upper grasslands where grazing has not been severe that the ground appears to be completely matted with vegetation. In addition to the grasses, numerous forbs such as balsam root, dandelion, yarrow, and others are abundant. Two poisonous plants, dwarf larkspur and death camas, are fairly common also. Patches of wild rose and coral berry are found in favoured spots.

The shorter growing season becomes apparent in the delayed development of upper grassland types. Growth does not commence for an average of 13 days after that in the middle zone and the range is not ready for nearly a month later than in the lower grasslands. Nevertheless, this zone has a yield double that of the middle zone, and its dominants, with the exception of downy brome-grass, are highly palatable. Curing is delayed in the upper zone because moisture conditions are usually favourable enough to maintain much of the vegetation in a green state through the summer.

Because of higher elevation, the upper grasslands are the most widely distributed of the three zones. They are found on the upper sides of the main valleys from Princeton to Soda Creek and along the Chilcotin to Alexis Creek. The black soil of the upper grasslands corresponds to the chernozem of the Great Plains. Higher in organic matter, yet with adequate lime content, this soil constitutes some of the best crop land. Dry farming has been attempted in various localities within this zone, but has not persisted, except in the Knutsford district south of Kamloops. Where topography is favourable, the soil yields good crops of alfalfa, timothy, and clover under irrigation.

FOREST OR TIMBERLANDS

Although the domain of open grasslands belongs to the major valleys, the forest claims the broad interfluves that collectively comprise the upland surface. Beginning at elevations from 3,200 to 4,000 feet, forests cover the uplands to timber-line at 6,000 feet.

Dominant Species

Of the three types comprising the timberland the conifers are dominant, with aspen on the better soils. Conifers are tolerant of relatively low temperatures, a short growing season, and the moderate precipitation common to the higher altitudes.

Shrubs such as the rose, Saskatoon-berry, and dwarf spirea form an understory wherever the tree stands are fairly open. Herbaceous vegetation, both grasses and forbs, forms the ground cover. Of significance to grazing is the very considerable increase of palatable forbs in comparison with the grassland zones.

As in the grassland, so in the timberland man has materially altered the climax vegetation. Whereas overgrazing of the grasslands became apparent only after settlement, destruction of the forests by fire in order to attract game to the hunting grounds was a common practice with the Indians. By burning the forests it was believed that the growth of grasses would be extended. This idea is still prevalent, and as a result the climax conifers (Douglas fir and Engelmann spruce) have been largely replaced by stands of lodgepole pine, a species that reproduces readily after fire (*see* Plate IV B). It is universal on the upland surface from the foothills of the Chilcotin to the eastern margins of the Cariboo and renders most of the upland around Princeton useless for grazing.

Horizontal Distribution

As the timberland is complementary to the open grassland, its distribution will conform to the broad interfluves that comprise about 80 per cent of the Cariboo-Chilcotin region and 60 per cent of the Thompson-Nicola area. Density of timber in response to greater precipitation increases eastward and northward. The increase eastward is related to the rain shadow effect of the Coast Range, which largely disappears east of Fraser River. As a result, the ranching area on the east is restricted by increasing density and size of timber. Much of it is of commercial value and large tracts have been set aside as forest reserves. The Nehalliston-Tranquille Reserve extends in a long band parallel with the western margin of the North Thompson Valley and forms the conspicuous wedge in the ranching area in this locality (Figure 1). The Niskonlith-Barriere Forest occupies a corresponding position on the east side of North Thompson River and the Monte Hills-Okanagan Forest Reserve serves to divide the Okanagan grassland from the Thompson-Nicola area. The sparsity of cattle in the segment of upland bounded by Thompson and Nicola Rivers and Guichon Creek is partly the result of dense timber in the Nicola Forest Reserve. Elsewhere over the plateau the stands vary in density, but with the exception of waste tracts due to windfalls and burns they are important as summer range for cattle.

Vertical Distribution

The vegetation of the timberland assumes a zonal pattern occasioned by a series of climatic changes varying with altitude. Soil types vary with elevation from brown podsolic to grey wooded. Certain changes with altitude are characteristic. The density of the forest increases from open stands formed by mature types in the lower forest zone to a dense cover of spruce and fir in the middle zone and to thinner or broken tracts in the subalpine; the density of the shrub cover decreases from the lower forest to the middle zone and shows little increase in the upper zone; herbaceous vegetation is most abundant in the lower zone, reaching a minimum in the middle zone but increasing again in the subalpine; suitability for cattle grazing is optimum in the lower zone, poor in the intermediate, and improves in the subalpine, whereas suitability for sheep grazing is at a maximum in the subalpine and alpine.

Lower Forest Zone (Tranquille elevation 3,200–4,000 feet). Varying up to 300 feet from its lower limit, the lower forest zone ascends to 4,000 feet or more. The dominant trees are Douglas fir (the climax type), lodgepole pine, and aspen. As a result of fire, the climax type over much of the upland has been replaced by lodgepole pine or aspen. An understory of shrub such as sopolallie *(Sheperdia canadensis)*, rose, and dwarf spirea *(Spiraea lucida)* are found in association with several varieties of herbaceous plants, including such highly palatable legumes as vetch and peavine. Pine-grass *(Calamagrostis rubescens)* comprises half or more of the available forage. It is not grazed as readily as some of the forbs and browse types and lacks the nutritious qualities of bunchgrass.

The relative grazing value of the lower forest zone varies greatly from area to area. Under a mature stand of fir or where aspen is abundant it is readily accessible to cattle by reason of fairly open stands and the forage is just as nutritious as the grassland types (*see* Plate IV A). A disadvantage of the timbered ranges is the abundance throughout the plateau of timber milk-vetch *(Astragalus serotinus)*. This common and palatable forb causes the disease in cattle known as timber paralysis, resulting in a lack of control of the hind legs, difficulty in respiration, and general emaciation.

The soils of the forested region are of two main types: brown podsolic in the Kamloops-Nicola area (up to altitudes of 4,500 feet) and grey wooded in the

Cariboo-Chilcotin region. The former are brown in colour, slightly acid, and often iron-stained. In elevations from 4,500 to 6,000 feet the soils are of the grey wooded type characteristic of the region to the north.

The grey wooded soils of the Cariboo-Chilcotin have a distinct leaf mat on the surface, beneath which is a dark brown to black upper layer from ¼ inch to 3 inches thick. The A_2 horizon is brownish grey, from 4 to 8 inches thick, and strongly leached of plant nutrients, iron, and bases. The B horizon has a zone of lime accumulation from 25 to 30 inches in depth. In general, these soils have inferior physical properties and are of low fertility, but with management may be built up to a point suited to mixed farming. Much of the cultivated hay land of the Cariboo-Chilcotin is located on soil derived from river silts and generally slightly alkaline and productive when irrigated.

Middle Forest Zone (Tranquille elevation 4,000–5,800 feet). The lower forest zone merges with the middle zone at elevations around 4,000 feet and extends upwards for nearly 2,000 feet. In vertical extent, this is the largest of the zones, occupying many of the highest parts of the plateau.

In the middle zone destruction of the thin-barked dominants Engelmann spruce and subalpine fir has been more extensive than that of Douglas fir in the lower zone. Lodgepole pine has almost completely replaced the climax types in this zone. Aspen does not reproduce well at this elevation, where temperatures are a limiting factor to tree growth. Partly because tree stands are dense, the understory plants are greatly reduced in number, and many are unpalatable, making this zone generally unsuited to grazing.

Upper Forest or Subalpine Zone (Tranquille elevation 5,800–6,100 feet). The upper forest zone commences at elevations where climatic and edaphic factors militate against tree growth. The characteristic association is one of forest alternating with treeless openings dominated by herbaceous species (*see* Plate V B). The principal forest tree is Engelmann spruce, with a scattering of subalpine fir. The shrub cover is poorly developed and consists mainly of alpine willows.

TRANSITION ZONES

Along the lower and upper margins of the timber are zones of transition to bunchgrasses and alpine meadow grasses respectively. These are zones of tension where small changes in the climatic factors may well result in the dominance of one vegetation type over the other. They are of particular importance to grazing because they have both a wide distribution and high carrying capacities. In appearance the transition zones resemble a park; as they consist of a mingling of trees either in clumps or widely separated and, therefore, may be referred to as parkland (Plate IV A). At lower elevations parkland types consist of yellow pine or yellow pine-fir associations and, especially in the northern part of the plateau, of aspen or fir-aspen associations. In the subalpine, the parkland consists chiefly of an intermingling of alpine fir and meadows.

It is common to find through the upper grasslands and extending even into the middle grasslands open stands of yellow pine *(ponderosa)* with individual trees more or less widely spaced above a ground cover of perennial bunchgrasses (*see* Plate I A). This association is most favourable for it breaks the monotony of bare grassland and at the same time offers no obstruction to the easy movement of cattle. The northern limit of yellow pine within the Interior Plateau follows a line from the vicinity of Clinton southeastward along the lower edges of fir

forest and then swings northward into the valley of the North Thompson as far as Vavenby. Accordingly, the yellow pine park is confined to the Thompson-Nicola-Princeton area. Locally, the closeness of the tree stand varies with exposure, slope, and drainage. Yellow pine stands commonly occur at the bottom of slopes or at the head of fans where seepage has increased the ground-water supply. Along the upper margin yellow pine mingles with fir. Herbaceous plants grow well under open pine and such areas constitute a favourite gathering place for cattle.

A second park type consists of fir or aspen arranged in clumps or groves interspersed with bunchgrass openings. This arrangement presents a pleasing landscape and one in which cattle may find shade as well as a variety of forage. Typical examples may be found along the upper grassland margins. Aspen groves are associated with dry ravines or "draws". Semi-open aspen stands are commonly found along well-drained, shallow valleys on the upland surface, especially around lakes such as Bridge or Meadow Lake. As a rule, a lush growth of forbs and grasses accompanies the aspen park and in such localities cattle tend to gather in groups (*see* Plate IV A).

Riske Creek prairie, north of the junction of the Chilcotin and Fraser, is a typical example of the fir park. Both here and in the Alkali Lake and Gang Ranch districts to the south, lodgepole pine, through overgrazing and burning, has encroached on the grasslands, producing a modification of the fir park type.

The upper or subalpine transition consists of alpine meadows mingled with stunted members of the spruce, fir, and willow families. The treeless openings are of two types, depending on moisture. Poorly drained areas are dominated by grasses, such as timber oat-grass *(Danthonia intermedia)*, alpine timothy *(Phleum alpinum)*, or sedges *(Carex)*. A second type is better drained and produces a rich growth of forbs such as lupin, blueberry, lousewort, and valerian. Such mountain meadows make good sheep ranges and are suited to cattle also, provided they are made accessible by trails (*see* Plate V B).

MEADOWS

A notable feature of the forested uplands is the large number of scattered openings throughout the timber called locally natural or swamp meadows. To a large extent, the widespread occurrence of meadows in the northern division of the ranching area, in contrast with the Thompson-Nicola region, is a matter of relief and drainage. In the Cariboo-Chilcotin, the undulating surface of the plateau is poorly drained, resulting in swamps and marshes in depressions caused by the unequal deposition of moraine. On the other hand, that part of the plateau from the Thompson Valley south has a much smaller area in upland meadows, largely because this region has reached a more advanced (sub-mature) stage in the cycle of erosion.

The wild meadow type may be further subdivided according to vegetation associations within each sub-type. (1) The wet (swamp) meadow is characterized by a growth of sedges, horsetail, and some grasses around the margins. It frequently has a stream flowing sluggishly through it, or it may be simply a swale with a pond at the centre derived from spring run-off. Swamp meadows may serve variously for autumn grazing, hay land, and some summer grazing around the dry margins. (2) The dry meadow is usually a former lake bed or swale bottom with a high water-table in the spring, but is dry during the summer and autumn (*see* Plate IV B). Usually better range grasses are found on the dry meadow such as spear-grass *(Stipa)*, brome-grass, and June-grass, as well as

foxtail, dandelion, and sedges *(Carex)*. (3) The willow bottom constitutes a third type of meadow found on the narrow flood plains of streams and creeks (*see* Plate III B). Such shallow flood plains are frequently 20 to 100 feet below the level of the upland and are characterized by a growth of shrubs such as willow, aspen, dwarf spirea, Arctic birch, and wild rose, together with some grasses and sedges. The woody shrubs (browse) are grazed in the early winter when snow makes the grasses difficult to crop.

Meadow soils found in poorly drained depressions are black in colour and higher in organic matter than the grey wooded soils. Peat and muck soils are common to the wet meadows.

CHAPTER III

RANGE TYPES AND THE DISTRIBUTION OF LIVE STOCK

GENERAL STATEMENT

The term "range" is commonly used to indicate the area grazed by cattle. It is a basic factor in ranching economy and around it is organized the ranch unit. It is also basic to an appreciation of the live-stock distribution pattern.

Ranges may be classified either according to the dominant vegetation associations, or according to the season of use. The latter classification is the one employed by the rancher himself. The total grazing area falls into four types of range according to the season of use: spring, summer, autumn, and winter range. However, this does not include all lands within the ranching area, as some are cultivated or cut for hay and some are useless for grazing.

The term "range" as defined above implies both physical and human-use elements. The four physical elements, topography, native vegetation, climate, and surface water, determine the use potentialities of a specific range, but it rests with man to decide how and when a given area of potential grazing land shall be used, if at all. The economic factor has gradually assumed such

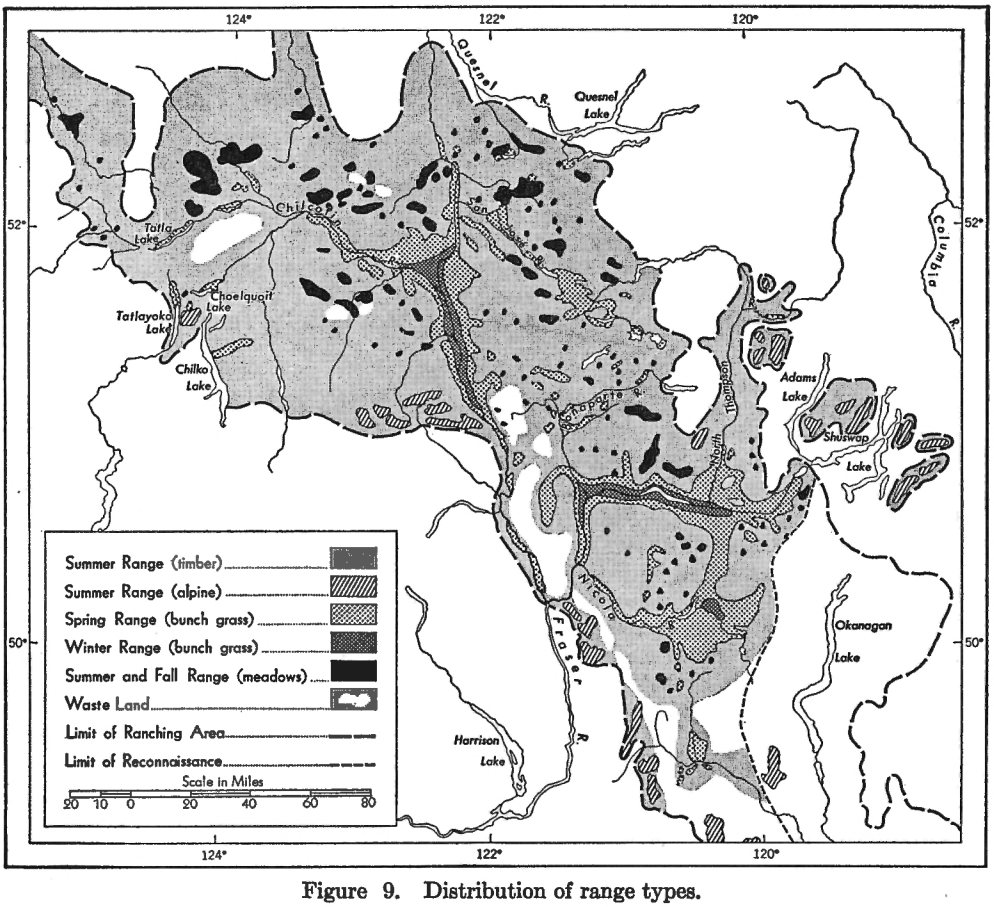

Figure 9. Distribution of range types.

importance in some range areas that competing uses have led to the replacement of grazing by intensive agriculture. This is particularly true along the flood plain of the Thompson from Kamloops to Chase, and in the vicinity of Ashcroft, where fruit and truck crops are specialties.

The several elements, both physical and cultural, referred to above combine to produce four categories or types of range. The characteristics and distribution of each type are described as follows (Figure 9).

SPRING RANGE

CHARACTERISTICS

That part of the grazing area known as spring range is grazed immediately after the snow finally disappears (Plate III A). The vegetation comprising spring range is usually grass that cures on the ground, that is, bunchgrass or, in the Cariboo-Chilcotin, Canada blue-grass. Except in the deep valleys, spring range is usually located on south-facing slopes either along valley sides or on ridges of moraine. Here the first direct rays of the sun produce their maximum warming effect and coarse gravel ridges provide good drainage favouring the growth of "hard" grasses. Usually spring ranges have ample water for stock because minor depressions are filled with run-off at that season of the year.

Spring range, as the term implies, is ready for grazing from 1 month to 2 months before the summer or timber range. Dates of readiness for grazing[1] in the Thompson Valley vary on the average from April 19 on the lower grasslands to May 13 in the upper grasslands. Early spring range turn-out occurs from early April to the end of May, according to locality (*see* Plate V A).

Spring range conforms to elevation which, in turn, is related to the length of the growing season. As a result it accords with the zonal distribution of soil and vegetation types. This leads to a further division into early and late spring range, the former conforming to the lower and middle grassland zones, and the latter to upper grasslands (2,850 to 3,000 feet). In the Cariboo-Chilcotin, because the area below 3,000 feet is small, spring range is restricted to a few localities. In the Thompson-Nicola, where low elevations are more extensive, the area in spring range amounts to nearly two-fifths of the region.

DISTRIBUTION

Conforming to major topographic differences, the pattern of spring range follows the major drainage features (Figure 9). Thus the middle Fraser Valley and the lower Chilcotin, especially at the confluence of the rivers, have extensive areas in spring range. However, where valley walls are steep, as along the Fraser between Lytton and Big Bar Creek or north of Chimney Creek, the area in spring range is greatly restricted.

Much less extensive, but of great local importance, are certain sections of spring range following some of the minor depressions on the plateau surface. The most conspicuous is the valley of San Jose River from Lac la Hache to its confluence with the Fraser. Much of this valley lies at an elevation of 2,700 feet. Open side hills and dry meadows, enclosed by light stands of aspen and fir, constitute limited range for spring grazing. Similar openings and exposed side hills conforming to minor drainage features are typical of the Chimney Creek area between San Jose and Fraser Rivers and in the vicinity of Tatlayoko, Tatla, and Choelquoit Lakes in southwest Chilcotin. Around a tiny string of lakes east of Canoe Creek and along Bonaparte River, small hard-grass areas are grazed after the snow melts.

[1] Readiness for grazing implies a growth of 5 or 6 inches, when the plants are able to stand moderate grazing without harmful effects.

In striking contrast with the northern region, the Thompson-Nicola country, characterized by the deeply indented trough of Thompson River from Chase to Spences Bridge and by the broad basin-like depression of the Nicola, has the broadest expanse of spring range in the Interior Plateau (*see* Plate IX A and B). The small "island" of early range located in the Princeton basin marks the southernmost limit of this type. Much potential spring range may be reserved for autumn grazing, in which case it will be discussed below under "fall range".

CARRYING CAPACITY

Carrying capacity, which denotes the ability of a specific section of range to sustain live stock for a definite period of grazing without injury to the plant growth, is highest in the spring range. Variations will occur from locality to locality, but as a general rule it will range from 10 to 30 acres per cow on a 6-month basis.[1] Along the San Jose Valley in the Cariboo the carrying capacity is 20 to 35, which is typical of most spring range in the upper country. In the Nicola, the carrying capacity[2] is more typically 15 to 20.

Differences in the carrying capacity of the four categories of range vary with the native vegetation and with climatic changes. Growth will be more profuse in the northern region, where spring range is co-extensive with the upper grasslands, than in the south, where precipitation is less. Overgrazing and types of native grasses are important factors in determining carrying capacity.

FALL RANGE

CHARACTERISTICS

Areas of bunchgrass allocated to fall grazing are designated fall range. However, in the Cariboo-Chilcotin region meadows are grazed late into the fall and even early winter. To be consistent with the definition of "range" implying the season of use, meadow land will be considered as a division of fall range.[3]

The bunchgrass type of fall range has physical characteristics similar to spring range; the chief difference lies in the season of use. Such ranges have high grazing value as long as snow depths permit cattle to forage for themselves. Fall ranges have the advantage of a second growth period from approximately August 15 to October 15 under favourable conditions of rainfall and temperature. This is important to their suitability for use, which usually commences in early October and continues into December.

Fall range may be identical with spring range when the same section is grazed a second time in the same year (*see* Plate IX B). Ranges having a retarded growth by reason of a northern exposure or edaphic factors are allocated to fall use.

The use of meadows and valley bottom land for fall grazing is typical of much of the ranch organization in the Cariboo-Chilcotin region. Although the individual meadow may be relatively small, the total area grazed is large.

DISTRIBUTION

Since spring and fall bunchgrass ranges may be used interchangeably from year to year, or may be the same area grazed twice in a year, they may be considered as identical on a map of range types. Districts deficient in hard grass

[1] For the sake of brevity, carrying capacities will be expressed in the *number of acres* capable of sustaining a cow for 6 months. The sheep-cow carrying capacity ratio is 4:1.

[2] Estimates of carrying capacity were obtained from cover maps of the Grazing Division, Dept. of Lands and Forests, Victoria, B.C. Some of these were made 30 years ago when the subjective element entered more largely into the estimate than at present. Lack of uniformity of data, as well as of coverage, is a distinct problem in discussing carrying capacity.

[3] Meadow openings are not included in "fall range" according to the classification used by the Grazing Division, Dept. of Lands and Forests, Victoria, B.C.

range depend heavily on meadow grazing, so that areas of fall range for much of the Cariboo-Chilcotin are synonymous with meadows (Figure 9). This is particularly true of settled areas remote from major valleys.

CARRYING CAPACITY

The capacity of fall range is similar to that of spring range when the vegetation consists of cured grasses. In areas where spring range is regrazed in the fall, the carrying capacity will be greatly reduced and the land frequently overgrazed.

The capacity of meadows varies enormously with the types of vegetation (browse, sedges, and grasses) and the availability for grazing. The latter will frequently depend on accessibility. The wet meadow is used for fall grazing when a covering of ice makes approach possible. Meadows commonly have a carrying capacity from 10 to 20 but more often 20.

WINTER RANGE

The essential characteristic of winter range is its ability to sustain strong stock throughout most winters without the necessity of feeding hay. It is among the most valuable of range types and, being relatively scarce, has all passed into private possession (*see* Plates IX A and I A).

CHARACTERISTICS

Winter range is co-extensive with the lower grasslands. The native vegetation, at least in the climax state, is blue-bunch wheat-grass, highly prized for its nutritional value and curing qualities. Snow depths at most are slight—seldom more than a few inches—and frequent thaws often leave the ground bare. The use of winter range, by those fortunate enough to control parts of it, is subject to three disadvantages: shortage of water, low carrying capacity, and in some areas difficulty of access.

DISTRIBUTION

Typically, winter range is located on the lower benches and steep slopes of the deeply entrenched main valleys at elevations generally below 2,300 feet. It extends along the middle Fraser, along the lower Chilcotin, and in the Thompson Valley from Chase to Ashcroft. There is a small area of winter range along the upper Nicola River between Douglas Lake and Nicola Lake. Possibly the presence of the lakes has a moderating effect on winter temperatures locally. In the case of the deep valleys, föhn winds are the most important of the factors accounting for its availability through the winter.

CARRYING CAPACITY

Owing to low precipitation and a high rate of evaporation, forage is sparse and watering places few. Carrying capacities vary, depending on the previous use of the range, but generally are quite low compared with late spring pasture. Along the north shore of Kamloops Lake the capacity is 40 to 45, the result of a long period of overgrazing. To a varying degree the same is true of most winter range, with the result that its potential under careful management is not known, except that it will be less than that of spring range.

SUMMER RANGE

CHARACTERISTICS

Whereas sheep and cattle use areas having similar physical characteristics for spring and fall grazing, a sharp division in this respect applies to summer range. Cattle, with some exceptions, graze under timber during the summer

whereas sheep for the most part (except where they are kept as farm flocks) are driven to alpine and sub-alpine park ranges. There are a few cases where cattle make use of alpine range but these are of minor importance.

Summer range occupies the upland surface of the plateau at altitudes corresponding to the forested zones (above 3,200 feet). Topographic and vegetation associations typical of this range have already been described in Chapter II. Pine grass is the chief forage associated with stands of lodgepole pine, and leguminous forage and forbs grow well under aspen and fir.

Readiness for grazing on summer (timbered) ranges averages 7 weeks later than on the lower grasslands, commencing usually about mid-June to early July. As summer range is almost entirely on Crown lands, the period of grazing is established by the provincial government. Although varying with districts, use of summer range is permitted for a period beginning usually between June 1 and July 1 and continuing to the end of September or early October.

Alpine summer range, with its lush vegetation of grasses and forbs, is ideal for sheep. Frosts render the forage unpalatable some time in September, reducing the season of use to 3 months or less. Grazing dates, fixed by the government in accordance with readiness for use and carrying capacity, usually run from July 1 to September 30.

The grazing of meadows scattered through tracts of timber constitutes an important element in the use of summer range. Dry meadows are usually grazed in the summer whereas wet meadows are more accessible in the late fall. Cattle will eat pine-grass (*Calamagrostis rubescens*) but, as a rule, congregate around the openings where the more palatable forage such as pea-vine, vetch, and meadow grasses is available.

Water is seldom a problem on summer range. Cool temperatures and timber cover reduce the evaporation rate, and the glacially disturbed surface results in numerous swales and poorly defined stream channels, all of which retain water for most, if not all, of the summer.

DISTRIBUTION

Much more than half of the grazing area comprises summer range under timber. Some of it, however, is not available to cattle. No serious attempt has been made to determine the extent of the unused or unusable area but estimates suggest about 50 per cent. It would appear from Figure 9 that the Cariboo-Chilcotin has unlimited amounts of summer range but, unfortunately, much is of poor quality. The timbered ranges south of the Nicola basin are superior. The meadow type of summer range covers large tracts in the Chilcotin and Cariboo but becomes much less extensive in the Thompson-Nicola region.

Alpine ranges have a peripheral pattern conforming to the mountainous transition zone. In general, where mountains rise from 5,800 to 7,000 feet, and where ridges tend to be rounded, good summer ranges are found. As sheep gain and hold their weight well on the lush feed of mountain meadows, these ranges are preferred for sheep, although cattle are found on three of the alpine ranges used.

CARRYING CAPACITY

The variation in carrying capacity among different types of summer range and in various districts throughout the Interior Plateau is enormous. Vast areas consisting mainly of lodgepole pine have the lowest capacity, frequently 45 to 50.[1] Fir and aspen park have a much richer variety and higher yield of herbaceous plants. In such range, the carrying capacity is 25 to 40. Where

[1] Number of acres per cow for 6 months.

openings occur in light stands of aspen or fir, such palatable herbs as pea-vine, vetch, wild timothy, and June-grass provide excellent feed and a high carrying capacity, frequently 20 (*see* Plate IV A). The range in the Meadow Lake district northwest of Clinton and the Aspen Grove district south of the Nicola Valley is of such quality. The "swamp meadow" consisting of sedges and some grasses found in vast areas of the Chilcotin-Cariboo has a carrying capacity of 20 to 40.

MARGINAL AND NON-RANGE LANDS

HIGH AND ROUGH AREAS

A glance at the landform map will reveal areas within the plateau sufficiently rugged to be classed as mountains (*see* Figures 2, 3, and 4). Most conspicuous are Marble and Pavilion Mountains lying to the east of Fraser River between lower Thompson River and Big Bar Creek. Steep, rocky slopes, together with a scarcity of forage imposed by a short growing season, have produced an island of waste within the ranching area. Low mountains project into the Chilcotin district from the vicinity of Groundhog Mountains on the south to restrict the usefulness of the range in this area. Again, along the northwest border of the Chilcotin, topography becomes rough and elevations high, precluding the growth of desirable vegetation. Meadow openings give way to muskeg in the region to the north and west of Chezacut. A large segment of timberland between the Thompson Valley and Guichon Creek extends to altitudes too high for the growth of suitable forage. The same may be said of the divide separating the Okanagan Valley from the Nicola basin. The Princeton basin is an island of grassland surrounded by barren stands of dense lodgepole pine at high elevations.

AREAS OF FALLEN TIMBER

An undetermined but very large part of the timbered range is inaccessible to cattle because of fallen trees occasioned by fire or destructive insects. Such areas have at present no grazing value. Their location is on a scale too small to delineate in general terms but it may be said that much of the summer range in the Chilcotin and considerable amounts in the Thompson-Nicola region are thus rendered useless for grazing. One such tract affected by a destructive beetle lies along the eastern margin of the Nicola basin. In almost every locality the ranchers complain of "windfalls" reducing the carrying capacity of the Crown ranges.

STEEP-WALLED VALLEYS

Although topographic in nature, the steep-walled valley is so extensive in its distribution as to merit separate mention. Parts of the middle Fraser, the lower Chilcotin, Thompson River south of Spences Bridge, and the lower Nicola beyond Canford are so steep sided as to make access virtually impossible to cattle. These canyon-like valleys constitute barriers to the movement of stock and serve only to mark district boundaries.

DRY AREAS

Some ranges during part of the year are too dry for stock, particularly cattle. Although these are not entirely "waste" as far as grazing is concerned, their value as range is greatly reduced. Frequently, dry conditions are found in recently burned-over areas, such as the "Devil's Garden" north of upper Big Bar Creek. In the southwest part of the Chilcotin district, between Chilanko and Chilko Rivers, the range is very dry (*see* Plate IV B). Large areas, now in lodgepole pine reproduction, have been burned so frequently that the soil is despoiled of humus and the range cluttered with charred debris.

RANGE CATTLE

NUMBERS

Based on figures for 1948 supplied by the B.C. Cattlemen's Association, the total number of range cattle within the reconnaissance area was 98,069. The number of cattle for which grazing permits were issued in the same area was 77,174, indicating that approximately 15 per cent of the cattle do not graze on Crown land. According to statistics, there were 183,900 head of cattle in the entire province, which would indicate that 53 per cent of the total, a little over 98,000 head, are within the area studied, of which some 48,000 were in the Cariboo-Chilcotin area and 49,000 in the Thompson-Nicola area in 1948.

The number of cattle varies from year to year according to the market, the severity of the winter, and the hay crop. When prices are attractive as they have been since the embargo on cattle entering the United States was lifted in 1948, cattle move to market in large numbers, thus decreasing the total on the ranges. Heavy snowfall frequently exhausts the hay supply and unfavourable weather at calving time may result in a heavy loss in the calf crop, as happened in 1947-48. If wild hay land becomes inaccessible, because of an unusually wet summer such as occurred in 1948, the rancher is unable to cut sufficient feed to winter his total herd. Therefore, he is forced to sell in the fall or lose considerable numbers from starvation during the winter. The former course is usually followed, resulting in a temporarily large movement to market. Thus, both climate and economic factors cause the cattle population to fluctuate considerably from year to year.

DISTRIBUTION

The map of cattle distribution (Figure 10) reveals not only a lack of uniformity but also certain major concentrations within the ranching area. Three major clusters, separated by areas of lesser density, can be readily recognized. The northern one is centred at the confluence of Fraser and Chilcotin Rivers and fingers outward in three directions following the lines of drainage. The central concentration is compact and more rounded in shape with minor offshoots following the stream courses. Detached from the major centres, several minor clusters are also apparent. These serve to mark out the smaller ranching communities such as Anahim Lake, Chezacut, and Big Creek in the Chilcotin, and 150 Mile House, Lac la Hache, and Clinton in the Cariboo district. The third major concentration is located in the southern extremity of the map around Princeton. The small cluster to the southwest marks the use of summer alpine range by cattle. Elsewhere the cattle are thinly scattered over wide areas, according to the carrying capacity of the range.

The map of cattle distribution may be regarded as a composite of maps showing differences in the physical elements affecting the ranching industry. The contour map indicating relief, the map of winter feeding periods, that of the native vegetation and drainage, and the map of range types and carrying capacities, which in itself is an integrated expression of many of the physical features mentioned, correspond closely with the map of cattle distribution.

Although no means has been devised of measuring objectively the relative significance of each factor in its effect on the distribution of live stock, it is possible to ascertain the function of each in producing conditions more or less favourable to cattle raising. Four major factors, besides several minor ones, may be cited as fundamental in accounting for the pattern of cattle distribution: (1) native vegetation; (2) topography; (3) drainage; (4) soil. The relative impor-

tance of each varies greatly in different areas, but as a general rule vegetation is the most important single factor, as it supplies the raw material from which beef is produced.

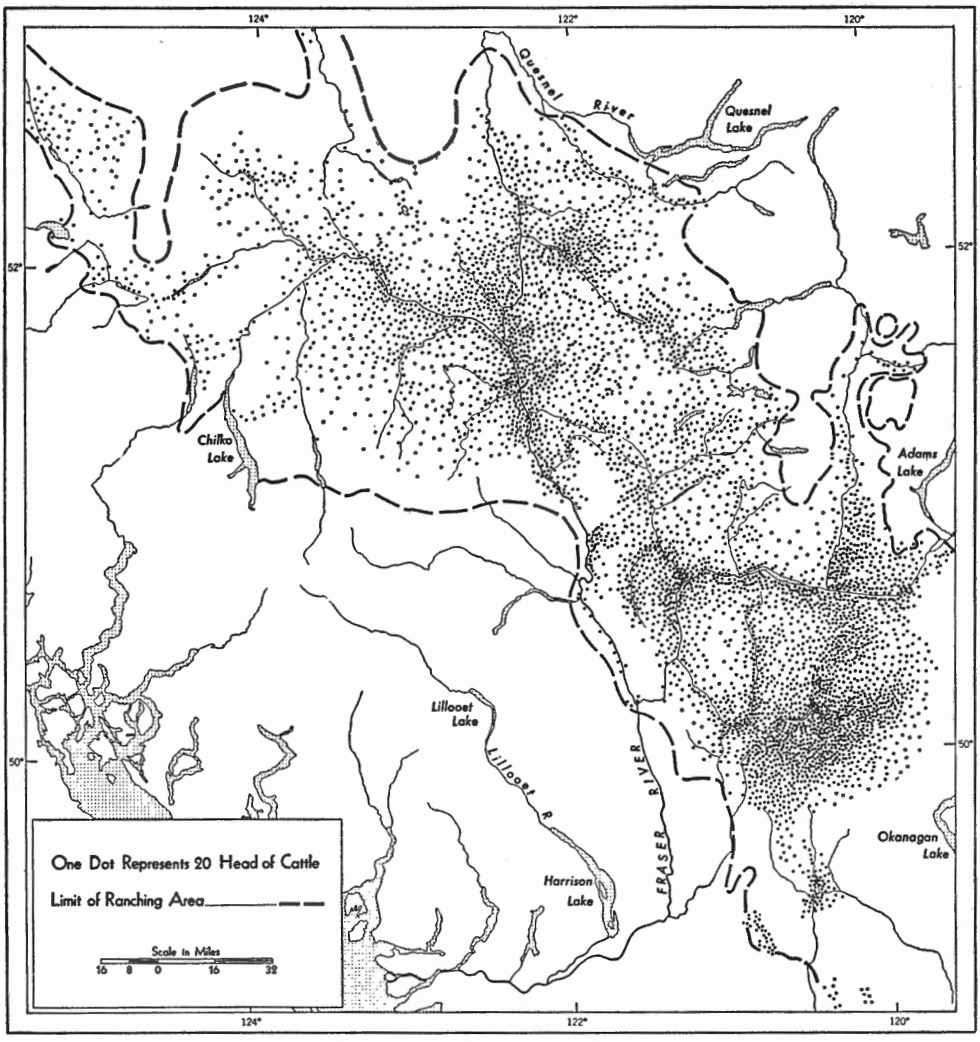

Figure 10. Distribution of cattle.

RELATION TO NATIVE VEGETATION

The three areas of major concentration of beef cattle are coincident with the most extensive areas of spring and fall range. Carrying capacities, owing to the nutritious bunchgrass, are high, ranging from 10 to 20 under careful management.[1] At the same time, these are areas having access to winter range, which reduces the necessity of winter feeding and greatly increases the carrying capacity of the area as a whole. The distribution of native vegetation and range types corresponds so closely with the pattern of cattle distribution that it may be safely said that the vegetation factor is dominant.

[1] Acres per head for 6 months. Owing to overgrazing, the capacity of many ranges is about 40.

Even concentrations of secondary importance in the distribution pattern are readily related to the quality of the range. Such districts as 150 Mile House, Lac la Hache, and the Princeton basin have some hard grass range with carrying capacities equal to the ranges of Thompson and Nicola Valleys.

In the Chilcotin especially, and to some extent in the Cariboo, minor concentrations reflect the presence of numerous meadows scattered throughout the timber. Ranching communities such as Big Creek, Chezacut, Anahim Lake, Tatlayoko Lake, Big Lake, and Beaver Valley stand out in the distribution pattern because of dependence on meadow grazing.

Vegetation conditions also explain thin spots in the pattern. Timbered ranges, chiefly lodgepole pine, are co-extensive with a sparse cattle population found in large tracts of land throughout the ranching area. Some "blank spots" on the map, such as that surrounding Princeton, carry such poor forage that grazing is not economically possible.

RELATION TO TOPOGRAPHY

Although the vegetation factor is dominant, it operates in conjunction with other factors, especially topography. Cattle do better on level to rolling land and will graze rough country only under necessity, steep hillsides and rough land inducing foot sores. Consequently, cattle refuse to travel in search of forage, particularly the heavier animals. Moreover, breeding is adversely affected by rough range. For these reasons, cattlemen avoid rugged topography. This fact is reflected in the distribution pattern around the margins of the ranching area, where a thinning out occurs. Areas of rough topography are well defined on the distribution map. Pavilion and Marble Mountains stand out as ungrazed areas; the Anahim Lake nucleus is separated from Chezacut by high elevations and rough to mountainous terrain; the steep-walled valleys of Fraser, Thompson, and lower Nicola Rivers, converging on Lytton and Spences Bridge, make good bunchgrass land inaccessible.

On the other hand, favourable topography finds expression in three major zones of cattle concentration. In the vicinity of the forks of the Fraser and the Chilcotin, the valleys open and terraces rise in tiers for hundreds of feet above the ribbon-like streams below. These "bench lands", as they are called locally, are usually accessible. Similar topography is typical of Thompson River above Spences Bridge, continues upstream as far as Chase, and may be traced along the North Thompson to Heffley Creek.

The third major concentration occupies the broad drainage basin of the Nicola. Here rolling terrain and moderate altitudes combine to favour dense cattle concentrations.

RELATION TO SURFACE DRAINAGE

A glance at the map will reveal elongations corresponding closely with drainage features, particularly shallow stream valleys on the upland surface, and showing a direct relationship between surface waters and cattle concentrations. Along minor drainage courses, river bottom-land or flood plain has a high water-table and frequently gives rise to an interrupted series of meadows containing palatable forage. Then, too, hay land is largely synonymous in the Cariboo-Chilcotin with meadow openings and irrigable bottom-land, which must be considered as an important factor in sustaining cattle during 4 months of the year.

Two elongated clusters trend south from the Thompson Valley to the Nicola country. The eastern one is related to excellent spring range associated with an old stream channel now nearly abandoned except for several lakes. The valley to the west, however, principally in the vicinity of Mamit Lake, has an extensive flood plain and a high water-table favourable to abundant hay crops.

RELATION TO SOIL

The three areas of major concentrations have fertile, brown, dark brown, and black (chernozem) soils corresponding to vertical vegetation zones. Particularly in the southern regions, where topography is suitable, these soils yield a large hay crop under irrigation and greatly extend the cattle capacity of these areas. On the upland surface, where grey wooded soils predominate, cultivated areas are greatly restricted, usually to immature soils of flood plains.

Soil in the sense of the regolith may exercise a strong negative effect on cattle distribution. Many areas of the upland are strewn with coarse gravelly moraines, which in some localities are so unfavourable that only lodgepole pine can thrive. It will be observed that a large segment of the West Chilcotin district between Chilanko and Chilko Rivers appears ungrazed. A traverse through this sector between Redstone and Tatla Lake revealed a regolith so stony that herbaceous vegetation was extremely sparse. Road building has few problems here, for natural gravels abound.

Some areas, usually too small to appear significant on a map of cattle distribution, have been rendered useless for grazing by destructive fires. Under dry conditions, particularly in midsummer, fires destroy the humus in the soil, making it unproductive except for lodgepole pine. This tree type nearly always appears after burning, no matter how severe the fire. Recent burns in large parts of the Chilcotin and throughout the timbered ranges generally have turned summer grazing land into waste.

REGIONAL DISTRIBUTION

The cattle within the reconnaissance area in 1948 were distributed over 567 holdings, of which about 147 were non-commercial units keeping a few head of cattle as a source of supplementary income. Accepting 25 head as a minimum for an economic unit under present market prices, there are 420 commercial cattle ranches within the area under study. The numbers and relative importance of commercial ranch units are given, by major regions, in Table II.

TABLE II

Regional Distribution of Ranch Units and Range Cattle, 1948[1]

Region	Ranch units by numbers grazed						Total ranch units	Total commercial units	Number of cattle	Average cattle per unit
	Under25	25–99	100–499	500–999	1,000–5,000	10,000				
Cariboo-Chilcotin....	122	127	79	12	7	—	347	225	49,332	142
Kamloops-Nicola.....	25	112	66	11	5	1	220	195	48,737	221
Total.....	147	239	145	23	12	1	567	420	98,069	170

From the data in Table II, several comparisons for the major regions[2] may be drawn. The Cariboo-Chilcotin has slightly more cattle than the region to the south and exceeds the latter in numbers of commercial ranches, the figures being

[1] Data are not available for determining exactly the number of non-commercial units (under 25 head), but on the basis of membership in the B.C. Cattlemen's Association, and of cattle grazing permits, the above figures are given as estimates.

[2] The boundary between the Cariboo-Chilcotin region and the Kamloops-Nicola region lies north of the Thompson Valley (*see* Figure 17).

225 and 195 respectively. It will be observed that there are more sub-marginal and marginal units in the Cariboo-Chilcotin, but with respect to large units of 500 head and upwards the two regions are about equal.

The slight superiority in total cattle numbers of the Cariboo-Chilcotin may be attributed to: (1) many marginal units possessing a few head that, together with part-time employment by the rancher, provide a basis for subsistence; (2) greater rainfall and better summer range, resulting in a higher carrying capacity; (3) widespread distribution of wild hay meadows; and (4) less dependence on irrigation for providing winter feed.

BREEDS

The predominant breed of cattle in the ranching area is the Hereford (*see* Plate II B). Out of 100 ranches, two-thirds reported Herefords and the remainder indicated some cross-breeding with Shorthorns. The resulting strain is believed, by some, to provide more milk (passed on to the calf in the form of increased weight) and a larger-quartered steer. Most, however, consider the Hereford to possess the desired qualities of quick growth to maturity, together with a smaller frame, thus yielding smaller cuts of beef in accord with the present market demand. Scattered herds of Aberdeen-Angus may also be found. There is no indication of regional difference in respect to cattle breeds.

A typical herd includes the breeding stock, yearlings, and 2-year olds. In isolated districts of the Cariboo and Chilcotin, where dependence on wild meadow hay is very nearly complete and where little supervision is given to the herd, it is common to retain steers until they are 3 years old before marketing them. It is believed by some that in areas depending on swamp hay the additional weight gained in the third year offsets the low cost of maintaining them for the additional time. However, it is now becoming common belief that with labour costs mounting, supplementary feeding and more supervision pays dividends by a turn-over every second year, especially as smaller animals are in demand at present.

It is customary to run one bull for every 20 to 30 breeding cows. The law requires no less than 1 to every 30 head in community breeding pastures. Bulls placed on Crown land must be registered pure-bred animals. As a result it may be generally stated that all bulls are pure-bred throughout the ranching area. They are acquired by purchase at cattle sales at Kamloops and Williams Lake, and some are imported from Alberta. Small ranchers frequently acquire bulls passed on from large herds at reduced prices. Several large ranches throughout the area maintain a small pure-bred herd to furnish the requisite breeding stock.[1] Breeding cows are not usually registered stock. They serve in the herd for 6 to 12 years and are then marketed.

Out of one hundred ranches sampled five raised pure-bred cattle exclusively. This percentage may be considered fairly representative of the area. Three raised Hereford stock, the remaining two, Shorthorn. Ranch sizes in terms of numbers of cattle are small, because greater care and supervision are required in raising pure-bred stock. The total of the five ranches was only 547 head. There appears to be no noticeable areal pattern in the raising of registered live stock; such ranches are scattered from the Nicola to the Chilcotin.

The pure-bred stock ranch must be completely fenced to prevent contact with non-registered herds. Accordingly, the land is owned or leased with little or no dependence on Crown summer range. Entire dependence on cultivated hay supplemented by grain is a necessity, and the winter feeding period must be extended by 1 month or 2 months. Registered animals are disposed of at the Kamloops or Williams Lake sales, or locally by private sale.

[1] The Perry Ranch in Semlin Valley and the Diamond S Ranch north of Lytton are units within larger enterprises that furnish pure-bred stock for the breeding herd.

In relation to the important factors involved in the raising of pure-bred cattle the Interior Plateau area does not possess any particular advantage. It is not a grain-raising area, and the kinds of feed required have to be either imported or grown under irrigation at increased cost. Moreover, the long feeding period adds considerably to the cost of production.

SHEEP

NUMBERS

The relative importance of sheep and cattle is indicated both in numbers and in types of units. According to the number of 1948 grazing permits issued, there were 105,000 cattle and 18,486 sheep from all parts of the grazing area.[1] If we use the grazing ratio of sheep to cattle (4:1), the total number of sheep (18,486) would be equivalent to 4,621 head of cattle or 4 per cent of the total cattle numbers. This may be used as a fair indication of the relative importance of sheep within the Interior Plateau. If we compare commercial ranch units, there are about 420 engaged primarily in cattle-raising and only 30 in sheep, with a few combined operations.

Unlike the lower ranges, alpine summer range for sheep is not fully utilized, pending further expansion in this phase of the live-stock industry within the Interior Plateau. There are several reasons why the ranchers of this area have not turned more to sheep-raising: (1) the problem of predatory animals, especially the coyote; (2) the difficulty of obtaining labour, as men are seldom attracted to sheep herding; (3) the added expense involved in employing a herder and packer, neither of whom are required in cattle-ranching; (4) until recently, the poor market for sheep.

In spite of the fact that there has been a bounty on coyotes for many years, they continue to be a serious menace, perhaps the most serious of all obstacles to sheep raising in the interior. Hunting, trapping, and poisoning have had little effect in reducing the numbers. The only protection against the coyote is herding and even then the utmost vigilance is needed to outwit this predator.

Although their movements are confined to the Cariboo, where sheep are sparsely represented, the activity of timber wolves is causing increasing concern. The cougar, on the other hand, frequents the mountain ranges bordering the ranching area where summer ranges are found and makes the presence of a herder indispensable to sheep protection. The grizzly and the black bear are frequently troublesome. However, bear and cougar, unlike the coyote, do not hunt in packs and can be tracked down with less difficulty.

The second problem, that of finding suitable men as herders, has been in recent years the chief reason for many ranchers turning from sheep to cattle. The isolated, lonely life of the herder, confined to the hills for 3 months, together with an absence of prestige associated with the occupation, appear to be reasons why young men are not readily available for this class of employment. Most herders employed on the range today learned the art in Europe.

The third factor in accounting for the relative unimportance of sheep raising in the interior is an economic one. The need for hiring a packer as well as a herder throughout the summer results in a greater labour cost than in cattle-ranching, where the practice generally is to turn the cattle out unattended to

[1] The limits of the grazing rather than the reconnaissance area are selected for purpose of comparison, as many bands of sheep with home ranches in the Okanagan Valley use summer range removed far afield and partly within the reconnaissance area. Within this area the numbers are 98,000 cattle and 15,500 sheep.

graze where they will for the summer. Labour costs in recent years have not been offset sufficiently by the price of mutton to justify the widespread raising of sheep. Then, too, the market for sheep prior to the war was little short of chaotic, and many ranchers disposed of their herds as soon as they could change over to cattle.

DISTRIBUTION

The pattern in Figure 11 represents the distribution of sheep on summer (alpine) ranges during 3 months of the year.[1] As in the case of cattle, sheep must be provided with spring and fall range and winter feed on lots near the home ranch. The significance of the distribution is the importance of summer range, which is complementary to cattle range and involves the seasonal movement of live stock known as transhumance (*see* Plate V B).

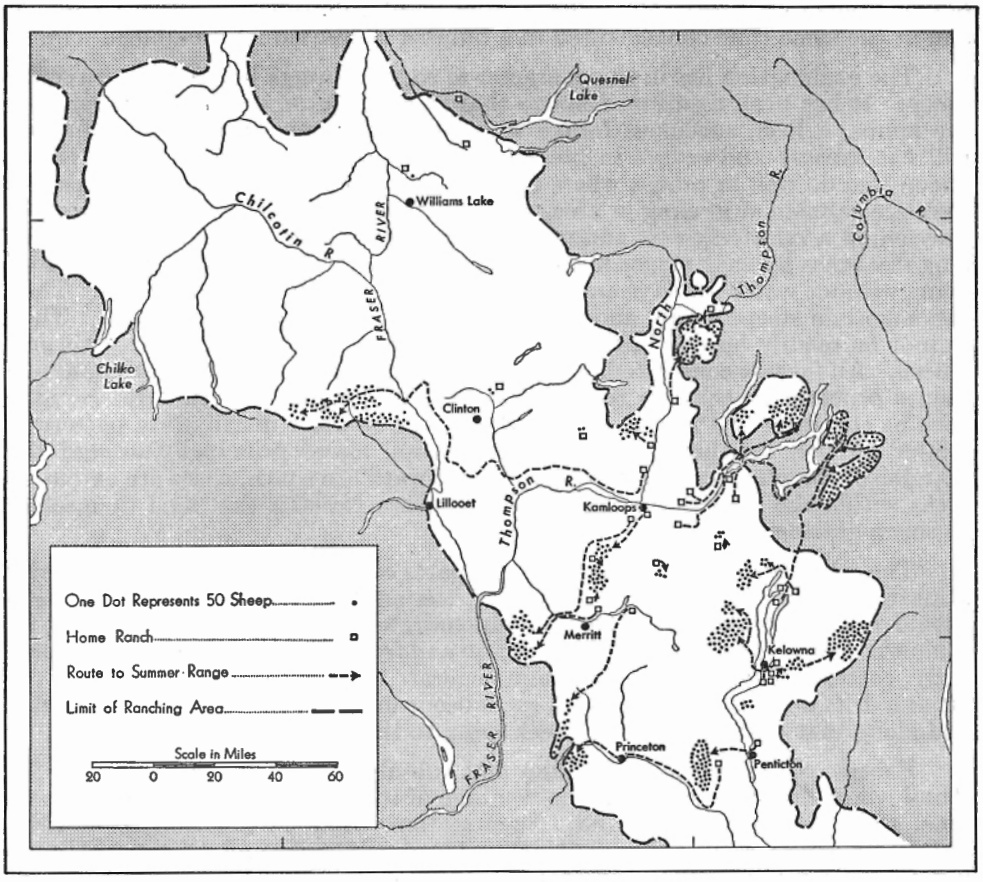

Figure 11. Distribution of sheep.

Two elements of the pattern are readily apparent: (1) the singular absence of sheep in the Cariboo-Chilcotin region, and (2) the peripheral distribution in the southern part of the ranching area.

[1] Data from Grazing Division, Department of Lands and Forests, Victoria, B.C., based on the number of permits issued to sheep ranchers for use of Crown lands as summer range. Farm flocks are not included.

Only in the French Bar Stock Range of the southeast Chilcotin are sheep to be found in large numbers, and in this case the home ranch is located within the Kamloops sub-region.[1] Elsewhere in the Cariboo-Chilcotin, sheep are found only as farm flocks numbering from a few to 40 or 50, and aggregating approximately 2,500.

The most obvious explanation for the comparative void in the northern part of the ranching area lies in the number of predators and the deficiency of alpine range. Although coyotes are a problem in the southern part of the area also, they move in greater numbers in the Cariboo-Chilcotin. Wolves also have been on the increase in the latter area. Added to this is the shortage of lush feed necessary for summer grazing on the alpine borders of the northern region. However, alpine ranges are reported to exist along the margins of the Cariboo Mountains.

With the exceptions noted above, sheep ranching is confined to the southern part of the Interior Plateau. The pattern of distribution is mainly peripheral and at the same time concentrated in a number of individual groupings.

The explanation lies in the character of summer range best suited to raising sheep. It has been mentioned above that sheep require, during the nursing of the lambs, a lush, succulent forage with forbs predominating. Though sheep will eat grasses and sedges in great quantities, they prefer them to be green. Sheep also do well in ranges where forage runs to browse types. Unlike cattle, they are capable of grazing in areas where flies and insects abound. Moreover, they enjoy a relatively cool summer temperature. They can endure travel for long distances by easy stages and actually put on weight. They are capable of going without water for days and even weeks on a diet of lush vegetation. They can negotiate steep, rough, and rocky terrain without undue difficulty. They cannot be readily herded in timber, where they would be an easy prey to predators. All factors considered, especially the character of the vegetation, alpine ranges provide the solution to desirable summer ranges in a semi-arid country such as the Interior Plateau. Accordingly, the summer distribution pattern is related to the distribution of alpine meadows, found principally around the margins of the plateau. As relief increases toward the south, there are extensive areas within the plateau having sub-alpine characteristics that lend themselves to sheep grazing.

The relegation of sheep to the higher parts of the ranching area is primarily a matter of "best" land use.[2] However, the antipathy of cattlemen to sheep should not be overlooked. This is demonstrated in the attitude assumed by some when sheep pass through their area to and from the summer range. Accordingly, cattle and sheep ranges are kept separate, and where one merges into the other a drift fence is erected. Such cases occur in the Swakum Mountain Range and along that part of Meadow Creek lying to the east of Guichon Creek.

Exceptions to the use of alpine and sub-alpine ranges for sheep may be found where browse forms a high percentage of the forage and where vetch, peavine, and other legumes abound. Such sections occur in the vicinity of Criss Creek, 59 Mile Creek north of Clinton, Meadow Creek, and Douglas Plateau lying east of Stump Lake. The total number of sheep on these areas is small, approximately 2,000 ewes.

The reason sheep concentrations appear in patches is related to the factor of altitude. Only those parts of the range from 5,800 to 7,000 feet are characteristically alpine.

[1] One rancher located on the Tranquille range north of Kamloops drives 3,400 sheep with lambs over 150 miles to the alpine pastures of Ground Hog Mountains.

[2] The allotting of range rests with the Grazing Division, B.C. Department of Lands and Forests.

REGIONAL DISTRIBUTION

Out of 33 commercial sheep ranches, including 3 that combine sheep and cattle on a large scale, 20 are located within the reconnaissance area. The remainder are in the Okanagan Valley, where the largest individual sheep ranches in the Interior Plateau are located. The 20 commercial ranches within the reconnaissance area (*see* Figure 11) account for 13,000 sheep[1] and an additional 2,500 are kept on cattle ranches as farm flocks ranging from several head to 40 or 50 per ranch. These are grazed entirely on fenced land owned by the ranchers concerned. Including farm flocks, the numbers are apportioned as follows:

TABLE III

Regional Distribution of Sheep in the Interior Plateau

Region	Number of sheep
Chilcotin	1,000
Cariboo	1,000
Lillooet	500
Kamloops	10,000
Nicola	3,000
Princeton	0
Total	15,500

Of 100 ranches sampled, 24 kept sheep mostly as farm flocks. This percentage is fairly representative of the ranches throughout the Interior Plateau grazing area.

The various pastures and ranges comprising the sheep unit are similar to those of the cattle ranch, with the exception of the summer range.

The principal sheep bred in the interior are the Rambouillet or the Rambouillet cross. It is desired for its flocking instinct, a valuable trait in a country of predatory animals and unfenced summer ranges and where large bands are economically desirable. The Rambouillet is a dual-purpose breed—large, hardy, and a good forager. The Suffolk cross provides a better meat strain and gives a hardy, good-rustling, quick-maturing animal.

Some cross the Suffolk with the Hampshire, the latter being desirable for wool. This cross gives a large, fast-maturing animal, hardy and well able to rustle. The Romney, Corriedale, and Southdown are used to a limited extent for breeding purposes.

The size of sheep ranches in the interior varies from a few hundred head to 3,800. Thirty-one units, depending on sheep primarily, may be arranged according to size as follows:

TABLE IV

Number of units	Number of breeding ewes
2	Under 100
6	100 to 200
6	201 to 400
2	401 to 600
7	601 to 1,000
3	1,001 to 1,500
2	1,501 to 2,000
1	3,000
1	3,400
1	3,800

[1] The number under permit to ranchers residing within the reconnaissance area in 1950.

It will be noticed that about one-quarter of the commercial sheep ranches are larger than 1,000 head, whereas one-half carry 300 to 1,000 head.

The distribution of 31 sheep ranches is shown on Figure 11. The largest holdings are in the Okanagan Valley, with the Kamloops and Nicola districts ranking next in numbers and size of ranches. The Cariboo-Chilcotin is lacking in commercial units for reasons already stated. Factors of location with regard to sheep ranches appear to be similar to those governing cattle units, especially the need for spring-fall range. Proximity to alpine summer range appears to have little bearing on the location of the ranch. Therefore, drives of many miles are necessary, as indicated on Figure 11.

HORSES

Although mechanization in crop production is increasing in the ranching area of British Columbia, the horse continues to hold an important place in ranch operations. Draught animals are less in demand, but the necessity for the "cow pony" in rounding and herding live stock has sustained the demand for riding animals.

NUMBERS

Accurate estimates of the total number of horses in the ranching area are not obtainable. Although grazing permits are issued for horses, these do not provide so close a check on the total numbers as in the case of range cattle, as many ranchers prefer to keep their horses entirely on their own land. The total number of permits issued for the reconnaissance area in 1949 was 2,702. Based on a sampling of 100 ranches in the same area, the total number of horses involved was 3,451. Reports made by individual ranchers appear to be more approximate for horses than for cattle, so this figure is undoubtedly low. If we assume that the sampling of horses bears the same relation to the total number in the area as the sampling of cattle, then we arrive at approximately 7,190 horses for the entire area.[1] The 1941 census report covering a somewhat larger area gives approximately 13,000 head. Making adjustment on the basis of area, the number of horses in the study area would be more nearly 11,000 for 1941. There is little reason to believe that this number has been greatly reduced, although some reduction due to mechanization is to be expected.

DISTRIBUTION

Using the ratio of horses to cattle, the relative importance of horses in the Cariboo-Chilcotin is 1:16 compared with 1:17 in the Thompson-Nicola. On the basis of the 1941 census about 60 per cent of the horses for the whole area are found in the Cariboo-Chilcotin region. The ratio of saddle horses to work horses is 1:2 for the Cariboo-Chilcotin and 1:1·2 for the Thompson-Nicola, indicating the declining importance of the work horse in the latter region, where machines are rapidly replacing it. These data are significant as indicating the pioneer type of organization in the northern area, as shown by a greater dependence on draught animals. The Thompson-Nicola, with a higher degree of mechanization, has less use for the work horse. Greater dependence on swamp hay in the Cariboo-Chilcotin calls for a greater number of horses, for the scattered nature and roughness of wild hay meadows makes the horse more practical than the machine in many instances.

A continuous problem in range maintenance exists in the numbers of wild horses, especially in remote areas of the Chilcotin and in the mountainous area

[1] Total number of cattle sampled 47,305 head; total number for the area 98,069; percentage of total sampled 48 per cent.

east of Fraser River from Dog Creek to Pavilion. The government has tried to cope with this problem by offering a bounty for their extinction. However, so far the program has served only to keep the numbers in check.

OTHER LIVE STOCK

In order to supplement the domestic food supply, chickens and hogs are commonly kept on ranches of the Interior Plateau. Hogs were raised on 42 per cent of the ranches studied, and chickens were present almost without exception. Fourteen per cent of those who kept hogs raised some for sale. Half this number had over 35 each and one ranch kept 100. In no case were hogs the primary source of income. The larger ranches found them an economical means of disposing of scraps from the mess table or of using up surplus garden crops. Those depending on hired help usually kept a few hogs for table use.

Most ranches kept a few milk cows. Only near the large centres were dairy herds found. In ranches of the Cariboo-Chilcotin region, some dependence on wild game, particularly moose and deer, was common, especially during the winter season. Wild-fowl abound in this country, and most ranch tables afford a variety of game in season.

CHAPTER IV

SETTLEMENT AND TENURE

PRE-COLONIAL PERIOD (1821–1858)

The beginnings of settlement in the southern interior of British Columbia may be placed as early as 1821, when Fort Kamloops was founded at the junction of North and South Thompson Rivers. The choice of site has been well justified in the present city and commercial centre of Kamloops. The initial period came to a close with the cancellation, in 1858, of the Hudson's Bay Company's exclusive licence to trade with the Indians and to occupy the lands adjacent to their posts for raising fodder for animals and garden produce for domestic use. In the same year, the mainland of British Columbia became a Crown Colony, with the maintenance of law and order as well as the disposal of public lands and mineral rights vested in the British Colonial Office. This opened the floodgates of settlement incompatible with the interests of the fur trade.

Within the southern Interior Plateau, three trading posts were maintained by the Hudson's Bay Company throughout most of this period. These were Fort Kamloops, Fort Alexandria (near the present town of Alexandria), and little-known Fort Chilcotin, which was established in 1829 at the forks of Chilcotin and Chilanko Rivers not far from the present post office at Redstone. The vast intervening territory was inhabited by Indians only. Fort Kamloops and Fort Alexandria were important as provisioning points on the Brigade Trail from the Oregon country to Fort St. James. Adjacent lands were cultivated to provide provender for pack animals that frequently wintered at these points, especially Fort Kamloops, where horses also were raised. Both forts kept small herds of beef and dairy cattle. Upon the dissolution of the company's interests in the interior, 3,400 acres were claimed by it in the vicinity of Fort Alexandria as having been brought under cultivation, and nearly 7,000 acres near Fort Kamloops used as pasture and hay land, besides the "dairy ranch" 6 miles to the north.

Moreover, employees of the company had squatted on small holdings in the vicinity of the posts and, upon their severence from the company after 1858, took up residence on these lands. As a result, such districts as Cherry Creek near Kamloops, where one ranch has been occupied at least since 1852, may justly claim to be the oldest settled areas in the southern interior. To the company and its "servants" belongs the credit for raising the first live stock and for cultivating the first farm land within the ranching area.

The most notable of the early travelled routes affecting the trend of later settlement was the Brigade Trail. It extended from Fort Alexandria, at the head of navigation on Fraser River, to Fort Kamloops and then south, via Okanagan Lake, to posts in the Oregon country (Figure 12). Parts of this route were followed by gold miners and especially by cattle drovers from south of the border. From Kamloops it followed the north side of the lake to Deadman Creek and then turned north to Loon and Green Lakes.

Upon the loss of the Oregon territory in 1846, the company, in search of an all-colonial route, traversed difficult passes through the Cascades. One followed Coldwater River to Nicola Lake and thence to Kamloops, a route much travelled to the present day.

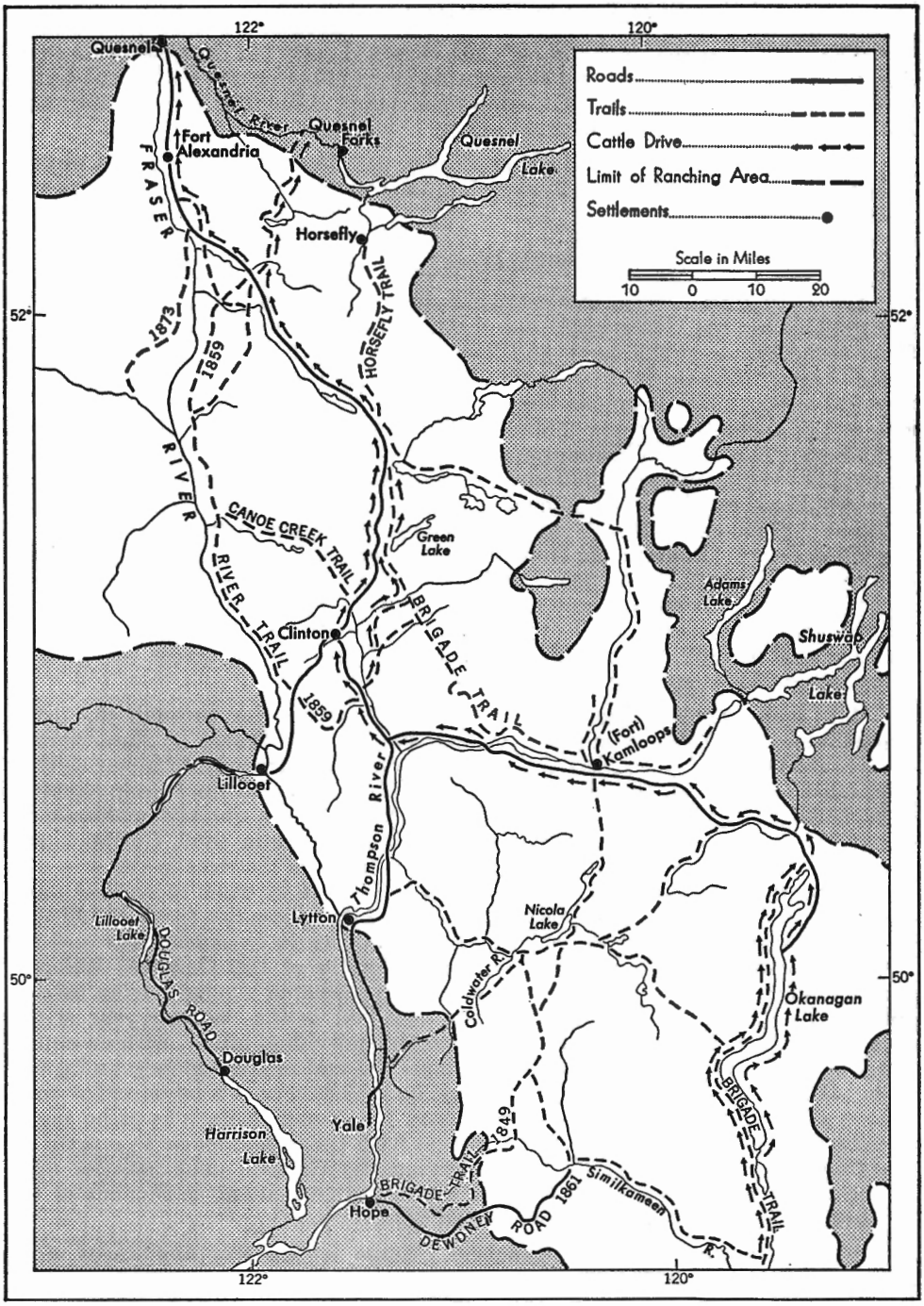

Figure 12. Early trails, roads, and cattle drives.

COLONIAL PERIOD (1858–1871)

The colonial period lasted little more than a decade but, in spite of its short duration, proved to be the most momentous in its effect on the pattern of settlement. The primary lines of occupation were clearly defined by its close, although the outer limits were far from reached.

The pattern of settlement followed very definite trends as a result of four influences: (1) the gold rush, (2) early routes of travel, (3) the Lands Acts, and (4) cattle drives.

THE GOLD RUSH (1858–1864)

Gold mining has been the precursor of settlement throughout the interior of British Columbia. The magnetic qualities of the yellow metal in drawing men from every corner of the earth and from every station in life was never better demonstrated than in the rush to Cariboo. So intense was the rush in 1858–59 that old hulks in San Francisco Bay, long considered unseaworthy, were pressed into use to carry Californian miners to Victoria and New Westminster. Some came from Oregon and Washington territory by way of Columbia River and the Okanagan. Of the various national groups, those of French extraction came in large numbers, leaving their names on many creeks and rivers throughout the interior[1]. Some came directly from France to settle eventually on the banks of the Thompson[2]. Some came from England, such as the Cornwalls, who gave the name "Ashcroft" to their ranch. Others from distant Australia were responsible for pre-empting land now known as the Australian Ranch on Fraser River south of Quesnel. Still others came from eastern Canada, notably the Overlanders[3] in 1862 who endured much hardship in moving across the prairies and through the mountains via the Yellowhead Pass.

The main stream of gold seekers entered the interior through the lower Fraser Valley in 1858, panning numerous bars of the Fraser as they worked upstream to Lytton and Lillooet, and finding the gold larger and coarser as they proceeded. Although the main tide temporarily advanced up Fraser River to Fort (Prince) George and then along the Nechako, it quickly withdrew to Quesnel River, where strikes proved to be richer. Late in 1859, Cariboo Lake was found and so the name for one of the most famous districts in the province had its beginning. By 1860, some 4,000 miners were at work in various parts of the interior and about 3,000 on the Fraser and its tributaries north of Lillooet. In the following year, several rich creeks, tributaries to Quesnel River and the Horsefly, were discovered, including the Eldorado of the Cariboo, Williams Creek. This touched off another wave, which gathered strength from distant corners of the earth. The year 1863 is described as the "banner year of the Cariboo"; by 1865 the crest was passed and the individual miner, with no equipment other than a grubstake and pan, faced the end of easy money and quick gain. If he chose to remain in the country, he might serve as a labourer for companies with capital and equipment necessary for deeper operations or he might pre-empt a bit of land and cast his fortunes with those who chose to remain on the frontier. Many chose the latter, giving the Cariboo gold rush its most important function as the occasion for the initial permanent settlement of the southern Interior Plateau (Figures 13 and 14).

Not all, however, became ranchers. Some set up stopping-places along routes of travel, depending on the transient trade. Statistical returns from this

[1] Savona, famous for Savona's ferry at the lower end of Kamloops Lake, came into the country some years before the gold rush from Fond du Lac, Wisconsin.

[2] M. Isnardy, a Frenchman, who in 1858 joined the gold seekers, subsequently took up a ranch at Chimney Creek in the Cariboo. J. Minnebarriet founded the Basque Ranch in the Ashcroft district.

[3] William Fortune, a member of the Overland party, pre-empted land on the site of Tranquille and subsequently worked for the Hudson's Bay Company.

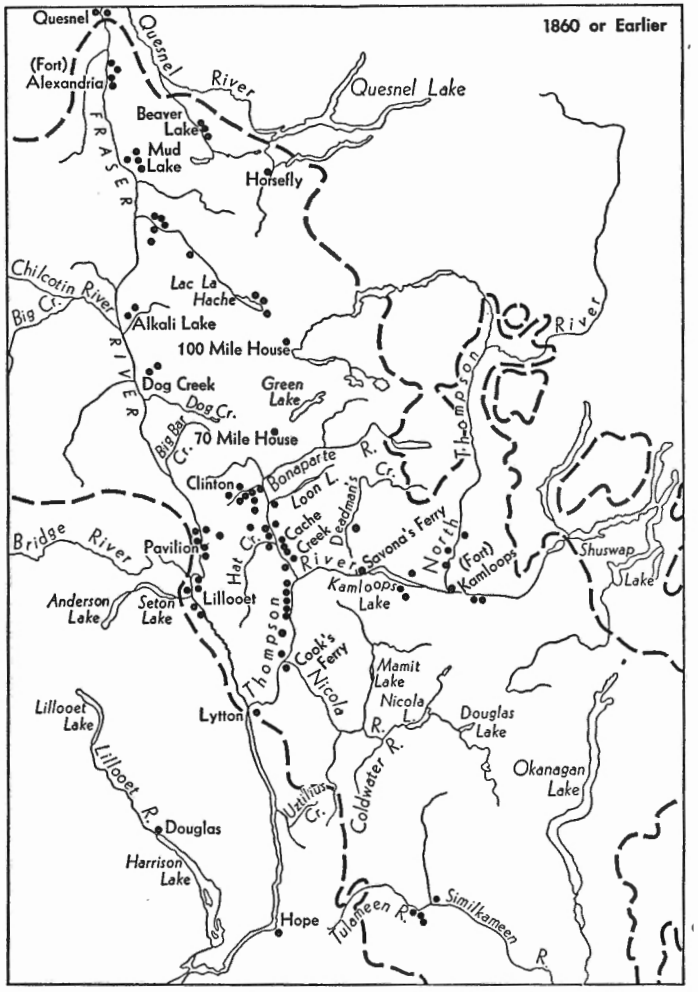

Figure 13. Settlement established by 1860.

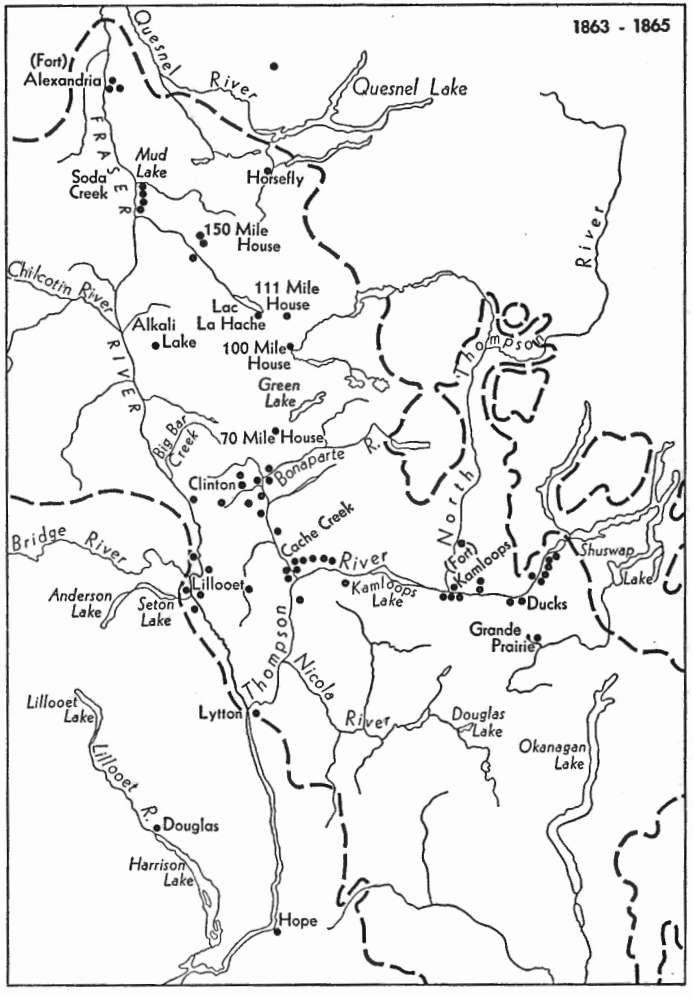

Figure 14. Settlement 1863–65.

time may be considered estimates at best, but they do show a trend to permanent settlement corresponding to the decline of the gold rush. The recording district of Lillooet will serve to illustrate this trend.[1]

TABLE V

Persons engaged in Agriculture and Numbers of Cattle, 1862–1870

Date	Persons in agriculture	Number of cattle
1862	19	120
1865	61	400
1866	70	700
1867	90	2,400
1869	120	3,750
1870	90	3,000

Besides supplying many of the first permanent settlers, the gold rush was responsible for providing, indirectly, an economic basis for settlement as well as defining the primary routes of travel.

The first of these, the economic basis for settlement, resulted from a sudden and overwhelming demand for foodstuffs and fodder for the great army of men and animals that surged into the formerly empty spaces of the interior. This was reflected in the large price differential prevailing during the early sixties between New Westminster (the port of entry) and the Cariboo.[2] Although conditions arising from shortness of supply were partly remedied by the building of the Cariboo Road in 1863, they temporarily provided an incentive to the settlers to raise crops locally, and not a few discouraged miners found farming a more lucrative occupation than panning and sluicing.

The demand for beef brought about a steady increase in cattle on the established ranches in the interior. According to government statistics of the time, the following were reported from the several districts of the interior.

TABLE VI

Distribution of Cattle, 1862–1869[3]

Year	Number of cattle	Area
1862	1,520	Lillooet and Lytton
1865	2,905	Quesnel, Cariboo, Lillooet, and Lytton
1866	5,680	Quesnel, Williams Lake, Lillooet, and Lytton
1867	8,446	Quesnel, Williams Lake, Lillooet, and Lytton
1869	10,275	Lytton, Lillooet, and Cariboo

It is not possible to say to what extent these figures include cattle introduced from outside the colony, but as the cattle drives from the south gradually fell off after 1865, the increase represents mainly indigenous growth. Numbers of sheep kept on interior farms also showed a steady increase during the decade, reaching 3,800 in 1869.

[1] Blue Book, Colony of British Columbia, 1862, 1865, 1866, 1867, 1869, 1870 (years for which data are available).
[2] R. C. L. Brown, British Columbia, an essay; Royal Engineers Press, New Westminster, 1863, p. 56.
[3] Blue Book, op. cit., 1862-1869.

EARLY ROUTES OF TRAVEL

The blazing of the early trails and the building of wagon roads, largely the direct result of the gold rush, was important in guiding the trend of settlement. The first trails into the interior, excepting those used by the Indians, were the Hudson's Bay brigade trails mentioned earlier. Unfortunately, these did not lead directly to the important areas of gold discovery.

The first direct route to the goldfields was the Douglas-Lillooet trail, constructed largely by the miners in 1858. It consisted of a series of portages between four large lakes over which traffic was ferried (Figure 12). In 1861 it was improved sufficiently to permit wagons to use it. This route was little used after 1861, as the Fraser Canyon route, built in 1862, proved to be more direct. At Lillooet, the miners had the alternative of two routes north to Quesnel. One route, the River Trail, ran north to Pavilion and then followed the lower part of a steep, forbidding canyon to Big Bar Creek. Here it ascended 1,000 feet to the plateau surface, where it proceeded to Canoe Creek, thence to Dog Creek (one of the earliest settled points in the interior), on to Alkali Lake, then to the western end of Williams Lake and north to Alexandria and Quesnel, the threshold of the Cariboo. An alternate route from Alkali Lake went via Spring House (Spences Springs) to the eastern end of Williams Lake and on to Beaver Lake and the Cariboo. That part of the route from Dog Creek via Alkali Lake to 150 Mile House is in constant use today.

Some of the "fifty-niners" instead of taking the shorter but more difficult river trail followed Cut-off Valley north of Pavilion to Clinton from where contact with the Brigade Trail was made by following the Bonaparte upstream. However, considerable delay in the transhipment of goods and mule teams via the Douglas-Lillooet route led to a demand for a trail through the Fraser Canyon from Yale, the head of navigation, to Lytton.

The construction of the Cariboo Wagon Trail, especially the link from Yale to Lytton, was one of the most stirring epics in British Columbia's road-building history. In 1862, an old mule trail through the Fraser Canyon was replaced by a wagon road as far as Lytton, and in the following year the link from there to Clinton via Cook's Ferry (Spences Bridge) and Cache Creek was completed. Also in 1863, the 244-mile stretch of road from Lillooet, via Clinton, to Alexandria, which came to be known then as the Lillooet-Alexandria Wagon Road, was completed, thereby constituting a direct passage from Yale, at the head of navigation on the Fraser, or from Douglas on Harrison Lake, to the Cariboo mines.

Two short-cuts to the Cariboo gold mines were sometimes used instead of the Quesnel route. The oldest, which antedated the Cariboo Road, proceeded from Mountain House (158 Mile House) north to Beaver Lake and Keithly. It was part of an earlier route leaving the old River Trail at Alkali Lake and extending northeast to Williams Lake. A second cut-off originated at 111 Mile House south of Lac la Hache and proceeded north to Horsefly, but it was little used. The link between the River Trail at Dog Creek and the Cariboo Road north of Clinton appears on maps of 1866 and is still in use.

A trail between Cache Creek and Kamloops had long existed, but it was not until 1864 that this link with the Cariboo Road was made passable for wagons. Together with the sector from Lytton to Spences Bridge it constitutes the oldest part of the Trans-Canada Highway in British Columbia. By 1865, the elements of the present road pattern, which have remained substantially the same to the present, were delineated. The outstanding exception was the Chilcotin Road, which was not constructed until 1888, when that vast country began to open to settlement.

The importance of early roads as a factor in the evolution of the settlement pattern can scarcely be over-emphasized. Their function was twofold: as a means of access and communication, and as a source of revenue to the settlers thinly distributed throughout their length. In those times it was rare to find ranch quarters located any appreciable distance from well-travelled routes (Figures 13 and 14).

Permanent settlement began in the interior with the roadside ranch dependent on revenue from freighting and staging along the early roads, especially the Cariboo Road. Much has been written about the romance connected with this industry: "Long lines of pack animals, heavy freight wagons, six-horse coaches, camels, traction engines (imported from Scotland), an army of men with packstraps" (Scholefield, 1911, p. 159). The motley assortment of carriers typical of the route during its most colourful days gave way principally to the freight wagon and the stage-coach, both of which were valuable revenue earners for residents of the interior until the advent of the railroad. Far less transitory, however, was the effect on settlement. The early "mile house"[1] was, in part, a farming unit producing its own crops and livestock and a hostelry where its produce was disposed of and where lodging was provided. In time, the latter service became insignificant as the ranching aspect came to the fore.

The stage-coach was introduced along the Cariboo Road in 1864 (*see* Plate VI A). When the Canadian Pacific Railway was constructed to the West Coast, the southern terminus of the stage-coach line was changed from Yale to Ashcroft, where it remained until the Pacific Great Eastern Railway was built in 1912. The significance of the stage-coach to early settlement lay in the necessity for maintaining a supply of horses at intervals averaging 18 miles apart and for arranging overnight accommodation for passengers at the close of a day's journey.[2] In addition, branch lines radiated from main-line points to various mining camps and settlements such as Lillooet, Alkali Lake (via Clinton), Alexis Creek (Chilcotin Road), Horsefly, and Quesnel Forks, all of which were stopping points. Each hostelry along the route maintained a fresh supply of horses for the next stage. As most of the coaches were drawn by six horses, the number of animals required numbered no less than 250, of which 150 were in harness. Passengers were provided for at the numerous posts. "Every ranch house in Cariboo functioned as a stopping house where a traveller was welcome day or night. These ranches, as a rule, were 15 to 20 miles apart even along the main road" (West, 1948, p. 198).

Although the stage-coach required a more elaborate organization, it was no more important as a source of income to the ranches along the Cariboo Road than the freight wagon. Added to this were the pack trains, often comprising 125 mules. The freight wagon frequently operated over less travelled routes, but wherever it went there were wayside houses with provision for men and animals.

Large quantities of hay, meat, and vegetables were needed to maintain the various staging points and road houses; such provender had necessarily to be procured locally, resulting in a continuous revenue to the settlers scattered along the various travelled routes. Several of these points, 100 Mile House, for example, have continued their function as supply centres to the present day, but many others, such as 150 Mile House, with less strategic advantages of position, were severely affected by the loss of revenue when horses and mules were replaced by

[1] Mile houses were numbered from Lillooet as mile zero and thence via Cut-off Valley to Clinton and along the Cariboo Road.

[2] Stopping points were located at Boston Bar, Lytton, Spences Bridge (Cook's Ferry), Cache Creek, Clinton, 74 Mile House, Bridge Creek, 111 Mile House, Blue Tent (Lac la Hache), 127 Mile House, 137 Mile House, 150 Mile House, and Soda Creek (head of navigation). Besides these there were eight additional points on the Yale-Kelowna line via Kamloops and Grand Prairie.

the motor truck and the railway. As cattle ranching became more firmly established toward the close of the colonial period, dependence on transportation gradually declined.

THE LAND ACTS

Although the discovery of gold proved to be the most powerful motivating force in the opening up and subsequent settlement of the interior, other factors also influenced the progress of settlement. Among these were the Land Acts of 1859 to 1865.

Aside from Hudson's Bay lands and Indian Reserves, the lands of the colony were open to pre-emption. Under the terms of the Act of 1860, only 160 acres of land could be pre-empted but additional land could be acquired by purchase. The pre-emption had to be rectangular in shape; no specifications concerning its orientation were laid down. As the rectangular survey was not introduced until 1882, earlier lots were odd shapes and sizes and oriented without respect to the cardinal points. Because holdings available by pre-emption were too small for a ranch unit, partnerships were quite common.

It was not until 1870 that 320-acre lots were open for pre-emption. The pattern of tenure in the colonial period was, therefore, one of numerous small holdings held by a large number of individuals. It was left for succeeding decades to consolidate the numerous individual lots into the larger holdings typical of a ranching community.

CATTLE DRIVES

Of more than romantic interest were the cattle drives from Oregon and Washington occurring every summer throughout the colonial period. They were occasioned by the sudden demand for beef arising out of the gold rush and the construction of the Cariboo Road, together with a surplus of cattle across the border. The Hudson's Bay Company had supplied herds to its Oregon posts since 1834. From here the first cattle reached the interior of British Columbia about 1840 in order to provide Fort Kamloops with a small herd. The settlement of Oregon in the 1840s added many thousands of cattle, and by 1860 the numbers had reached 182,382 for Oregon and Washington together. Here, then, was a large surplus available for market, coinciding with the sudden demand from the goldfields to the north. Two months after the first miners arrived from California, beef started to move across the boundary.

Most of the cattle entering from the south followed the old Brigade Trail to Osoyoos, the port of entry. Following the western and eastern margins of Okanagan Lake, they passed through Grand Prairie (as the open grazing land around Falkland was then known) and made for Kamloops. Here was a virgin range-land with bunchgrass growing in profusion. The route from here usually followed the south side of the lake to Savona's Ferry (Savona) where a crossing was made. It appears that most drives followed Thompson River to Cache Creek, then north along the Bonaparte, where contact was made with the Brigade Trail. Following the trail northward to Williams Lake and Quesnel, they turned east, reaching their destination at Barkerville, a distance of at least 400 miles from the border.

Not all the cattle reached Barkerville. Some were sold locally to construction gangs, others to ranchers for breeding stock. The drives frequently met vicissitudes such as swollen rivers, hostile Indians, and hard winters, so that large numbers perished. However, between 1859 and 1870, records kept at Osoyoos indicated that during the colonial period about 22,000 cattle were driven across the border.

The significance of the cattle drives in relation to settlement is twofold. In the first place, many of the early settlers, whose names appear on later records as leading cattlemen, first entered the colony as drovers from the south. Most famous of the long list of drovers were the Harper brothers, who between 1863 and 1880 acquired the property now known as the Gang Ranch, the second largest in cattle numbers in the province. Secondly, the cattle drives provided the original herds of breeding stock necessary to the establishment of the industry. This came about toward the close of the sixties, when the demand for livestock from the south dwindled to an insignificant amount. Although the decline is partly accounted for by the cessation of the gold rush, the growth of population in the colony as a whole (reaching 4,628 in 1871) created a demand that only large domestic herds could supply. By the close of the period, cattle were being driven to the coast. Nevertheless, the coastal centres still imported, by ship, over 1,000 head annually.

THE SETTLEMENT PATTERN BY 1871

The pattern of settlement by the close of the colonial period was linear in form (Figures 15 and 16). The individual ranches were strung like beads along a few roads and trails. Conformity to the existing routes to the Cariboo was quite evident during the first few years of settlement, when the motive for taking up a fixed abode was primarily to serve the needs of the passing stream of miners and packers en route to the goldfields. Later, settlement conformed less to the heavily travelled routes of that time and more to choice grazing lands. These, in turn, were directly related to the principal stream valleys and lowlands, where water was readily obtained and where forage plants grew profusely.

Nevertheless, the pattern, even along the trails, was by no means uniform. Typical of the period were little nodes of two or three ranches grouped around a favoured watering place or rich pasture. This is well illustrated in the case of the River Trail from Lillooet north. Big Bar Creek, Dog Creek, Alkali Lake, Williams Lake, were, and are today, centres of settlement because of the natural features of water and open grassland found together. Along the Cariboo Road from Clinton to Lac la Hache, where the trail passes through heavy timber on the higher upland, settlement clusters were few and far between and this is still the case.

The importance of the roads in influencing location, even beyond the limits of favourable natural features, is clear from a study of the early pattern. Ranches were located along the trail north of Soda Creek, and even along Quesnel River, where areas of open grassland were greatly restricted. A few of the first settlers, even as early as 1861 and 1862, seemed to be motivated primarily by opportunities for establishing farms or ranches. Alkali Lake ranch, said to be the first cattle ranch in the province, was started in 1861, although a road-house was operated on the site as early as 1859.[1] Today, the Alkali Lake ranch is counted among the largest in the Cariboo.

By the end of 1862, the heaviest settlement clusters were found along Fraser River from Lillooet to Pavilion, and around Cache Creek and Clinton.

The Semlin Valley, pre-empted several years later, did not appeal to the first settlers, presumably because it was without the abundant water and natural meadows so necessary to the raising of stock in this semi-arid country. South of Cache Creek, along the benches of the Thompson, several pre-emptors located near tributary streams such as Oregon Jack Creek.

Kamloops and Nicola districts, now the heart of the cattle country, were not permanently settled until the close of the colonial period. There was little

[1] H. O. Bowe, owner of the ranch, purchased breeding stock from two Oregonians heading for the mines.

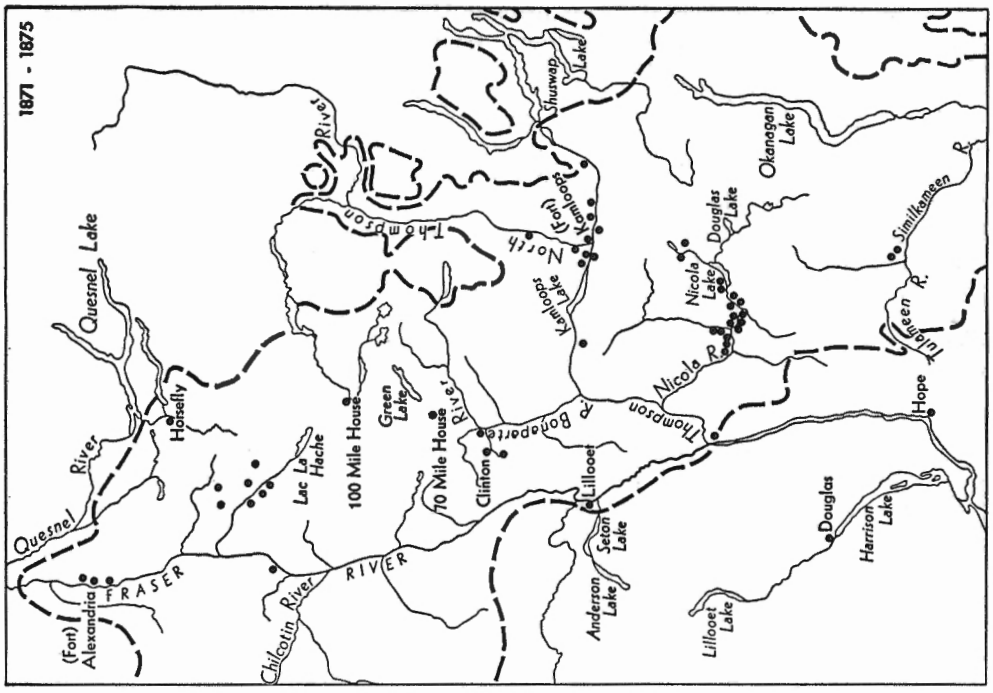

Figure 16. Settlement 1871–75.

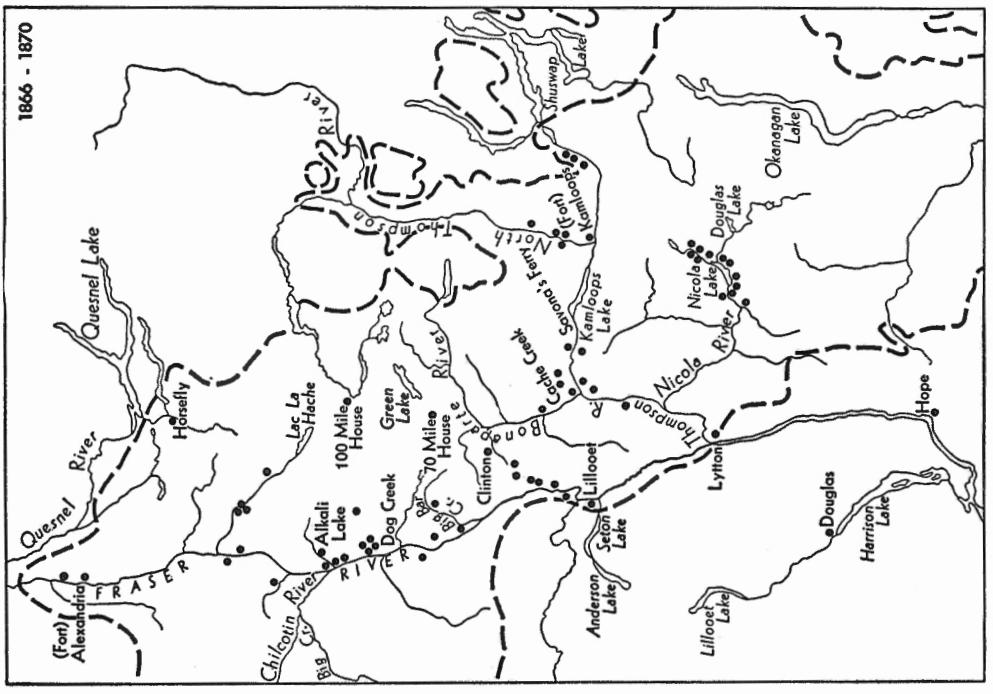

Figure 15. Settlement 1866–70.

incentive to settle in these districts prior to 1868, for the lucrative traffic to the goldfields by-passed them, but cattlemen from the south, attracted no doubt by the "bunchgrass waving in the wind like a sea of grain in the autumn, and stretching for miles upon miles",[1] settled at points that offered advantages for stock raising. About 1868, land was first pre-empted in the vicinity of Nicola Lake and even earlier near Kamloops. In the early seventies the pattern was still linear, but more "beads" began to dot the string of trails and river courses of the Nicola and the Thompson.

The Chilcotin remained almost uninhabited, except for warlike Indians, during this decade. Only two pre-emptions were applied for prior to 1870, one on Meldrum Creek and the other on Riske Creek. The Chilcotin lay off the beaten track to the goldfields and, as no scarcity of range existed in the more accessible districts to the east, there was no incentive to settle this country where, moreover, the Indians were considered treacherous.

EARLY SUPPLY CENTRES

Certain locations along the Cariboo Road, because of strategic advantages, grew to be supply points for the districts around. Today some are small towns. Clinton early became an important stopping place at the junction of Cut-off Valley Road from Lillooet and Cariboo Road from Cache Creek (Figure 12). It was sufficiently removed from Ashcroft to constitute an important lap in the journey northward by stage. The coming of the railway in 1912 did not affect its position as a transportation centre.

100 Mile House gained prominence as a stopping point on the road to the mines as early as 1862. Its importance did not diminish with the passing of this traffic: settlement eastward increased its status as a supply point and with the advent of the automobile, it became a popular stopping and fueling place for tourists.

Prior to 1912, 150 Mile House was the metropolis of the Williams Lake area, with stores and stopping places to serve the local community. As the focus of traffic from Alkali Lake, Horsefly, and Quesnel Forks, as well as the Cariboo Road, it early became an important stopping point and service centre for transients. With the coming of the Pacific Great Eastern Railway, its function as a supply point passed largely to Williams Lake. Today, it numbers scarcely a dozen persons. The heyday of Soda Creek, the point of transhipment from road to steamer, corresponded with that of 150 Mile House.

PERIOD OF CONSOLIDATION (1872–1885)

With the gradual passing of activity in the Cariboo mines, only the better-established houses at strategic points along the main roads survived. As a result, there was a tendency for many pre-emptors to abandon their holdings. At the same time, certain land holders, appreciating the natural advantages of the country for cattle raising, began to add to their holdings. This trend was apparent in the late sixties and continued through the following decade. Although it did not cease with the coming of the railroad, the influx of land-hungry settlers at that time tended to retard the trend to consolidation. Most of the large cattle ranches within the area today were either fully formed or well on the way to their point of maximum growth by the close of the period.

A factor that influenced the trend to larger holdings was the Land Act of 1870, by which 320 acres could be pre-empted. Leases for pastoral purposes and for hay cutting were provided for also. Provision was made for the sale of public lands by auction at the upset price of $1 per acre. In 1882, the system of

[1] H. S. Cleasby, personal communication.

rectangular survey was adopted, after which lands had to be surveyed before they could be pre-empted. One year later the railroad land grants were made, transferring a 20-mile strip along the main line of the Canadian Pacific Railway to the railroad.

THE CHILCOTIN

The most spectacular advance in settlement during the period 1872–1885 occurred in the Chilcotin. In 1873, " a section of land commencing from the junction of the Chilcotin and Fraser Rivers, to a point five miles below the junction of Alexis Creek and Chilcotin River" (Daily British Colonist, 1873, p. 3) was declared open for pre-emption by the Land Ordnance of 1870. Prior to this time, only two pre-emptions had been recorded within this vast area. Choice lots, which later became "home ranches", were taken up from 1873 to the close of the period. The Riske Creek prairie received the first settlers, and by 1884–85 ranches at Hanceville and across the river at Chilco[1] were first pre-empted. Consolidation in the Chilcotin was later in coming.

Access to the Chilcotin Valley was originally by ferry from Alexandria, and then from Soda Creek. The Chimney Creek bridge was constructed in 1904 about the time the Williams Lake-Chilcotin wagon road was built. Soda Creek and 150 Mile House were the supply points until Williams Lake assumed this function after the Pacific Great Eastern Railway began to operate in 1917.

THE SETTLEMENT PATTERN BY 1885

Although the trend to larger ranch holdings eliminated some of the original pre-emptors, settlement in the Nicola, where open range was still available, continued to expand. In 1876, G. M. Dawson made the comment that forty-eight "settlers with houses" had located in the Nicola (Dawson, 1876, p. 34B). In the 1887 B.C. directory, about eighty persons are listed as "farmers and stock raisers". This can be accounted for only by a steady growth, increasing somewhat in tempo toward the close of the period. It is of interest to note that Nicola at this time had an estimated 80,000 acres of alienated land, 30,000 head of cattle, and 2,000 sheep.

Other parts of the ranching area did not record the same growth. Ranches approximated a total of 262 for the entire area and were allocated as follows:

TABLE VII

Distribution of Ranches, 1887

Area	Number of ranches
Chilcotin	40
Williams Lake—150 Mile House—Soda Creek	40
100 Mile House—Lac la Hache	26
Clinton (vicinity)	11
Bonaparte Valley	8
Cache Creek	10
Spences Bridge	9
Lytton (vicinity)	3
Savona (vicinity)	11
Ashcroft (vicinity)	16
Kamloops (vicinity)	38
Nicola (vicinity)	80

[1] These include the present Chilco Ranch, the T. H. Ranch at Hanceville, the Graham Ranch at Alexis Creek (Martin's ranch), and the Cotton Ranch recently acquired by the Chilco interests.

In the Chilcotin, settlement followed the accessible parts of the lower Chilcotin River and the Chilcotin Road. As serving transients was of minor importance in the Chilcotin, the pattern conformed closely to the most desirable areas for stock raising. As the Riske prairie had large stretches of bunchgrass range, lots were first taken there, but settlement was widely separated and confined to the individual pre-emptors' holdings up to the close of the period.

Throughout the Cariboo-Lillooet region the pattern continued to conform to transportation routes, but in the Thompson-Nicola area settlers made their way back from the lines of transportation. The vast expanse of open range, typical of the latter district, encouraged a more uniform pattern.

THE RAILWAY ERA (1885–1917)

No single event since the gold rush was more far-reaching in its scope or revolutionary in its effect on settlement than the advent of the railway and the automobile. The interval 1885–1917 witnessed the building of two transcontinental rail lines, a provincial railway, and two branch lines through the ranching area. Moreover, it experienced the most widespread road-building and improvement program since the construction of the Cariboo Road.

The Canadian Pacific Railway was built along the south bank of Thompson River and along the canyon of the Fraser in 1883–84. It began operating transcontinental trains in 1886. Formerly, steamboats had operated on Kamloops Lake, benefiting from considerable traffic during the minor gold rush to Columbia River about 1868. The railroad brought this traffic to an end, and also had an effect on staging and freighting to the upper country. The stage-coach line transferred its headquarters from Yale to Ashcroft, and freight wagons also operated from this terminus. The wagon-road route through the Fraser Canyon was used in part by the railroad, and was not rebuilt until after World War I, when motor traffic became common. In 1892, a branch line was constructed south from the main line of the Canadian Pacific Railway to Kelowna, and in 1898 the southern or Kettle Valley route was constructed through Merritt and Princeton.

In 1915, the Canadian Northern (Canadian National) line was put through to the West Coast. This line followed North Thompson River to Kamloops and then ran parallel with the Canadian Pacific Railway to Vancouver.

In 1912, construction of the Pacific Great Eastern Railway from Quesnel to Squamish, via Lillooet, brought the Cariboo and east Chilcotin within easy access of the coast. It did not begin operation, however, until 1917. By the close of World War I all parts of the ranching area, except the west Chilcotin, were within reasonable reach of rail transportation.

The advent of the automobile in 1907 resulted in an improvement to main roads and their use for trucking. Remote regions were brought into closer touch with supply centres. Revolutionary changes in transportation, besides providing an impetus to settlement, caused the relocation and rapid growth of supply centres and a revival of markets. Population doubled following the turn of the century, as indicated by the census figures which for 1901 were 29,155, and a decade later were 56,382.

RELOCATION AND GROWTH OF SUPPLY CENTRES

It must not be concluded, however, that the sudden increase in population prior to World War I was entirely a land movement. The pre-emption figures for this decade, although indicating an increase in rural settlement, did not climb at the same rate as those for urban centres. Ashcroft, which was non-existent prior to railroad construction, quickly gained in population as the southern terminus of the staging route and point of shipment to the Cariboo. Williams

Lake came into being also as a result of rail construction after 1912. Kamloops, an important divisional point on the Canadian Pacific Railway, expanded greatly after 1885.

On the other hand, several centres that were thriving towns in the sixties and seventies practically disappeared in the eighties. Soda Creek at the point of transhipment to river boats for freight en route to Quesnel and the mines lost this basic function with the coming of the railroad and motor transport. The centre of supply for the upper Cariboo-Chilcotin region had been 150 Mile House, but the railroad by-passed it in 1912, making the town of Williams Lake its divisional point. Cache Creek, at the junction of routes to the Cariboo, was the supply centre for a large area, but lost this function to Ashcroft. The town of Nicola was the supply centre for its region until Merritt gradually assumed this function after 1907. Of all the thriving centres within the ranching area prior to the railroad, only Clinton, Princeton, and Kamloops continued to increase in size and importance.

Growth in urban population during this period was due primarily to the railroad, which employed large numbers at divisional points such as Kamloops, Ashcroft, and Williams Lake. It provided jobs for trackmen, station agents, and others at numerous small points along the line. Added to this, the railroad made possible the export of lumber from interior points and created a market for ties. This in turn attracted loggers and mill men to the more heavily timbered sections of the interior. The net over-all result was a greatly expanded economic base that provided local markets for beef and also made the rapidly growing coastal markets accessible.

REVIVAL OF MARKETS

Difficulties in marketing during the seventies were surmounted by the coming of the railroad. No longer were cattle drives necessary from Alexis Creek to Ashcroft or from the Nicola through the mountains to Hope. Cattle arrived at the coast in prime condition and so commanded a better price.

The railroad itself provided a very important, though temporary, market during construction days. This was particularly true of the years 1883-85 when an actual scarcity of beef existed in the interior. The growth of towns, due in large part to the railway, improved the local market, but access to the coast proved to be the greatest boon to the rancher. By 1909 cattlemen were able to supply the demand during 7 months of the year only, although cattle had been increasing. The total for the province in 1881 was 69,573, and a decade later 109,415. During the war years (1915-17) cattle herds increased from 100,000 head to 190,000.[1]

On the other hand, the advent of the railway and motor transport had a temporarily depressing effect on certain sections of the interior. With the operation of the Pacific Great Eastern in 1917, the colourful stage line with its system of road-houses and staging-points disappeared along with the lumbering freight wagon. Ranches along the Cariboo Road found themselves without a market for hay and garden produce. Horses quickly depreciated in value. The reorientation to cattle ranching exclusively was not entirely successful, although most ranches managed to make the transition. The automobile could cover much greater distances in a day, and hostels, except in the major towns, lost their trade completely. Many old "mile houses" with huge stables still stand to remind the passing tourist of the once colourful era of the stage-coach and pack train. In recent years, transient trade has become important once more, but has shifted to the resort sections along the margins of the ranching area.

[1] This increase has been evident to 1948 when the all-time high of 268,200 beef cattle was recorded for the province as a whole.

CHANGES IN THE SETTLEMENT PATTERN

At the outset of the railroad era (1886) settlement was still largely oriented to the major routes of travel, but towards the turn of the century settlers pushed beyond the established routes and occupied remote districts. In the Thompson-Nicola region, the pattern of settlement became dispersed. During the eighties the Douglas Lake interests purchased the holdings of many small ranchers[1] throughout the eastern part of the Nicola and so gradually consolidated their enterprise, with Douglas Lake as its centre.

Up to that time settlement in the Nicola consisted of a large number of small holdings, and only late in the period did large ranches, such as the present Guichon Ranch and the Nicola Lake Stock Farm, begin to take shape. By the close of the century, the open range had been mostly acquired and fenced. With the disappearance of the open range, settlers began to push into the timber. Holdings were grouped around grass openings or swamp meadows.

Some districts witnessed a change in land use from ranching to dry farming. The government had encouraged experimentation in this method by setting up, as demonstration centres, dry farms in both the Nicola and the Cariboo. As a result, the land around Knutsford was acquired by dry farmers, and much of this locality today is so used. In the Cariboo the experiments were not a success. Frequency of very dry years, soil erosion from steep slopes, and the distance from market militated against this form of land use. Large acreages in the vicinity of Big Bar Creek and Chimney Creek reverted to range after World War I.

In the Cariboo-Chilcotin region, the settlement pattern underwent considerable change during the railway era, particularly towards its close. The original linear pattern conforming to established routes of travel remained dominant, but added to it were numerous isolated population clusters served by side roads and trails. Settlement followed the accessible bunchgrass ranges along the terraces of the Chilcotin from 1873 to 1893. In addition to the river lots, the early ranches acquired meadows on the upland back from the river for hay cutting and fall grazing.

As the Chilcotin Valley lands became stocked, settlement moved to more isolated districts on the upland, where wild meadows were abundant. Big Creek received its first settlers in 1903 and continued to expand up to World War I. Meldrum Creek, located on the road from Soda Creek to the Chilcotin Valley, was among the first districts in the Chilcotin to be settled, and continued to grow up to World War I. Chezacut, 30 miles north of Redstone, was first settled about 1898 and continued to receive settlers until after World War I. Tatla Lake, in the west Chilcotin, was approached first from the Pacific coast. Pre-emptions here date from 1890. Tatlayoko, more remotely situated at the head of the lake of the same name, was settled about 1917; Anahim Lake and Kleena Kleene areas were opened prior to this, but continued to receive settlers through the decade following the war.

Districts in the east Cariboo such as Forest Grove, Buffalo Lake, Canim Lake, and Lone Butte were first settled during, or at the close of, World War I. They are made up of pioneer holdings typical of the eastern transition zone. The construction of the Pacific Great Eastern Railway was directly responsible for the influx into these marginal districts, and supply centres such as Lone Butte owe their start directly to the railroad.

[1] These included settlers at Chaperon Lake and Minnie Lake.

TABLE VIII

Settlement by Sub-Region and District[1]

Sub-region	District	Initial settlement
Chilcotin	Meldrum Creek	1886–1905
	Riske Creek	1873–1903
	Big Creek	1903–1910
	Alexis Creek	1892–1908
	Redstone	1888–1910
	Chezacut	1898–1912
	Tatla Lake	1890
	Tatlayoko	1917–1925
	Kleena Kleene	1911–1920
	Anahim Lake	1909–1920
	Gang Ranch	1884–1892
Upper Cariboo	Horsefly	1893–1914
	Ochiltree	1893–1910
	Miocene	1908–1920
Lower Cariboo	Bradley Creek	1921
	Ruth Lake	1920
	Timothy Lake	1904–1912
	Forest Grove	1916
	Buffalo Lake	1910–1920
	Canim Lake	1910–1919
	Hawks Lake	1922
	Roe Lake	1910–1919
	Loon Lake	1884
	North Bonaparte	1907–1914
Kamloops	Criss Creek	1911–1921
	Red Lake	1912–1927
	Meadow Lake	1886
	Mamette Lake	1876

DEVELOPMENTS AFTER WORLD WAR I

Following World War I, settlement was modified along three lines: the consolidation of small holdings, the establishment of soldiers' settlements, and the addition of tourist facilities. Although most of the large ranches had taken shape before the war, there was a trend during and following it to consolidation into medium and large ranches. Land available for pre-emption by this time was marginal in kind and appealed only to the few who were prepared to carve themselves a homestead out of the forest. During this period Forest Grove, Canim Lake, Red Lake, and similar districts attracted a few who have continued to subsist on marginal units. This trend to small "places" was accompanied by the building of hunting lodges and resorts, some in connection with ranches, in order to supplement the small income from livestock. The advent of the automobile brought to the Cariboo a new wave of seekers, not for gold, but recreation. The forested areas to the east of the Cariboo Road, abounding in attractive lakes and game animals, witnessed the advent of tourist resorts, hunting lodges, and a few dude ranches.

Soon after the close of World War I, all the land suited to full- or part-time cattle raising had been acquired. No more new areas awaited pre-emption; older districts saw a renewed trend to consolidation. Small ranches were

[1]Source: Pre-emption records, British Columbia Department of Lands.

acquired by some returning from the war, but settlement by returned soldiers was on a small scale only. Only those establishments depending on tourists made any important change in the frontier of settlement and then chiefly along its eastern margin.

LAND TENURE

The composition of the ranch unit cannot be fully appreciated without some conception of the various rights under which land is held today.

According to the tenure vested, there are three classes of land within the ranching area: (1) privately owned land; (2) leased Crown land; and (3) open Crown land. Each of these is considered in relation to the ranch unit and its rights.

PRIVATELY OWNED LAND

This is land that has been acquired by pre-emption or direct purchase from the Government of British Columbia. Within the limits of the grazing area there are 2,325,000 acres of such land.

The ranchstead and adjoining hay-fields are almost always privately owned. Wild hay meadows may be either privately owned or leased from the Crown. Spring, fall, and winter bunchgrass range is usually owned outright, although in the Ashcroft district large areas are also held under lease. The most important use-elements of the ranch unit are acquired, therefore, by purchase or pre-emption and are privately owned.

LEASED LAND

Most ranchers have some leased land as part of their holdings.[1] In the Thompson-Nicola region, out of 52 ranches sampled, 43 held leases, and in the Cariboo-Chilcotin, out of 47 sampled 28 leased some land. If we may regard this as representative, then over 80 per cent of the ranches in the southern region and 60 per cent of those in the northern region include leased land as part of the ranch unit.

The total area of leased land in the ranching area is 460,000 acres. In the Nicola district, the area of leased land is much less than that of alienated land, being 1 to 15. In the Ashcroft district,[2] which has several large ranches, the amount of leased land to privately owned land is nearly 7 to 1. That of the Kamloops district is 2·5 to 1. As the kinds of range are similar in each district, the difference in the amount of leasehold can be explained only by reference to historic circumstances.

In other districts, the ratio of leasehold to alienated land, based on sampling, is as follows: Chilcotin 3:1, Cariboo 1:13, Lillooet 1:9. With the exception of the Nicola, the southern region has a higher proportion of leasehold than the northern, a situation partly explained by the greater amount of highly prized spring and fall range. The southern region also has more cattle per acre of leased and alienated land than the northern, the ratio being 20 to 15.

Lands within the grazing area of British Columbia may be leased for a period up to 21 years. The leases now carry the obligation of fencing and are subject to cancellation or renewal at the discretion of the government. As a general rule, however, grazing leases are renewed in areas where grazing is considered the "best" use and priority is given to the leases of long standing. Leases once acquired are seldom relinquished. The lessee enjoys exclusive grazing rights and is not governed by the dates set for grazing unleased Crown lands. Leases are subject to a low annual rental and are taxed.[3]

[1] The term "holdings" is defined as the amount of land owned and leased in any ranch unit.
[2] Of the six ranches sampled, all of them holdings, alienated land totalled 11,140 acres and leased land 76,400.
[3] The 1950 rental was 14 cents per acre.

Leases may also be granted to individuals for specific uses such as hay cutting and for special pastures. The obligation to fence is implied in all cases. Hay leases are not to exceed 500 acres, and all leases are conditioned on the lessee having first pre-empted or purchased land in the vicinity and having become a resident engaged in ranching.

CROWN RANGE

Crown range refers to unalienated land within the grazing area. Rights in Crown range are vested in the government, which may issue permits to graze stock for a specified period of time not exceeding 6 months in a designated area on the payment of a fee.[1] Except in the case of "term permits", the usual grazing permit is issued annually and is conditional upon (1) residence of the stock owner on an improved ranch adjacent to the grazing area, and (2) his ability to stock to capacity the range allotted to him. Preference is given on the basis of previous use, and is retained only by continuous use.

The number of stock run by a particular rancher will depend upon the number he has previously run under permit, subject to the carrying capacity of the range. Of great importance to the stability of the ranching unit is the recognition of grazing rights as accruing to the ranch unit and not to the individual. As a result, a transfer of the ranch through sale includes those rights attached to the unit at the time of sale.

In addition to the use of Crown range for grazing under the permit system, the right to use government land for particular purposes such as special pasturage or hay cutting may be granted under the Grazing Act. Land so used must be fenced, and the permit carries no tenure privileges except a prior right of renewal based on past use.

Various other permits establishing rights in the use of Crown land include the "special use" permit allowing grazing in provincial forest reserves; "on and off" permits compensating the rancher for the use of his unfenced land by cattle other than his own when it adjoins Crown range; "special crossing" permits for those driving stock (especially sheep) through Crown land to summer range; and the "grazing allotment" permit by which a man enjoys exclusive grazing rights on a particular part of the Crown range.

Whereas the best spring and fall bunchgrass range is controlled by ownership or lease, summer range is usually government land subject to use by annual permit. Under this system, summer range is most often grazed in common by the cattle of a group of ranchers adjacent to a particular range unit. The use of the range by the ranch unit is not reckoned in acres but in numbers of stock provided for by permit. In some instances a block or unit of range is stocked to capacity by a single rancher, in which case he becomes the exclusive user. Each ranch is confined in its use of Crown range by dates set by the government and by the number of stock permitted. The period of use is arrived at by an estimate of the carrying capacity of the range, the readiness of the range for grazing in the spring, and the previous practice of ranchers in its vicinity. Alpine range may be grazed for 3 months (July to September); other range, subject to the factors mentioned, may be used as early as April 1 and as late as December. Generally speaking, the period averages from 4 to 5 months. Hay land, subject to permit, tends to remain with the unit that has established use-precedence over a long period.

[1] 1950 fees; 16 cents per head for cattle; 20 cents per head for horses; 3½ cents per head for sheep on a monthly basis. Rates set by the government in relation to prevailing price of beef and mutton.

EFFECTS ON THE RANCH UNIT

The various kinds of rights in land are directed towards stabilizing the ranch unit. Rights acquired by permit or lease are vested in the ranch unit and are not transferable at the will of the rancher. Crown lands are regarded as the possession of the public and are administered with a view to conserving the natural resource, in this case grass. Where a ranch unit does not make full or proper use of its privileges acquired by prior use, or where a "better" use consistent with the economic potentialities of the land is found, such privileges may be forfeited in whole or in part. In general, however, the government administers Crown lands in the interests of the integrity of the ranch unit. Under this method, large ranches with long-established use of Crown land tend to remain large, whereas small ranches enlarge, as a rule, only by consolidating holdings. Indeed, such a tenure system has encouraged consolidation of small holdings and the perpetuation of large ones.

Out of 100 ranches, 58 were owned and operated by individual heads of families; two were leased and similarly operated; and another 32 were operated by a kind of loose partnership within the family, either by brothers or by father and son or sons. This means, then, that in 92 cases, the ranch was a family undertaking, the family providing management and much of the actual labour required. Of the remaining eight units, five were under a partnership outside the family, two were large companies hiring scores of hands, and one was operated by a resident manager for the absentee owner. These figures, although dealing with only one-quarter of the units in the ranching area, may be considered as percentages representative of the area as a whole. In summary, at least 92 per cent of the ranches are family undertakings; tenancy is very low throughout the area; and the large stock-holding company ranches are few in number, although they control approximately one-quarter of the live stock.

Labour recruited outside the family for ranch work may be permanent or seasonal. The study of 100 ranches shows that one hired man is required permanently for each 150 head of cattle. As 57 per cent of the commercial ranches in the area are under 100 head, it is correct to say that in at least 60 per cent of the cases the family provides all the permanent labour required.

In the matter of seasonal labour, however, with very few exceptions, commercial ranches use some help for haying during 1 month or 2 months of the year. The main labour force is employed during the summer months, with a few hands being hired for winter feeding, spring branding, and the fall round-up. In some instances, the help may be afforded by neighbours in return for similar services. The ratio of seasonal labour to permanent hired help, according to the 1941 Census of Canada, is 1:2·6.

Dependence on hired help is well illustrated in the case of large units. The Guichon Ranch (3,000 head) uses 31 men permanently and from 10 to 12 additional hands seasonally. The Douglas Lake Ranch (10,000 head) employs 90 men permanently besides additional hands for haying and spring branding.

Ranch labour on a temporary basis depends considerably on the Indian. It is estimated that 70 per cent of the labour in the Chilcotin and 50 per cent in the Cariboo comes from this source (Walsh, 1950). Indian labour is usually hired for hay cutting under contract, but many ranchers consider Indian help unreliable and are turning wherever possible to machines.

THE USE OF WATER

Under the laws of British Columbia, private ownership of water does not exist; all such rights are vested in the provincial government. The right to use water is acquired and held under the terms of a licence issued by the govern-

ment, subject to the completion of the necessary works to ensure its beneficial use. A licence may be cancelled for non-use, improper use, or failure to pay rent. Restrictions on the use of water may be summarized as follows:

1. Location on a stream carries no advantage other than eligibility to use the water, subject to the granting of a licence. Should licences have been issued up to the limit of the stream-flow, no further users are permitted.
2. Licences permit each user to take a specified amount of water from a given stream.
3. The date of the granting of a licence establishes use-priority so that if more than one user diverts water from a stream, the holder of "first-right" is assured of his quota before that of the next user and so on.
4. A water licence cannot be bought or sold apart from the ranch unit and remains the right of the property owner or lessee. Should a ranch change hands, water rights under the licence automatically pass to the new owner.

The significance of water rights to the ranch unit is fourfold. In the first place, tenure is presupposed, since the area on which the water is to be used must be privately owned or leased from a private owner before a water licence is granted. Second, because water rights are not separately negotiable, the value of a ranch unit will be determined in part by the water rights secured to it. Third, expansion in terms of new units will necessarily be governed by existing water facilities, the rights to which may have been granted already in whole or in part. Finally, in dry years only those units with high priority in water rights are assured of adequate supplies.

Two kinds of organization to facilitate more efficient use of water on a community basis may be found within the ranching area, namely, the "Water Users' Community" and the "Improvement District". The former may be established under the "Water Act, 1939" to enable those using the water of a particular stream to co-operate in building and maintaining storage dams and works necessary to the community as a whole. Membership is voluntary and costs are shared on an approved basis. Six or more licensees, one of whom is designated manager, are necessary. In the ranching area there are nine such communities.

Improvement Districts are designed to benefit large communities. They are set up in response to a petition signed by a majority of the community. Trustees are elected, with power to tax and borrow. Existing rights are assigned to the district, and each member pays in proportion to the amount of water used. There are nine such districts in the ranching area.

CHAPTER V

MARKETS AND SUPPLY CENTRES

As a general rule, the rancher looks to the smaller points within the region for his supplies and to larger, extra-regional points for his markets. Vancouver, as the chief distributing point for most of British Columbia, is the main source of almost all the rancher's requirements and certainly constitutes the market for 90 per cent of his cattle.

LOCAL SUPPLY POINTS

In order to appreciate the function of the various kinds of supply points and their relative importance to the region as a whole, each has been subjected to a rating based on several criteria considered important to the primary as well as the secondary needs of the rancher.

TYPES

The various supply centres (Figure 17) have been grouped into three types depending on the number and kind of services rendered. Type one comprises centres meeting two or three of the primary needs (food, education, mail service).

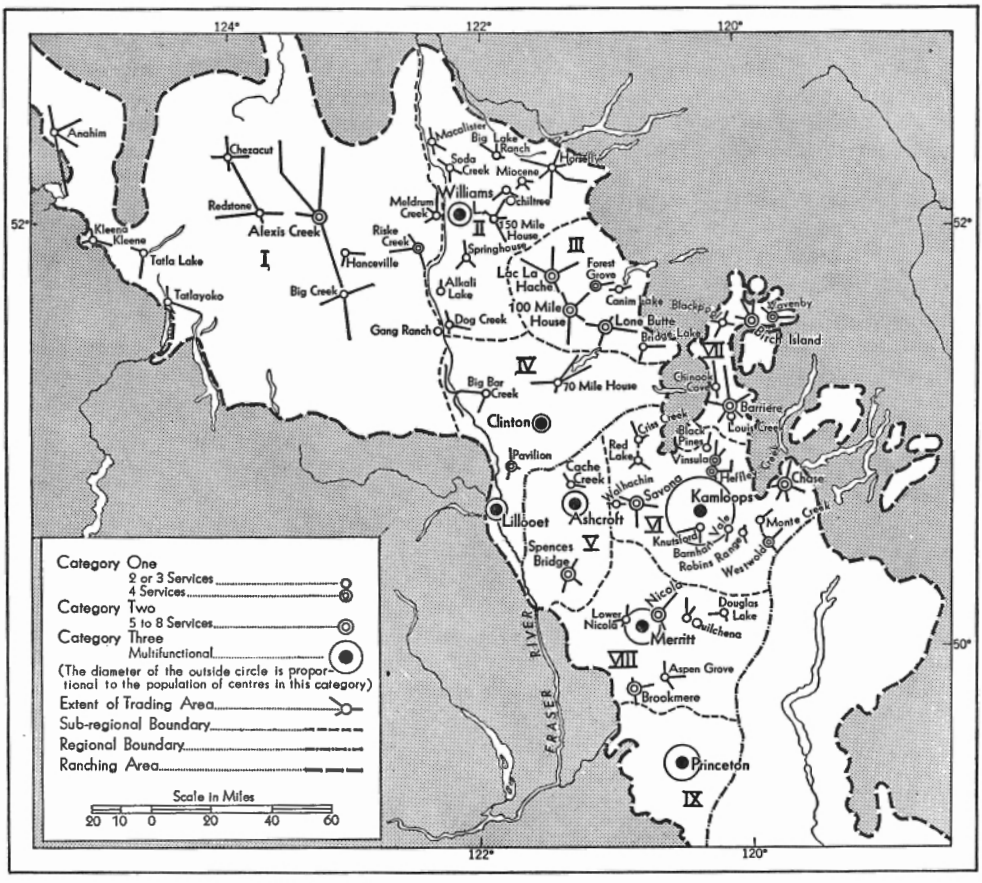

Figure 17. Supply and market centres.

Those centres having, in addition, a second store, or serving as a cattle-shipping point, are rated as four and placed also in type one. Towns of type two have populations exceeding 50 and supply several additional services through a hospital, hotel, and several stores. The third type consists of seven larger centres, each exceeding 500 people. Kamloops and Merritt are incorporated cities, Williams Lake and Lillooet are villages, and Princeton, Ashcroft, and Clinton are unincorporated towns. The leading supply centre and administrative point for the ranching area as a whole is Kamloops.

Both the second and third types go beyond supplying the elementary needs of a ranching community. Both have more than two stores; some have one or more banks, a hospital, and a district forester with power to administer the Grazing Act. The largest have, in addition, several hotels and a newspaper.

CHARACTERISTICS OF SUPPLY CENTRES

Type One

The first type consists of those serving the primary needs of a small ranching community ranging from 16 (Kleena Kleene) to approximately 200 people. A typical centre, such as Hanceville, consists of a centrally located and long-established ranch that has obtained the post office concession and keeps on hand some staple goods of a non-perishable nature.

Many find that a nearby Indian Reserve is their mainstay, and a large variety of wearing apparel, harness, and trinkets is kept, either for sale or exchange for Indian handicrafts. In most cases, the store occupies a separate building. If the district served is large enough, the store is owned and operated apart from the ranch to which it was originally attached. For example, the store and post office in Big Creek are attached to the rancher's house; that in Redstone functions independently.

Most of the centres in type one have a small school, which in remote communities is constructed of logs. Occasionally, a community hall is added, serving as a recreational centre, church, and hall for farmers' institute meetings, should such an organization exist in the community. A separate church building is not usually found except in long-established and more populous communities. A few centres in this type may have extra buildings such as an additional store in connection with the tourist business, or the headquarters of the district forest ranger or assistant ranger, or cattle pens, as in the case of Pavilion on the Pacific Great Eastern Railway.

Most centres in type one are found in remote areas and at the centre of a cluster of ranches. Communities like Chezacut, in the Chilcotin; Anahim Lake, in the far northwest; or Red Lake, north of Kamloops, are typical.

Other centres less typical, such as Gang Ranch and Douglas Lake, are the headquarters of large ranches that find it necessary to provide community services for their employees. Most outstanding in this respect is Douglas Lake Ranch, which has built modern homes for its key employees, thus recognizing the value of community advantages in maintaining a stable labour supply. In addition, ranch centres are usually marked by bunkhouses and a mess house for the ranch hands.

Type Two

Intermediate in size and number of functions performed are the supply and market centres of the second type (Figure 17). It is difficult to assign any exact population to them, as such data have never been collected. Most of them exceed 50 people; however, several with less have been included on the basis of numbers of functions performed.

Besides the primary functions, the centres in type two may have a hotel, cattle pens, and offices of the forest ranger or an assistant. In supplying lodging or loading facilities they reach beyond their immediate environs, serving numerous small satellite communities. Thus Alexis Creek is a focal point for the central Chilcotin; 100 Mile House serves Forest Grove, Canim Lake, and Lone Butte, smaller communities to the east (Figure 17).

Some centres of this type depend more on such industries as the railroad, the tourist trade, or lumbering, although they also supply services relating to ranching. Thus Savona, on the west end of Kamloops Lake, and Spences Bridge, farther downstream, cater to tourists, besides being railroad points. Barriere on the North Thompson, as well as several towns to the north of it, owe their existence primarily to logging and lumbering in the vicinity.

The importance of some centres in type two can be explained only by their past function in connection with the use of the Cariboo Road as a stage line to the mines of Barkerville and vicinity. In the days prior to World War I, horse teams were the sole means of hauling freight to the mines and, as a day's journey averaged approximately 18-20 miles, stables and hostels were maintained at frequent intervals along the road. The more important of these, 100 Mile House and 150 Mile House, have survived to the present and continue to serve as supply points and overnight stopping places for commercial travellers, truck drivers, and tourists.

The centres of this type follow two lines of distribution: along the main routes of travel, that have survived since the stage-coach era, and along the principal railroad lines.

Type Three

Each of the seven supply and market centres of the third type has a population exceeding 500 and a diversity of functions characteristic of large towns and small cities. All have the requisites for supplying the rancher with his full requirements. All are equipped with electricity and running water so that they provide the usual amenities of advanced communities. Because of their size and varied functions, they draw custom from many miles around. The general store of type one is replaced in the larger town by various shops, each specializing in some line of merchandise. Moreover, banking facilities are available, a hospital and medical services are provided, and government agencies may be easily reached. A town newspaper keeps the rural district informed of local events and carries advertisements of local merchants, all of which helps in maintaining a community feeling. Should the rancher go to town, as he must do to market cattle, he is assured of lodging in one of several hotels and can meet representatives of business firms who have extensive connections.

Clinton (414) and Ashcroft (540) (*see* Plate VI B) were supply points on the early road leading to the Cariboo and later became centres of ranching.[1] Williams Lake (1,200) came into being in 1912 at the northern terminus of the Pacific Great Eastern Railway and subsequently became the principal supply and market centre for the Cariboo-Chilcotin region. Unlike many of the centres in group three, which serve lumbering and mining interests, Williams Lake functions almost entirely as a service centre for ranching. It has the largest cattle yards in the province, with accommodation for 2,400 head.

Merritt (1,250) was a product of the coal mines that attracted a colony to the Nicola district in 1908, after ranching had been established with its centre at the town of Nicola. The coal mines have been almost exhausted but Merritt continues as the chief supply centre for the Nicola sub-region, having replaced Nicola.

[1] Based on Canada, Post Office Dept. (1952), Canada, Trade and Commerce Dept. (1953), and British Columbia and Yukon Directory.

Princeton (2,200), to the south, also owes its rapid development to the mining industry and its function today is largely unchanged, depending only to a minor extent on the ranching activities of its hinterland.

Kamloops (10,078), the largest city in the ranching area, located at "the meeting of the waters", as its Indian name indicates, is also at the junction of two transcontinental railways. Its commercial function had its origin with the Hudson's Bay Company, which established a post there in 1821. At the time of the gold rush, settlers came to take up ranches in the vicinity. The building of the C.P.R. and the C.N.R., and the location of their divisional points at Kamloops brought a steady income to the community. More recently, the growing of truck crops, tree fruits, and hops on the river flood plain and adjacent lower terraces has expanded its function as a supply centre. Logging and several small sawmills in the area also depend on Kamloops, both as a supply centre and a local market. Numerous small industries have grown up to meet the needs of a rapidly expanding community, and the abundance of game and fish in the nearby region has made it a rendezvous for sportsmen in the summer and fall. Owing largely to its central location, Kamloops expanded and soon came to be the chief administrative point for forestry, grazing, and agriculture in the southern interior. In addition, the Dominion Experimental Range Station is located 5 miles north of the city. The Trans Mountain oil pipeline from Alberta runs through Kamloops, making it an important refinery centre for the southern interior of British Columbia.

Two of the seven leading centres have functions that are vastly important to the hinterland. Kamloops has an annual stock show and sale of pure-bred cattle, and Williams Lake stages a feeder and bull sale and fat cattle show. Both are promoted by the British Columbia Cattlemen's Association and draw stock from the far corners of their respective regions. The holding of fairs and sales in these cities is an added indication of their recognized supremacy over other large centres in the ranching area.

Live stock for the sale at Williams Lake comes every year by truck and on the hoof from West Chilcotin to Horsefly, and from Quesnel to 100 Mile House. Over 2,000 head are offered each year at auction to buyers from Canadian and American packing houses. The autumn of 1952 saw the fifteenth annual sale.

Kamloops has an annual bull sale in March, which includes breeding stock and market cattle. A fat-stock show in December of each year features the sale of prime beef for the Christmas trade. However, unlike the Williams Lake event, it does not feature the sale of feeder stock, reflecting the greater abundance of bunchgrass range in the Kamloops-Nicola region in contrast with the Cariboo-Chilcotin. The annual ram sale, an event exclusive to Kamloops, brings buyers from all parts of the province.

Areas Served

The three categories of supply and market centres vary according to the size of the areas served. Those in category one usually reach out for a few miles only to meet the needs of a small community. Only in remote districts, such as Anahim Lake, is the radius large. For the most part their influence does not reach beyond 10 or 15 miles (Figure 17).

Centres rated in the second category frequently serve more than one community and reach out for 15 or 20 miles.[1] Some owe their size and importance to other industries and may have a very restricted trade among ranchers. Examples of this type are numerous along the North Thompson, except in the

[1] 100 Mile House, by reason of its location on the railroad, acts as a supply point for stores located in Forest Grove, Canim Lake, and Buffalo Creek, and at the same time provides the ranchers of these areas with certain services that their own district centres are unable to supply.

case of Vavenby and Birch Island, where outlying ranching communities are located. Chase, Savona, and Brookmere are only secondarily supply centres for ranching, their main function being to service other industries. On the other hand, Alexis Creek reaches out nearly to Redstone on the west and to Hanceville on the east, depending entirely on trade with the rancher, except during the hunting season when it profits considerably from sportsmen. Some centres, such as Nicola and 150 Mile House, at one time served a more extensive trading area but have become overshadowed by the growing importance of towns in category one.

The centres of category three, because of their size and numerous functions, draw custom from many miles around. Six of the seven act as leading supply points for a sub-region. Lillooet serves mainly a mining and intensive farming community. Considerable overlap exists between the areas served by centres of category three and those of two and one. Owing to improved methods of transportation and more roads, distances have become less significant, so that even such remote points as Kleena Kleene and Tatlayoko are within the orbit of Williams Lake. Nevertheless, poor roads may serve to alter the direction of flow from a given settlement to a particular centre. Although Dog Creek trades with Williams Lake, the Gang Ranch, separated by a very narrow and precipitous stretch of road from Dog Creek, deals with Clinton and even Kamloops on occasions.

On the basis of the major supply centres the ranching area, exclusive of the Okanagan Valley, may be divided into two regions as follows: Cariboo-Chilcotin, with Williams Lake as its chief centre, and Thompson-Nicola with the city of Kamloops as its major supply point (Figure 17).

The regional names are not entirely satisfactory, as "Cariboo" does not usually include the Clinton sub-region referred to locally as "Lillooet", nor does "Thompson-Nicola" usually include the Princeton district. However, as any expansion of terms would be cumbersome, these outlying sub-regions will be included in the two major regions for purposes of this study.

Unfortunately, a confusion of names exists in the Interior Plateau, resulting from the establishment of arbitrary boundaries by various government departments. "Cariboo" referred originally just to the goldfields of the northeast, but the Cariboo Land Recording District comprises all the territory north of 52 degrees, including the northern Chilcotin. The application of "Cariboo" west of the Fraser has no conformity to local usage.

The name "Lillooet" is applied to a large district, including the Clinton area, as a result of usage by the Lillooet Land Recording District. This name, therefore, serves well to designate the sub-region.

At times it has been customary to include the Clinton sub-region with the Cariboo, as indicated by the circulation of the Williams Lake newspaper and the administration of agriculture from the latter city. Moreover, its ranching practices resemble those of the Cariboo more than those of the open range country to the south. For these reasons it will be considered as part of the larger Cariboo-Chilcotin region.

Kamloops, as the centre of its region, exerts a strong economic attraction even on districts as remote as Princeton and Ashcroft, for the administrative offices for many departments of the southern interior are located there. Moreover, both Kamloops and Williams Lake by their stock shows and cattle sales draw ranchers from the remote corners of their regions.

On the basis primarily of the trading areas served, the subdivisions of the regions with their local centres are shown on Figure 17 and in Table IX.

TABLE IX

Region	Sub-region	Centre
1. Cariboo-Chilcotin	1. Chilcotin	Alexis Creek
	2. Upper Cariboo	Williams Lake
	3. Lower Cariboo	100 Mile House and Lac la Hache
	4. Lillooet	Clinton
2. Thompson-Nicola	5. Ashcroft area	Ashcroft
	6. Kamloops area	Kamloops
	7. North Thompson	Several centres
	8. Nicola	Merritt
	9. Princeton area	Princeton

Each sub-region has its local trade centre, with two exceptions: the North Thompson, designated a sub-region because of its proximity to the river, is served by such centres as Vavenby, Barriere, and Vinsulla; the Lower Cariboo has no one centre sufficiently well advanced to bring the entire sub-region within its orbit, so that Lac la Hache and 100 Mile House act in this capacity.

Supply Centres as Indicators of Transition

Local supply points are important indicators of zones of economic transition. The change from areas in which cattle ranching is dominant to those in which other industries assume a place of major importance is reflected in the number, size, and changing functions of border towns and settlements.

Along the eastern margin of the ranching area, transition is indicated by an increasing number of resorts and dude ranches and by an increase in the number of sawmills. Certain supply points are typical examples of this transition. The Horsefly district has two lodges, some mining activity (a relic of the gold rush days), and considerable logging in the vicinity. In a broad zone west of 150 Mile House, there is a steady increase eastward in the number of ranchers who act as licensed guides. Again, at Rose Lake and Big Lake lodges operate through the summer and late into the fall to serve the vacationist and the hunter. A similar transition occurs in the Lower Cariboo and Lillooet sub-regions, with concentrations at Canim Lake, Bridge Lake, and Green Lake. In the latter districts, settlements cater to the tourist and ranching is secondary.

The sub-region of North Thompson from Heffley Creek to Vavenby is also a zone of transition. Around Birch Island, Louis Creek, and Vavenby numerous logging outfits constitute the main support of these small centres and account for the unusually large cluster of settlements in a limited area.

The town of Chase (532) is supported almost entirely by large sawmills operating at Shuswap Lake, and marks the eastern limit of cattle ranching in the Thompson Valley. Monte Lake, site of a large sawmill, marks the transition zone to the southeast.

In summary, the eastern transition zone, as defined by the changing functions of its towns, may be accounted for by the following physical factors: the size, extent, and commercial value of timber; the roughness of topography; and the abundance of wildlife, particularly big game.

The transitional nature of the western margins is indicated by fewer settlements, especially in the Chilcotin, where transportation difficulties and remoteness discourage the production of any commodity not readily moved to market. However, in the Kelly Lake and Pavilion areas, dude ranches and resorts make their appearance.

The village of Lillooet (1,200) farther south reflects large-scale mining in the Bridge River country and a change to horticulture in its vicinity, both of which are more important elements in its economy than ranching.

Princeton (2,500), centre for the Copper Mountain mine and for the coal mines at Blakeburn and Tulameen, derives only a small part of its income from ranching in the surrounding area. Brookmere, also a western transition town, is a divisional point on a branch line of the Canadian Pacific Railway and a centre for sawmills in the vicinity.

Although forest industries are important along the western zone of transition, mining assumes first place by reason of the contact between batholithic rocks of the Coast Mountains and sedimentaries of the Interior Plateau. Hunting and the tourist trade, though less developed in comparison with the eastern margin, respond to an increase in game and the scenic element, which, in turn, are related to heavier forest growth, increased precipitation, and rougher topography than are found on the adjoining plateau.

COMMUNICATIONS

The transportation pattern throughout the area reflects the sparsity of settlement characteristic of a ranching economy, where long cattle drives to shipping points are accepted practice (Figure 18). An analysis of the pattern

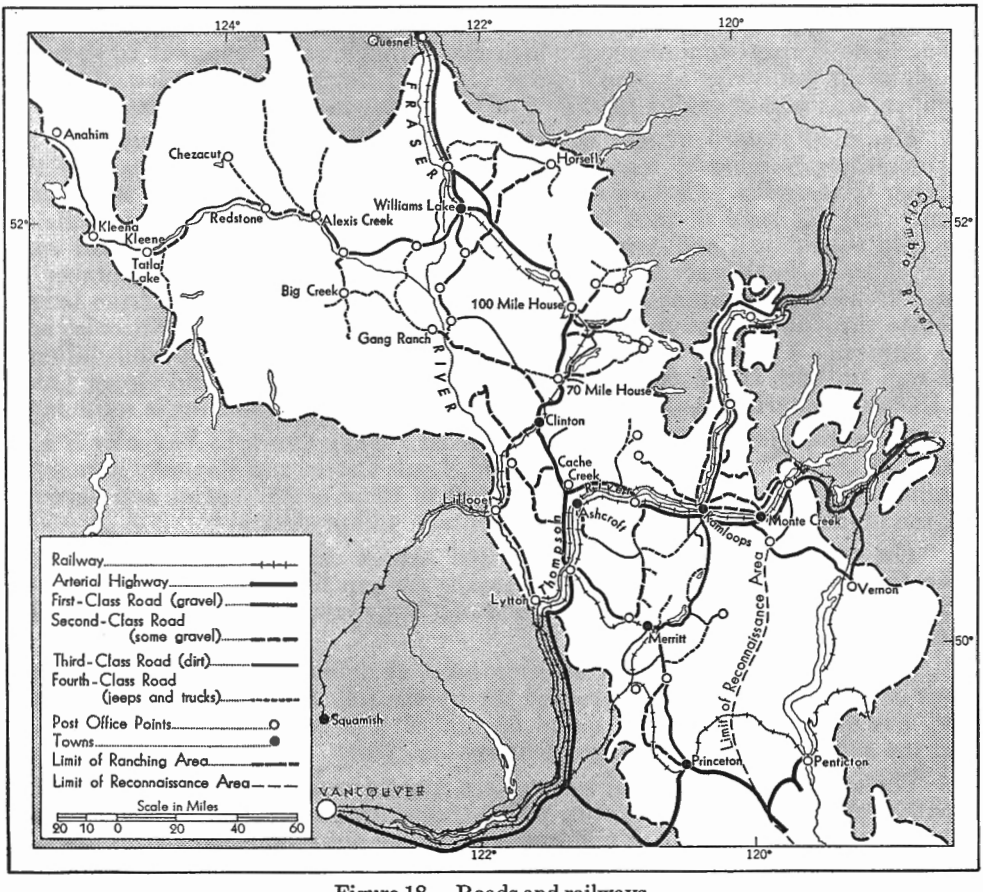

Figure 18. Roads and railways.

reveals four principal flow lines: a north-south route and three east-west routes joining the former along the western margin of the area.[1] Principal roads parallel the railroads. The latter lack feeder lines as cattle can be driven or trucked to a shipping point.

ROADS

The principal roads run according to the cardinal points. These in turn are fed by many tributary roads coming in at right angles and "draining" the vast inter-road spaces comprising the range lands of the Interior Plateau (*see* Figure 18). Moreover, the main highways, to carry the analogy a step further, may be termed "exotic" in the sense that they flow through the ranching area but neither begin nor terminate in it and carry much traffic that has no relation to the region itself. There may be observed, also, a coincidence between the minor drainage features of the upland and the secondary roads, whereas the main highways traverse the upper terraces of the large valleys.

Roads fall into five classes[2], according to their general usefulness and their ability to serve a ranching economy. Three roads—the Trans-Canada Highway, the Cariboo Road, and the Southern Trans-provincial Highway— are arterial highways. The first originates in Vancouver, follows the tortuous Fraser Canyon to Lytton, then proceeds along the South Thompson Valley to Cache Creek and east to Chase; the Cariboo Road begins at Cache Creek and runs northward through the Cariboo to Prince George; and the third begins at Hope, where it branches from the Trans-Canada Highway, and proceeds eastward through the Cascades to Princeton and beyond. This newly completed route promises to be a valuable link between the horticultural districts of the southern part of the province and the West Coast. All three are part of an extra-regional system and carry a heavy truck traffic as well as summer tourist traffic.

The Cariboo Road, famous for its historic associations with the gold rush to the bars of the Fraser and its tributaries, has undergone extensive improvements in the post-war years. Between Cache Creek and Williams Lake it has been widened to 100 feet in many stretches and is hard-topped. An extension of the road from Prince George to the Peace River country is now completed. Owing to the recent improvements to the Cariboo Road, trucking cattle to Vancouver will become practicable for parts of the Cariboo-Chilcotin now dependent almost entirely on the Pacific Great Eastern Railway.

The Trans-Canada Highway serves the Thompson Valley. Large movements of freight occur along this route through the cattle country from Spences Bridge to Chase.

Confined to the region exclusively and forming vital flow lines to the arterial highways are several first-class roads. The most travelled one is the road serving the Nicola between Merritt and Spences Bridge, where it connects with the Trans-Canada Highway. A route from Kamloops south connects with this road at Merritt and serves an area of great cattle concentrations and large ranch holdings. A third route running south from Merritt connects with Princeton. The northern two-thirds of this road are of great importance in relation to large cattle movements through the summer ranges in its vicinity. These roads, converging at Merritt, have made it the chief point of supply for the wealthy Nicola basin.

[1] These are: (1) the Cariboo Road and Pacific Great Eastern Railway; (2) the main lines of the Canadian National and Canadian Pacific Railways paralleling the Trans-Canada Highway; (3) the Kettle Valley Railroad (C.P.R.) and the Spences-Merritt Road; and (4) the Southern Trans-provincial Highway (Hope-Princeton) and the Coquihalla branch of the C.P.R.

[2] These classes are based on the following criteria:

Arterial highways	—mostly hard surfaced, serving extra-regional areas;
First-class roads	—main roads, gravelled, frequently graded, kept open all winter;
Second-class	—gravelled in a few stretches, infrequently graded, slippery when wet, closed in mid-winter;
Third-class	—dirt, practically impassable for cars when wet, poorly maintained;
Fourth-class	—trails through timber, dangerous for cars, suited to trucks and jeeps.

The North Thompson Road from Kamloops serves the diverse commercial interests of the transition zone. The Cariboo Highway is fed mainly by second and third-class routes with the exception of the Chilcotin Road from Williams Lake to Anahim Lake. The section from Tatla Lake to Anahim Lake is no more than a third-class road. The Chilcotin Road has been the scene of cattle drives to the Pacific Great Eastern at Williams Lake for decades.

Second-class roads serve the many scattered communities. As a general rule, the more remote the settlement, the poorer the means of access. This is exemplified in the case of Chezacut or Tatlayoko, connected by rude trails negotiable by truck or jeep but virtually impossible for cars. A comparison of road mileages in the Cariboo-Chilcotin and Thompson-Nicola regions is given in Table X.

TABLE X

Road Mileages

Region	Main highways			Secondary roads	Farm and mining roads	Grand total	Ratio roads: area
	Hard surface	Gravel	Total				
Cariboo-Chilcotin.....	50	493	543	1,007	583	2,133	1:8
Kamloops-Nicola.....	165	325	490	2,175	—	2,665	1:4

As many of the primary roads of the ranching area originated as routes of travel to the goldfields, their first traffic consisted of freight teams and stage-coaches. Later they became avenues for great cattle drives, many of them before the advent of the railroad covering several hundred miles. Although at present they are still used for driving cattle to a rail point or sheep to alpine summer ranges, modern motor traffic is gradually changing them to truck lines or tourist routes. With improvements to the arterial highways, truck transport has become a very important factor in the moving of supplies from Vancouver to local centres. Movements of cattle by truck to a rail point and even to Vancouver via the Trans-Canada and Cariboo Highways, are of growing importance.

In the Chilcotin district even remote Anahim Lake has motor freight service once in 2 weeks, and other points along the Chilcotin Road are visited once a week as far as Kleena Kleene. A weekly stage service is also maintained to these centres except for a period during the winter. The most isolated ranching community, Tatlayoko, has freight service every third week.

Bi-weekly stage and freight service is maintained between Williams Lake and Horsefly to the east, and Dog Creek to the south.

RAILWAYS

Although an increasing volume of freight is moved by truck, railways still carry by far the larger total tonnage to and from the area. There are four principal rail lines serving the ranching industry, two of which follow the valley of Thompson River. The third, a branch line of the Canadian Pacific Railway, serves the Princeton and Nicola districts, and the Pacific Great Eastern runs through the Cariboo.

The only provincial line is the Pacific Great Eastern with termini at Prince George and Squamish at the head of Howe Sound. An extension from Squamish to North Vancouver is now being built.

The cattle business has been the mainstay of the Pacific Great Eastern. During 1948 it carried 240,000 tons of freight, a threefold increase over 1942. The heavy tonnage coincides with one of the greatest cattle movements in the history of the Cariboo-Chilcotin. At least seventeen points along the route have cattle pens and chutes to facilitate loading. The various loading points with tonnages for 1949 are shown in Figure 19. On reaching Squamish at the head of Howe Sound, barges convey the cattle cars directly to stockyards in Vancouver.

The Kamloops-Ashcroft district is well served by two transcontinental lines—the Canadian National and the Canadian Pacific Railways. The latter was completed to Vancouver in 1885 and the former in 1921. Both follow the Fraser Canyon from Vancouver to Lytton, then along the South Thompson Valley to Kamloops. Here the C.N.R. follows the North Thompson, serving the small centres as far north as Blue River. The C.P.R. proceeds east to Chase. A branch line of the C.N.R. proceeds southeast through Monte Lake and Westwold to the Okanagan Valley. The Nicola country is served by the Kettle Valley line of the C.P.R., running from Spences Bridge through Merritt and Princeton.

DISTANT MARKETS

THE PACIFIC COAST

Practically all cattle are shipped to Greater Vancouver, where the market serves an urban population of over half a million. With such a large area of the province devoted to stock ranching, it seems anomalous that the entire cattle production scarcely meets half the demand. This would indicate that the populous districts of the west coast will continue to be the destination of most interior cattle shipments. When prices "across the line" compete favourably, a few head are drawn to the American market and again, where freight rates favour an eastern flow, as indicated by heavier shipments from the Okanagan and East Kootenay districts, some reach the Calgary market, but the main ranching area will continue to ship almost exclusively to Vancouver. In 1949, only 907 head went to the United States from the area under study and 277 to Calgary.

Cattle shipments vary from year to year according to local weather conditions (as affecting the winter feed supply) and the market. In 1948, when Cariboo herds were greatly reduced, 51,551 head (an all-time high) were shipped from the ranching area. In 1949, the number was less than average, totalling only 40,711 head.[1] Cattle shipments reaching Vancouver are purchased by six packers and slaughtered locally.

MARKETING

The cattle flow diagram (Figure 19) shows the various districts from which cattle originate and, by means of flow lines, the routes taken to market. The thickness of the larger flow lines is proportional to the number of head shipped from railway sidings; the minor lines indicate the trails and roads used in gathering the cattle from the ranges.

Cattle shipments from the Cariboo-Chilcotin amounted to 26,814 in 1948 and 18,593 in 1949. This represents 50 per cent of the total for the entire area in the former year and slightly under that for 1949.

Cattle shipments from the Thompson-Nicola totalled 25,188 in 1948, slightly below the Cariboo-Chilcotin; however, in 1949 they exceeded the

[1] Cattle shipped from the ranching area excluding the Okanagan and the Kootenay districts accounted for 68 per cent of the total shipped from all points in the province for 1949.

latter with a total of 22,118 head. These figures include a few head whose destination was within the ranching area but no means of segregating this small number (under 5 per cent) from the total was found.

Some feeder cattle are shipped from the Cariboo to be fattened on alfalfa hay in the Thompson-Nicola, especially if a severe winter in the northern region causes a hay shortage. Taking both regions together, total shipments were 52,000 in 1949 compared with 40,711 in 1948. The decline is accounted for by the severe winter of 1948, which resulted in a hay shortage, especially in the northern region, and to high beef prices resulting from the lifting of the embargo on shipments to the United States in the same year.

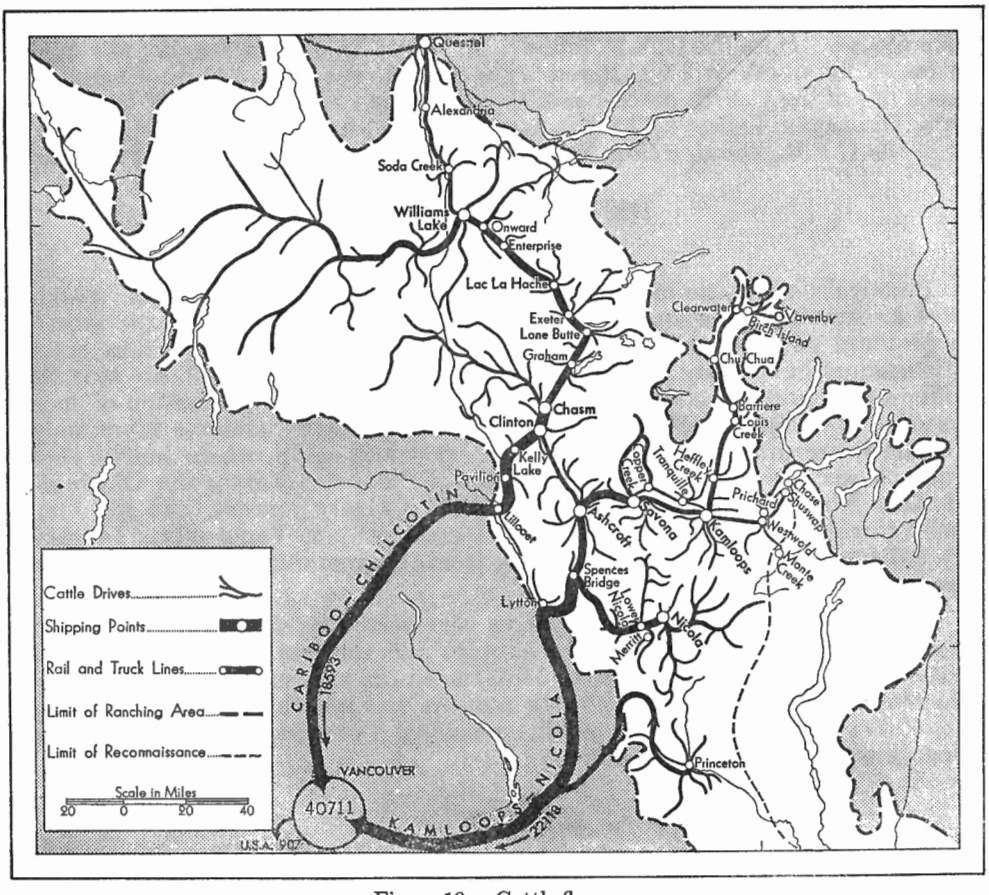

Figure 19. Cattle flow.

The relative importance of shipping points is apparent from Figure 19. Williams Lake with 9,331 head is the largest, followed by Nicola (8,194), Kamloops (5,495), Chasm (2,623) a siding near Clinton that receives the bulk of the Gang Ranch and B.C. Cattle Company stock. Ashcroft follows with 2,464 head and Clinton ranks sixth with 1,941 head.

Most cattle are shipped direct from the range to the packing house. In the case of large units, 2 year old steers are fattened in beef pastures during the summer (Figure 28). Most ranchers, however, select the marketable beef from among the herd while on the summer range.

About 5 per cent of the sales from the Cariboo are feeder cattle. Districts making a practice of selling feeder stock are principally along the moist eastern margin of the ranching area from Horsefly south to Bridge Lake.

Most of the cattle are marketed in the fall, because winter feeding does not produce prime beef. This is especially true of the Cariboo-Chilcotin ranches. Only where grain is raised or where it pays to buy grain for winter feeding are cattle marketed in the early spring. During the summer, stock from the range, as well as from beef pastures, is shipped in considerable numbers but the largest movement to rail lines takes place in the late fall, when the cattle have been rounded up. Because prices tend to decline in response to an increase in supply during that season, many ranchers try to market as much as possible during the summer. Midwinter marks the low point in cattle shipments, but in the early spring, especially if hay shortages are apparent, numbers marketed show an increase.

After the cattle to be marketed have been gathered in from the range, three sale possibilities are open to the rancher. The usual means is to notify one or more cattle buyers representing Vancouver packing firms. This is done through the medium of the B.C. Live Stock Producers' Association, whose field men bring buyer and rancher together.[1] The field man usually advises the rancher in advance regarding prevailing market prices and what he considers to be a fair price for his beef.

On reaching a rail point the cattle are weighed by the buyer, inspected for brands, and loaded on the cattle cars. Should the rancher not wish to sell to the buyer, he may ship his cattle to the Cattlemen's Association stockyards at Vancouver and there receive the prevailing market price. Comparatively few choose this alternative.

A second method is to sell by public auction. Such auctions are held twice in the fall at Williams Lake. Buyers from the Vancouver area and the United States bid in competition. Two public auctions are also held each year at Kamloops but the turnover is smaller. Private buyers and local ranchers may also bid. The largest amount of beef marketed in the Cariboo-Chilcotin is disposed of by public auction. In the Thompson-Nicola more is sold by direct negotiations with the packing-house buyers. Hide shipments indicate that less than 15 per cent of the beef is slaughtered locally.

Although it is customary to transport small lots of cattle to rail points by truck, most of the cattle are still driven on the hoof (*see* Plate VII A). The former method reduces shrinkage in weight to a negligible amount, whereas cattle drives lasting several weeks may result in a loss of up to 10 per cent by weight. Most ranchers in the Princeton, Nicola, Kamloops, Ashcroft, and Lillooet districts are within 1 day or 2 days' drive of a shipping point. Along the eastern margins of the Cariboo (Beaver Valley, Horsefly, Bridge Lake districts) drives require 3 or 4 days. In the Chilcotin they sometimes last for 3 weeks, as in the remote districts 180 to 200 miles from Williams Lake. A journey of 10 miles takes as many hours, and requires much hard work, patience, and skill on the part of the drovers. In the Chilcotin the provincial government has supplied holding grounds where pasture and corrals are available a day's journey apart. Anahim Lake cattle cross the low divide separating them from Chezacut district and reach the Chilcotin Road at Redstone. From here, the drive to Williams Lake takes 8 to 10 days.

To avoid delay at Squamish (point of transhipment at tide water), cattlemen in the Clinton area and as far west as Canoe Creek truck large numbers to Ashcroft where shipment via C.P.R. places them in Vancouver in 1 day.

[1] Field men are stationed at Williams Lake, Kamloops, and Merritt.

Cattle leaving Williams Lake take from 35 to 50 hours to reach Vancouver via the P.G.E., whereas those shipped by noon from Ashcroft via C.P.R. will arrive there the same evening. By using the latter route, a half cent per pound more is received, as weight losses are negligible.

Hides, a by-product of the local consumption of beef, have declined in recent years being 7,515 in 1948 and 4,559 in 1949 for the ranching area. The larger figure reflects the necessity for drastically reducing the herds in 1948. The gradual long-range reduction in local slaughtering has been attributed to the attractive prices in recent years, so that the rancher "cannot afford to eat his own beef".

CHAPTER VI

THE RANCH

THE RANCH UNIT

A wide variety of conditions, resulting from a number of physical and economic factors, govern the location of the ranch unit, which comprises not only the ranchstead but also its range and cultivated lands. The following factors are of first importance: hay land; seasonal range; water; and market centres (*see* Plate IX A).

LOCATION

The relative importance of each factor varies with the locality. Thus, in the drier, low-lying lands of the Thompson-Nicola region, access to irrigation water is a crucial factor because cultivation of hay depends primarily on adequate amounts of water during the spring and summer. On the other hand, in the Cariboo-Chilcotin, although irrigation in some form is still essential to growing domestic hay, it is not so vital, as more dependence is placed on wild hay. However, as wild hay is less nutritious than cultivated hay, more is required. Then, too, long winters and less open range cause greater demands on the hay supply. Accordingly, hay meadows were among the first pre-empted locations on the upland throughout the Cariboo-Chilcotin region.

Availability of spring and fall range is also an important location factor. Range that will reduce the winter feeding period by permitting an early spring turnout or late fall grazing is the first concern. The latter is largely taken care of in the northern region by the use of the wild meadow for fall rustling, but in the Thompson-Nicola meadows are less numerous, so that dependence on bunchgrass is vital. In the matter of spring range, however, the northern region is generally lacking, thereby imposing a serious limitation on ranching in that area. By contrast, the open bunchgrass ranges of the south give it a permanent advantage over the former by considerably reducing the period of winter feeding.

Although summer range comprises more than three-fifths of the range throughout the ranching area, some of the larger ranch units find their expansion limited by lack of summer range. For the most part, however, it is adequate in terms of the amount of spring-fall range and hay land available. Only in respect to alpine summer range may it be said that large areas are as yet understocked.

The factors considered above have all been physical in view of the extensive nature of the industry and its dependence mainly on one natural resource, grass. However, the factor of accessibility to markets is also significant. In the colonial period (1860–1875) ranches were established mainly to serve the passing traffic to the Cariboo. Inferior sites along the route were of more value at that time than remote situations with superior range. The chief object was providing services and selling hay and foodstuffs directly, not cattle raising. Later decades saw a shift in emphasis, but many ranches have remained along the early routes of travel where physical factors favoured the transition to cattle raising.

In the past, good roads were of minor importance because cattle could be driven to market over rough trails. In this day of truck transportation, roads assume a more important place, for even the most elementary organizations have come to depend increasingly on communications with market and supply centres.

The composition of most ranch units today is the result of the consolidation of several small holdings. To become an economic unit, every ranch must be

situated in accordance with at least three of the location factors mentioned above. The most important are: access to hay land, access to summer range, and access to fall grazing. The presence of the other factors to a significant extent will generally increase the value of the unit and remove it from a purely marginal category. It is possible to recognize three ranch types on the basis of the number of favourable location factors inherent in a given unit, viz., the upland meadow type, depending on wild meadows for hay and grazing; the lowland type, with large areas of bunchgrass range for spring and fall grazing; and the transition type, relying in part on meadows and in part on limited amounts of bunchgrass range.

SIZE

Ranch sizes may be expressed either in numbers of cattle or in acres. As most ranchers share the Crown range, it is impossible to include this land in estimating the area of a given unit, except in a few instances where exclusive grazing privileges are enjoyed. The correlation between the numbers of cattle and the size of the ranch unit in acres is given in the following table, based on a sampling of 100 ranches, carrying a total of 57,305 head, in the grazing area.

TABLE XI

Cattle (under permit)	Ranch units	Average acres[1]
Head		Acres
25 to 99	25	950
100 to 499	45	3,222
500 to 999	17	11,765
1,000 to 5,000	12	36,270
10,000	1	144,000

[1] Exclusive of government grazing land used during the summer under permit.

If the area of Crown land grazed were included, the extent of the individual unit would be, in most cases, many times greater. Several examples will serve to indicate this. The Douglas Lake Cattle Company, with 144,000 acres of alienated and leased land, has an estimated total range of 500,000 acres, including Crown land grazed under permit. The Chilco Ranch, with exclusive grazing rights on the White Water Stock Range (between Taseko River and Big Creek), controls, in all, 850,000 acres. Gang Ranch, the largest in British Columbia in grazing area, controls 1,000,000 acres.

Except in the case of small ranch units, the present holdings have evolved from pre-emptions of 160 to 320 acres. Small ranches, if located on an early travelled route, constituted an economic unit in the first decade of settlement, as they depended primarily on selling farm produce, but it became increasingly apparent, as traffic to the Cariboo declined in the seventies and eighties, that a transition from farming and catering to extensive ranching was desirable. One problem of such transition resulted, in part, from the early pre-emption system, which until 1870 allowed only 160 acres to be taken up. Although the size of the pre-emption was later increased to 320 acres, such a unit was too small for successful ranching and, consequently, consolidation of individual pre-emptions took place.

The area is dotted with numerous abandoned ranchsteads, which might at first glance be taken as an indication of economic failure. Most of the abandoned sites, however, are the inevitable result of consolidation, one of several ranchsteads being selected as the "home ranch" and the others entirely abandoned or used only seasonally for winter feeding stations or summer hay-cutting quarters.

Examples of consolidation are more numerous in the Thompson-Nicola region than in the Cariboo-Chilcotin, as the former affords better range and promises supra-marginal returns. However, abandoned ranchsteads are found in both areas. The Chilco Ranch (45,000 acres), located across the river from Hanceville, comprises no less than five formerly independent ranches. The Felker Ranch at Lac la Hache (12,000 acres) represents the consolidation of nine separate holdings.

THE RANCHSTEAD

The ranchstead may be defined as that part of the ranch unit consisting of the buildings, the surrounding yards, and ancillary facilities, and is the centre of organization for the whole unit. Where more than one ranchstead functions in connection with a single unit, the principal one is called the "home ranch".

LOCATION

In the case of the ranchstead, the location factors may be traced to the initial period in the development of the ranch unit. Under the pre-emption system, the first settlers were not aware that their choice of a site for a homestead would be, in many cases, the centre of operations for a large enterprise. They were motivated simply by those factors that they regarded as favourable for small operations in the light of the economic circumstances of the time. Therefore, we must look upon the ranchstead location factors as having operated mainly in the past. However, during the process of consolidation, the less desirable sites for ranch quarters were abandoned in favour of those that combined more advantages, and the sites that exist today, therefore, have undergone a certain degree of selection.

Ranchstead location factors may be grouped as major and minor. The major factors include access to (1) travelled routes, (2) natural hay meadows, (3) water, and (4) cultivable land. In addition there are three minor factors: (1) topography, (2) shelter, and (3) elevation.

Access to Travelled Routes. The importance of such routes as the River Trail, the Cariboo Road, and the Thompson Valley road to Cache Creek in providing the economic basis for stopping places has been mentioned previously.

Natural Hay Meadows. Besides providing food and shelter the roadhouse needed to have abundant hay land nearby to supply winter feed and summer grazing for the horse and mule teams that plied the trails. As a result, ranchsteads were commonly located in shallow valleys where main routes of travel encountered natural meadows capable of being cut for hay.

Natural meadows still provide the basis for ranching over widely scattered parts of the Cariboo-Chilcotin region, and to some extent in the southern region also. Long trips during the winter feeding period are avoided if the ranchstead is located near the main source of hay, which is usually the meadow.

Access to Water. Water for stock, domestic use, and irrigation is of prime importance. For irrigation purposes it must be obtainable from a stream flowing through a valley with a broad flood plain, or from a spring in the vicinity of fairly level land, or from a lake. Where the climate is semi-arid, as in the Thompson-Nicola, water for irrigation is frequently the chief factor in setting the upper limit of cattle numbers on a given unit; as a result, the ranchstead is located close to important sources of water.

Access to Cultivable Land. During the middle sixties, when it was realized that the southern Interior Plateau possessed many advantages for cattle ranching as an industry in itself, it became apparent that a successful ranch unit must

have land capable of producing large amounts of hay. Therefore, relatively flat land with good soil and sufficiently low in relation to sources of water was at a premium. The ranchstead was usually located close to such land for convenience in cultivation.

Topography. Topography was frequently of importance locally. In very rough or steep land, a terrace or a minor expansion of an entrenched valley often provided a favourable site for the erection of buildings and the cultivation of hay.

Shelter. Ranch buildings were usually located in the valleys, to avoid strong winter winds. The existence of a sheltering promontory along the valley would invite location on its lee side.

Elevation. Where ranches were located in valley bottoms, it was customary to choose a low terrace or slight rise in the land on which to place the buildings. This avoided the danger of spring flooding. Where such elevations were not available, the ranchstead was commonly located close to the valley wall.

Where similar combinations of location factors are found repeatedly, type locations may be recognized. As most of the factors are physical, the various types will be associated with both regional and landform differences. It was found, from a study of the location of 100 ranchsteads, that 57 per cent are located in valley bottoms. These are almost all valleys traversing the upland with streams flowing near the general surface level, and at points where the flood plain broadens. [1] Only 25 per cent were found on benchlands (terraces), where topography would appear very favourable. Unfortunately, most suitable benches are elevated high above the main streams, often rendering the water inaccessible except by pumping, or by diversion from a tributary stream. In several instances location by springs was a critical factor. [2] Another 18 per cent were located on the upland in close proximity to wild hay meadows. The most recent pre-emptions in the Cariboo and Chilcotin have adopted such sites for want of a more favourable combination of factors. Examples may be found in the eastern Cariboo transitional zone and in western Chilcotin.

DISTRIBUTION

The map of cattle ranchsteads is designed to show the location of the "home ranches" that serve as a base of operations for the ranch unit as a whole (Figure 20). In the case of the larger ranches, subsidiary quarters are sometimes maintained, but these have not been plotted because they are part of a single organization. Only those units in which the major share of income is derived from extensive cattle raising have been plotted. The pattern thus obtained is a picture of rural settlement throughout the area, with the exception of tourist lodges, intensive farm units, and units with less than 25 head of cattle. The map also shows the relative size of each ranch on the basis of numbers of cattle.

In 1948 there were 648 permits issued to graze cattle on government lands. These represent the approximate number of separate holdings in the ranching area. Many are too small to be considered commercial ranches whereas others are mixed farming establishments and others combine a few cattle with dude ranching and the tourist trade. If all holdings with less than 25 head and all those in which cattle raising is subsidiary to other activities are disregarded, there are approximately 420 commercial units depending on cattle primarily.[3]

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[1] For example, Bonaparte River above Cache Creek.

[2] It is said that T. H. Hance, when choosing the site for the historic Hanceville ranch, was largely influenced by the presence of several springs. The Indian Gardens ranchstead at Savona may be cited as another example (Figure 21).

[3] Twenty-five head was arbitrarily selected as a minimum for the commercial holding, since by marketing one-third each year the income would approximate $1,500. Owners of small holdings usually derive additional income from seasonal employment such as logging, guiding, and trapping.

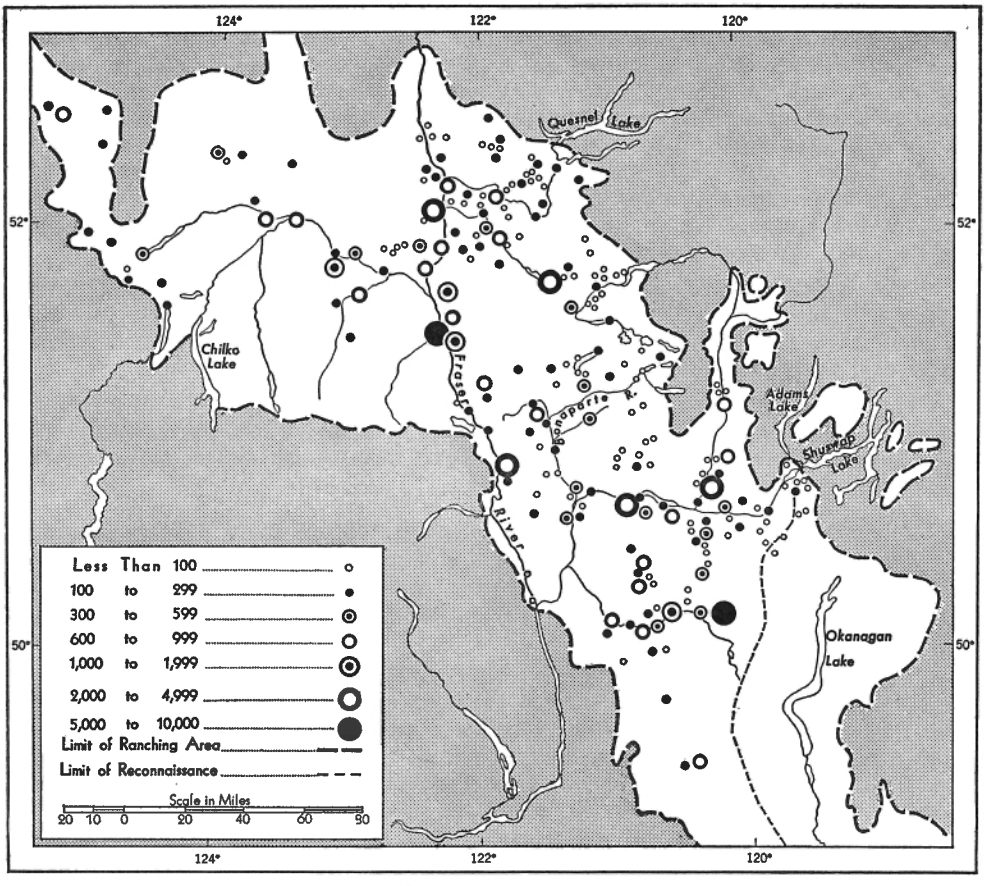

Figure 20. Distribution of cattle ranchsteads.

It is apparent from Figure 20 that the pattern of ranchsteads is predominantly *linear* in broad outline, but *clustered* in detail. It will be observed also that the small holdings (under 100 head) are *peripheral* in arrangement.

On a regional basis, the Cariboo-Chilcotin has about the same number of ranches as the Thompson-Nicola. This fact corresponds to the cattle population for the respective regions [1]. This ratio does not hold, however, for the numbers shipped to market from the two regions, for a considerable number of Cariboo cattle (at least 4,000 head) are trucked to Ashcroft and thence shipped to Vancouver (Figure 19).

Factors Affecting the Pattern. The various factors explaining the distribution of ranchsteads may be classed as general and specific. The specific location factors are dealt with in Chapter V. The general distribution factors may be grouped under *human* and *physical*. The human factor has operated only during the short course of settlement and includes the incidents of history and the unpredictable element of human choice. The physical factors, on the other hand, such as native vegetation, cultivable land, water resources, etc., constitute the somewhat more enduring elements of the landscape that have influenced the broad pattern of settlement from the gold rush to the present.

[1] In 1948, the number of cattle in the Cariboo-Chilcotin was 49,332, compared with 48,737 in the Kamloops-Nicola.

The Human Factor. By the close of the first decade of settlement (1860-1870), the fundamental elements of the present pattern had been established. The early routes of travel to the goldfields of the Cariboo became the lines of settlement, and the present distribution pattern still follows those lines. During subsequent decades, the original pattern was filled in and added to, particularly in the Chilcotin area. The coming of the railroads did little to alter the fundamental lines. All the important ranches had taken shape by the close of World War I, most of them prior to that time. Thus the broad lines of settlement were laid by the close of the colonial period and subsequent events have changed only slightly the basic picture.

The distribution of small holdings along the borders of the settled area indicates the movement into lands marginal and sub-marginal for ranching. They mark the outer limits of commercial cattle raising, and also indicate the areas that were settled last.

It will be observed that, in general, the large ranches are not associated with dense clusters. This reflects the fact that large holdings frequently comprise many former small holdings that have been consolidated over a period of years into a single operating unit.

The Physical Factor. It is evident that the distribution pattern conforms closely to a variety of integrated physical factors, notably vegetation, topography, available irrigation water, and soil. As a result, the map of ranchsteads corresponds closely with the distribution of spring range and high carrying capacities.

The relationship of settlement and the stream pattern is quite apparent from an examination of Figures 13 to 16; it depends on such matters as favourable topography and soils for the cultivation of hay, superior bunchgrass range along major valleys, and water for irrigation. As these factors are all vital to successful ranching, the "home ranch" is generally found located with respect to them.

As in the case of cattle distribution (Figure 10), three major clusters of ranchsteads occur where favourable physical factors combine, namely in the vicinity of the forks of Chilcotin and Fraser Rivers, along the valley of the South Thompson, and in the basin of Nicola River.

COMPOSITION

The Buildings. In contrast with the typical ranchstead of southern Alberta and Saskatchewan, there are many buildings on the British Columbia ranch, the number varying with the history and the size of the unit. Where ranches once functioned as staging-points or stopping-places, there are usually two or more barns, a granary, and possibly an abandoned store. That the number of buildings is also related directly to the size of the enterprise is indicated by the following averages, based on 100 ranches.

TABLE XII

Number of cattle per ranch	Average number of buildings [1]
Under 100	7
101 to 500	8
501 to 1,000	11
1,001 to 10,000	18

Additional reasons for the large number of ranch buildings may be attributed to the abundance of timber for log construction, and to distance from

[1] Buildings of the "home ranch" only.

supply centres. If the latter lie at great distances over poor roads, ranches tend to become self-sustaining in many articles of food, labour, and services usually rendered by the large supply centres.

The various kinds of buildings differ according to use in relation to the size, age, functions, and location of the ranch. Ranches may have functions in addition to cattle raising. Some are dude ranches and some provide accommodation for hunting parties: these have cabins or a lodge and large horse stables.[1] Some function as local supply centres, frequently depending on Indian trade, and have, in addition to the usual buildings, a store. Others are transitional in function, combining dairying with mixed farming: these will have more sheds and out-buildings than the typical cattle ranch. Still others may combine sheep and cattle and so require more and different buildings.

On the small ranch (under 100 head), the minimum essentials are a house and a horse barn. Usually, however, one or more additional buildings, such as a cow-shed, chicken-house, machine shed, and garage will also be found. Larger ranches with 200 to 500 head frequently have, in addition, a harness room, blacksmith shop, bunkhouse for seasonal labour, lighting plant, piggery, sheep house, and granary. As the unit increases beyond 1,000 head, married living quarters, bunkhouses, and a cookhouse are provided. Cattle-feeding pens, several sheds, and duplication of some of the buildings are not uncommon. Large ranchsteads, particularly if isolated, may have a sawmill, a store, and an oil-storage house.

Corrals. Pens used for holding live stock are referred to as corrals. Some have special functions—branding, breaking horses, or loading for shipment.

The small ranchstead has only the minimum of corrals, frequently just a fenced enclosure attached to the horse barn. However, larger ranchsteads have corrals with special functions and equipment for dehorning, slaughtering, and dressing the carcasses.

Although there are several variations in the general pattern, a typical plan of corrals on medium to large ranches usually incorporates the features given in Figure 21, a plan of the Indian Gardens Ranch at Savona (*see* Plate VII B).

TYPES

On the basis of size, age, degree of organization, and general location, ranchsteads may be grouped according to the following types: (1) modern company ranchsteads; (2) pre-emptors' ranchsteads; (3) frontier ranchsteads; (4) historic ranchsteads; and (5) commercial ranchsteads (Figures 22 to 25). A plan of an historic ranchstead is not included, for evidences of the once romantic Cariboo with its stage-coaches, covered freight wagons, and hostelries remain only in a few quaint buildings dating from the colonial period. One of the last ranches still using the early buildings is the Hat Creek Ranch, located 15 miles north of the junction of Cache Creek and the Bonaparte. This was near the site of the first pre-emption in the Ashcroft district.[2] The ranchstead site is typical of a valley bottom location. Situated at the edge of the Bonaparte River flood plain, it had access to native hay meadows that were highly prized for pasture in the day of cattle drives and pack-trains. Bunchgrass covers the terraces, which rise steeply from the valley bottom and afford immediate shelter to the buildings located at their base. The tributary stream, Hat Creek, flows through the property and diversion ditches have been constructed to the cultivated lands of the valley flood plain.

[1] Examples are the Bar C Guest Ranch at Cherry Creek or the T.H. Hance Guest Ranch at Hanceville (Figure 25).

[2] Donald McLean, a former Hudson's Bay Company trader, pre-empted lot 93 immediately north of this land in 1860, and there operated a stopping house known as "McLean's Restaurant".

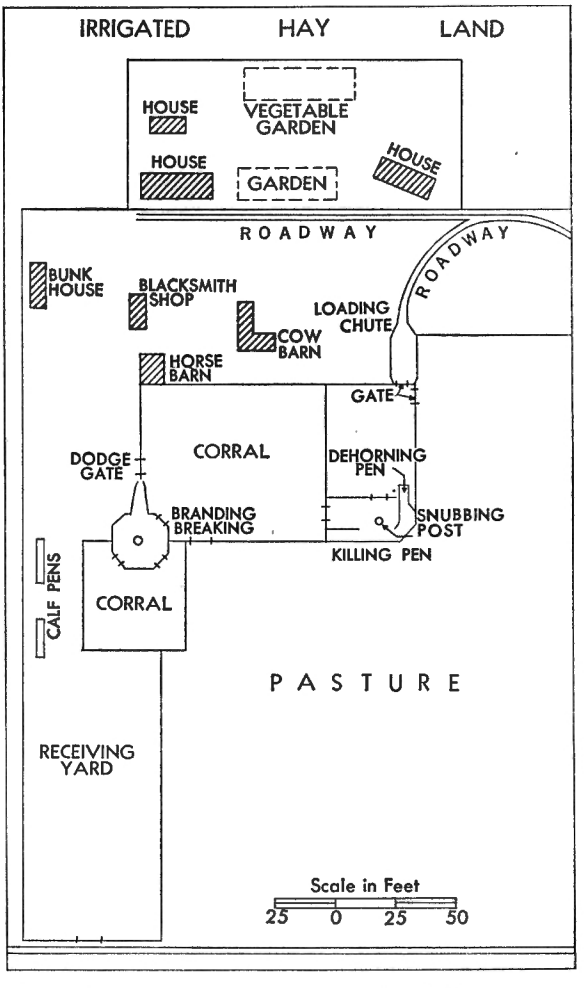

Figure 21. Plan of Indian Gardens Ranch, Savona (*see* Plate VII B).

Explanation of Figure 21

The Indian Gardens Ranch is located along the south side of the Thompson Valley in the vicinity of Savona (Figure 30). The site of the ranchstead is a knoll on the edge of a fan formed by an intermittent stream and close to springs. The ranch grazes 1,200 cattle and the corrals include all the facilities usually found in the larger cattle ranches. Special pens include the killing pen with windlass, chutes for loading trucks, dehorning pen, and a dodge gate for separating cattle into groups by merely swinging the gate. The branding and breaking corral is equipped with a snubbing post at the centre.

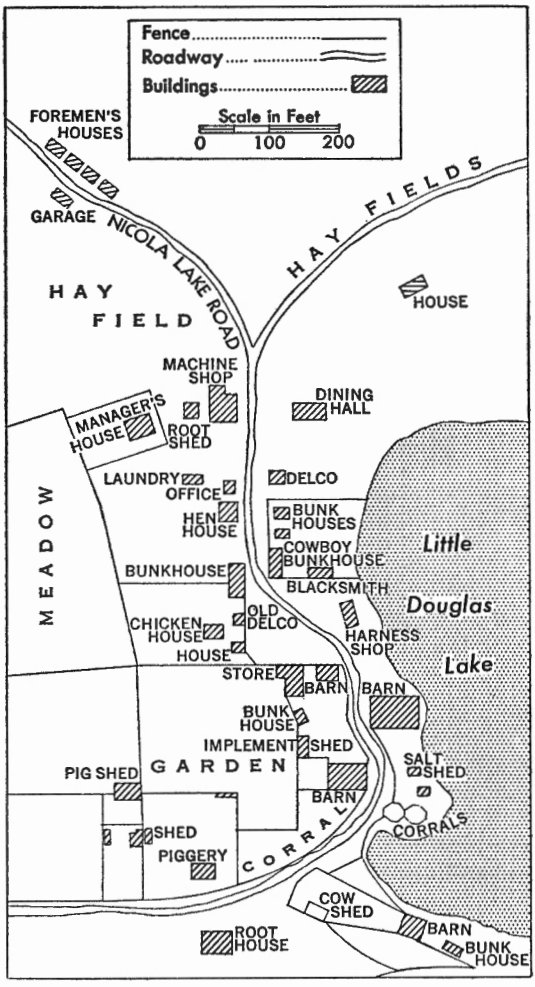

Figure 22. Plan of modern company ranchstead.

Explanation of Figure 22

Eight ranchsteads fall within this category: three in the Nicola, one in the Kamloops area, one at Pavilion, one at Dog Creek, and two in the Chilcotin. The one shown is the ranchstead of the Douglas Lake Cattle Company, which is the centre of operations for the largest individual unit in Canada, grazing 10,000 head of cattle. Three subsidiary ranchsteads, formerly centres for independent units, are operated from the home ranch at Douglas Lake, located 25 miles from the railroad between Douglas Lake and the small adjoining Little Douglas Lake. This site is composed of recent alluvium deposited by Nicola River in such a way as to dam the eastern extremity of Douglas Lake, thus forming the adjoining lakelet. At the point where Nicola River enters Douglas Lake, a delta has formed, which was once covered with marsh grass but is now drained and cultivated. The adjacent countryside is ideal range with a heavy growth of bunchgrass. The site, therefore, affords many advantages for the home ranch, including central position with reference to the unit as a whole.

This central ranchstead comprises no less than 42 buildings. Two large horse barns with haylofts house a few of the 450 work and riding animals. A piggery with 50 sows is maintained in part by scraps from the mess house. A company store serves a permanent staff of 90 employees (besides extra hands during the hay season) and the neighbouring Indian reserve. Four modern bungalows provide homes for the ranch foremen and several bunkhouses accommodate the cow hands. An electric generating plant and water works provide modern facilities. All buildings are of recent frame construction and are painted.

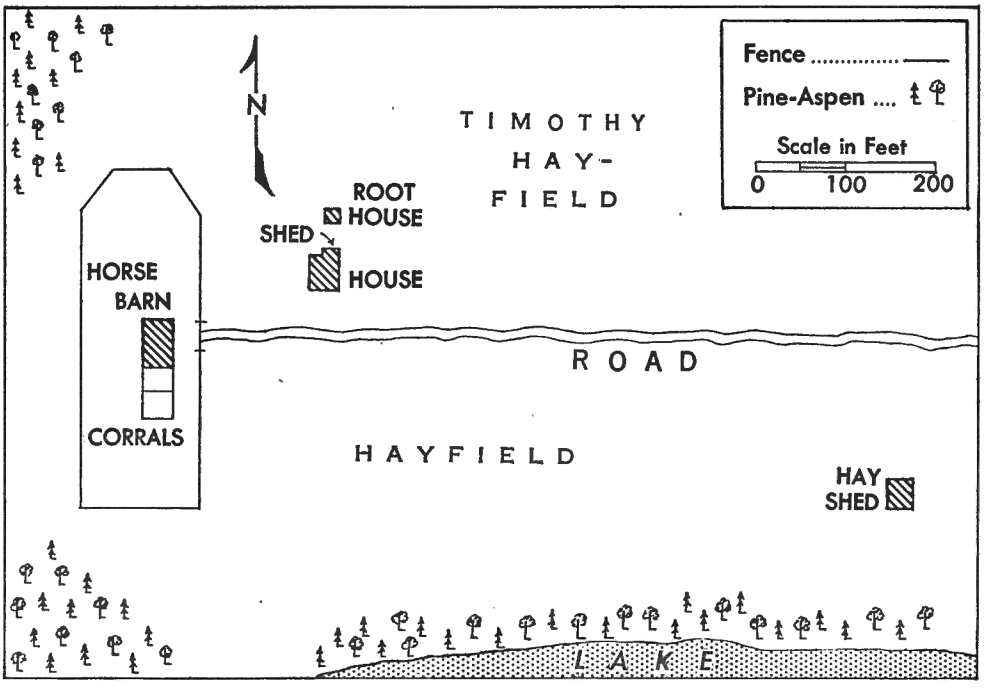

Figure 23. Plan of pre-emptor's ranchstead (*see* Plate VIII A).

Explanation of Figure 23

In contrast with the large consolidated unit, the small pre-emptor's ranch of a few hundred acres, dating from World War I, is common on the eastern margin of the ranching area. A typical pre-emptor's ranchstead is located in the Big Lake (Cariboo) district 30 miles east of the shipping point of Williams Lake. The ranch consists of 680 acres of which 320 acres are leased. It is stocked with from 40 to 75 head of Hereford cattle and 8 horses.

The ranchstead site is on a knoll about 100 yards from a small lake. The lake margins have some open grassland but fairly thick stands of fir, spruce, and poplar are typical of the area away from the lake. The soil is good and a few acres have been cleared near the ranchstead for cultivated hay.

The four buildings consist of a two-story house with the unfinished upper story serving as the sleeping quarters; an open-loft barn used for sheltering calves, a milk cow, and a few horses during the winter; a hay shed, located about 200 yards from the house, which the owner intends to use for an implement shed; and a root house. Chickens are housed in the barn. The corrals are simple and small. The buildings have log walls and shake roofs.

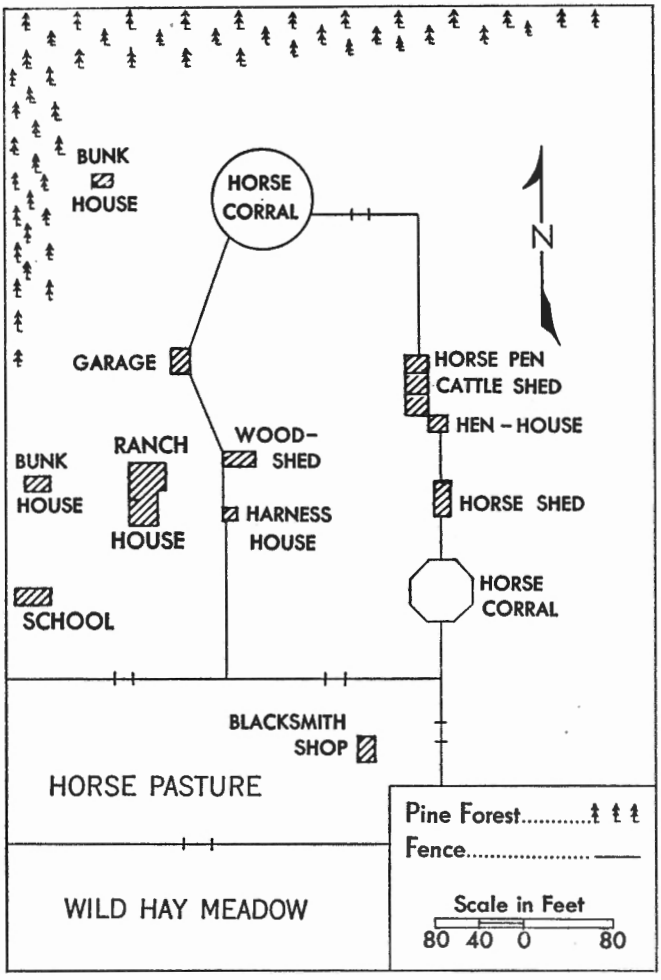

Figure 24. Plan of a frontier ranchstead.

Explanation of Figure 24

Situated on the undulating upland in a remote district of the Chilcotin known as Chezacut is the "M" Ranch. The 30-mile stretch of road from Redstone to Chezacut is so poor as to be passable only by truck or jeep. The unit comprises 1,800 acres of alienated and leased land and carries 300 head of cattle and about 100 horses.

Typical of plateau locations, the site of the ranchstead is the flat upper margin of a vast meadow over a mile in diameter. Except for a growth of wild meadow grasses and sedges and a small amount of bunchgrass on the side-hills, the prevailing vegetation is lodgepole pine.

The ranchstead consists of ten buildings, rudely constructed of logs, some roofed with sods, and fenced with rails. Water supply for the house is obtained from a well; the cattle use a spring. No shelter is afforded except a thicket of pine behind the buildings. Materials of construction, diversity of uses, and general condition of the buildings mark this unit as typical of the remote sections of the frontier.

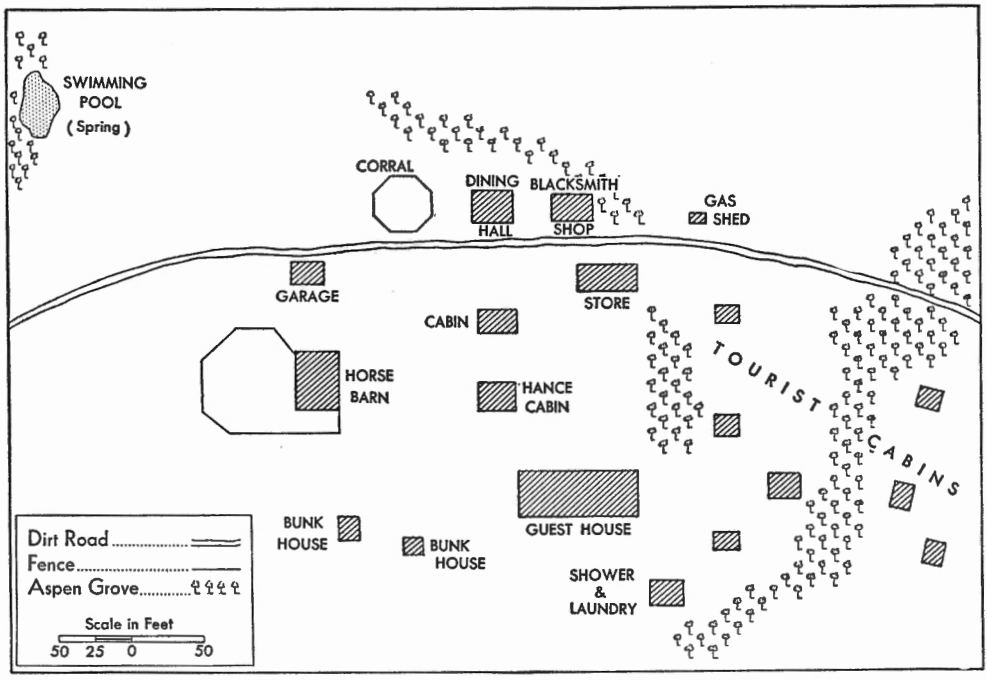

Figure 25. Plan of a commercial ranchstead.

Explanation of Figure 25

The T.H. Hance Guest Ranch at Hanceville represents the addition to a single-function cattle ranch of recreation facilities. Its site is part of an elevated terrace high above Chilcotin River and averaging, in this vicinity, half a mile in width. Two large springs furnish domestic and irrigation water and, together with good soil, level ground, and superior bunchgrass range, explain the choice of this site. It will be observed from the accompanying diagram that cabins, a guest lodge, a dining hall, and a swimming pool served by a spring, have been added to the usual ranch buildings. The store belongs to a much earlier period, having grown out of the Indian trade when T. H. Hance arrived at Soda Creek from Oregon in 1875, and hearing of the opening up of the Chilcotin located there in 1876. At first he traded with the Indians to acquire capital to stock his ranch.

Typical of the Chilcotin, the buildings are made of logs. Ranching is still the major source of income, although the unit is noted for its "riding, dancing, fishing, camping, swimming and round-ups".

The buildings, erected at a very early period, now serve purposes almost entirely different from their original ones. The present house was once advertised as a "twenty-room hotel". The wood siding represents a later addition to the original log structure beneath. The large log barns were built in the stage-coach days to accommodate the horses. Many of the sheds are very dilapidated and would have collapsed long ago but for the heavy log construction and the very dry atmosphere. This historic ranchstead, though fast disintegrating, is typical of many places along the early routes of travel.

RANGE LAND

Characteristics and types of range land have been described in Chapter III. It remains, however, to relate range types to ranch units and to distinguish the different types of ranch units according to the kinds of range comprising them.

RANGE TYPES

According to the dominant type of range accessible to a given unit, ranches may be classified as:

Upland Meadow Type Unit
1. Summer and fall meadow sub-type
2. Summer timber and fall meadow sub-type

Transitional Type Unit

Lowland Type Unit
1. Spring-fall sub-type
2. Spring-fall-winter sub-type

Upland Meadow Type Unit. The upland meadow type unit, as its designation suggests, depends mainly on the wild meadow, including shallow creek bottom, characteristic of the Cariboo-Chilcotin. Hard-grass range is either non-existent or very limited in relation to this type. Out of 50 ranches sampled in this region, 17 (34 per cent) depended for grazing primarily on meadow land, whereas in the Thompson-Nicola the percentage was 14. In some localities the vegetation under the timber is so poor (or even lacking) that grazing is confined almost exclusively to meadows during the summer as well as the fall. In others, the timber grasses and forbs are important during the summer grazing period. These differences suggest a division into two sub-types.

1. Summer and fall meadow grazing (Figure 26). Ranch units depending upon the meadow during both summer and fall are common in remote districts of the Chilcotin plateau, such as Anahim Lake, Kleena Kleene, Chezacut, and Big Creek. In these districts, grazing under timber is minor owing, in part, to repeated fires, high altitudes, poor soil, and dense thickets of lodgepole pine. In general, dry meadows are grazed in summer, and wet meadows in the fall, when frozen ground makes them accessible.

As relief is slight, cattle movements show little relation to topography, but a definite progression accompanying seasonal changes may be noted. Because of moderate to high altitudes (3,400 to 4,500 feet), spring "turnout" is later than in the grassland zones. However, during April cattle are made to forage for themselves on the first green growth of side-hills or in aspen groves. Frequently they graze on the former season's grass because the new shoots have barely appeared. In the early spring, grazing is confined to the rancher's own fenced land, as the date set for Crown range falls later in order to protect it from the ill effects of too early grazing.

Cattle may be moved to Crown range (government-controlled) as early as April 1, but more commonly not until May 1 or even later. The cattle usually wander from one timber opening to another in search of forage (Figure 26). The dry meadows (swale bottoms) afford much forage during early summer, as they are more accessible than the wet meadows at that season. In order to

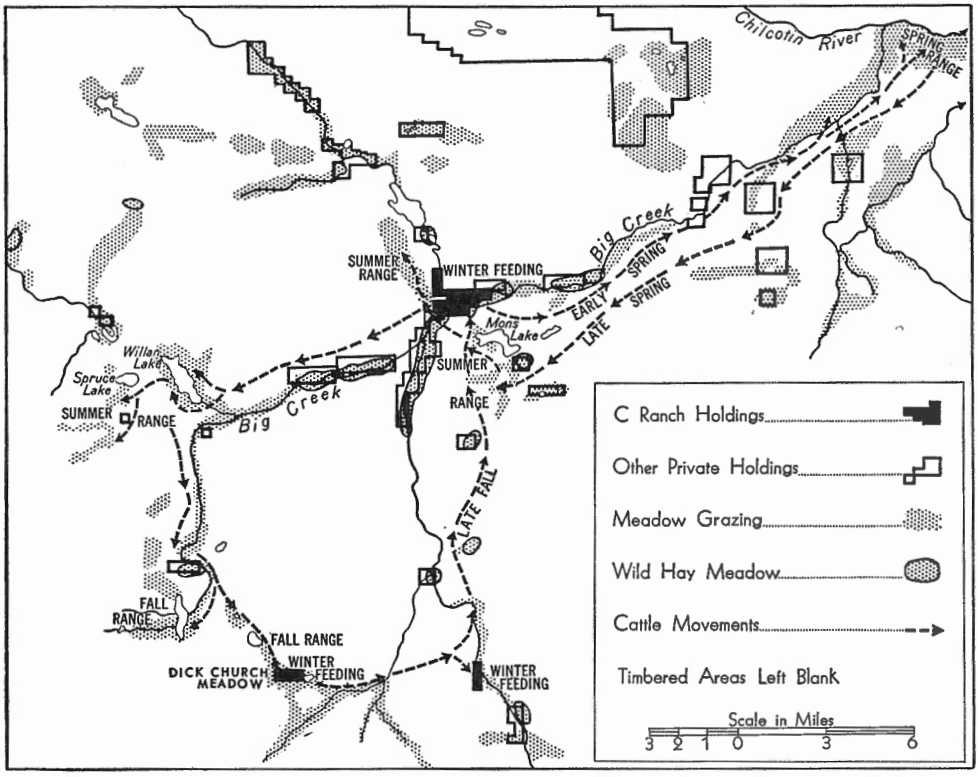

Figure 26. Plan of meadow type unit.

Explanation of Figure 26

The "C" Ranch is located 16 miles south of Hanceville in the vicinity of Big Creek. It comprises 1,200 acres of alienated land and has access to several thousand acres of Crown summer range. The land was first pre-empted in 1902 by the father of the present occupant. Live stock consists of 450 to 500 head of cattle, 20 sheep, and 80 horses. The cattle are chiefly Hereford crossed with Shorthorn.

The range has an altitude of 3,600 feet generally but is slightly lower along the creek. With the exception of some upper grassland spring range known as the Big Creek Unit along the south bank of Chilcotin River near the junction of Big Creek, the range is predominantly timberland with numerous meadow openings following minor drainage depressions on the upland (in this respect, the "C" Ranch is a non-typical meadow unit, as it has access to spring bunchgrass range). Grazing under timber is almost non-existent, owing to the density of the lodgepole pine reproduction following repeated fires. Abundant forage is found in both dry and wet meadows scattered throughout the timber. Some alfalfa is cultivated along the narrow flood plain of Big Creek but dependence on swamp hay is considerable.

About mid-April, after 4 months of winter feeding, the cattle are driven to the bunchgrass allotment along Chilcotin River. In mid-June the herd is brought back to the summer range in the Big Creek vicinity and allowed to graze, in part, on the dry openings and moist meadows west of Mons Lake and Big Flat and, in part, on Bluebird Meadows, and Willan and Spruce Lakes. Toward the end of October the cattle are brought into fenced meadows, where rustling continues until winter feeding commences about mid-December. Some of the stock are brought to the cut-over meadows near the home ranch and fed there through the winter period of 3½ to 4 months.

escape flies and heat, cattle frequently seek higher ground. Many ranchers drive their cattle to the outer limits of their grazing allotment and permit them to work gradually homeward as the season progresses.[1] Toward the close of the permitted use-period on Crown range, which varies usually from the end of September to the end of November, the fall round-up takes place and the cattle are driven to private land.

Fall grazing may continue to January on cut-over hay meadows near the ranchstead, although many wet meadows, inaccessible during the summer, become available when the ground freezes in the fall. Even after several inches of snow have covered the sedges and similar vegetation, cattle may rustle by pushing the snow aside. In such circumstances, that part of the sedge protruding above the ice and partly buried by snow remains green. Cattle may subsist on such forage until late in December or early January. Unlike horses, they do not "paw" the snow in search of forage, so that if a crust forms as a result of a thaw and sudden freeze forage becomes inaccessible and winter feeding must begin. Brush-covered bottom-lands provide browse forage late into the season. Usually by January all cattle have been gathered to the winter feeding grounds in the vicinity of the hay supply.

2. Summer timber and fall meadow grazing. By contrast, the "summer timber-fall meadow" sub-type has much grazing under close timber in the summer and depends on the wet meadow mainly for fall rustling. As in the case of the former sub-type, spring "turnout" is relatively late. Spring range is usually very restricted, and many ranchers turn their cattle out directly onto Crown range from April 15 to May 1. Cattle move to the more favoured and accessible parts of the range, seeking higher ground during the hot season. When the first killing frost of fall occurs, the green feed in the timber becomes unpalatable and the herds, of their own accord, move to lower areas in the vicinity of the ranchstead. Rustling on meadows commences, as in the former sub-type, usually in October. When Crown range is no longer available, the rancher moves his cattle to fenced meadows frequently cut for hay. Bottom-land with a high percentage of browse types may be grazed into December.

The eastern margin of the Cariboo is characteristic of this sub-type, which extends from the Criss Creek district at the headwaters of Deadman Creek to Horsefly and Beaver Lake Districts.[2] This sub-type is represented also in the Thompson-Nicola region, but is confined here to the higher parts of the plateau such as Meadow Creek and Aspen Grove.

Transition Type Unit. Grazing practices associated with the transitional unit depend on limited amounts of bunchgrass range available in the spring. As this type combines meadow grazing in the fall with bunchgrass range in the spring (typical of the lowland type unit), it is classified as transitional (Figure 27). Twenty-seven of 100 ranches studied conform to this pattern, which may be regarded as a typical percentage for the plateau.

The distribution of the transitional unit conforms to numerous shallow valleys on the plateau sufficiently entrenched to favour the development of grasses characteristic of the upper grassland zone. Fir and aspen park associations are, therefore, typical of the native vegetation.

Grazing practices in the transitional type unit commence with a spring "turnout" directly onto early bunchgrass range. Although, because of elevation, such grass matures latest of the three grassland zones, it is the general practice

[1] A grazing allotment established by the Grazing Division is usually shared in common with neighbouring ranches and may comprise a subdivision of a stock range known as a "unit". Range units are frequently defined by such natural features as canyons and steep cliffs, or by drift fences.

[2] Included in this sub-type in addition to those districts mentioned are: Rose Lake, Miocene, Forest Grove, Canim Lake, Horse Lake, Green Lake, and North Bonaparte districts.

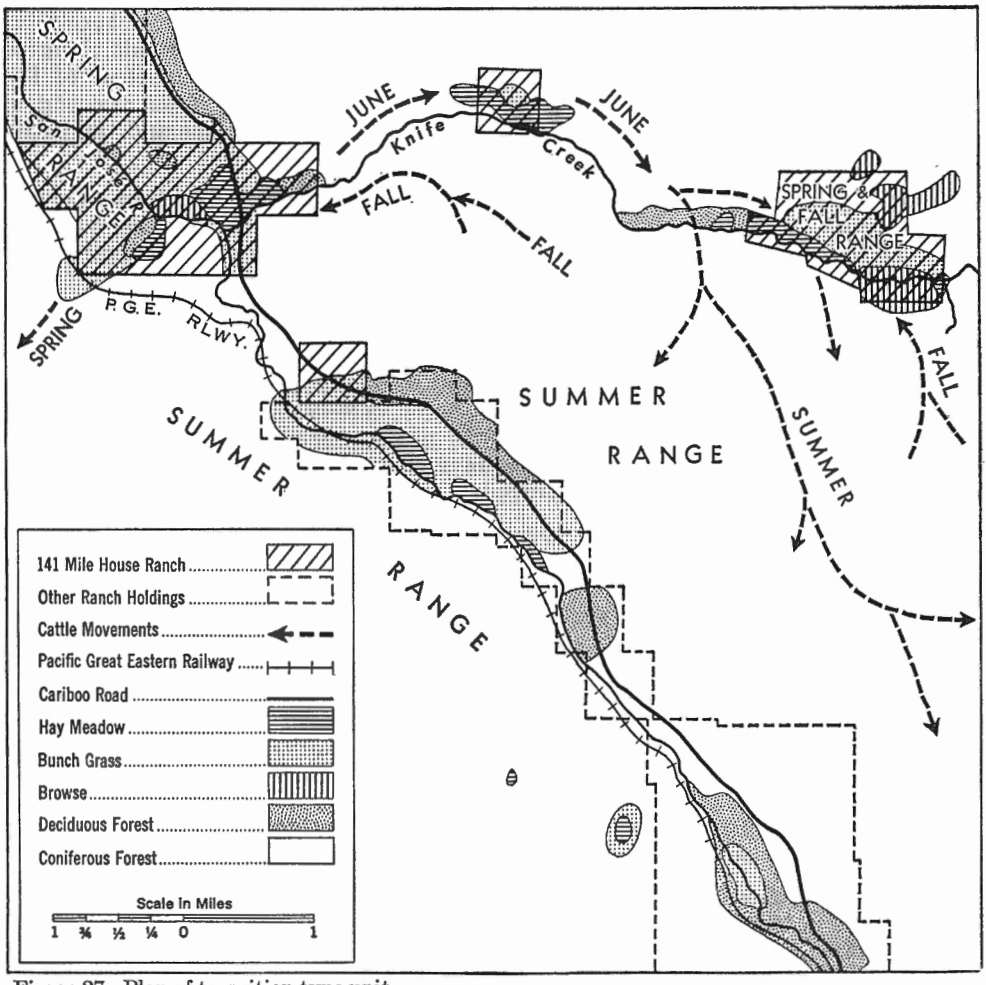

Figure 27. Plan of transition type unit.

Explanation of Figure 27

The 141 Mile House Ranch at the junction of San Jose River and Knife Creek is typica of the transition type unit. The ranch operates 1,200 acres of privately owned and leased land and grazes 400 head of cattle and 40 horses. It originated as one of the historic stopping places serving the Cariboo Road.

Turnout onto fenced pastures in the vicinity of the home ranch occurs about mid-April. Open valley side-hills clear early and grazing on last season's grass and cut-over hay fields provides limited range for a few weeks in the spring. On June 1, cows and yearlings are permitted to enter the Crown range and gradually move down Knife Creek. The 2-year old steers are kept in a fenced pasture and fattened on bunchgrass during the summer.

Summer range is shared with several neighbouring ranchers and comprises land extending from Knife Creek south to Forbes Creek, with the Cariboo Road as its western boundary. The eastern margin is defined by the Sprout Lake area, largely wasteland owing to the steep slopes of Timothy Mountain, impenetrable thickets of lodgepole pine, and windfalls. The timber becomes noticeably larger and thicker along the eastern boundary in response to an increase in precipitation from west to east. The area has an average elevation of 3,000 feet, about 500 feet above the adjacent valley bottoms of San Jose River and Knife Creek. The topography is rolling.

The total area of the unit is 31,800 acres, with four-fifths covered by dense timber, principally lodgepole pine, under which pine grass is the predominant forage. The carrying capacity of the timbered areas is 45 acres per head for 6 months. The cattle tend to collect

to turn out the cattle onto it as soon as the snow has cleared in patches, which is about mid-April. The cured grasses of the previous season provide the first forage, followed by the new grasses as soon as they are available.

Cattle remain on spring range for a month or 6 weeks and then are driven into semi-open range. In such typical districts as San Jose and Chimney Lake Valleys, cattle move gradually from the lower valley slopes into the timbered areas for summer grazing. Summer range is usually one of sparse forage under lodgepole pine, broken here and there by meadow openings and swale lakes rimmed with grasses and sedges. Semi-open patches of broad-leafed forest are associated with an understory of pea-vine, vetch, and palatable forbs. Cattle tend to congregate around such openings and appear to avoid timber grass growing under pine and fir.

About the first of September, the cattle gradually move toward the shallow valleys in the direction of the home ranchstead. Round-up usually occurs in October, and by the end of the month the herd is gathered within fences and allowed to rustle on cut-over hay meadows and browse until winter feeding commences. In general, rustling on meadows in the Cariboo is not continued as late in the fall as in many districts of the Chilcotin.

This type has a wide distribution, being found in the valleys of the Cariboo, including San Jose, Chimney Creek, and Lac la Hache, or along the middle Chilcotin west of Alexis Creek, or, again, along the upper Bonaparte and in the vicinity of certain lakes such as Bridge Lake, Green Lake, Meadow Lake, and White Lake. Many variations are found within the transitional type.

Lowland Type Unit. Ranches of this type are located in areas of considerable relief and have access to bunchgrass range in the spring and fall (*see* Plate IX B). Progressive movement of livestock from lowland to highland at a rate corresponding to the readiness of the range for grazing is characteristic of these units. This is in contrast with the horizontal or nearly horizontal movement of the meadow type unit, and, to a lesser extent, of the transition unit. Cattle movements in the lowland type unit vary from 1,000 to 2,000 feet, compared with 500 to 1,000 feet in the transitional type, and 100 to 500 feet in the meadow type unit.

Ranches located in the Nicola and Princeton lowlands, or in deeply entrenched valleys of the Fraser, Thompson, and Chilcotin, have access to large areas of open grassland. The added advantages of bunchgrass ranges have enabled lowland type units to accommodate large herds and so to operate well above the economic margin. Commanding such range, measured in thousands of acres, the large unit has a diversity of practices based on a higher degree of organization.

Depending on seasonal use of the range, two sub-types may be recognized: *spring-fall sub-type* and *winter sub-type.* The latter includes range capable of being grazed all through the winter by part of the herd, otherwise the two subtypes are identical in range practices. About 60 per cent of the ranches having more than 100 head in the Thompson-Nicola region, and about 18 per cent in the Cariboo-Chilcotin may be classed as belonging to the first sub-type. About 11 per cent of the ranches studied throughout the area have some winter range.

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on the remaining one-fifth of the range around meadows, where grazing under poplar and fir provides better forage, including vetch and peavine. Water from small streams and swales is ample for the stock. The valley of the Knife, partly fenced as hay land, has large tracts of wild meadow land, used during the summer and early fall.

In late September, the cattle are admitted to willow bottom land and cut-over meadows around the home ranch and in the Knife Creek Valley where they rustle until winter feeding begins in early December.

Ranches enjoying winter range include land found along the deep valley bottoms of the middle Fraser, South Thompson, and, to a very limited extent, along Nicola River.

1. Spring and fall sub-type (Figure 28). In this sub-type, the cattle leave the feeding grounds, according to weather conditions, from March 1 to April 1, generally a full month earlier than in the case of the meadow type unit of the upland. The stock are first turned into early maturing pastures of the lower grasslands (if available) or the middle grasslands. As the upper grasslands become ready for grazing, the cattle are moved upslope into late spring pastures. In the large ranches, the breeding herd is separated from the steers. Two-year old steers, destined for summer and early fall market, are finished on choice bunchgrass in fenced pastures.

During the period May 1 to June 1 (as indicated by government permit), the breeding herd and yearling steers will be turned out of fenced pasture into the timbered summer ranges of the uplands. The cattle are usually herded over the allotted part of Crown range. In each movement from the time of turnout until midsummer, they work progressively from the early maturing grasses of low elevations to higher and higher elevations, reaching eventually the summits of ridges and divides on the upland surface. In the Nicola, for example, such movements commence around 2,500 feet, and usually by midsummer reach 4,500 feet in the Aspen Grove or Brookmere districts and on the Coutlee Plateau.

Explanation of Figure 28

The "G" Ranch, located in the Nicola Valley, is representative of the large operation depending on extensive tracts of spring and fall range. The ranch comprises 40,000 acres of alienated land and 280 acres of leasehold divided into scattered parcels in the Nicola basin and in the Brookmere district, 30 miles to the southwest. It is operated from three ranchsteads, formerly owned and operated as separate units. The home ranch (H) is centrally located near the outlet of the upper Nicola River; the Beaver Ranchstead (B) is located at the upper end of Nicola Lake; and the Quilchena Ranchstead (Q) is situated near the mouth of the creek of the same name. Cultivated hay land, aggregating 2,500 acres, lies in the vicinity of the three ranchsteads, which serve as winter feeding quarters.

The summer range comprises four tracts, three of which are shown above (I to III), the fourth being in the Brookmere district 30 miles to the south. For the most part the summer range is rolling to hilly with steep slopes. Timber types include yellow pine to elevation 3,500 feet, Douglas fir to 4,000 feet, and lodgepole pine above this limit. Parts of the summer range, especially in the Douglas Plateau section (II), have been burned and rendered inaccessible by fallen timber except where stock trails have been cut. This section is used for sheep pasture. The lower elevations, below the timber, are grass covered, with bunchgrass predominating, and constitute the available spring and fall range. The "G" Ranch does not have access to winter range, although a restricted area of such range lies immediately east of the home ranch in the valley of Nicola River.

The following sequence of range uses will illustrate the more complex organization associated with broken and scattered holdings separated by fences. After winter feeding in the lots adjacent to the ranchsteads, the cattle are turned into the early bunchgrass pastures nearby (indicated by arrows). Depending on weather conditions, the date of turnout may vary from March 1 to April 1. The yearling steers are segregated into the beef pasture (BP), where they are fattened on bunchgrass and, later in the season, driven to the railroad terminal at Nicola. From the spring pasture near the Beaver Ranchstead (B), cows and calves are driven about June 15 to the summer range adjacent. The breeding stock turned into the summer range adjacent to the Quilchena Ranchstead may be driven later 30 miles southwest to summer range in the vicinity of Brookmere, which becomes available after May 1. Part of the herd is usually pastured in the spring range southwest of the Hamilton Indian Reservation before being driven to the Brookmere summer range late in May. With the first killing frost of autumn, the cattle drift downslope to the cured grasses in the vicinity of the three ranchsteads. Fenced fall pastures are then used through October until January if the season is favourable. Some rustling is possible on the cut-over hay lands near the ranchstead and on browse land along the edge of the grassland. All stock must be fed for 3 months or longer.

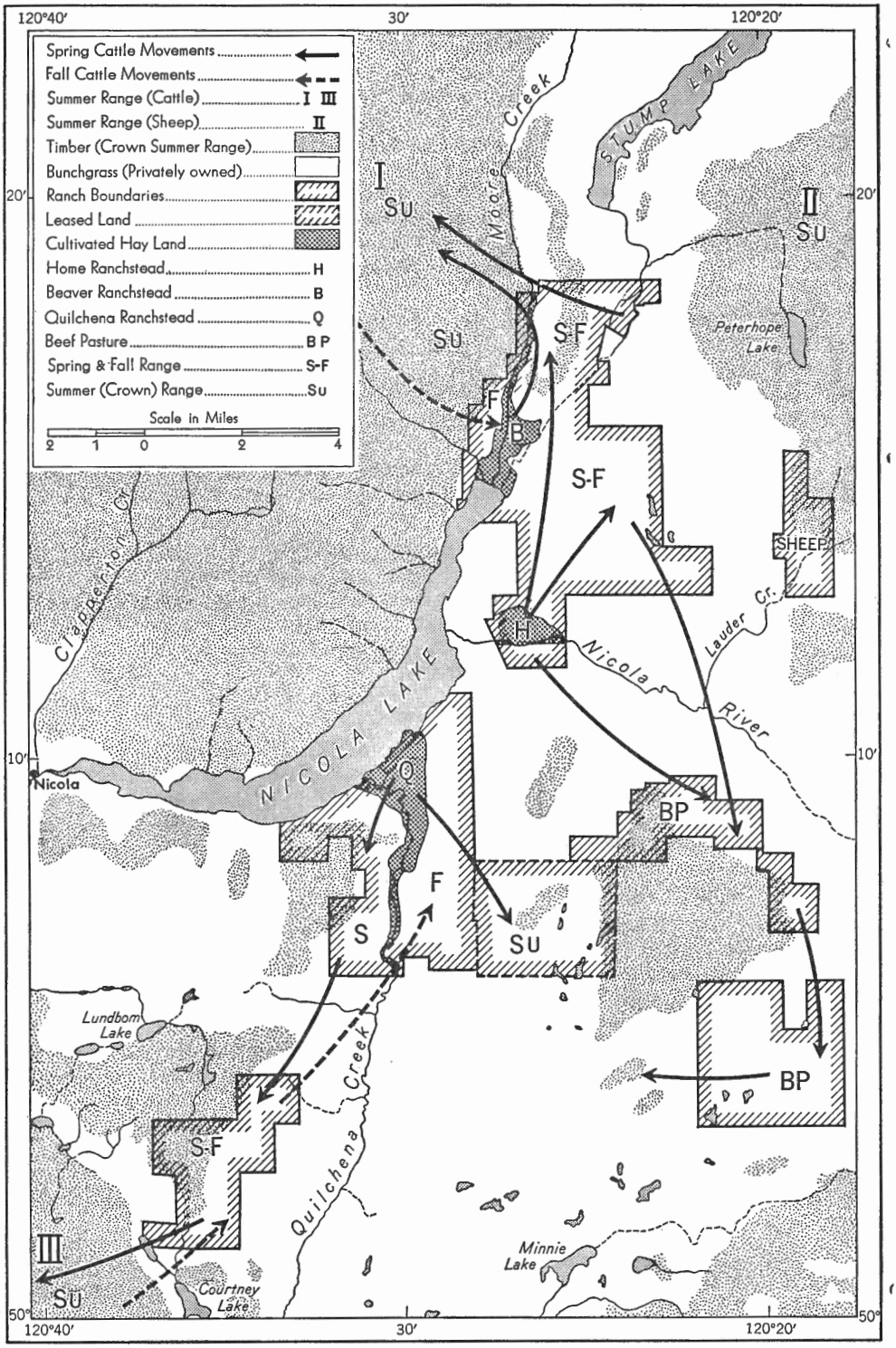

Figure 28. Plan of lowland type unit.

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As in the timbered ranges elsewhere on the plateau, the cattle begin to descend the slopes after the first killing frost. As the higher elevations are affected first (frequently in mid-September), there is a progresssive movement downslope to the edge of the upper grasslands, where feeding on the cured grasses may continue until the expiration of the grazing permit on Crown land, usually during October. At the end of this period, the cattle are admitted to fall range on private land after working downslope from the upper to the middle grasslands. Approximately two-thirds of the herd "drift in" of their own accord, the remainder must be rounded up according to the general practice in late October and early November. Late fall grazing usually takes the form of rustling on the cut-over alfalfa fields in the vicinity of the winter feed lots until feeding commences late in December.

2. Winter sub-type. As previously mentioned, practices of the winter range sub-type are similar to those of the spring-fall sub-type, except that in the case of the former a part of the herd may rustle all winter on bunchgrass (*see* Plate IX A). Depending on the individual rancher, winter range is usually grazed from late December to early April. Although the number of units with winter range is probably not more than 5 per cent of the total commercial units in the regions studied, their importance is considerable in terms of stock, which aggregates 18,000 head. Approximately one-half of this number rustle through the winter on bunchgrass.

Alpine grazing of cattle, though of small importance, is found occasionally. From the vicinity of Keremeos (east of Princeton), about 900 head are driven to alpine ranges on the western and southern margins of the Princeton basin.[1] In the Tatlayoko district, some cattle are driven to the alpine meadows of Potato Mountain nearby, and a similar transhumance is practised in the Kleena Kleene district of the foothills of the Coast Range.

THE BALANCED UNIT

A balanced distribution of range types within the ranch unit is highly desirable from an economic standpoint. The shorter the winter feeding period, the less hay required. As the cost of labour in haying is the largest single item of expenditure the rancher is obliged to meet, it is highly advantageous for a given unit to possess large amounts of spring, fall, and especially winter range. However, because winter range is limited in extent in relation to the total grazing area, it is unavailable to more than 95 per cent of the ranchers.

A second way to achieve a shorter winter feeding period is to turn stock out early in the spring and delay feeding until late in January. This can be achieved best where there is sufficient bunchgrass range to carry the herd until summer range is accessible and where large areas of good fall range are obtainable.[2] Unfortunately, both spring and fall range are limited in extent. Their desirability is attested by the value attached to them and by the efforts to acquire and consolidate holdings possessing such range. The lack of bunchgrass fall range is partly offset by wild meadows.

The summer range is by no means minor in importance as cattle on most units are marketed directly from it; but, because it is relatively abundant, it is less important in achieving the balance desired in an economic unit. Ideally, the balanced unit should contain all four types of range. Bunchgrass fall range is less important provided that meadow grazing is substituted.

In the Kamloops-Nicola, where spring and fall range are relatively more extensive, the controlling factor for most enterprises is the amount of hay that

[1] Alpine cattle ranges are located on Kettle, Skaist, Granite, Red, Passayten, and Cathedral Mountains.
[2] Accessibility to Crown land used as summer range is controlled by permit. Dates of access to the range are fixed by the Grazing Division, Department of Lands and Forests, Victoria, B.C.

can be put up, which depends on the amount of irrigated land. In the case of the largest ranches, however, limits are set by the quality and amount of summer range.

In the Cariboo-Chilcotin, on the other hand, the limits are set, to a great extent, by the amount of spring range available to given units. Lack of such range is partly offset by the natural meadows, which supply enormous quantities of hay. However, labour costs are high and the value of wild hay as feed is relatively low; as a general rule, therefore, the limits of expansion for most units in this region depend on the amount of spring range available.

RANGE CONSERVATION

Conserving grass has been encouraged by both provincial and federal governments by the publication of information on conservation, by providing district agriculturists and forest rangers who administer the grazing laws, and by operating a range experimental station at Kamloops. Conservation practices vary greatly throughout the ranching area according to the district, the individual rancher, and the size of the unit. Generally speaking, there is little effort put into conserving the range in remote districts where ranch enterprises are close to the economic margin. In such areas the ranchers depend almost entirely on Crown lands and, because these are usually grazed in common by the community concerned, there is little incentive for the individual to spend money in protecting the range. He would, in fact, be subsidizing his fellow ranchers. In areas where large tracts are privately owned and enterprises have reached a size where they have become companies, the necessity of conservation and the promise of definite gains from good range practices are well recognized.

In general, the ranchers of the Kamloops and Nicola districts and of the open ranges along the Fraser are conservation-minded. However, many ranchers throughout the interior are still content to winter their cattle for as short a period as possible on the cheapest hay obtainable, and to allow the herd to roam at will over the unfenced range during the rest of the year with little or no supervision.

Misuse of the range by over-grazing is apparent everywhere (*see* Plates II B and V A). It has proceeded to the point of altering the climax vegetation by permitting less desirable species to invade the range and by encouraging the encroachment of timber on the margins of the open grassland. Through government restrictions on the use of Crown land, this abuse is slowly being remedied, but much remains to be done. The prosperity of the cattle industry in recent years has enabled the more progressive units to employ a degree of conservation not formerly possible under adverse market prices. Good management practices directed toward range conservation take the following forms: (1) retarding the use of early spring range; (2) alternating spring and fall range; (3) better distribution of stock; and (4) range improvements.

Retarding the use of early spring range amounts to an increase in the cattle feeding period to enable the first "flush" of grass to attain a size sufficient to ensure propagation. By moving the herds from lower to upper grassland areas, in keeping with the "readiness for grazing" period, the climax vegetation is protected. "Drift fencing" by the government encourages this practice, as exemplified on the Riske Creek range and the Coutlee Plateau.

Alternating the use of spring and fall bunchgrass ranges is sometimes practised to reduce the effects of heavy grazing. By fencing off part of the grass range and keeping it for either spring or fall use, and by rotating the pastures occasionally, the native forage is conserved.

Better distribution of stock ensures a more equitable use of the range and is accomplished chiefly by salting and herding. The former involves the placing of salt in troughs in locations removed from watering places, so that the lightly grazed sections will be frequented. Cattle tend to do less wandering and graze more evenly in areas well supplied with salt. Employing a rider during the summer to move the herd over the range promotes more uniform use and favours both its conservation and a better finished animal.

Range improvements include clearing old stock trails of fallen timber, cutting new trails to inaccessible forage, improving seepage springs, fencing the range for seasonal use, etc. Although such practices are undertaken by the government on behalf of the ranchers using Crown range, the more progressive stockmen themselves undertake some of the work, especially on their own land. The building of trails through windfalls and dense jack pine serves to increase available forage and decrease over-grazing around pot-holes and lightly treed areas.

HAY LAND

The third element comprising the ranch unit is hay land. Since some stock on all ranches, and all stock on at least 95 per cent of the ranches must be fed for part of the winter, land suited to hay production assumes a place of great importance (Vrooman and Chattaway, 1946). Hay land is the main means of carrying the herd from 3 to 6 months of the year. In the Thompson-Nicola, the amount of hay that can be cut is the chief limiting factor in the number of cattle a given unit can sustain.

Physical features and methods employed suggest a division of hay land into two main types: natural meadows and cultivated hay land.

NATURAL MEADOWS

The natural meadow cut for hay may be further classified as valley bottom meadow and swamp meadow. The former is usually the flood plain of a small stream on the upland and possesses a water-table sufficiently high to favour the growth of meadow grasses, forbs, and browse types (*see* Plate III B). By clearing such land of willows and other woody shrubs, it becomes a desirable source of hay. It is inundated naturally each spring. When the stream subsides after the spring freshet, such land is usually accessible, although drainage is frequently necessary. After cutting in the summer it is grazed in the fall, generally just before winter feeding commences. Swamp meadow used for hay land is usually located in poorly drained depressions in the upland, such as swales in glacial moraine.

In order to ensure an adequate hay crop, the rancher may close the meadow outlet by a crude earth dam early in the spring, causing the meadow to flood. This may be followed by artificial drainage about mid-June or early July to permit accessibility. When the meadows are accessible, cutting commences, usually during July and August. On natural meadows, horse-drawn machinery is more commonly used than power-driven mowers, owing to the rougher ground.

Haying practices vary little throughout the area. After cutting, the hay is raked in windrows, then moved by sweeps to the stack. Slings are hoisted by a derrick (boom stacker) powered by horses. The stacks are always fenced with poles as a protection against both cattle and large game animals, which roam the northern region in considerable numbers.

The distribution of units depending mainly on native hay corresponds to the frequency of natural meadows. It is apparent, from the occurrence of swamp meadows (*see* Figure 9), that remote sections depend most on native hay.

It has been stated by Vrooman and Chattaway (1946) that in the Thompson-Nicola 95 per cent of the hay and crop land is cultivated, from which we infer that less than 5 per cent is wild meadow land. In the Cariboo-Chilcotin, only 39 per cent is tilled and 59 per cent of the hay land is natural meadow. This difference is related not only to topographic dissimilarities between the two regions, but also to the drier climate associated with deep valleys in the southern region, where systematic irrigation is imperative.

CULTIVATED HAY LAND

Because of the infrequency of wild meadows and the superiority of cultivated hays, the Thompson-Nicola region depends mainly on the latter (*see* Plate VIII B). The relative importance of cultivated hay in the Thompson-Nicola is 2·4 times that of the Cariboo-Chilcotin, based on an average of irrigated land devoted mainly to hay crops.[1]

TABLE XIII

Irrigated acreage in the Ranching Area, October 31, 1939 [2]

Region	Irrigation district	Irrigated area (Acres)
Thompson-Nicola	Kamloops	27,000
	Ashcroft	15,100
	Nicola	14,500
		56,600
Cariboo-Chilcotin	Cariboo-Chilcotin	16,000
	Lillooet	7,700
		23,700

The most widely grown and the most nutritious hay is alfalfa.[3] Frequently it is mixed with timothy or brome grass to prevent lodging and to reduce the danger of bloating in the live stock. Generally, two crops a season are taken from irrigated land. A third is often possible but is usually thin. It is of greater value if left for fall grazing and sometimes serves as a beef finishing pasture.

Timothy, mixed with clover (alsike), brome-grass, or red-top, is common, especially where elevations exceed 3,000 feet, as winter tends to kill alfalfa. For this reason, the upland hayfields are more often sown in timothy and clover than alfalfa. This is typical of the Cariboo and Chilcotin away from the terraced valley sides. The western limits of alfalfa in the Chilcotin are found at Alexis Creek; it exceeds by far all other hay crops in acreage in the more favoured southern region.

The practice of raising grain for hay arises chiefly from the need for a nurse crop preceding the planting of alfalfa. Usually oats will be cultivated on a few acres of freshly plowed land with the intention of later seeding it to timothy, clover, and alfalfa. Only in cases where grain is grown extensively by dry-farming methods is it threshed.

Site Characteristics. Cultivated hay land is located with respect to the following factors: (1) gently sloping land; (2) good soil; and (3) access to irrigation water. The first requirement is commonly met either by flood plains or

[1] This does not include irrigation by flooding of wild meadows, a practice peculiar to hay production on uncultivated (wild) hay land.

[2] Source—Kamloops Board of Trade.

[3] Good stands of alfalfa yield 2½ tons per acre. Mixed hays generally average 1¼ to 1½ tons per acre, whereas wild hay yields only ¾ ton per acre. Cultivated hays are high in phosphorus, vital to the health of young stock.

stream terraces (*see* Plate IX B). The soil requirement is usually met in the form of alluvium, either recently deposited or of Pleistocene origin. In the latter case, sufficient time has elapsed to allow the formation of brown or dark brown soil on the terraces. The third requirement, irrigation water, is the most crucial as only a few localities in the ranching area receive sufficient moisture to render irrigation unnecessary.[1] One of the most valuable assets of a ranching unit is the right to irrigation water in sufficient quantities to assure hay requirements. No other single factor places such strict limits to expansion.

Irrigation. Hay land requiring irrigation will usually occupy a part of the flood plain adjacent to the main stream and will be irrigated by a diversion ditch originating upstream and having a rate of fall less than that of the main stream. In some cases the irrigated land will occupy a former flood plain and will depend on water diverted from some stream not now flowing through it. An example of this is Semlin Valley, once occupied, in all probability, by Bonaparte River (*see* Plate I B). The famous "Harper Ranch" northeast of Kamloops, is situated on an abandoned flood plain. An abandoned valley to the south of Heffley Creek depends on water diverted into it from that creek.

Where hay land occupies valley terraces, irrigation water must be diverted from a tributary stream cutting across the terraces en route to the main stream, or be pumped up from the main stream to the terraces above. The former system is typical of ranch units located on bench land along deeply entrenched valleys. Sometimes the irrigated land is on the upper edge of an alluvial fan. Such fans, some on high terraces, are common along the south bank of Thompson River.

It is customary for one or more storage dams to be constructed in the drainage area to enlarge the existing lakes or to create new ones in order to ensure a dependable flow during the dry season. Frequently, diversion ditches are constructed across shallow divides to divert the water from a neighbouring drainage basin. A short distance above the terraces to be irrigated, water is diverted into flumes or ditches and conveyed to the irrigated site (Figure 30).

Only three cases of pumping to terraces from main streams can be cited among 100 ranches sampled.[2] Cost of pumping is usually in excess of the benefits received.

The distribution of irrigated hay land corresponds to stream valleys sufficiently entrenched to have developed a flood plain or terraces. Irrigated flood plains are illustrated by the upper Chilcotin and Bonaparte Rivers and by San Jose and Guichon Creeks. These are mainly tributary to trunk valleys. Less extensive are the abandoned flood plains such as the Semlin Valley referred to above. Irrigated terraces and fans conform also to the pattern of deeply entrenched main rivers. This type is less widely distributed than the flood plain because the vital factor—water—is more difficult to bring to terraced land.

The ranch units possessing large tracts of irrigated hay land depend very largely on machinery for harvesting the crop. Mowers, sweeps, and even stackers are powered by tractors. A combination mower and baler is rapidly replacing older methods of putting up hay; it reduces by one-half the labour required in haying, and the baled hay is more readily handled and transported. The initial overhead is large, but in the long run mechanical equipment proves the cheaper and certainly the more dependable means of securing the winter hay supply. Both medium and large units are rapidly becoming mechanized.

[1] In such districts as Princeton and Knutsford, dry farming is common. Along the eastern margin of the Cariboo rainfall is sufficient to make irrigation unnecessary in most years.

[2] Examples of irrigation by pumping are: the "L" Ranch in the Chilcotin at Hanceville, the Springfield Ranch north of Soda Creek along the Fraser benches, and the Harper Ranch northeast of Kamloops. Pumping also provides water for the Heffley Creek irrigation district.

Examples of the type of hay site irrigated by diversion from stream channels are supplied by the "B" Ranch in the Chilcotin Valley and the Durand Creek Water Users' Community at Savona (Figures 29 and 30) (*see* also Plate VIII B).

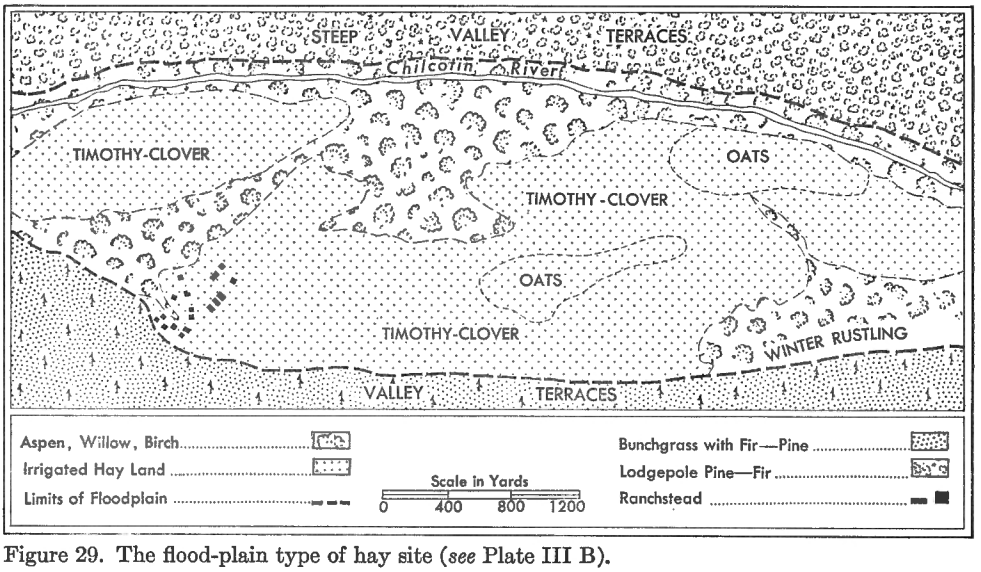

Figure 29. The flood-plain type of hay site (*see* Plate III B).

FEEDING PRACTICES

With a few exceptions, ranches of the interior plateau are obliged to feed their herds for a period up to 6 months. In medium and large ranches the division of the herd into breeding stock, yearling steers, and calves is common, in which case the various divisions may be quartered at several feeding grounds. With smaller herds, where the labour is usually confined to the rancher and his family, all the cattle are kept together and fed as a unit.

The ranches depending mainly on swamp hay find it necessary to move the herd (or parts of it) from one feeding ground to another, according to the distribution of hay meadows. Thus, a part of the herd will usually be first turned out at the more remote sites and moved gradually towards the home ranch. Young stock and weak cows are, from time to time, taken out of the main herd and fed at the home ranch. Where feed lots are dispersed, a man may be employed for a month or 6 weeks to look after the herd before moving to the next supply. Water holes must be chopped in the ice of a nearby pond or creek and a watch maintained against predatory animals. During the night, the cattle find shelter in the timber close at hand, preferring spruce swamps where some protection may be found against strong, cold winds.

Explanation of Figure 29

The "B" Ranchstead is situated close to the irrigated flood plain in the valley of Chilcotin River 5 miles south of Redstone. Here the Chilcotin has formed an extensive flood plain thickly covered with browse types, wild grasses, and sedges. This willow bottom land was partly cleared and a diversion ditch was built a few hundred yards above the point where irrigation is required, taking advantage of a fall in the river in this vicinity of 25 feet per mile. Lateral ditches were then dug through the flood plain following the natural drainage lines. As the water-table is normally high, irrigation is carried on usually no more than twice a season. Four hundred acres of timothy, clover, and red-top are raised on this site, with a few acres of oats as a nurse crop. Alfalfa is subject to winter-killing in this area, the western limit being Alexis Creek. This unit also depends on 80 acres of swamp hay grown on the meadows on the plateau.

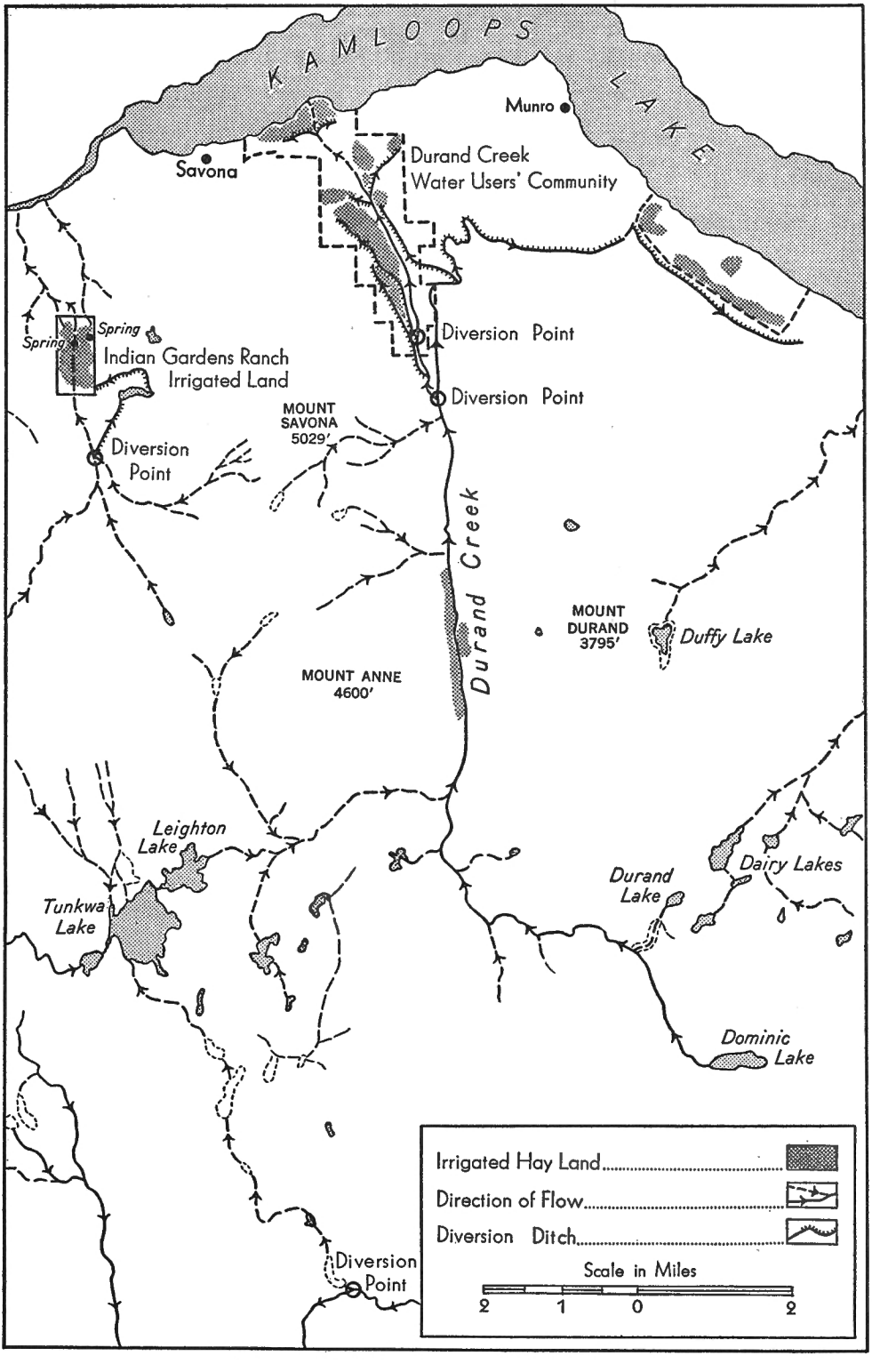

Figure 30. Irrigated valley terraces (*see* Plate VIII B).

Supplementary feeding is now becoming general even among the more remote ranches. With high beef prices and a government subsidy on shipments of grain for feeding purposes, many ranchers who were accustomed to consider losses due to malnutrition and a resulting low calf crop a normal occurrence can now afford to bring in grain. Some ranchers also provide protein concentrates in the form of pellets; in the case of the Gang Ranch, these are dropped by aeroplane.

Oat hay, produced locally, is fed to horses, calves, and stock that are in poor condition. At the home ranch, rude cattle sheds are sometimes built facing away from the prevailing winter winds to protect the weaker stock. A "hospital lot" is often included to provide special care and feeding for sick animals.

WINTER FEEDING PERIODS

Variations in the winter feeding period are indicated in Figure 31. Isopleths connect places having the same feeding period expressed in months.[1] The pattern conforms closely to elevation. Along deep valley sides, from 2,000 to 2,600 feet, the feeding period varies from zero to 2 months. On the plateau, where elevations generally exceed 2,900 feet, the period increases to 4 or even 5 months. The Chilcotin region feeds for 4 months, although in the eastern part the period is shorter, as feeding is done in the valleys. In the Cariboo, the period increases rapidly eastward until on the margins (Beaver Lake south to Canim Lake and Horse Lake) the period is close to 6 months.

In the Thompson-Nicola, where a larger percentage of the total area lies below 2,900 feet, the feeding period is shorter than the average for the northern region. Three months is typical for the broad lowlands of the Nicola and its extension northward to Kamloops. Only one small area in the Nicola Valley, near the lake, has a feeding period of zero (winter range), but along the north side of the Thompson Valley, there are several areas of winter range where no feeding is required (*see* Plate IX A).

[1]Data for the map were gathered by sampling 100 ranches in various districts throughout the area. It should be understood that the numerical values are estimates based on the ranchers' opinions and not on averages of carefully recorded statistics. Such estimates refer to an average period for most of the herd and do not include the feeding of calves and weak stock. The degree of reliability may be considered good for the scale of map used.

Explanation of Figure 30

Located along the south side of Kamloops Lake in the vicinity of Savona are several ranches using valley terraces for cultivating hay. Eight licensees have banded together to form the Durand Creek Water Users' Community. Water Users' Communities are voluntary organizations of water users along a stream used in common. They maintain jointly the diversion ditches, dams, and other works necessary to keep a steady flow of water throughout the season. Each ranch has rights to a specified number of acre-feet, according to a licence issued by the provincial government. Water is diverted from Guichon Creek (1,666 acre-feet) and Chartrand Creek (282 acre-feet), both of which lie south of the Durand Creek basin. Several lakes, such as Dominie and Tunkwa, have been impounded to serve as storage reservoirs at the headwaters of Durand Creek

Different users, according to their rights, divert water from the creek. The Indian Gardens Ranch irrigates 173 acres along the flood plain south of the valley terrace land. The "C" Ranch has first rights on the creek and irrigates, in all, 279 acres located on upper benchland that was subsequently dissected and trenched by Durand Creek (*see* Plate VIII B). Farther down is the "S" Ranch and, along the low benches near Kamloops Lake, there are three smallholders. A total of 730 acres is irrigated in this way. Crops of alfalfa and timothy constitute the bulk of the hay, although some wheat and oats are also grown and fed green.

The Indian Gardens Ranch has hay land west of Durand Creek that supplies the home ranch (*see* Plate III B). By diverting water from several small streams, a reservoir is maintained a short distance above the site to be irrigated.

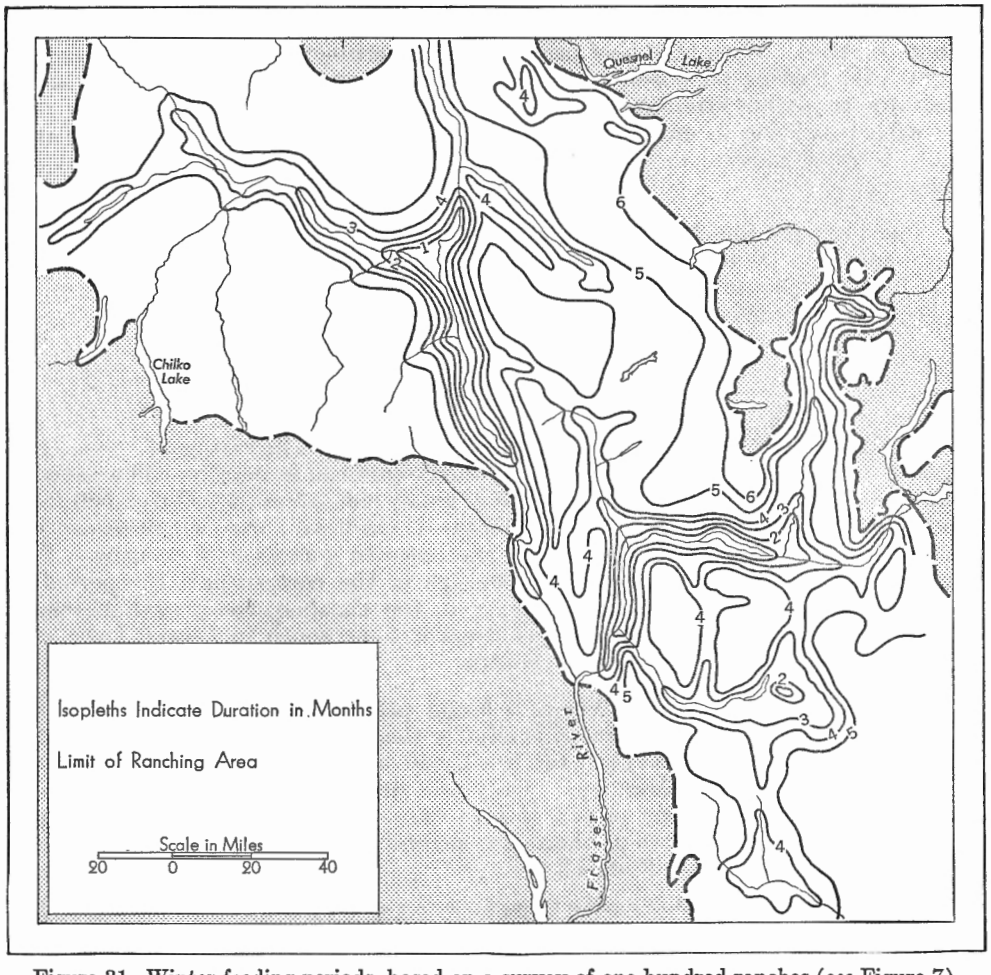

Figure 31. Winter feeding periods, based on a survey of one hundred ranches (*see* Figure 7).

There are three primary factors in explaining the variations in the feeding period: topography, climate, and native vegetation. This becomes apparent on comparing the winter feeding map (Figure 31), and maps of precipitation (Figure 5), duration of winter (Figure 7), topography (Figures 2, 3, 4), and range types (Figure 9).

In the first comparison (precipitation and length of winter feeding period), it will be noticed that the precipitation factor increases sharply along the eastern margin, which increase in turn, is reflected in a deeper and more prolonged snow cover. In the second correlation (temperature and duration of winter), it follows that when the frost season is prolonged in the spring and sets in early in the fall the feeding period will be longer. The influence of topography is shown in that the deeply entrenched valleys with lower elevations, less precipitation, and föhn winds have a shorter feeding time. Owing to exposure (the product of slope and direction), the south-facing slopes of the Thompson Valley, the middle Fraser, and the Riske Creek prairie have the finest winter range in the interior. The relationship of ranch types and feeding period suggest the import-

ance of the vegetation factor. Bunchgrass is nutritious long after the first killing frost of fall and is available below a light, uncrusted snow through the winter. The distribution of bunchgrass ranges is basic to an explanation of the duration of the feeding period.

The effect of the winter feeding period on ranch practices varies with the districts and with the individual rancher. In remote localities of the Chilcotin, such as Anahim Lake, Kleena Kleene, Chezacut, and the eastern Cariboo, the custom has long been to turn stock out early, even before the first flush of vegetation. This may be explained partly by the inferiority of the swamp hay on which these districts so largely depend, and by the tendency, in the past, to winter steers until they were 3 years old. Then, too, because one-third more wild hay than cultivated is required to sustain cattle, ranchers frequently run short. In the southern region, where spring and fall range are privately owned the ranchers, with an eye to conservation, prefer to extend winter feeding. A slightly longer feeding period will enable 2-year old steers to be brought to prime condition in a shorter time after being turned out in the spring.

The relationship between the length of winter feeding and ranch economy is crucial, as the cost of putting up hay is the most important single factor in operating expenses. The shorter the feeding period, the lower the cost of producing beef and the higher the profit. This is reflected in land values, in the size of ranch units, and in the degree of organization.

Those units with a long winter feeding period tend to operate on the economic margin, often combining part-time ranching with hunting, logging, or serving tourists. The larger and more prosperous ones lie within the zones of short winter feeding. By comparing the map of ranchsteads with that of winter feeding periods, the relation between size of unit and duration of feeding will be apparent.

SPECIAL PURPOSE LAND

Most ranchers who have medium to large holdings with bunchgrass range allocate fields to special purposes. Such fields are fenced off from the rest of the unit. The names used to designate them suggest the nature of their use.

Breeding Pasture. Out of 50 ranches sampled in the Thompson-Nicola, approximately 28 (56 per cent) used breeding pastures. A somewhat smaller percentage was found in the Cariboo-Chilcotin (*see* Figure 28).

The breeding pasture is usually located on spring or early summer range in open or semi-open grassland. It varies in areal extent with the size of the unit. On the basis of a carrying capacity of 25 acres per cow for 6 months a breeding pasture used for approximately 6 to 8 weeks would be about 8 acres in area for each animal pastured. Accordingly, on a ranch of 100 head, assuming one-third to be breeding stock, a 260-acre field would be required. In order to encourage better management practices, the government sometimes permits Crown range to be fenced and used either by the community herd or by individual herds for breeding pasture.

Beef Pasture. Medium to large units (with bunchgrass range) usually allocate a field for the finishing of beef to be marketed during the current season. This is intended to take the place of the feed lots common in other ranching areas. The steers, on well-managed units, are kept separate from the time of "turnout" and may be turned directly into the beef pasture for 3 to 5 months. In such circumstances, a very large area is required as beef pasture. These pastures also may be acquired on government land by complying with certain regulations, including fencing, or may be shared by the community.

Bull and Horse Pastures. It may be advisable to segregate bulls or horses from other stock on the range. As the period during which bulls are allowed to run on the open range is regulated by statute, it is often necessary to confine them to pasture at other times. This also has the advantage of preventing calving too early in the spring or too late in the fall. Because horses can graze rough land inaccessible to cattle, the horse pasture is frequently located on such range.

Camps. On very large units, such as Gang Ranch, a temporary camping place used by cowboys during beef drives and at round-up time may be established. This is called a "cow camp". It has a holding corral used for branding or segregating for market. The right to fence on Crown range is provided by temporary permit. The camp may also serve as quarters for cowboys during the regular procedure of herding on the summer range. Large ranches in the Nicola usually have subsidiary ranch quarters at intervals which serve the purpose of cow camps.

FENCES

The number of ranchers reporting on the total amount of fencing was only 62 out of 100 sampled. Of these, 66 per cent reported "mostly wire", and 34 per cent mainly wood. Almost without exception, those in the Thompson-Nicola used wire, whereas in the Chilcotin the wood fence predominated. In the Cariboo, the amounts used were more nearly equal, with wood slightly more common. Preference for wood fences in the Chilcotin is related to the pioneer character of much of the ranching in the area, remoteness from supply points, and the greater efficiency of wood fences in keeping out moose. In the Thompson-Nicola, there is not the same need for wood fences. It is generally conceded that the rail fence is superior, but high labour costs make it more expensive than barbed wire. The largest amount of fencing on any single unit was the 500 miles of wire on the Douglas Lake Ranch. Several units reported over 100 miles of wire.

Although there are numerous modifications, four principal fence types may be differentiated: rustle, pole, log, and barbed wire (*see* Plate VIII A).

Fences have many uses on the ranch unit. Corrals, special pens and gardens are fenced and, also, the nearby cultivated land with haystacks, pastures, and hay meadows. When privately held, spring and fall range are fenced, together with dangerous water holes, holding grounds, and major divisions of the range. Further, it is required that leased land be fenced as a provision of use, but government lands cannot be fenced except under permit for use as special pastures or hay allotments.

CHAPTER VII

CONCLUSION

In assessing the future use possibilities of the ranching area, two questions arise. Is there room for further expansion of the industry? Do trends indicate a transition to a more intensive use of the land resources?

Of a total area of 19,000,000 acres comprising the "ranching area" of the southern Interior Plateau, probably not more than 50 to 60 per cent is being grazed or cropped at present. Much is too heavily timbered, has too short a growing season, is deficient in bunchgrass range, or is too high and inaccessible. Except for constructing stock trails through areas now impassable because of fallen timber, there appears to be little hope of overcoming such physical limitations. Judicious burning of timber will probably assist in maintaining the areas now in open grassland, but there are extensive tracts that cannot be reclaimed from the forest by this method. As areas of open grassland and abundant upland meadows have been settled to their practical limits since World War I, the basis for establishing new commercial ranch units no longer exists and no significant expansion can be expected in the future.

On the other hand, expansion of cattle numbers is within the practical limits of realization by increasing the total available forage and by fattening young stock on feed lots. The problem of increasing forage is related directly to more efficient use of water resources. Irrigating pastures by sprinkling methods should increase the carrying capacity of large tracts of terraced land now in desert shrub and overgrazed bunchgrass.

Large-scale planning for the more efficient use of irrigation water involving major development projects would bring more acreage into production. At the same time, the abandonment of water rights in favour of a more equitable distribution and more efficient methods must accompany extensive projects. Encouragement to establish more irrigation districts would be in itself a step toward the tapping of resources beyond the means of the individual.

In addition, irrigating areas of bunchgrass range by sprinkling is within the means of many individual ranchers. It has been demonstrated, under similar conditions in the State of Washington, that the yield per acre can be greatly increased, even above that obtained by present methods of irrigation.

In the uplands, where wild meadows supply much of the forage, expansion must take the form of increasing the amount of cultivated hay. This will depend partly on displacing native hays with types adapted to meadow conditions and partly on developing more efficient practices in the use of meadow land for hay. Such developments await controlled experiments.

Expansion of the industry within the present ranching area may also be effected by more specialization in the raising of livestock. Certain districts, including much of the Cariboo, have ample summer range but are deficient in bunchgrass range. This lack of balance may be partly compensated by the raising of feeder cattle in areas having an abundance of green feed. This is particularly true of the district already referred to from Beaver Valley and Big Lake south to Bridge Lake and Criss Creek. Such areas lack hard-grass range for fattening cattle but possess ample soft feed for raising calves. On the other hand, by bringing more of the Thompson Valley under irrigation, alfalfa could be raised in amounts sufficient to winter cattle on feed lots. Supplemented by grain made available through direct rail haul to the Peace River country, sufficient feed could be obtained for establishing feed lots and finishing yearlings

from the less favoured parts of the Cariboo. With the trend toward cash crops in the Thompson Valley, east of Kamloops Lake, the need for increasing the amounts of animal manure would favour intensive feeding.

With reference to the second question, recent trends certainly indicate a more intensive use of land within the ranching area. In the vicinity of Kamloops and west of Chase approximately 6,000 acres are under irrigation and are used for raising horticultural, truck, and commercial hay crops. The present flood plain and low terraces comprise the sites to which water is supplied by pumping from the river. Apples, the first crop, are shipped to the extent of over 200,000 boxes each year. Potatoes and hops comprise large acreages also. In 1944, a cold storage plant was constructed with a capacity of 100,000 boxes. Of great importance to the entire Thompson Valley as far west as Lytton is the 25,000 horsepower hydro unit.

Under the Veterans' Land Act, 2,000 acres of terrace land between Kamloops and Chase may be reclaimed to provide small farm units. With most areas suited to intensive crop production now taken up, the reclamation of more land west of Kamloops, especially in the Wallachin district, must follow. As markets in the Vancouver area continue to grow, it may be reasonably anticipated that the Thompson Valley will undergo a development similar to that of the Okanagan Valley. Although such transition may ultimately bring about a situation where ranching is no longer the first industry in terms of value in the Thompson Valley, the encroachment on the range as a whole will be almost negligible.

Important benefits from the road-building program in progress will accrue to the Cariboo especially. Increased use of the Cariboo Road, now a first-class highway, will enable produce and livestock to be moved quickly and more cheaply to the Vancouver market. A transition to dairying in the humid eastern parts may yet prove profitable, but of much greater importance will be the increased tourist traffic to the region, already famous for its historic past, its scenery, and its recreational facilities. A broadening of the economic base through greater diversity in industry may also be expected. This, in turn, should be followed by an increase in settlement, and by some notable growth in population in the areas east of the Cariboo Road and in the Thompson Valley particularly. The margins of the area have become increasingly important for lumbering with the result that returns from this source are now greater than from the cattle industry.[1] However, when trends are viewed in terms of the great expanse of territory comprising the southern Interior Plateau, we may reasonably conclude that, for both economic and physical reasons, the area generally will long continue as the domain of the cattlemen.

[1] Personal communication from W. C. Pendray, Dept. of Lands and Forests, Victoria, B.C.

CHAPTER VIII

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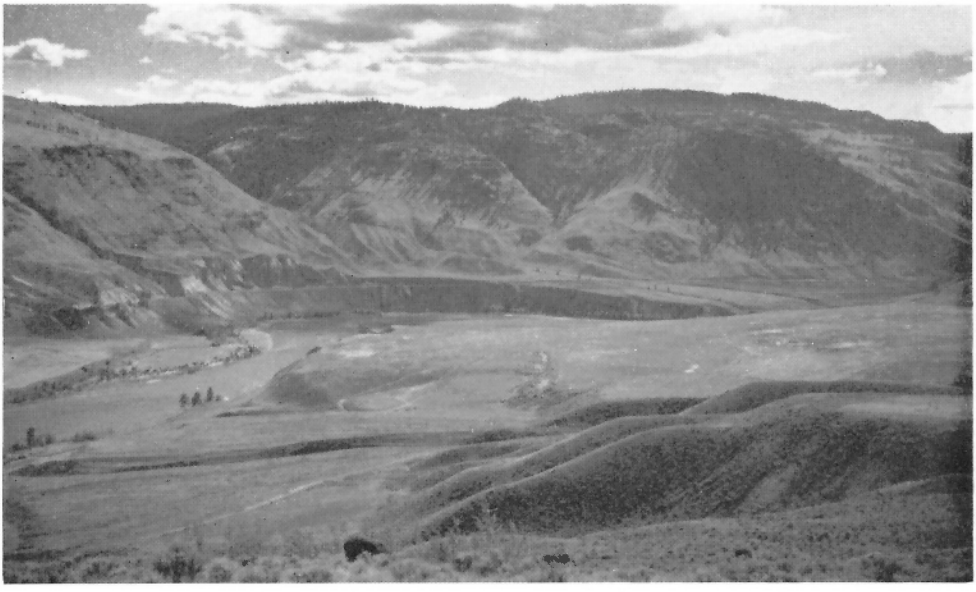
PLATE I

A. Deeply entrenched Fraser River in the vicinity of Gang Ranch. The steep slopes serve as winter range. Note the extensive terracing in Pleistocene silts.



B. Terraced valley sides along Thompson River above Ashcroft provide both winter range and early spring range.

PLATE II

A. Ironmask Lake, near Kamloops, with salt-encrusted margins. Many such lakes receive spring run-off and are then reduced by evaporation.

B. Overgrazed (sage-brush) range in the vicinity of Ashcroft. Such range is used for spring, fall, and winter grazing.

PLATE III

A. Upper grasslands, consisting mostly of spear grass, used as spring range at Alkali Lake, Cariboo district.

B. Willow bottom-land in Durand Creek Valley. The flood plain has been cleared of willow shrub and planted in timothy and brome-grass. Such land is watered by natural flooding in the spring.

PLATE IV

A. Summer range near 100 Mile House. Dry meadow openings in the timber afford good summer grazing.

B. Dried-up swale in the upper Chilcotin. Covered with till, and degraded by constant burnings, such areas yield little forage.

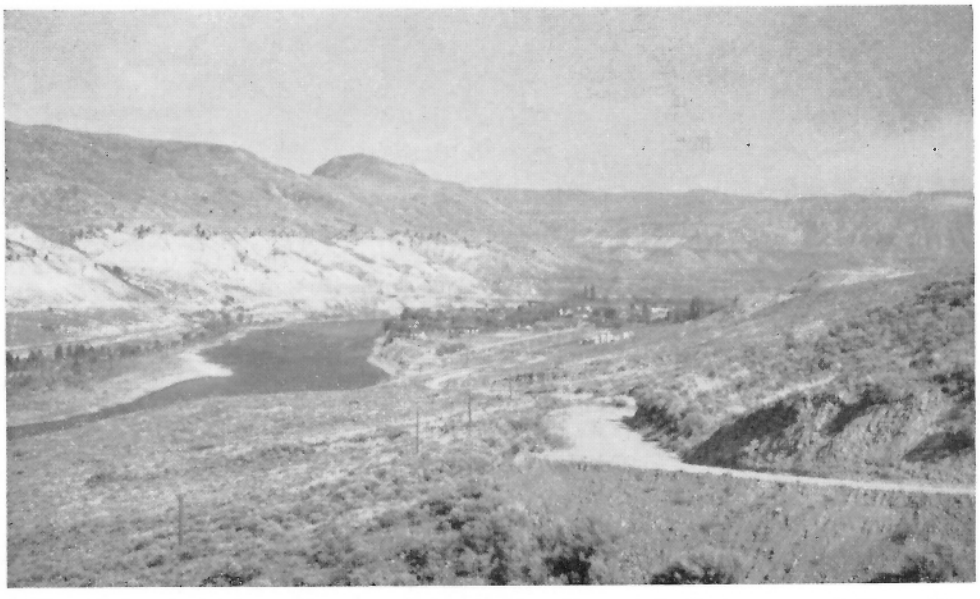
PLATE V

A. Hereford cattle on early spring or winter range north of Kamloops.

B. Sheep on the alpine range of Poison Mountain in the French Bar stock range of southeast Chilcotin (Courtesy Grazing Division, British Columbia Department of Lands and Forests).

PLATE VI

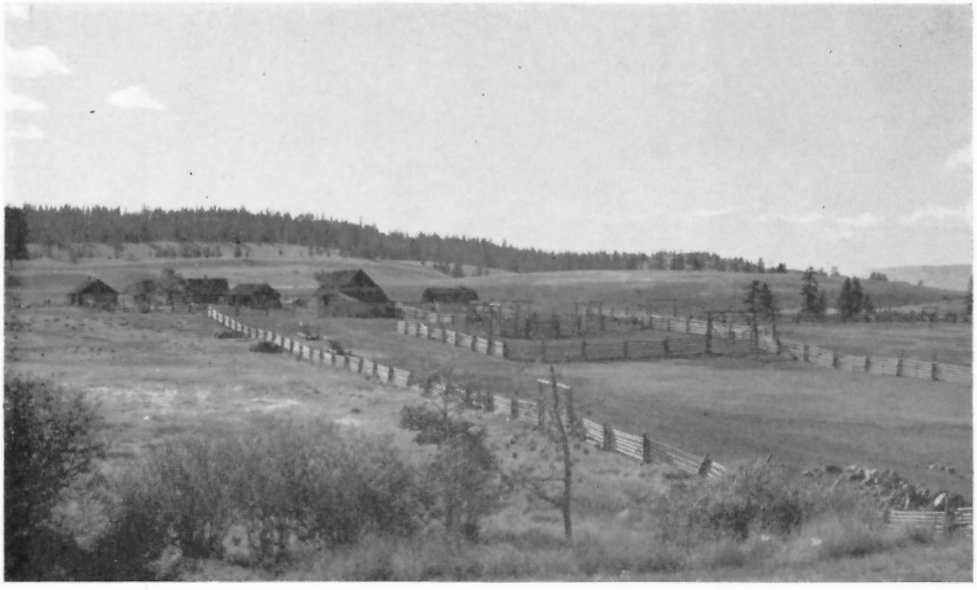
A. BX stage-coach at Cache Creek; this once plied the Cariboo Road from Ashcroft to Soda Creek.



B. Ashcroft, a supply centre and former southern terminus of the BX stage-coach line. The surrounding lower and middle grasslands with sage-brush and bunchgrass afford good spring and fall range.

PLATE VII

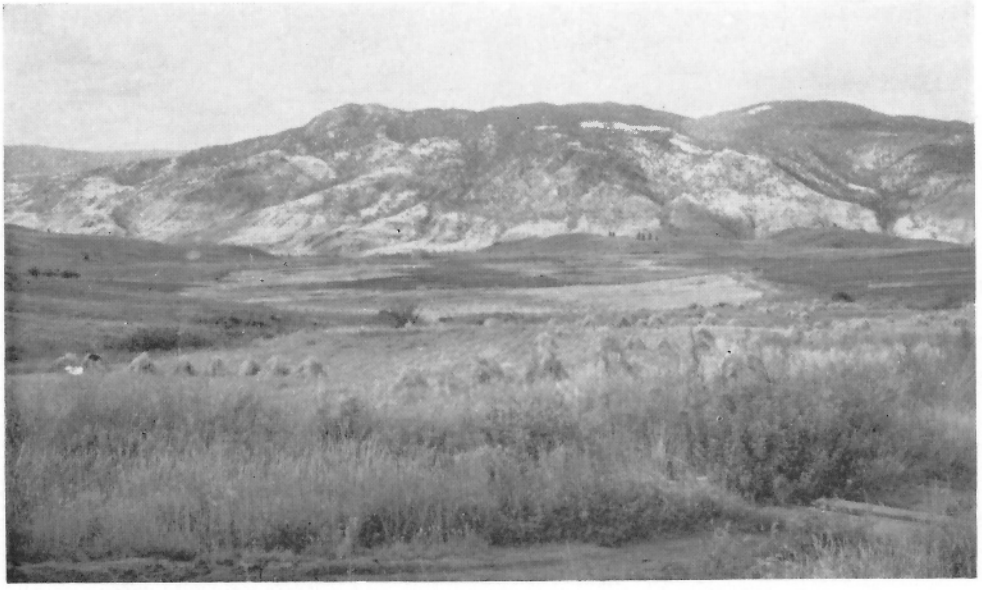
A. Cattle drive along Chilcotin Road. Drives taking as long as 2 weeks are required to bring cattle from the remote parts of the Chilcotin district to the shipping point at Williams Lake.



B. Corrals at the Indian Gardens Ranch.

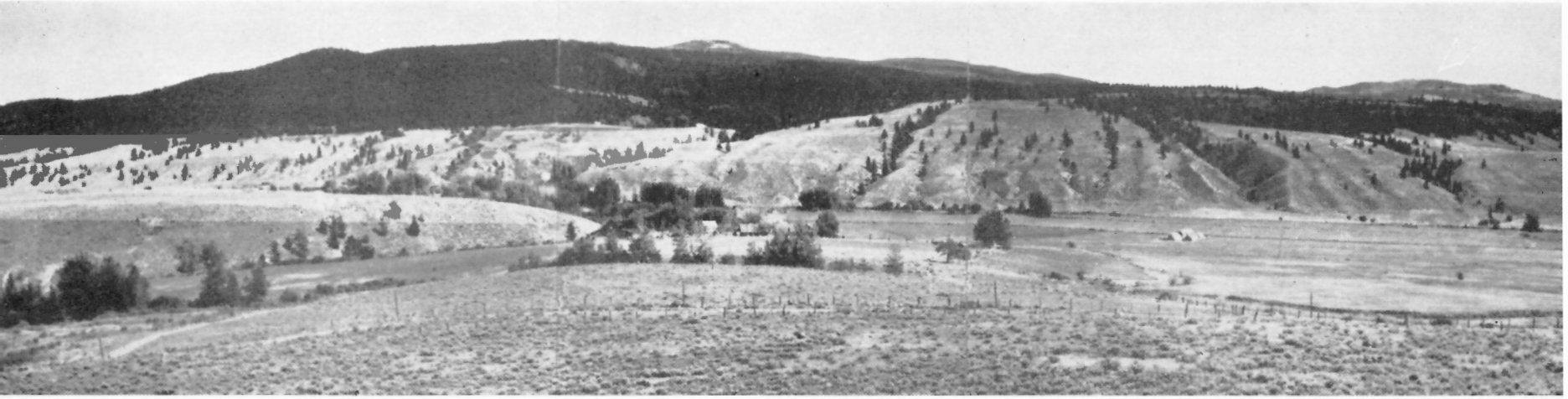
PLATE VIII

A. Pre-emptor's ranchstead at Red Lake, on the upland north of Kamloops. Such units lack good spring and fall range and tend to become subsistence units.



B. Pleistocene terraces irrigated by diversion from Durand Creek. Oat-hay is being harvested.

A. Winter range on Kamloops Lake near Savona. Choice bunchgrass range is prized for winter and early spring or late fall grazing.



B. Lowland type unit near Ashcroft. The ranchstead is located at the head of the large alluvial fan. Water is diverted from a creek to grow hay for winter feed. The lower grasslands afford good spring and fall range and the timbered uplands afford summer grazing.

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