THE UNIVERSITY OF ALBERTA

MAN AND LANDSCAPE CHANGE IN THE BANFF NATIONAL PARK AREA BEFORE 1911

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF

MASTER OF ARTS

CALGARY, ALBERTA

SEPTEMBER, 1964

ABSTRACT

National Parks in Canada are important recreational and scientific resources. For approximately the last fifty years the Mountain Parks of Western Canada have been influenced by an effective policy of protection. An attempt is made to describe, and account for, the landscape of the Banff National Park area as it was before protection became effective. As a necessary preliminary, some attention is given to the variable factors, both physical and cultural, that combined in varying degrees to produce this landscape. Some reference is made to general postglacial changes, but most attention is given to developments during the nineteenth century and the first decade of the present century. Largely because of the claim that the landscape of a National Park is, and always has been, "natural" or non-human in origin, particular attention is given to the importance of man as an agent of landscape change. The phrase "landscape change" is interpreted in its broadest sense but because of the limitations of the available evidence much of the thesis is concerned with changes in vegetation. The relevance of the study's findings to present National Park policy and ideals is examined.

ACKNOWLEDGEMENTS

The author gratefully acknowledges the help given to him by Dr. J.G. Nelson, of the Department of Geography, University of Alberta in Calgary, who suggested the original idea. Thanks are also due to the many members of Federal and Provincial Government Departments in Calgary, Edmonton, Banff, and Ottawa who gave their time to answer questions and to offer advice and information. Further acknowledgement is made to the staff of the Glenbow Foundation in Calgary for their assistance. Thanks are given to the inter-library loan staff of the University of Alberta library in Calgary, to Mr. Denis Johnson for assistance in preparing the thesis, and also to Miss Dingham for her competent typing. The award of an Intersessional Bursary of $1,000 from the University of Alberta during the summer of 1963 is gratefully acknowledged.

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CHAPTER I

Introduction

Canada's National Parks, being areas in which man's influence on the landscape is strongly controlled, provide especially favourable opportunities for study in many branches of natural science. However, the control and protection of the Parks has only been effective for approximately the last fifty years. This thesis represents an attempt to describe and account for landscape changes in the Banff National Park prior to the passing of the Forest Reserves and Parks Act of 1911. The same year saw the establishment of the Parks Branch which might be said to mark the beginnings of an effective protectionist policy. The phrase "landscape change" is interpreted in its broadest sense, but because of the limitations of the available evidence much of the thesis is concerned with changes in vegetation. The study has not been limited to the present Park area, partially because the area of the Park has been changed on several occasions (see Figure 4), and also because its boundaries have always been in many respects arbitrary. The study area covers approximately 4,000 square miles, and can be roughly described as that part of the Rocky Mountains, west of the Front Range, drained by the Kananaskis, Bow, Red Deer, Clearwater, and North Saskatchewan rivers. As far as the time period is concerned, some reference is made to long-term changes during the postglacial,[1] but most attention is given to developments during the nineteenth century and the first decade of the present century.

The claim is often made that, apart from the obvious features of settlement and transportation, the landscape of a National Park is essentially

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[1] Approximately the last 10,000 years, according to Heusser (1956, p. 298).

"natural," or non-human, in origin. Largely because of this, particular attention is given in the following chapters to the importance of man as an agent of landscape change.

The question as to what is the significance of man's effect on the landscape has been given an increasing amount of attention during recent years. Evidence of this was the publication in 1956 of the proceedings of an international symposium on the theme, "Man's Role in Changing the Face of the Earth," (Thomas, Ed., 1956). However, because man's role is only one of the many variables influencing a landscape at any one time, it is important to recognize also the independent, though often closely related, environmental changes. Consequently, although this thesis is especially concerned with man's effect on the landscape, an attempt is also made to evaluate the importance of contemporary environmental changes. Chapter two provides a summary of the environmental changes that have affected the landscape of the thesis area during the time period in question. There follows a brief introduction to the geology, geomorphology, climate, and vegetation of the study area.

Geology

The thesis area contains parts of the two geologically contrasting areas that make up the Canadian Rockies east of the Continental Divide. As described by North and Henderson (1954) they are from west to east: (1) the eastern Main Ranges sub-province, and (2) the Front Ranges sub-province. The boundary between the two is the Castle Mountain thrust fault, which runs approximately north by northwest from the Continental Divide at Simpson's

Pass, across Copper Mountain, up Johnston Creek, up the upper Pipestone Valley and down the Siffleur to, and beyond, the North Saskatchewan. Immediately to the west of this fault is a synclinal structure which, with its long axis parallel to the fault, trends north from Castle Mountain (Mount Eisenhower) towards and beyond the North Saskatchewan. Farther west the syncline is replaced by a breached anticline, which contains the valleys of the Bow and Mistaya rivers. These structures are characterised by relatively gentle dips, only in a few cases reaching 25 degrees. The rocks, generally highly competent, are predominantly quartzites, massive limestones and dolomites, of pre-Cambrian and Cambrian ages.

East of the Castle Mountain thrust are the series of thrust fault blocks that comprise the Front Ranges; these are bounded in the east by another major thrust fault, the McConnell thrust. Dipping usually between 30 and 45 degrees west, these relatively minor faults extend, often discontinuously, in a generally north-west direction. The Front Ranges are subparallel and usually four or five in number. The rocks are younger than those in the Main Ranges and are mainly of Upper Devonian or Carboniferous age. Each thrust block often contains Mesozoic beds in its upper portions. Of these Mesozoic beds the Upper Cretaceous are coal-bearing and owing to the overriding of the thrust blocks some of the coal is anthracitic in nature, as in the Cascade basin east of Banff. The front ranges, in part quartzite, are predominantly limestone. This large areal extent of limestone has been a significant factor in accentuating the relative aridity of the eastern slopes.

The development of relief in the Rockies, in comparison with other similar mountain regions, has not been great. The highest peaks, which are those along the Continental Divide, never reach 12,000 feet. The Front Ranges show a remarkable accordance of summit levels at about 9,500 feet. The major river valleys, generally about 4-5,000 feet below the surrounding peaks, break through the front range at altitudes of between 4,300 and 5,500 feet above sea level. Although their relief is not outstanding, the Canadian Rockies have a well-deserved reputation for ruggedness. This is largely based on the Main Ranges where low dips, resistant rocks, and glaciation have combined to produce some very spectacular scenery.

Rivers in the area show a general adaption to structure, although several break through ranges at right angles to the strike, the Bow at Banff being a good example of this. As yet no satisfactory explanation of the development of the drainage pattern has been given. But as North and Henderson (1954, p. 70) suggest, the Laramide uplift must have been responsible for some of the discordance.

Geomorphology

Although pre-glacial erosion was probably responsible for producing the basic features of the present landscape, its characteristically glaciated appearance is largely due to the effects of Pleistocene glaciations. During the Pleistocene, Cordilleran ice is believed to have accumulated to such a depth that only the highest peaks remained uncovered. Then, as now, precipitation was probably greater along the continental divide and it is in the adjacent valleys of the Bow, Mistaya, and North Saskatchewan that the erosive

effects of glaciation are more pronounced. Most of the valleys in the area retain the characteristic "U"-shaped profile, and many of them, especially in their lower courses, contain considerable depths of glacial till. According to Laycock (1957b, p. 434), bores 600 feet deep in the upper Ghost Valley failed to meet bedrock. The till is characteristically poorly sorted. MacPherson (1963), in a study on the upper Red Deer, interpreted this lack of sorting as one indication of ice stagnation rather than retreat up-valley from an active ice front. Although some work has been done on contemporary glaciers, a glacial chronology for the Pleistocene has yet to be determined. Similarly, little is known of the extent or movement of the Cordilleran ice.

River erosion has cut into the glacial deposits, often leaving terraces along the valley sides. However, it is unlikely that all terraces in the area are due to river cutting, some undoubtedly being of a kame type. Periglacial activity has been, and still is, an important geomorphic process in the area. Large gravel fans at the outlets of tributary valleys, such as those in the Canmore area, are probably postglacial in origin.

The present physiography is a complex of landforms resulting from the different actions of water, ice, frost, and wind. The dominant forms are glacial, although these have been modified by water erosion and deposition.

Climate

The present climatic characteristics of the area have not as yet been accurately determined, mainly because of the lack of a comprehensive network of weather stations. The best summary account of the available evidence is that given by Laycock (1957b, pp. 9-21), from which much of the following is

taken. The main climatic characteristic of the area would seem to be the variability typical of mountain regions. The area's main features are determined by its western interior location on the North American continent, its high elevation, and the fact that it is separated from the Pacific to the west by a series of mountain barriers.

Variation in annual precipitation depends upon the relative frequency and duration of influx of mP and mT air, and the degree to which this air is uplifted either cyclonically, orographically, or convectionally. Maritime tropical air, from the Atlantic and Gulf of Mexico, rarely penetrates beyond the Front Ranges. However, when it does it may supply as much as one-half of the annual precipitation. The most important sources of precipitation are the maritime Polar air masses that enter the area from the west. Mild and moist on reaching British Columbia, they lose much of their moisture in crossing the various mountain ranges before reaching Alberta. Polar Continental air, which sometimes penetrates the Front Ranges from the northeast, does not provide moisture itself but may cause precipitation. Cold front and orographic precipitation is particularly heavy on the northeast-facing front range. Tropical Continental air is occasionally present in the summer or early fall of some years. These air masses are hot and dry and may result in temperatures above 80°F. and 90°F. Such conditions are especially favourable for forest fires, a topic that will be dealt with in some detail in later chapters.

As far as annual precipitation totals are concerned, there is considerable areal variation. The high, back range areas normally receive well

over 50 inches of precipitation annually and possibly over 100 inches, most of which falls in the winter months as snow. In contrast, the low-lying eastern intermontane valleys normally receive less than 25, or even 20, inches each year, the large part of which usually falls in spring and summer as rain. Sheltered valleys in an intermediate position between the continental divide and the front range may receive especially low precipitation totals. These have been suggested by Laycock (1957b, p. 246) as being reason for the existence of the larger areas of prairie within the mountains, such as at the "Yahatinda" or the "Kootenay Plains."

Temperatures show great seasonal and annual variation. Generally speaking, summers are warm and dry and the winters cold and dry. Figures for Banff and Lake Louise (Appendix I) give some indication of "average" monthly conditions in the relatively sheltered valley bottoms. However, they should be regarded with caution as the essential variability of the climate makes mean values misleading. The larger question of climatic change is an important one to this thesis and is dealt with in the next chapter.

Vegetation

The vegetation of the eastern slopes, particularly in the Park area, is as yet poorly known. Its characteristics are just as varied as the geology and climate. Three main vegetative formations are found: coniferous forest, grassland, and tundra.

Forest associations are the most widespread. The upper tree line is found at an altitude of approximately 7,000 feet, where its limiting factors are usually cold, exposure, and steep gradients. The lower tree line is more

variable and is determined by such factors as xeric conditions, repeated fires, deep winter snow, and waterlogging. Rowe (1959) has distinguished two forest divisions: (1) the Subalpine Forest, and (2) the Montane Forest.

In the Subalpine Forest, Engelmann spruce[1] is found in the higher valleys and white spruce in the lower valleys to the east. Between the two at heights between 5,000 and 6,00 are hybrid populations. Horton (1956, p. 6) concluded that the division represents "an ecotype response ... Engelmann spruce preferring the cooler, moister conditions and white spruce the warmer, drier." Heusser (1956, p. 270), largely on the basis of the distribution of white spruce, subdivided the Subalpine Forest into two zones, an upper and a lower. In the upper zone whitebark pine, limber pine, and Lyall's larch are present in small numbers. The latter is especially frequent in the Lake Louise district and in the valley of the Ten Peaks. Alpine (or subalpine) fir is found in association with the spruce throughout the Subalpine forest, and is especially common at elevations above 6,000 feet.

The Montane Forest extends up the Bow Valley to an altitude of about 4,700 feet in the Castle Mountain area. This forest type is characterized by the occasional occurrence of Douglas fir; lodgepole pine and aspen poplar are quite common especially on drier sites. On the moister sites adjacent to the Bow, white spruce is predominant.

The dominant pioneer tree species in both forest divisions is the

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[1] For a list of the common and scientific names of the main trees found in the Park, see Appendix III.

lodgepole pine. Its serotinous cones are often able to survive fires, the heat of which actually frees the seed and enables reproduction to begin. Fire subclimax stands of lodgepole, usually even aged, cover a large part of the thesis area, notably along the Bow, Spray, Kananaskis and North Saskatchewan valleys. At higher altitudes (above 6,500 feet) lodgepole is seldom observed, and spruce or fir may follow directly after burns (see photograph 9). Aspen is another pioneer species. Because of its growth by root suckering it is able to survive disturbances such as fire. After fire, its reestablishment is even quicker than the lodgepole's. The distribution of aspen within the Park area is largely limited to drier sites within the Montane forest.

The stable grassland areas in the mountain valleys, as mentioned in the previous section on climate, are usually found in areas with low precipitation. Other areas where tree growth is restricted are well drained gravel terraces and south-facing slopes. According to Moss (1955) this stable grassland is "sub-montane mixed prairie" or the Festuca scabrella association. On undisturbed sites, rough fescue is dominant, but where grazing is evident the dominants are June grass and sedges (Flook, 1962).

Flook, while primarily concerned with forage producing areas, has described four "subclimax types" in the Subalpine zone that are in part grassland: (1) open conifer stands, (2) fire-produced grass and shrub ranges, (3) moist, shrubby meadows, and (4) avalanche slopes. The first, he attributes to slow reforestation by conifers after fire. Until the tree canopy closes, grasses, particularly hairy-rye grass, and the shrub buffalo berry,

occupy the area between the trees. The second type is the result of fires on arid and south-facing slopes where recovery by trees is especially slow. Such slopes carry a cover of grasses and sedges, and also creeping juniper and bearberry. Similar conditions occur on burned-over flats, where a gravel substratum under a shallow soil causes arid conditions. The "moist shrubby meadows" are flood plains, or silted-in beaver dams, and are characterized by stands of willow and dwarf birch with a mat of sedges and grasses. The fourth type is due to avalanches preventing trees from becoming established and maintains a cover of shrubs and herbaceous plants.

In the Alpine zone, because of the ruggedness of the terrain, a large proportion of the land surface is rock and scree. Lewis (1917) used the term "mat-grassland" to describe the luxuriant herbaceous growth that sometimes occupies the vicinity of the forest-tundra ecotone. Often known as "alpine meadow" this grassland has in some areas been extended by fire (see photograph 7). Above this is Lewis's "mat-herbage." The vegetation is almost completely herbaceous, consisting of perennials with a few decumbent willows and occasional grasses. Higher still this is replaced by a cryptogamic flora, consisting mostly of lichens.

From this brief introductory survey it is apparent that one of the main characteristics of the physical environment is variety. What is perhaps not as apparent as it should be is the changing character of the environment. Although the limited amount of available moisture in the area tends to slow down and limit the growth of vegetation, the same factor is in part responsible for rapid changes. Susceptibility to drought, which is basically climatic, is increased by the general porosity of bedrock and surficial deposits. Consequently

given favourable conditions, fire once started can burn over widespread areas. The causes and frequency of forest fires are important aspects of landscape change in the study area, and will be dealt with in some detail in later chapters.

CHAPTER II

THE CHANGING PHYSICAL ENVIRONMENT

Introduction

Without an awareness of the significance of changes in physical processes through time, the interpretation of any aspect of a landscape is prone to error. The dangers inherent in a short term assessment have been clearly shown in western Canada, first with Palliser's pessimistic prognostications, during the late 1850s, as to the potential of the prairies, and later with the settlers equally unfounded optimism during the 1880s and 1890s.

The question as to how far back in time these environmental changes should be traced is largely answered by the nature of the problem involved, and the reliability of the available evidence. For the present study a logical starting point would seem to be after the last major retreat of the Cordilleran ice. The problem of the chronology of Wisconsin ice fluctuations is also significant to this thesis insofar as it provides the key to possible human migration through the area. Consequently this chronology will be dealt with in chapter three.

During the postglacial the most significant changes in physical process have been in climate. These changes, together with their effects on the environment, and notably on vegetation, have been investigated by Heusser (1956). He used three main methods of establishing climatic change: fossil pollen analysis, measurement of glacier movement, and the analysis of meteorological records kept at Banff since 1895. Griggs (1938) has used an

additional method, measurement of timberline movement. However, for reasons to be noted later, this method is not considered reliable. Schulman (1947, 1959) has done some tree ring analysis in the Banff area, and his conclusions correlate quite well with Heusser's findings.

The more recent climatic changes have been established with fair accuracy by Heusser. However, for most of postglacial time only pollen analysis provides any evidence for climatic change and then only in a very approximate fashion. Nevertheless, before reviewing the more recent climatic record, climatic and environmental perspective must be established by summarizing postglacial climatic change as revealed by pollen studies, and also by critically reviewing the ideas on plant migration that have been put forward for the study area. These ideas on plant migration are, of course, intimately related to pollen analysis and the climatic record, and must be evaluated in any study of man's effect on vegetation.

Changing postglacial environments as shown by pollen analysis

Although of the four pollen profiles Heusser (1956) constructed in the Canadian Rockies only one was from the Banff National Park, the fact that they each showed similar trends and correlated quite well with profiles constructed by Hansen (1948, 49a, 49b) in central Alberta and western Montana, allows certain generalizations to be made.

According to Heusser the pioneer conifer following deglaciation appears to have been lodgepole pine, a species which, according to his pollen profiles, has remained predominant throughout postglacial time, since it usually represented more than 80 per cent and never less than 65 per cent

of the pollen counted. Spruce, and especially fir, which is recognized as an indicator of cool climatic conditions, were also shown to be present in the early postglacial forests. A small increase in Douglas fir at an intermediate position on three profiles has been interpreted as representing the hypsithermal, and a more recent increase in Alpine fir has been taken as indicating the return to cooler conditions.

Hansen's profiles are more distinct and reflect the same pattern: "an initial cool, moist period, a second period of warming and drying, a third stage of xerothermic maximum followed by a final period of cooler and moister climate which in general has persisted to the present." (1948, p. 152)

His final conclusion as regards the persistence of cool-moist conditions until the present will be questioned later in view of other significant evidence.

As far as this thesis is concerned, perhaps the most significant feature of the profiles constructed by Heusser and Hansen, with the exception of the two from Montana, is the high representation of lodgepole pine. Hansen regarded the high proportion of pine pollen at lower levels in his southern Alberta profiles as being anomalous. He suggested as a possible explanation: "...physiographic instability may have been largely responsible for their preponderance in early postglacial, with the effects of fire a favourable contributing factor." (1949b, p. 64) Heusser employs the same explanation for the high percentage of pine pollen at the lower levels of his Rocky Mountain profiles: "These early forests (i.e. of lodgepole) were

replaced by spruce and fir in part while owing to the instability of the land ... lodgepole pine continued to dominate the landscape." (1956, p. 292)

Perhaps of more importance to the present study is the recent expansion of lodgepole pine in the Cordilleran forest. Hansen comments on this expansion in each of his three papers cited above and attributes it to the possibility of increased burning since the advent of the white man. In contrast Heusser (1956), with one exception,[1] makes no mention of the expansion. In a general description of lodgepole subclimax stands, he points out their frequency in the valleys of the Bow, North Saskatchewan, and the Athabasca south of Jasper, and states: "Repeated burning has maintained this vegetation throughout postglacial time; the white man and the Indian have been largely responsible, although lightning has also been a cause." (1956, p. 271)

This implies that these extensive subclimax stands have been more or less permanent during the postglacial; however, as later evidence will show, this has probably not been the case.

Before summarizing the findings of Hansen and Heusser, the probability of overrepresentation of pine pollen must be mentioned. It is known that the percentage of pine pollen in a profile gives an unrealistically high indication

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[1] In describing his Sunwapta Falls profile he states: "The gradual succession of lodgepole to spruce which is shown over most of the section has quite recently been interrupted." (1956, p. 295) He does not, however, attempt an explanation.

of the actual percentage of pine trees it represents. This has been shown experimentally in a comparison between present vegetation and surface pollen samples, made in Vermont by Davis and Goodlett (1960). They found pine pollen to be overrepresented and commented that it is "produced in great quantity," is "readily dispersed," and "falls in an even rain over a wide area." If this is the case in the Canadian Rockies it would do much to explain why pine percentages are so high.

Hansen's and Heusser's conclusions on postglacial changes in climate and vegetation agree, and also reflect the familiar sequence described elsewhere in various parts of the northern hemisphere. Briefly, they suggest climatic changes from cool-moist conditions to warm-dry and again to cool-moist. The associated vegetational changes have been from pine-spruce-fir to pine-spruce-Douglas fir and more recently pine-spruce-fir again.

Plant migration

A further topic, which is closely connected with the broad climatic changes that caused and followed the melting of Wisconsin ice, is that of plant migration. As far as the author is aware, for the area concerned no detailed analysis of these postglacial plant migrations has yet been attempted. Clarke, in a paper which is basically concerned with zoological problems in the Park, gives the following account:

> In explanation it is necessary to go back to the time immediately following the last glacial retreat, before any forest trees had a chance to invade the country east of the Rockies. Then there were undoubtedly only two plant formations, the grassland and tundra, with a wet meadow type intermediate. Engelmann Spruce and Alpine Fir invading from the west, have interposed themselves along the line of separation between the two formations, and in deep snow country have occupied the valleys.

> As a temporary type the Lodgepole Pine has overrun the entire area. From the northwest the white spruce, with poplar as a forerunner, has invaded the grassland area of the east slope and extended into the mountains to meet the Engelmann Spruce, leaving small areas of prairie still unconquered. (Clarke, 1940, p. 3)

This hypothesis can be questioned on several points. The implication that there were no forest trees in the country east of the Rockies would seem to be incorrect. Hansen (1949a) has shown that ice-free areas between Cordilleran and Keewatin ice sheets, possibly during both the early and late Wisconsin glaciations, may have provided refugia for both Cordilleran and Boreal forest species. Ogilvie (1962) has suggested the possibility of a postglacial movement of plant species westwards from the unglaciated Porcupine Hills[1] into the Rocky Mountains of southwest Alberta.

Clarke's idea that grassland and tundra pioneered the deglaciated landscape must also be queried. In the Canadian Rockies Heusser found that only ten years after deglaciation tree seedlings begin to establish themselves (1956, p. 272). The same author states that in the north Pacific coastal forest, conifers "may invade almost directly following glacier recession." (1960, p. 67) While recognising the possibility that none of the fossil pollen profiles constructed from mountain sites date back to the early postglacial, it should be noted that none of them show any indication of grasses at lower levels. Bearing these factors in mind, it seems quite likely that coniferous forests of lodgepole, spruce and fir colonized the mountain valleys very quickly after deglaciation.

Clarke's claim that Engelmann spruce and Alpine fir invaded from the west is also open to question. Garman, while concerned with the origins of

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[1] On figure 8, the Porcupine Hills are approximately delimited by the non-contiguous area of the Forest Reserve, some 60 miles south of Calgary.

the present distribution of spruce in British Columbia, suggested that following deglaciation, Engelmann spruce moved northwards from an ice-free area to the south (1957, p. 25). Possibly a similar movement occurred in Alberta. Similarly a westerly or southwesterly movement into the area of the boreal species, white spruce and poplar, may have supplemented immigration from the northwest.

Clarke's final implication that the small areas of prairie have remained "unconquered," i.e. uncolonized by trees, throughout postglacial time, must also be questioned. While admittedly large areas of prairie, such as are found at the Kootenay Plains on the North Saskatchewan or at Yahatinda on the Red Deer, have probably been grassland during most of the postglacial because of local climatic conditions (see page 7), the same is not true of all the areas of prairie in the mountain valleys. Forest fires have undoubtedly been responsible for some of the prairies. Dwight, while describing forest conditions in the Rocky Mountain Forest Reserve, made the following comment:

> The second type (i.e. meadows in main valleys) has, in most cases resulted from ancient fires that have killed a pure spruce stand on low ground and lack of seed trees after the fire, or repeated fires, has resulted in the occupancy of the area by grass. (1913, p. 29)

The areal extent of grassland in the Park area has undoubtedly fluctuated considerably during the postglacial. Fire, climate, ground water levels, and grazing pressure are all variables that have affected, and are affecting, the grassland areas to a greater, or lesser, degree.

A problem of plant migration not mentioned by Clarke is how and when the Douglas fir came into the area. Its significance as an indicator of

xeric conditions has been pointed out by both Hansen (1948) and Heusser (1956). Horton (1956, p. 8) notes its occurrence in the three main mountain passes (Howse, Kicking Horse, and Athabasca?) and accepts this as suggesting intrusion from British Columbia. If this is correct, it could be inferred that the Douglas fir migrated eastwards into the area during the supposed hypsithermal. Even so, the possibility of northward movement east of the divide should not be ignored.

Glacier variation

By dating the variations of twelve Rocky Mountain glaciers, Heusser (1956) has compiled a fairly detailed chronology of climatic fluctuations for the area during the last five hundred years. His findings suggest that the onset of cooler conditions during the fifteenth, sixteenth, and seventeenth centuries resulted in the general advance of glaciers in the Canadian Rockies, an advance which continued into the first part of the seventeenth century. After a relatively stationary period, recession is believed to have commenced during the last quarter of the eighteenth century and has continued, apart from a major advance during the 1840s and a minor advance around the turn of the present century. Cooler and moister conditions during the 1940s and 1950s were correctly interpreted by Heusser (1956, p. 289) and Collier (1957) as indicating a possible readvance during the early 1960s. Their predictions have been substantiated by the recent advance of the Athabasca (Davis, 1962, p. 8).

The significant conclusion to be drawn from this summary is that, with the exception of relatively brief periods in the 1830s and around the

turn of the present century, the climate during the years between 1775 and the late 1940s has been relatively dry and warm. This amelioration has not been confined to the Canadian Rockies, for the hundred years prior to 1950 it had been reflected in negative regimes for all but a few of the glaciers on which observations had been made (Flint, 1957).

Timberline movement

The investigation of timberline movement is a further method of recognizing climatic change. No detailed work using this method has been done in the study area. However, a broad survey by Griggs (1938) provided conclusions that conflict with the evidence outlined above. Discussion of this paper by Griggs is justified, especially since it may have been responsible for some erroneous attitudes towards climatic and vegetational change within the area.

The paper deals with the southern Rocky Mountains in general, and covers a latitudinal extent of some 10 degrees, from approximately Wyoming Peak, in Wyoming, to the mountains in the vicinity of Jasper, Alberta. Part of the survey included the Lake Louise area, where the author found evidence for recession: "Around Lake Louise on both sides of the range there are many large dead trees (Lyell's larch) at the forest margin where only small cripples are now alive." (1938, p. 563)

He later states: "Explanation of conditions around Lake Louise is not so easy, but it must be pointed out that although the recession is general locally it does not extend as far south as Glacier Park on the south nor to Jasper on the north." (1938, pp. 563-4)

Heusser attempts to explain Griggs' retreating timberline by a deterioration in climate:

> The presence of dead remnants of an early more thrifty forest in the timberline zone ... may represent a time of amelioration when the snowline was higher prior to its lowering in recent centuries. (1956, p. 297)

This "time of amelioration" is difficult to reconcile with Heusser's own chronology of climatic change, since the "lowering in recent centuries" was taking place as long ago as 450 $\pm$ 150 years, according to his radiocarbon date for the Robson glacier advance. In view of the marked amelioration of climate during the hundred years preceding Griggs' investigation, some factor other than deterioration in climate would seem likely to have been responsible for the depression of the tree line.

Part of Griggs' final conclusion, "in the Rocky Mountains, timberline and therefore climate is static, or ... too slow to be detected by the methods employed," was quoted, though not condoned, by Moss in a major paper (1955, p. 551). Possibly this may have given currency to the idea that recent climatic change has been insignificant. Certainly it would seem that in mountainous regions, where numerous variables control the movement of timberlines, intensive study must precede any general conclusions.

Dendroclimatology

Schulman (1947, 1959) in 1944 did some tree-ring analysis in the Banff area. Cores were taken from ten Douglas fir, one lodgepole pine, and "a few" white spruce. While recognizing the limitations of this small sample, his graphs (see Fig. 1) of annual precipitation at Banff, and annual tree-ring growth, show a marked correlation. It therefore seems

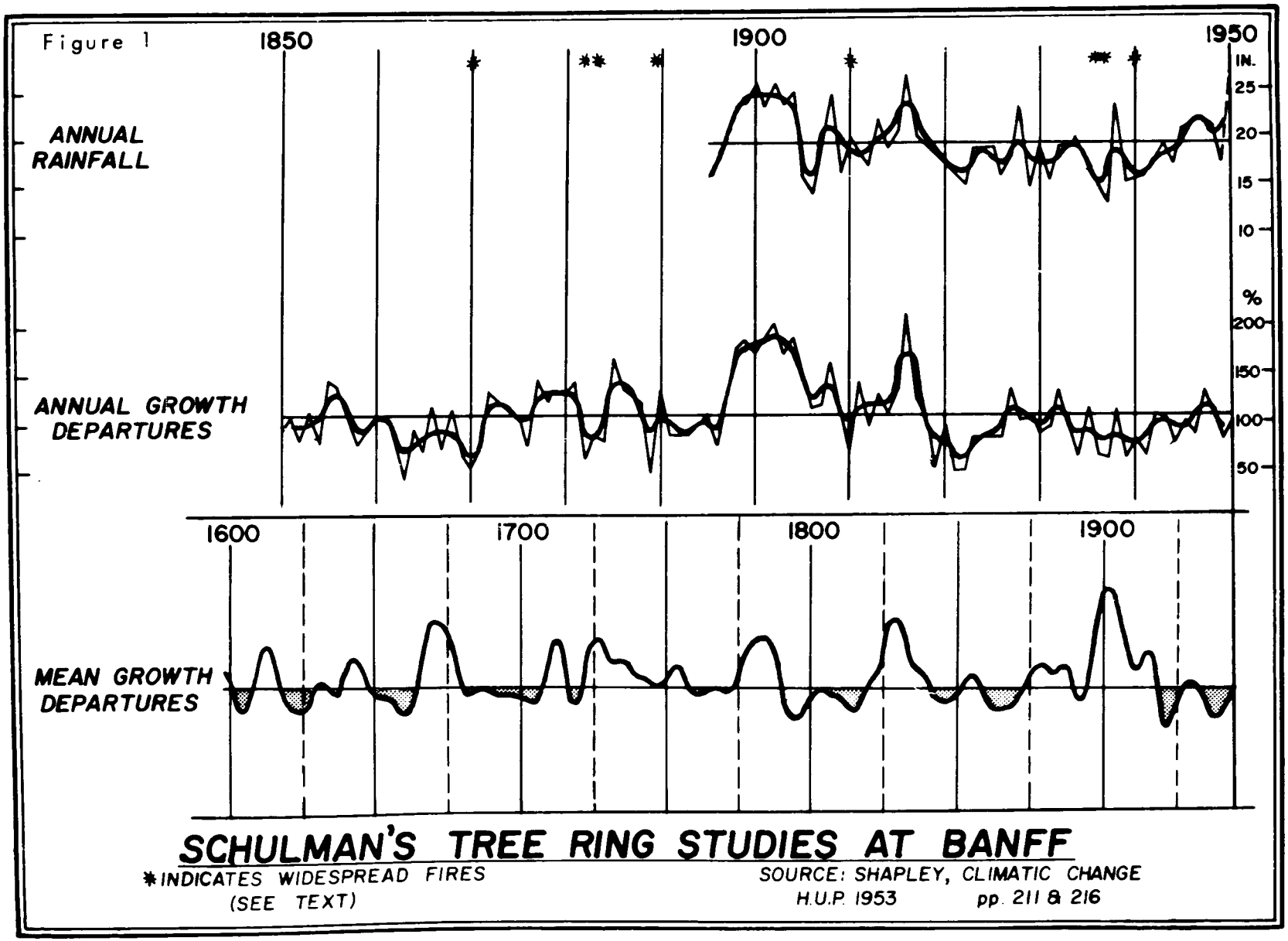
Figure 1
1850
1900
1950
IN.
25
20
15
10
ANNUAL RAINFALL
%
200
150
100
50
ANNUAL GROWTH DEPARTURES
1600
1700
1800
1900
MEAN GROWTH DEPARTURES
SCHULMAN'S TREE RING STUDIES AT BANFF
*INDICATES WIDESPREAD FIRES
(SEE TEXT)
SOURCE: SHAPLEY, CLIMATIC CHANGE
H.U.P. 1953 pp. 211 & 216

safe to use the latter as an indication of the former for the years prior to 1895. His tree-ring mean growth graph indicates that, apart from periods of above average growth around 1830 and 1900 the 160-year period following 1790 shows consistently below average increments. Marked growth minima occur at c. 1790, c. 1820, c. 1840, 1860 to 1870, c. 1920, and 1930 to 1950. If these low growth periods represent a lack of available moisture, the same periods may have been climatically warm and dry and probably included a relatively high number of drought years. Heusser (1956), while analysing the same graph, makes the significant point that although the 1830 growth maximum was reflected by a strong glacial advance during the 1840s, the even higher maximum around 1900 was followed by only moderate glacier responses. This, he states, implies that "temperature was lower prior to 1900 and played a significant part in earlier advances" (1956, p. 297).

The value of Schulman's graphs to this thesis is that they add detail to the evidence for recent amelioration of climate that Heusser presented from glacier retreat data. While indicating clearly that the late eighteenth and nineteenth centuries were climatically different from the period 1660 to 1790, the graphs also show how, and when, periods of relative drought increased in frequency.

The Meteorological Record

Climatic changes during the present century are largely beyond the scope of this thesis. However, they are of value insofar as they reflect possibly similar changes during the nineteenth century. The climatic amelioration shown by glacier variation measurement and tree-ring analysis has

not been a regular development. Time periods in the order of ten to thirty years appear to have followed each other in a warm-dry, cool-wet sequence. Heusser (1956, pp. 289-290), on the basis of the Banff data, notes a "general decline of precipitation from the beginning of this century to the late 1930s while over this same period temperatures have risen..." and also a "conspicuous increase of precipitation and decline of temperature during the late 1940s..." The same author showed that during the period 1899 to 1938, ten-year running means of the total annual precipitation at Banff fell from 22 inches to just more than 16 inches. During the same period, ten-year running means of mean annual temperature showed an increase of 1.7°F (1956, p. 268). These mean values, while indicating the scale of the ten to thirty year changes, fail to show the significance of annual fluctuations. Some idea of annual climatic fluctuation, at least in terms of precipitation, can be obtained from the graph shown in Figure 1 . The relatively warm and dry first three decades of the present century can be seen to have included several years in which precipitation totals were approximately twenty per cent below normal. They are: 1905, 1906, 1922, 1926, 1929, 1931, 1935, 1936, 1937, 1939, 1940, and 1941.

Because of the fair correlation between Schulman's annual tree-ring growth figures and the annual precipitation totals for Banff during the present century, the former probably also reflect nineteenth century climatic changes. If so, it seems likely that during the several warm-dry periods of the nineteenth century,drought years were relatively frequent, just as they were during the first three decades of the present century. And also, that they were

certainly more frequent than during the eighteenth century. The significance to this thesis of the climatic amelioration, and in particular its increased frequency of drought years, is that it probably meant that environmental conditions favourable for forest fires also increased.[1]

Recent changes in climate and their effects on the landscape

A particularly significant aspect of climatic fluctuation would seem to be its modification of the environment so as to make it more, or less, vulnerable to further change. In the case of vegetation, fire and disease are both important aspects of change; the importance of both is often clearly dependent upon the prevailing climatic conditions. The relationship between the recent climatic amelioration and forest diseases has been briefly discussed by Hepting (1960). As far as the author is aware, little attention has been given to the relationships between climatic change and forest fire frequency.[2] That the frequency and extent of forest fires in the Banff Park area increased during the nineteenth century as a result of a combination of an increasingly favourable environment for fire, and the arrival of the white man, is a basic theme of this thesis.

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[1] Admittedly a low annual precipitation total alone may not necessarily indicate a bad fire year; other factors such as the seasonal distribution of precipitation must be taken into account. Even so, it seems reasonable to expect that the general warming and drying of climate meant conditions favourable for forest fires recurred with greater frequency.

[2] Exceptions are two papers by Larsen & Delevan (1922) and Gray (1934). Both investigate in some detail the variable climatic factors influencing forest fires.

It is quite clear from the climatic evidence shown above that several marked periods of drought during the nineteenth and early twentieth century provided environmental conditions that were especially vulnerable to widespread fires. Such periods would be 1790-1820, 1840-75 and 1910-45. There is no available evidence for the first period, though historical evidence for the second and statistical evidence for the most recent period show clearly the relationship between fire and climate.

As Heusser states, forest fires have occurred within the area "throughout postglacial time" (1956, p. 271); this is proved without doubt by the numerous observations of buried charcoal layers (e.g. Dawson, 1886, p. 33b). Unfortunately we have no means of estimating the frequency or extent of prehistoric fires. Pollen profiles for the area show marked fluctuation in pine percentages, which can be attributed to the effects of fires, but little more can be deduced from them.

Possibly the widespread burning that followed the arrival of the white man in the area may have created a false impression of the role of fire in vegetation change. This, together with the reaction against the "unnatural" conditions maintained by successful fire prevention, may have led some authors to overrate the importance of fire under "natural" conditions.[1]

The evidence for the relationship between fire and climate will be

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[1]See for example Bloomberg (1950) who maintains "that fire is not only associated with the succession cycle ... but is actually the kingpin of the whole structure."

examined in later chapters. The point to be stressed in this chapter is that the white man alone should not be blamed for the extensive forest fires of the late nineteenth century, since he arrived in the area at a time when conditions were becoming increasingly favourable for such fires.

The recent climatic amelioration has probably affected the environment of the thesis area in a variety of ways other than by directly changing vegetation through fire or disease. Changes in fauna, such as those described for other areas by Crisp (1959) and Harris (1964), may have occurred. However, their investigation is clearly beyond the scope of the present study.

Successional Change

Clearly all the aspects of change in a landscape are not directly due changes in climate. Perhaps the most important aspect of non-climatic change is that of plant succession. Largely due to the short time period during which observations have been made, the dynamics of forest succession are as yet not clearly understood.

Horton's survey (1956) has shown that lodgepole pine and aspen poplar are subclimax species which, because of serotinous cones and rapid growing root suckers respectively, establish themselves after interruption by fire or other disturbance. Aspen, however, is not able to compete with the pine over much of the region and therefore lodgepole is the dominant subclimax species. After 225 to 375 years, depending on the closeness of the subclimax stand and the availability of spruce seedlings, the spruce will outgrow the pine and suppress it. The stability of the resultant spruce-fir climax has been a question of some debate. Bloomberg (1950) has taken the

view that without fire the spruce-fir climax cannot reproduce itself. Cormack (1953) has emphasized the stability of the climax. According to Moss (1955) after a period of approximately 500 years the spruce will be succeeded by the fir. Cormack (1956) disagrees, and suggests that the eventual dominant will be spruce. Moss also pointed out that this length of time without fire made it a theoretical concept. Similarly, Smithers (1961, p. 46), in referring to the Subalpine forest, has commented: "History has disclosed that long before the climax stand can become fully developed, the chances are that fire will strike."

Fire is undoubtedly an important part of forest succession on the eastern slopes. A major point in this thesis is that the importance of fire is a variable factor, depending on changing environmental conditions and cultural attitudes. Historical evidence for fire frequency is based on short-term observations and is therefore possibly atypical. A better understanding of succession on the eastern slopes must clearly be based on detailed stand history study and an awareness of long-term environmental changes.

A further aspect of plant succession that will be mentioned in later chapters is that of succession on the areas of subalpine grassland within the mountain valleys. In this case the stability of the Rough Fescue association (Festuca scabrella) is not upset by fire but by grazing. Once again the dangers inherent in a short-term assessment of what are "normal" conditions are apparent. Historical evidence for changes in the successional status of the grassland areas will be dealt with in later chapters.

Conclusion

From the foregoing summary it can be seen that the landscape of the area has never been static, but in a constant state of change. Throughout postglacial time climatic change has probably been the most important causal factor, though others have been involved. Due to the present lack of available evidence the problem of assessing the relative significance of different scale climatic changes in changing the landscape is almost insoluble.

During major fluctuations of climate such as the "hypsithermal" and the following "Little Ice Age" the vegetation of the area underwent certain changes. Apparently there was an increase in Douglas fir during the former and a reassertion of Alpine fir and spruce during the latter. Small scale climatic fluctuations that have presumably always accompanied the major climatic changes have been fairly well documented for the last 500 years. And for approximately the last 120 years, by use of historical evidence, some estimates can be made as to their importance in changing the landscape, particularly with reference to forest fire frequency.

When the white man reached the area in significant numbers during the second half of the nineteenth century, he did not replace environmental processes of change but in some cases accelerated them, and later during the "protection period" attempted to control them.

CHAPTER III

MAN'S SIGNIFICANCE IN THE AREA DURING THE PRE-EUROPEAN PERIOD (? - c. 1750)

The variable nature of man's effect on the landscape

Having briefly surveyed the physical processes that have changed, and are still changing, the physical environment, an attempt will be made to assess the significance of man as an agent of change. It must be stressed that man's role is seen, not as an independent process superimposed upon unrelated natural processes, but rather as a variable closely integrated within the complexity of the changing landscape as a whole. The variability of man's role is perhaps best understood by the use of four time periods:

1. The Pre-European Period (? - c. 1750)
2. The Fur Trading Period (c. 1775 - c. 1850)
3. The Prospecting and early Railway Period (c. 1850 - 1886)
4. The early Park Period (1887 - 1911)

As will be shown later these divisions are to a certain extent arbitrary, but even so the different cultural values and activities they represent are clearly differentiated and are in part reflected in the landscape.

Because of a lack of available evidence, archaeological or otherwise, the significance of aboriginal man as an agent of landscape change must remain as yet largely unknown. The seriousness of this inadequacy is perhaps lessened by the generally held belief that his significance was slight. The pre-European population density in the mountain valleys was undoubtedly never very grea Partially because of this and also because of his limited cultural development

aboriginal man was probably never in any sense a dominant factor in his environment. However, to add perspective to later historical developments, some discussion will be given to the possibilities of his presence in, and effect on, the area.

The antiquity of man in the area

Theoretically the first question to be posed is, "When did man first arrive in the area?" Understandably no definite answer can be given to this, but if certain assumptions are held to be correct several tentative conclusions can be drawn. First, the assumption is made that the Alberta foothills were a main routeway for prehistoric migrations southward from the Bering Straits. That they were the only routeway south is certainly not true. Heusser (1960, p. 209) has pointed out the advantages of a west coast route, and the discovery of human artifacts, in the Fraser valley at Hope, associated with a C_{14} date of 11,000 (Pendergast 1963, p. 133) suggests the feasibility of an intermontane movement. If the Alberta foothills are accepted as an important prehistoric routeway, it follows that there would undoubtedly be a seasonal movement into, and perhaps through, the adjacent mountain valleys, especially when game was in short supply on the plains. That such a movement occurred in early historic times was noted by Palliser (1863, p. 92).

Accepting then the feasibility of aboriginal man entering the mountain valleys, the question as to how soon he began to do so still remains unanswered. Until definite archaeological evidence is uncovered, any answer must be essentially a deductive one based on a knowledge of the glacial chronology for the area and a consideration of definite dates for prehistoric

settlements further south. As Sauer (1944, p. 356) has said, the determination of glacial successions in western Canada will provide the key as to how and when prehistoric man moved south. Although work in Alberta has not yet provided a comprehensive Pleistocene chronology, a review of the more recent findings seems pertinent.

Glacial chronology and the antiquity of man

Due largely to the small number of C_{14} dates determined as yet, no absolute chronology for the successive glaciations in Alberta is available. Gravenor and Bayrock (1961, p. 47) have summarized the rather meagre evidence. One C_{14} date of at least 31,000 has been determined for a spruce log found in surface drift in the Smoky Lake district northeast of Edmonton. Stalker (1958, p. 252) obtained a date of at least 30,000 for wood found in inter-till deposits in a section near Kipp on the Oldman River. He believes the inter-till deposits represent a major interglacial stage, "possibly Yarmouth or Sangamon." Gravenor and Bayrock also refer to a date of 11,000 years derived from a piece of willow wood found 40 feet below the surface in outwash sands at Taber in southern Alberta.

Further evidence, not quoted by Gravenor and Bayrock, is presented by Horberg in his paper on the Waterton area (Horberg, 1954). He notes the existence of two buried soil profiles of different ages. The oldest he found on the Kennedy drift, which is thought to be correlated with the Kansan ice advance. He describes the soil as being of a considerable thickness representing a long period of weathering, "probably including Yarmouth, Illinoian and Sangamon time." The second buried soil he found on early

Wisconsin drift (Tazewell and Iowan). He calls it the Drywood soil and regards it as belonging to a Wisconsin interstadial representing a period of weathering which would "equal or exceed the post-Cary interval believed to be represented by the younger surface soils" (Horberg 1954, p. 1134).

Tharin (1960), in a thesis concerned with the surficial geology of the Calgary area, notes evidence for two definite periods of ice advance. During the first,Cordilleran and Keewatin ice met in the Calgary area, whereas during the second there was no coalescence. The plausibility of an ice-free area to the west of the Keewatin ice is suggested in a previously mentioned paper by Hansen (1949b, p. 62). He states: "An ice-free area a hundred or more miles wide was open to forest invasion before and during the Altamont" (i.e. Mankato advance).

Although the absolute chronology he uses is invalidated by dependence on Antev's earlier dates (i.e. Tazewell - 40,000, Cary - 35,000, Mankato - 25,000 B.P.), his findings correlate with those put forward by Tharin.

As far as the deglaciation of the mountain valleys is concerned, Horberg's comments on the Waterton region are presumably applicable to the Banff area. "It appears the Mankato glaciation was very weak or locally absent and that a major discontinuity separates the Cary deposits from the cirque moraines, valley and fan gravels attributed to the little Ice Age" (Horberg 1954, p. 1111).

If correct, this would imply that the mountain valleys have been largely free of ice for 10-11,000 years. This agrees to a certain extent with Heusser's chronology (1956, pp. 297-8) which suggests that Cordilleran

ice began to retreat c. 10,000 years ago.

In conclusion, the early Wisconsin advance, which began at least 30,000 years ago and resulted in the coalescence of Cordilleran and Keewatin ice, must have definitely prevented any human migration southwards through Alberta. If Horberg's conclusions about the Drywood soil are correct, it would seem possible that some interstadial migration may have occurred. That migration also may have been possible during the late Wisconsin (Cary) is suggested by the findings of Hansen and Tharin. However, Horberg's mapping of the continental moraines associated with the Cary substage shows them to be skirting the front range, and therefore for a time at least precluding any human movement southward. The Mankato readvance of some 8-11,000 years ago extended into eastern Alberta only as far as the Altamont, or Max moraine (Townsend and Jenke, 1951) and was insignificant in the mountains. This would suggest that it was probably not a barrier to southward migration.

The idea of an ice-free corridor between Cordilleran and Keewatin ice, varying in width during successive advances and retreats, may have only limited validity in Alberta. According to work done by Stalker (1960) and others, the dominant process of ice wasting in Alberta was stagnation rather than lateral recession. The significance of such findings to the question of migration by prehistoric man deserves further study.

In view of the relatively recent date for the first Wisconsin advance, together with C_{14} dates for settlement further south, an early date would seem to be demanded for the antiquity of man in western Alberta. If the predecessors of the peoples who inhabited the site near Lewisville, Texas,

where artifacts have been dated at more than 37,000 years old,[1] used the foothills route, they must clearly have done so before the last major ice advance. The same argument could be applied to the prehistoric peoples who inhabited Tierra del Fuego as long ago as 10,000 years before the present (Bird, 1951; Auer, 1960).

The significance of pre-European penetration into the area

Pre-European penetration of the area was probably never very great. An indication of this is that in contrast to mountain areas further south none of the numerous caves in the area have shown any evidence of human habitation. For the primitive Indian, the Canadian Rockies must have presented a difficult environment in which to survive. The foothills, as a transitional zone between the mountains and plains, offered the Indian more game and a milder climate, and therefore a better chance of survival. Some of the smaller, less warlike tribes may have been forced to hunt in the mountains, but their numbers were probably never very great. The Rocky Mountain Stoney's, who during the nineteenth century hunted in the mountains from the North Saskatchewan to near the present international boundary, numbered only about 225 at the time of the Palliser expedition (Palliser, 1863, p. 201). Kroeber (1963, p. 187) described the Rocky Mountains as a cultural boundary:

> Like the other elevated major divisions the Rocky Mountains constituted chiefly fringes, hinterlands, or barriers under native settlement. There was no population pressure, in our sense, to force active utilization of all land; no mining, stock raising, or lumbering industries to draw parts of a population from the lowlands into the mountains.

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[1] Quoted though not condoned by Wormington (1957, p. 58)

The Rocky Mountains were not an impassable barrier to the prehistoric Indian. Indians living to the west of the mountains, such as the Shushwap and the Kootenay, had crossed to the plains to hunt the buffalo for an unknown period of time before the arrival of the white man. According to Franchere, writing in 1819 (cited by Spry, 1963b, p. 36), war parties of the Plains Indians as large as 2,000 crossed the mountains.

The effects of postglacial changes in climate on the density of the Indian population in the mountain valleys is as yet unknown. Wedel (1963), while stressing the significance of water springs on the high plains and "the nearby sheltered valleys of the Front Range" as possible settlement sites for the pre-horse Indian, cited a statement by Huscher and Huscher (1941, pp. 226-9):

> The most important inferences to be drawn from the season's work are that the Rocky Mountain region likely was occupied continuously throughout the post-Pluvial drought period which came to an end some 4,000 years ago, and that during the drought, retreat of some of the small nomadic bands must have been upward into the higher hills instead of downward, to regions of more stable rainfall.

This statement was based on work done in Colorado; whether or not any similar claims can be made for the Canadian Rockies will depend upon the findings of future archaeological work. On the basis of available historical evidence it seems unlikely that the mountain valleys of the thesis area offered anything more than summer hunting for a relatively small number of Indians.

Aboriginal man's effect on the landscape

Although no definite conclusions have been drawn as to the antiquity

of man in the area, or the possibilities of prehistoric penetrations into the mountain valleys, it would seem unwise to dismiss the prehistoric Indian as being of no significance as an agent of landscape change. By hunting he may have occasionally depleted the numbers of certain game animals in the area; however, such changes were probably of a similar order as those associated with "natural" fluctuations. Of more significance to this thesis is the question of aboriginal man's importance as a cause of forest fires. On the basis of the incomplete evidence available, the tentative conclusion can be drawn that he did not often deliberately burn the forest in the Park area. Before attempting to justify this it might be useful to summarize the evidence for the contrary view.

Lutz (1959), in a survey of man's importance as a cause of fires in the Boreal Forest, listed the following as motives for deliberate burning: (1) signaling, (2) hunting, (3) warfare, and (4) combating insect pests. For the Cordilleran forest the author has uncovered only one reference to the use of fire in signaling, and that in Montana, some twelve miles northeast of Helena. Captain Lewis has the following entry in his Journal for July 20, 1805:

> ...about 10 A.M. we saw smoke arise as if the country had been set on fire up the valley of this creek about 7 mi. distant. We were at a loss to determine whether it had been set on fire by the natives as a signal among themselves on discovering us, as is their custom, or whether it had been set on fire by Capt. C. and party accidentally. The first however proved to be the fact, they had unperceived by us discovered Capt. Clarke's party or mine and had set the plain on fire to alarm the more distant natives (heard a gun from Capt. C's party & fled quite over the mountains thinking it their enemies the Blackfoots) and fled themselves into the interior of the mountains. (Thwaites, ed., 1959, Vol. 2, p. 252)

Whether the Kootenay Indians, who hunted in the foothills of southwestern Alberta during the early eighteenth century, used fire for signaling is not known. Certainly they faced the same situation that confronted the Shoshoni as described by Lewis, and were eventually driven across the Rockies by their more warlike eastern neighbours, the Piegan. Hector (1861, p. 230) described how the Plains Indians who lived along "the edge of the woods," had "either by accident, or for the purpose of making signals," cleared, by burning, large areas of coniferous forest. He also commented that "similar fires take place in the thick wood country and in the forests of the Rocky Mountains." By 'Rocky Mountains' Hector was probably referring to the general thesis area as this was the only part of the Rockies he was familiar with. Although brief, his comment does indicate that the Indian caused forest fires in the early historic period, and probably also in the prehistoric period. Whether they were started deliberately or accidentally is not clear. The botanist David Douglas, who crossed the Rockies by the Athabasca Pass in 1827, made no mention in his Journal of Indian fires within the mountains, but gave the following description of a Parkland area some thirty miles northeast of Edmonton:

> ...fine undulating ground with clumps of poplar and willow on the low parts, Mespilus canadensis on the dry spots intermixed with Rose and Rubus, both shy in growth, the country from time to time being burned by the Indians. (Douglas, 1914, p. 267)

Although Douglas suggests no reason why the Indian burned the forest, it was probably the indirect result of prairie fires started to drive the buffalo. Peter Fidler's Journal (Fidler, n.d.) contains numerous references to the burning of the prairie for buffalo drives. Possibly such fires may have swept westward and affected the foothills or eastern mountain valleys.

However, as far as burning of the forest to aid hunting within the mountains is concerned, the lack of evidence means no definite conclusions can be made. Similarly, the prehistoric Indian's use of smudge fires to combat insect pests may have been a cause of forest fires, but once again this remains unsubstantiated by factual evidence.

An example of deliberate burning,not mentioned by Lutz (1959) but described by Lewis and Clark, in the Rocky Mountains was that of burning trees for superstitious motives. Lewis, in his entry for June 25, 1806, describes the actions of the Chopunnish Indians, a part of the Nez Perce tribe, who lived seasonally in the Bitteroot Mountains of Montana:

> Last evening the Indians entertained us with setting the fir trees on fire ... The natives told us that their object for setting those trees on fire was to bring fair weather for our journey. (Thwaites, ed., 1959, p. 159)

Whether such practices were ever carried out in the mountains of the thesis area is as yet unknown. Stewart (1956, p. 129) made the rather sweeping summary statement that: "The unrestricted burning of vegetation appears to be a universal culture trait among historic primitive peoples and therefore was probably employed by our remote ancestors."

Before drawing any similar conclusions it seems desirable to discuss the evidence that would suggest the prehistoric Indian was not a significant cause of forest fires.

Forest fires on the eastern slopes, particularly during a dry season, can be fast moving and dangerous occurrences. The deliberate starting of fires by the prehistoric Indian, whether for hunting, warfare, or other pur-

poses, could have been a particularly hazardous proposition. A further negative point would have been that forest fires within the mountains and the smoke they produced were often responsible for reducing the amount of game.

While the use of fire for signaling was undoubtedly valuable under some circumstances, it has been suggested to the author[1] that fire smoke could also betray the position of a weaker tribe, as those inhabiting the mountains often were, to their more warlike enemies. Consequently the Indians who seasonally inhabited the mountain valleys may have been careful in their use of fire.

In the opinion of early explorers in the area the Indian had not been a significant cause of forest fires prior to the arrival of the white man. The geologist Dawson, who explored the area very thoroughly in the 1880s, pointed out that those passes used by the Indian, such as the Vermilion and North Kootenay, were generally unburnt (Dawson, 1886, p. 37b).

An historian well versed in the historical literature of the area has indicated to the author[2] that she was unaware of any evidence suggesting that the Indians deliberately burnt the forest in the mountains.

In summary, the admittedly sparse evidence available for the late eighteenth and nineteenth centuries can hardly be used to interpret with any

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[1]Personal communication. Hugh Dempsey. Oral.

[2]Personal communication. Irene M. Spry. March 16, 1964.

certainty the significance of the prehistoric Indian as a cause of forest fires during what may have been as much as the previous 10,000 years. The lack of more definite historical evidence in itself suggests that, at least during the immediate pre-European period, the Indian had not been important as a cause of forest fires. Certainly his effect on the landscape was insignificant in comparison to that of the white man during the second half of the nineteenth century.

CHAPTER IV

THE EXPANSION OF THE FUR TRADE INTO THE AREA

The Fur Traders, even more than the Indians, regarded the Rocky Mountains as little more than a barrier to transcontinental movement. Although during the first few decades of the nineteenth century the mountain valleys were an important source of beaver, for several reasons the Fur Trade never became firmly established in what is now southwest Alberta. By mid-nineteenth century the Hudson's Bay Company had all but lost its influence in the area and the Palliser Expedition (1857-9) might be said to mark the beginning of the period when prospecting for minerals promised to be more lucrative than trading for furs. However, before attempting to analyse the Expedition's reports, which provide the first scientific descriptions of the area, it will be of value to summarize the irregular nature of early European expansion into the region.

As has been pointed out by Warkentin (1964, p. 10), the early penetration of western Canada by Europeans was not a rapid process. This was especially the case as far as English expansion from the Hudson's Bay was concerned. Nearly two centuries were to follow Button's first sighting of the west coast of Hudson's Bay in 1612 before Thompson sent his two voyageurs, La Gasse and Le Blanc, across the Rockies through what is now the Banff Park, in the fall of 1800. French expansion to the west, during the first half of the eighteenth century from the St Lawrence basin, promised to be more enterprising but was cut short by the Seven Years War of 1756-63.

There were several reasons why the westward expansion of the fur trade was delayed, the most important being the early policy of the Hudson's Bay Company. Apart from Kelsey's obscure journey in 1691-2, the Company for a period of some 84 years after receiving its charter in 1670, was content to restrict its activities to trading with Indians coming to the Bay. Also important was the understandable unwillingness of Indians who acted as middlemen to guide the Fur Traders inland. The reluctance of the Plains tribes to hunt for furs was a further factor restricting the westward expansion of the fur trade.

During the second half of the eighteenth century increasing competition for furs gave a sudden impetus to exploration in western Canada. Whether Saint Pierre's report that Fort la Jonquiere was founded in May 1751 as far up the Saskatchewan "as the Rocky Mountains" is correct or not, it was the associated French expansion that forced the Hudson's Bay Company to send Henday inland in 1754. Henday, who wintered with the Blackfeet, reached just to the southwest of the present town of Red Deer, Alberta. Although he apparently did not reach the Rockies, he is credited with being the first European to see them.

As mentioned above, the Seven Years War ended the French interest in the fur trade but this was replaced after 1763 by the vigorous expansion of free trade from Montreal, and the establishment of the North West and X.Y. companies. The need for accurate maps that developed as a result of the rapid extension of the fur trade was responsible for the beginning of what has been called "a new era ... in the scientific exploration of the Canadian

West." (Warkentin, 1964, p. 65) In 1778 the Hudson's Bay Company appointed for the first time a trained surveyor, Philip Turnor, who was succeeded in 1792 by his pupil, Peter Fidler (Baker, 1937, p. 364). Other important figures in this new phase of exploration were Alexander Mackenzie, David Thompson, D.W. Harmon, and Simon Fraser. Of particular interest to this thesis is the work of Fidler and his pupil Thompson.

During the years 1787-8, Thompson, while still with the Hudson's Bay Company, wintered with the Piegans in the Bow River area just to the east of the front range. It seems clear he did not enter the mountains during this journey, but his following description of them, given from a viewpoint which must have been near the present site of Calgary, illustrates what a formidable obstacle they appeared to be.

> ...but as we proceeded, they (the Rocky Mountains) rose in height, their immense masses of snow appeared aboye the clouds, and formed an impassable barrier, even to the Eagle.[1] (Warkentin, 1964, p. 95)

Four years later in 1792 Peter Fidler, having just succeeded Turnor as official surveyor to the Hudson's Bay Company, began his "journey over land from Buckingham House to the Rocky Mountains." Fidler wintered with the Piegans in much the same area as Thompson had before him. Fidler was keen to cross the mountains but was strongly discouraged from doing so by his hosts. He did, however, travel along the mountain front from Chief Mountain, just south of the present international border, to the Devil's Head near the Ghost

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[1] Extract from the thirty pages of Thompson's Narrative missing from the Champlain Society 1916 edition. Manuscript discovered in 1957 and now in the Ontario Department of Public Records and Archives.

River. He also collected as much information as he could about passes through the Rockies and recorded it in his yet unpublished journal (Fidler, n.d.). After talking to a Kootenay Chief somewhere near Chief Mountain, he concluded: "There is no way of passing over these Mountains in these Latitudes except along rivers and here it is attended with great hardship and danger." (Cited in Spry, 1963b, p. 27) He also described what he had learned of La Gasse and Le Blanc's journey to Kootenay country which was made in 1800 probably across what is now called the Howse Pass. The two voyageurs had reported that the Indian trails had fallen into disuse and become overgrown, since smallpox had in 1781 killed many of the Kootenays who had used them.

Fidler, in describing the journey of La Gasse and Le Blanc, was in fact recording the achievements of the North West Company. Thompson, disgruntled with the Hudson's Bay Company's lack of enthusiasm for exploration, had joined the North West Company in 1797. And it was this company that was largely responsible for extending the fur trade across the Rocky Mountains. An initial impetus was given to this movement by the arrival at Edmonton House in 1798 of a small band of Kootenay Indians, who told of valuable furs across the mountains. In the following year the North West Company, to accommodate the Kootenays, who were reluctant to travel through Blackfoot country, built Rocky Mountain House "as far up the North Saskatchewan as canoes could go."[1] The Hudson's Bay Company was quick to follow suit, and in the same year built

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[1]H. Dempsey article in Calgary Herald Magazine on discovery of new fort at Rocky Mountain House. Sat., Dec. 14, 1963.

Acton House a short distance away. In 1806, or perhaps a few years earlier, the North West Company established a post even further upstream on the Kootenay Plains, where the Siffleur River joins the North Saskatchewan.

In the same year a combination of several factors of wider significance than the Kootenay trade demanded that the North West Company extend its influence across the mountains. After the amalgamation of the North West Company with the X.Y. Company in 1804, it became necessary to find new territory for the increased number of partners. At the same time the Lewis and Clark expedition was seen as an indication of possible future American competition (Innis, 1962, pp. 203-204). David Thompson was charged with effecting the crossing, and in May of 1807 he took advantage of the temporary absence of the Piegan Indians and crossed the Rockies for the first time, via the Howse Pass. For a brief period of four years the Howse Pass was used for trade with the Kootenay Indians in the Columbia-Kootenay valley (Spry, 1963, p. 31). However, the return of the Piegan Indians to the area east of the pass in 1810 prevented its further use. The Piegan were jealous of the advantages of trade with the white man and were reluctant to share them with their transmontane enemies, the Kootenays. Because of the 'Piegan blockade' Thompson was forced to look further north for a safe pass. This diversion led to the discovery in January, 1811, of the Athabasca Pass, which was used for the next seventy years as the main transmontane route in British Territory.

The situation in 1812 as far as geographical knowledge of the study area was concerned is well shown on Thompson's own map (see Fig. 1). Apart from the Howse Pass, the area between the continental divide, front range,

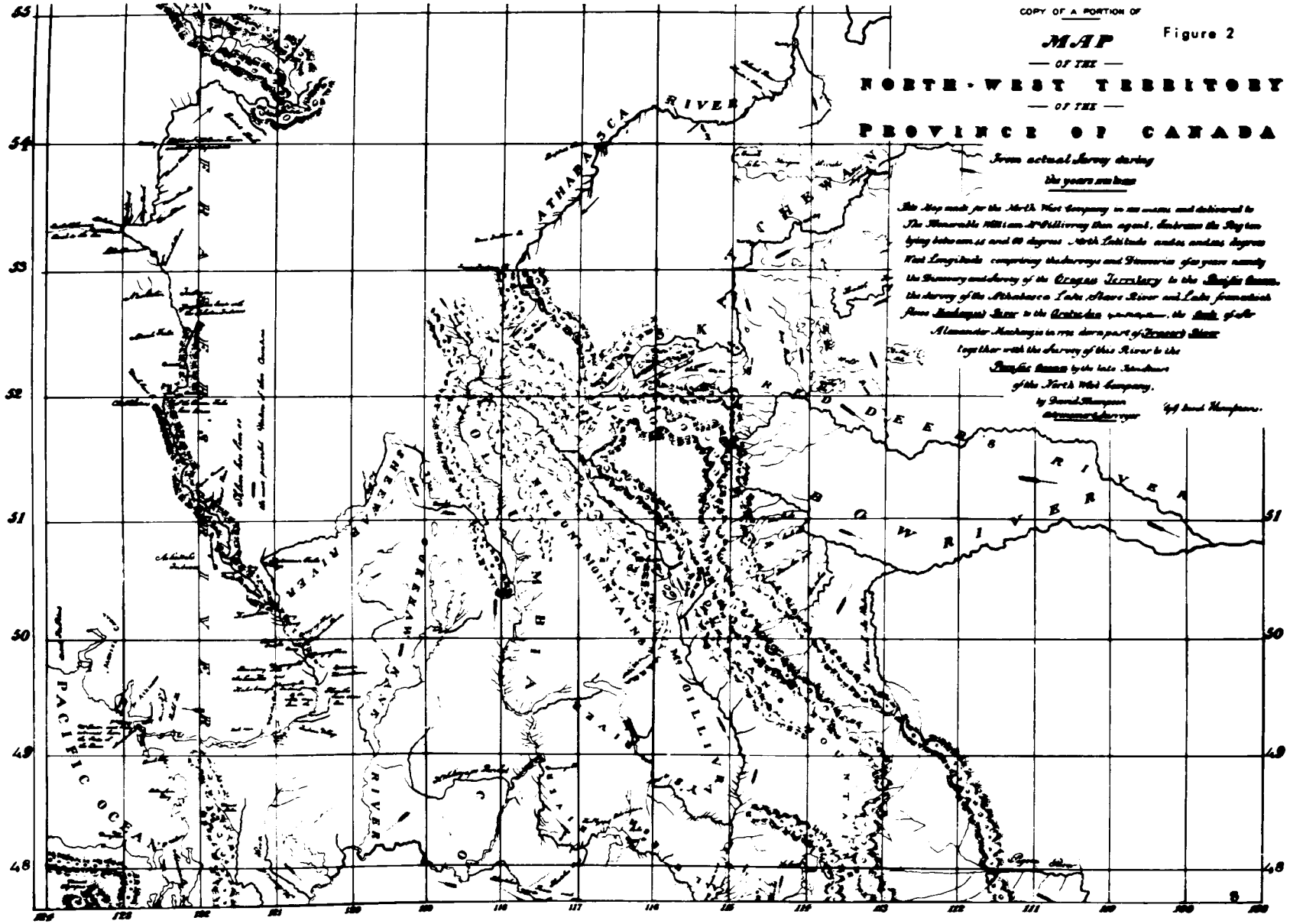
COPY OF A PORTION OF
MAP
— OF THE —
NORTH-WEST TERRITORY
— OF THE —
PROVINCE OF CANADA
From actual Survey during
the years
ATHABASCA RIVER
PACIFIC OCEAN
ROCKY MOUNTAINS
55
54
53
52
51
50
49
48

Figure 2

Athabasca Pass in the north and American passes from the Missouri in the south, remained unknown to him.

The hostility of the Piegan towards white use of the passes south of the Athabasca had seriously hindered the exploration of Fidler and Thompson and continued to deter European penetration of what is now the Park until the 1840s. It was especially unfortunate that men like David Douglas, whose description of the landscape at an early date would have been invaluable, were compelled to avoid the area. Douglas' Journal has the following entry for Friday, April 20, 1827:

> This (i.e. McGillivrays or Cootanie River) is said to be a good route across the mountains, but from the hostile disposition manifested by the natives inhabiting the higher parts of the Saskatchewan, the Athabasca portage is preferred, being free from such visitors. (Douglas, 1914).

Although the Piegan Indians were a problem as far as use of the southern passes was concerned, a band of them at least were important as suppliers of beaver. Alexander Henry the Younger, who served the North West Company on the North Saskatchewan during the years 1808-1813, made the following entry in his Journal:

> There are 30 or 40 tents who seldom resort to the plains, either in summer or winter, unless scarcity of animals or some other circumstance obliges them to join their countrymen. This small band generally inhabit the thick, woody country along the foot of the mountains, where they kill a few beavers, and, being industrious they are of course better provided for than those Piegans who dwell in the Plains. (Coues, ed., 1897, pp. 723-4)

The Governor of the Hudson's Bay Company, Sir George Simpson, in his report to the Governor and Committee dated York Factory, 10th August 1832,[1]

[1] H.B.C. Arch: D. 4/99/fos. 42d-44d.

gave a more impressive account of Piegan activity. According to him, of the warlike Plains tribes frequenting Edmonton House and Rocky Mountain House, the Piegan were the Company's best customers. They lived at "the skirts of the mountains to the Southward" where they made excellent beaver hunts. They also collected furs from their Blackfeet neighbours and when on war excursions west of the mountains.

However, the establishment of an American trading post, Fort Piegan, at the junction of the Marias and Missouri rivers in the fall of 1831, took the Piegan custom away from the Hudson's Bay Company posts. So important was this loss in trade that Simpson in his 1832 report stated that the Company had lost between some 3 and 4,000 beaver.

To counter this competition it was decided to abandon Rocky Mountain House in favour of a fort nearer the Piegan hunting grounds. In 1832 Piegan Post was established; in Chief Factor Rowand's words it was "situated at the heads of the Bow River near the foot of the Rocky Mountains."[1] In actual fact the site is on a terrace which forms the east bank of the Old Bow Fort Creek at its junction with the Bow, and is at least seventy miles from the headwaters of the Bow. Rowand's statement implies that he had little or no knowledge of the country to the west between the front range and the divide.

In 1834, after two years unprofitable trading, Piegan Post was

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[1]H.B.C. Arch. D.4/126, p. 116.

abandoned and Rocky Mountain House reestablished. The higher prices offered by the Americans, together with the defeat of the Piegan in a battle with the Bloods during 1834, had meant there was no point in maintaining the post. Rocky Mountain House remained in more or less continuous use until 1875, when it was abandoned in favour of a post in Calgary. Even so, as early as 1840 the trading activities of the Hudson's Bay Company in the Saskatchewan District were on the decline. The situation in that year is described by the Chief Factor at Fort Edmonton, John Rowand, in a New Year's letter to the Governor, George Simpson, chief factors and chief traders in the Company's Northern Department.

> There is so many unforseen difficulties to contend with it is not easy to conjecture how matters will turn out in these difficult times. I can only say with truth that we refuse nothing in the shape of Furs, as for the Beaver it is, I am sorry to say, getting preciously scarce indeed. How can it be otherwise this poor old worn out District, encroached on from all sides not only by our American opponents but also by Indians and Half Breeds from other Districts. (Dempsey, 1963, p. 5)

Although it is known that several Europeans[1] passed through what is now the Park during the 1840s and early 1850s, none of them left a comprehensive description of what they observed. The rather scanty information available for these journeys has been discussed in detail in an article by Spry in which she concludes:

> By then (i.e. 1859) it was clear that there were indeed passes over the Rockies south of the Athabasca Pass and north of the forty-ninth parallel. It was equally clear that extraordinarily little was known about them. (Spry, 1963b, p. 39)

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[1] Simpson, 1841; Sinclair, 1841, '50, '54; de Smet, 1845; Warre and Vavasour, 1845; Rundle, 1848.

The same author in an earlier article enlarges on some of the reasons why so little was known of the area.

> The Hudson's Bay Company, in an attempt to protect its monopoly position, had pursued a 'policy of silence.' Certainly the Company showed itself ready to assist scientific work on many occasions, but it was not in the habit of volunteering information. Even its own officers were not informed as to what information was available. (Spry, 1959, p. 154)

In conclusion it can be said that prior to the arrival of the Palliser Expedition in 1858 the area was still relatively unknown. The mountain valleys west of the Front Range seem to have been of secondary importance as fur-producing areas. More important to the fur traders were the foothills or the transitional zone between woodland and prairie, where trade could be carried on with both plains and thickwood tribes. A further point is that as far as the fur traders were concerned the Rocky Mountains' main function was that of a barrier to transcontinental movement. Consequently the search for passes through them was of primary importance. In this context the Piegan's reluctance to let the white man trade with the transmontane Kootenays, was a major factor in maintaining the relative isolation of the area. A suggestion, possibly also relevant, is made by Lent (1961, p. 58). She claims that knowledge of passes through the Rockies was withheld because of Sir George Simpson's desire to achieve personal glory as one of their first discoverers. Certainly at that time the Hudson's Bay Company had nothing to gain by making public its knowledge of the area. However, merely because little was known of the region prior to 1858, it does not follow that little had been changed as a result of the arrival of the fur traders. Their significance in terms of landscape change is dealt with in the next chapter, in

which an attempt is made to describe the landscape of the area as seen by the members of the Palliser Expedition.

CHAPTER V

THE PALLISER EXPEDITION, 1857-60

In his introduction to the General Report, dated April 4, 1862, Palliser states clearly one of the reasons why he had been commissioned to lead an expedition to British North America:

> The information we possessed concerning the Rocky Mountains, and the extent to which they truly formed a barrier to the formation of a road across the continent in the most southern latitudes within the British territory, was extremely vague and unsatisfactory. (Palliser, 1863, p. 4)

Palliser's main concern, then, in the Rocky Mountains was the discovery and description of usable passes. In this context the expedition was successful, five passes being explored: the Kicking Horse, Vermilion, Howse, Kananaskis, and the British Kootanie[1] (see Fig. 3). Palliser reported that they were suitable for horses and that after "a reasonable outlay a road could be made across them" (Ibid., p. 14).

Fortunately, apart from the question of the routes through the Rockies the members of the expedition were instructed to record the: "physical features of the country ... the nature of its soil, its capacity for agriculture, the quality and quantity of its timber and any indication of coal or other minerals." (Ibid. p. 5).

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[1] Of these, the first four are within the thesis area; the first two now contain major routeways and the third will shortly do so with the opening of the David Thompson highway.

Consequently the reports contain a considerable amount of information on a variety of subjects, and from this it is possible to attempt a reconstruction of what the area was like at that time. As far as this thesis is concerned, entries by three members of the expedition, Bourgeau, Hector, and Palliser, are useful and will be dealt with systematically in terms of vegetation, wildlife, the Indian population, the fur trade, and prospecting.

Understandably the Journals do not contain a botanical survey of the area in any way comparable to those made by Dwight (1913) or later workers. The botanist attached to the expedition, Eugene Bourgeau, a product of the times, was primarily concerned with the collection and classification of plants. Even then, the short period of time he was able to spend in the field was limited to investigating a comparatively small section of the Bow Valley between the Lac des Arcs and near the present site of Canmore.[1] James Hector,

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[1] Bourgeau's familiarity with the mountains has apparently been overestimated, due to a misinterpretation of his route by Ewan in "Rocky Mountain Naturalists," Univ. of Denver Press, 1950. Ewan states on page 168 that "Bourgeau followed the Bow River (Riviere des Arcs) from old Fort Kananaskis to its headwaters at the Bow Lakes just east of the northern portion of Yoho Park."

Bourgeau did not reach the Bow Lakes (Bow Lake) but remained in the Lac des Arcs area. Hector clearly states in his entry for August 12, 1858 (Palliser's Journal, p. 100) "having taken leave of Bourgeau, who did not intend to proceed much further up the valley but to cross to Windy Mountain" (Mount Lougheed, see Fig. 6).

Ewan's mistake, clearly due to an unrequired translation of "Lac des Arcs," has been quoted as correct by Heusser in his important article "Postglacial Environments in the Canadian Rockies" (1956) and is significant insofar as it gives a false impression of Bourgeau's knowledge of the mountains.

although accompanying the expedition nominally as a geologist, was a natural scientist in the broadest sense and his reports contain a wealth of scientific information on a variety of subjects. He covered more of what is now the Park (see Fig. 3) than any other member of the expedition, and his remarks on vegetation are perhaps more significant than Bourgeau's. Captain Palliser himself was not a trained scientist, and only spent some five days in the Kananaskis valley. However, his Journal does contain some useful information on vegetation and forest fires.

From a reading of the Journals above, it is difficult to visualize, with any accuracy, what the areal distribution of the different forest types was at the time, and whether it differed from earlier or late distributions. Neither is it possible, except for relatively small areas, to draw any firm conclusions as to the successional status of forest stands. This is not the case with the small areas of prairie within the mountain valleys, and these will be discussed in some detail. However, before doing this some attention will be given to descriptions of the forest.

Of a view possibly seen from Windy Mountain (Mt. Lougheed) Bourgeau states:

> From the river to the limit of the snow, all the chain of peaks as far as the eye can reach, are wooded, principally with three species of conifers, Abies nigra?[1] and alba[2] and Pinus.[3] The latter grows mostly

[1] Douglas fir. In Bourgeau's letters and indeed throughout the Journals the identification of plant species is often vague and contradictory. Therefore the author has suggested in footnotes, on the basis of personal observation, the probable modern name. (See Appendix No. III for scientific names of trees).

[2] White spruce or Alpine fir

[3] Lodgepole pine

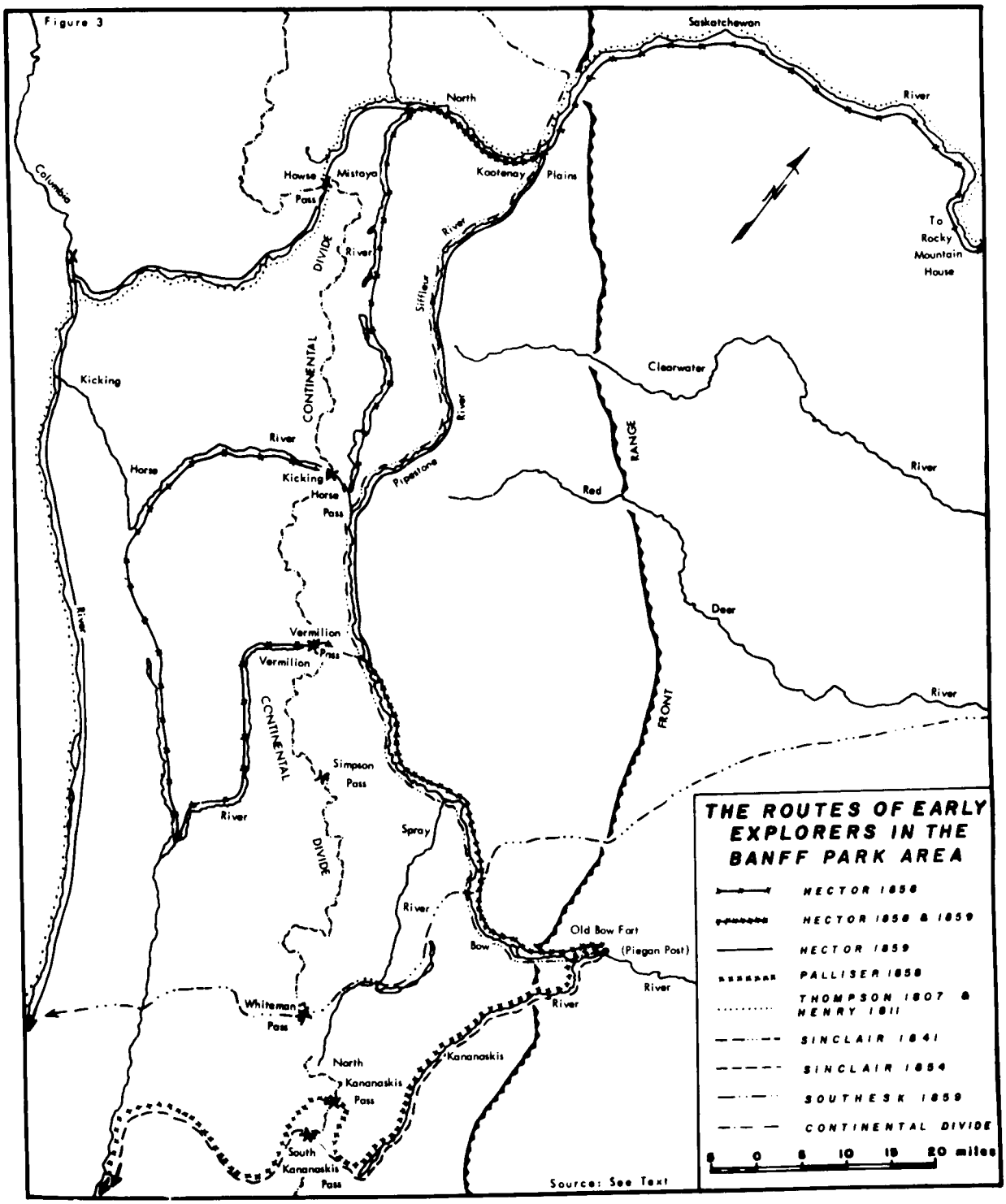
Figure 3
Saskatchewan
River
North
Kootenay
Plains
Howse
Pass
Mistaya
Columbia
DIVIDE
River
Siffleur
River
To
Rocky
Mountain
House
CONTINENTAL
Kicking
Clearwater
River
RANGE
Horse
River
Kicking
Horse
Pass
Pipestone
River
Red
River
Deer
River
Vermilion
Pass
Vermilion
River
CONTINENTAL
DIVIDE
FRONT
Simpson
Pass
River
Spray
River
Old Bow Fort
(Piegan Post)
Bow
River
River
Whiteman
Pass
Kananaskis
North
Kananaskis
Pass
South
Kananaskis
Pass
Source: See Text
THE ROUTES OF EARLY EXPLORERS IN THE BANFF PARK AREA
HECTOR 1858
HECTOR 1858 & 1859
HECTOR 1859
PALLISER 1858
THOMPSON 1807 & HENRY 1811
SINCLAIR 1841
SINCLAIR 1854
SOUTHESK 1859
CONTINENTAL DIVIDE
0 5 10 15 20 miles

on the southern slopes, and does not much exceed thirty feet high - the largest being about one metre in circumference. The Abies nigra? is the largest and tallest of the forest-trees which I have observed in the Valley des Arcs; one of which I measured was 3 metres 23 centimetres in circumference. There are also other forest trees in greater or less abundance, as Populus balsamiflua,[1] P. tremuloides,[2] Betula papyracea,[3] and B. pumila.[4] (Palliser, 1863, p. 249).

From this statement little can be deduced other than that the lodgepole pine were more common on the drier southern slopes. Knowing that the lodgepole is a sub-climax fire tree, it might be argued that Bourgeau's estimate of the height of the lodgepole, as being not much more than thirty feet, suggested relatively young stands and therefore recent fires. However, other factors such as site condition and stand density may also have been responsible (Smithers, 1961, p. 51).

Another description of the forest is given by Hector, possibly in an area on the northwest slopes of Cascade Mountain:

> The highest trees are Abies alba,[5] which has a short thick stem, only one or two feet high, while the branches are long and recumbent, spreading over the face of the declevity like thatch ... Below this the forest is composed of Abies balsamea[6] of good growth, and then followed by the

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[1]Balsam poplar

[2]Aspen poplar

[3]The white - or paper - birch, which is locally abundant around the south shore of Lac des Arcs and that part of the Bow valley.

[4]May refer to B. grandulosa, the bog birch, or B. occidentalis, the river birch.

[5]Alpine fir

[6]Alpine fir

> ordinary trees of the mountain valleys of which Abies alba and niger are the largest, along with birch, as sometimes the Prusche,[1] which is a large species of Spruce fir that was first seen at the Bow Fort. (Palliser, 1863, p. 101)

This description, with its confused taxonomy, tells us little more than Bourgeau's. The good growth of Alpine fir that Hector describes was almost certainly destroyed by fire before the turn of the century. In several entries in the Journals Hector describes what must have been sub-climax lodgepole stands. While in the Kootenay valley on August 24, 1858, he stated: "We travelled on terraces of shingle, where the timber consisted of pines, as is usual in such soil." (Ibid., p. 104)

In the entry for August 29, the following year, he describes what appears to have been lodgepole pine at the Kootenay Plains (at the junction of the Siffleur and North Saskatchewan - see Fig. 3).

> The terraces are here covered with a beautiful pine tree, the foliage of which has a slender tufty appearance and a slight grey-green colour. It has a tall slender trunk and grows to about double the height of the so-called cypress with the spinous cone. It is also quite different from the pine which I observed on the opposite side of this valley last year which is very sturdy with rough contorted branches and coarse foliage. I saw no cones on these slender pines. (Ibid., p. 149)

The pines he had observed on the opposite side of the valley during the previous year were probably Douglas fir.

> They grow on sand hills and have much the appearance of Scotch firs, the trunks and branches being twisted, and of a red colour. The cone is large and covered with a fragrant balsam. (Ibid., p. 112)

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[1] Douglas fir

While ascending the Pipestone valley Hector noted the relatively rare Lyell's larch: "I saw a solitary larch fir[1]... this may perhaps be a different species which has straggled from the west side of the mountains." (Ibid., p. 148)

As can be seen from the above quotations, little can be deduced from the Journals as to the areal variation or successional status of forest stands in the area at the time of the expedition. However, several entries describing the small areas of grassland are of significance as far as their successional status is concerned.

The question as to what species represents the true climax cover of the short grass plains of North America has been the cause of considerable debate. Certain plant ecologists, among them Weaver and Albertson (1956), maintain that the dominance of short grasses represents a disclimax which is due to the arrival of the white man and domesticated animals. Others, notably Larson (1940) point out that pre-European grazing by the buffalo and other wild animals must have maintained a short grass cover and therefore the same can hardly be called a disclimax since "this animal life was natural to the biome." (Larson, 1940, p. 113)

As far as the thesis area is concerned, some light is thrown on the problem by entries in the Journals, and a description of the Kootenay Plains as seen in 1811 by Alexander Henry the Younger.

The comment on Bourgeau's collection in his Final Report contains the

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[1]Lyell's larch

following remark: "The valleys of the mountains are occupied by forests excepting in a few localities where there are level gravelly plains covered with 'bunch grass' (Festuca sp.?)." (Palliser, 1863, p. 246)

Hector on several occasions described such areas. In the Bow valley near the present site of Canmore there were "fine patches of level prairie along the river for our horses." (Ibid., p. 100) In the area now known as Hillsdale he camped at "a spot with very rich pasture." (Ibid., p. 101) He described the Kootenay Plains as "an extensive plain covered with bunch grass." (Ibid., p. 111) At Saskatchewan Crossing he tells how he left the horses to feed on "a fine meadow of 'Prele' or goose grass (a species of Equisetum) of which they are very fond." (Ibid., p. 150) In the Kananaskis valley, probably near the junction of the main stream with Ribbon Creek, Palliser described how "we arrived at a patch of prairie land which offered good feeding for our horses." (Ibid., p. 93)

As rough fescue, a tall-growing palatable species, is not at all resistant to grazing pressure (Johnston, 1961) it would seem that the members of the expedition saw the grassland in a relatively undisturbed condition. That this may in fact have represented a climax condition, has been suggested to the author:

> The climax grassland was probably rough fescue (Festuca scabrella Torr.), Idaho Fescue (Festuca idahoensis Elmer.) with the addition of several species of native blue grasses, June grass and several carices.[1]

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[1]Personal communication. J.A. Campbell, Chief Grazing Appraiser, Government of Alberta. August 18, 1963.

However, that the rough fescue had been a dominant in the pre-European or even early European period seems doubtful. Alexander Henry in 1811 gives a description of the Kootenay Plains that is markedly different from Hector's quoted above. Henry states: "Buffalo are very numerous on this plain, ... on this small plain are some spots of meadow with a sandy soil, covered with a very short grass." (Coues, ed., 1897, pp. 686-7)

As will be mentioned later in this chapter, fire, disease and an increase in hunting led to a marked decrease in game in the mountain valleys during the first half of the nineteenth century. Whereas the thickwood buffalo had been "very numerous" in 1811, by the time Hector reached the area they had almost disappeared. The resultant reduction in grazing pressure must have been a major reason for the dominance of rough fescue evident at the time of the Palliser expedition. Larsen's thesis would seem to be valid in this case, since the rough fescue only became dominant due to a reduction in grazing pressure that was in part due to the arrival of European influence.

With the beginnings of settlement in the area in the 1880s, the increase in numbers of horses grazing on these areas of prairie resulted in further changes, but these will be dealt with in a later chapter (see page 94).

A factor of major importance in forest succession on the eastern slopes is the significance of forest fires. A recent report on forest fires in Alberta states that "information about them is available only for the past sixty years." (Kiil, 1964) Admittedly nineteenth century sources are vague, but for the Banff area alone the Palliser Report contains several references to forest fires. These will be discussed in terms of areal extent, causes,

effects, and frequency.

According to Bourgeau and Hector the Bow valley had been burnt over in several areas. Bourgeau, whose knowledge of the mountains was probably limited to the Bow valley downstream from the present site of Canmore, made the following comments:

> The forests suffer almost every year from fires; the trees fall in all directions on the ground, and thus form innumerable barricades to the progress of horses and even of men...This description holds good of all the localities which I have visited. (Palliser, 1863, p. 249)

In a further comment describing the size of timber in the Bow valley he stated: "Most of the forest trees had no remarkable size, the too frequent burning of the woods preventing their development." (Ibid., p. 252)

Hector referred to burnt forest in three areas of the Bow valley. In an entry for August 11, 1858, while on the north side of the Lac des Arcs below Grotto Mountain, he states: "We descended into the valley by a faint trail leading through burnt woods." (Ibid., p. 99) A week later, on August 18, he camped in a burnt-over area on the left bank of the Bow opposite the Vermilion Pass, where the "fallen woods...lay breast high to our horses." (Ibid., p. 102) On August 23 of the following year Hector camped some fourteen miles further upstream on a creek[1] just north of Castle Mountain in "a large tract of burnt woods." (Ibid., p. 148)

According to Palliser's own report the Kananaskis valley within the mountains and immediately to the east of the front range had been extensively

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[1]Possibly Baker Creek.

burnt over, the fallen trees providing a considerable barrier to progress. The fallen timber was, in Palliser's words, "the result of fires in former years." (Ibid., p. 93) These fires must have been comparatively recent, since the fallen trees blocked an old Indian hunting track, traces of which were still evident.

Four years earlier, in September of 1854, James Sinclair and his party of a hundred settlers enroute to Oregon Territory had also had considerable difficulty in making a trail through burnt forest in the Kananaskis valley (Lent, 1963, p. 256). Even earlier in 1845 the Jesuit de Smet had passed through an extensive burnt-over area in the nearby Spray valley. In an entry for September 18, 1845 he commented:

> For the space of six hours we were compelled to trace our route across fragments of broken rocks, through an extensive and parched forest, and where millions of half consumed trees lay in every direction. Not a trace of vegetation remained, and never had I contemplated so dismal and destructive a conflagration! (de Smet, 1905, p. 506)

Apart from a fire that he was himself responsible for, and which will be discussed later, Hector makes no mention of burning in either the Pipestone, Siffleur, upper North Saskatchewan or upper Bow valleys. While this negative evidence is not totally convincing, it implies that for some years prior to the arrival of the expedition forest fires had been more frequent in the southern valleys within the thesis area. If correct, this would imply that the white man was already important as a cause of fires, since it is known that the passes in the south such as the Whiteman, Kananaskis, and Simpson were in occasional use by whites before the arrival of the Palliser expedition. In contrast, the Pipestone, Bow, Kicking Horse, and Howse seem to

have been rarely used.

With regard to this question of the causes of forest fires, The Palliser Report contains several interesting references. While in the Kananaskis valley, Palliser states in an entry for August 19, 1858:

> Here I observed a very satisfactory proof that lightning must frequently be the cause of fires and that all forests are not destroyed by the hand of man, for we saw whole masses of forest, isolated in mountain cliffs, fallen by fire, the mountain trees burnt in places so precipitous that no human hand could ever have reached them. (Palliser, 1863, p. 93)

Hector, having described prairie fires started by the Indian "either by accident or for the purpose of making signals," goes on to state:

> It is true that similar fires take place in the thickwood country and in the forests of the Rocky Mountains; but although they do much damage, the chance of their recurring on the same spot within a short enough time completely to remove the timber is small. (Hector, 1861, cited in Warkentin, 1964, p. 168)

The ease with which forest fires can be started is well shown by Hector's own example. On September 11, 1858, having camped in an area of mature forest on the north shore of Glacier Lake, a camp fire was not properly extinguished and resulted in the destruction of "a large area of forest." (Palliser, 1863, p. 111). A similar fire had almost been started a week earlier on September 4. A pine tree caught fire, owing to the camp fire being lit against it. Fortunately, as Hector said (Ibid, p. 108),"it did not communicate with the other trees."

Bourgeau makes no comment as to the cause of the fires he mentions. Hector's general opinion seems to have been that most fires were started by man. Palliser's above-quoted entry citing lightning fires implies that he was correcting a generally-held opinion that "all forests were...destroyed

by the hand of man." Understandably, in view of the relatively short time the expedition spent in the area, the Report contains no definite quantitative assessment of the relative importance of man-caused and natural fires.

Although the causes of forest fires remain rather vague, Hector made a perceptive observation as to the effects of fires and showed an unusually accurate grasp of the dynamics of forest succession:

> Where the poplar seeds cannot reach such burnt spots, they are usually crowded with the gaudy plants of Epilobium augustifolium, among which the young pine seedlings can gain a footing, so that the forest often reverts in such a case to the coniferous type; but the thickets which spring up, strangely enough, very seldom contain plants of Abies alba but almost invariably consist of the Pine which I have alluded to as allied to P. inops. (Hector, 1861, cited in Warkentin, 1964, p. 168)

The question of fire frequency, which is an important aspect of this thesis, is briefly mentioned in the Reports by Bourgeau and Hector. Bourgeau, in a statement quoted above (see page 62), maintained "the forests suffer almost every year from fires." Before accepting this opinion, two points might be raised. First, Bourgeau, who admittedly qualifies his description with the phrase "for all the localities I have visited," was only familiar with a small section of the Bow valley (see Footnote on page 54). Also, this area is one that is naturally relatively dry, the Bow valley in the Canmore area receiving an average precipitation of less than twenty inches each year (Laycock, 1957a). Secondly, it is generally accepted that Palliser's pessimistic opinions as to the agricultural potential of the prairies were in part due to seeing them only during relatively dry years. Similarly, it seems likely that Bourgeau was mistaken in accepting short-term conditions in the Rocky Mountains as being typical. In the same way a visitor to the area

during the comparatively dry 1930s would undoubtedly have different opinions on the fire frequency than someone who had only seen the area during the 1950s. That the summer of 1858 was comparatively dry is suggested in Bourgeau's comment on the aridity of the area he visited:

> ...the mountains are barren with few streams and little humidity... streams are scarce on the southern slopes; on the northern water is more abundant, owing to the snow; but they are only little torrents sunk deep in the rocks. This is the character of all the ravines which I have visited. (Bourgeau, 1860, p. 16)

Although forest fires had undoubtedly been frequent in the years immediately preceding Bourgeau's arrival, it would seem unwise to accept his statement that they occurred "almost every year." More specific information concerning fire frequency is contained in an interesting entry by Hector, for September 14, 1858: "Eleven years ago, they say (i.e. the Stoney Indians), there were great fires all through the mountains, and in the woods along their eastern base..... Before that time (somewhere about 1847-1848) there was a great abundance of game in all parts of the country; since then there had been a great scarcity of animals." (Palliser, 1863, p. 111)

This statement suggests that widespread forest fires were not annual or biannual events, but only occurred during years when conditions were favourable. The situation in 1936, when severe drought conditions were to a large extent responsible for extensive burning on the eastern slopes, may have been similar. While these drought years do not recur with any regularity it has been noted that they were evident in Alberta and other areas of western Canada during the 1820s, 1860s, 1890s, and 1930s (Rowan, 1952, p. 37).

The Earl of Southesk, who travelled through the area (see Fig. 3) in

1859, in describing the trees in the Bow valley near the present site of Canmore, stated:

> Most of them bore traces of the fires which are the curse of this region, which have destroyed the beauty of these noble valleys, ruining the magnificent forests that ages had matured, and leaving in their stead endless tracts of charred and decaying remains amidst which wretched seedlings struggle up as best they may." (Southesk, 1875, pp. 250-251)

Both Southesk's and Hector's statements imply that forest fires had increased in frequency, at least since the mid-1840s. Two possible explanations for this were introduced in previous chapters. In chapter two evidence was presented for climatic amelioration which began about 1840 and may have meant that favourable conditions for forest fires were becoming increasingly common.[1] At the same time as was mentioned in chapter four, starting with Simpson's journey through the area in 1841, white penetration had increased. In 1841 and 1854 Sinclair conducted parties of 116 and 100 settlers through the area (see Fig. 3). Although no definite evidence has been uncovered that forest fires were increased by European penetration, that this was the cause seems very likely. Rather than speculate about the relative importance of either man-made or "natural" fires, it would seem important to recognize that the increase in fire frequency was due to the combined effects of climatic change and increased European penetration.

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[1]Hector, in 1858, noted that the South-east Lyell glacier had already retreated c. 100 yards from its terminal moraine (Palliser, 1863, p. 110).

Wildlife

As the members of the Expedition were living off the land, there are frequent references in the Report to different types of game and their availability. Occasional references are also made to other kinds of wildlife. However, in the following account it is not proposed to present a zoological summary of all the species mentioned.[1] Instead, attention will be given to the changes in animal population that had occurred, their possible causes and consequences.

As was mentioned in chapter three the mountain valleys, in comparison to the foothills and plains, were of secondary importance as sources of game. Even so, the widespread scarcity of game that confronted Hector and Palliser seems to have been exceptional. Palliser, probably forewarned by other mountain travelers, was aware of a possible scarcity even before entering the mountains. In an entry dated August 3, 1858, he stated: "I well knew that none of us would find much game in the mountains." (Palliser, 1863, p. 90)

With the exception of Hector's difficulties in the Kicking Horse valley during August of 1858, none of the Branch expeditions through the area experienced serious shortage. Yet hunting was by no means easy, and as the Stoney guides told Hector, "only the best hunters can make sure of killing." (Ibid., p. 111)

Other travelers through the area during the 1840s and 1850s had

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[1] For a zoological summary of the mammals found in the Banff National Park see Banfield (1958).

experienced difficulty in living off the land. De Smet in 1845, having travelled through the area in his journey to attempt the conversion of the Blackfoot, avoided it on his return westwards because of the shortage of game (Roe, 1957). In 1854 Sinclair and his party of a hundred settlers met with little game and were forced to kill some of their oxen (Lent, 1963, p. 257). Southesk, "through the improvidence of his men," ran short of food while travelling south down the Pipestone in 1859 (Palliser, 1863, p. 150).

Apparently this shortage of game was a widespread development. As Hector mentions in the Report:

> When we compare the description given by Sir Alexander Mackenzie of the prairie country along the Peace River, with its vast herds of buffalo and elks, when he passed in 1793, with the present northern limit of the large herds of these animals, at least three degrees of latitude further south, the change is very striking; and still more so if it is true, as the hunters say, that the disappearance of the large quantities of game has only taken place within the last 20 years. (Ibid., p. 126)

The Stoney's explanation that forest fires were responsible for the decrease in game has already been quoted in part. Apparently after the widespread fires of 1847-48: "a disease broke out among all the animals, so that they used to find wapiti, moose and other deer, as well as buffalo, lying dead in numbers." (Ibid., p. 111)

Disease was probably not the only reason for the decrease. The introduction of the firearm, and the increase in demand for food, and furs, must also have been significant. Hector, while in the upper Columbia valley, described what must have been a widespread development:

> Elk or wapiti must at one time have been very numerous in this district, as we saw a great many antlers lying on the ground,...but the open nature of the woods, and the limited range, excepting up and down the valley, must have made them an easy prey to the Indians as soon as they acquired firearms. (Ibid., p. 154)

As in the case of forest fires it seems likely that a combination of factors, both physical and human, the relative significance of which it is impossible to estimate, were responsible for the changes in game populations.

The effects of these changes were far reaching. In terms of vegetation, the changes in dominant species in the areas of prairie have already been mentioned. The disappearance of the wood bison, or thickwood buffalo as Hector called it, was undoubtedly a major factor in reducing the grazing pressure on these areas of prairie. Banfield (1958, p. 41), having summarized the historical evidence, concluded that the bison ranged into the alpine tundra in summer, and in winter concentrated in a few of the lower valleys such as the North Saskatchewan as far west as the Crossing.

The depletion of the beaver was apparently more or less complete by the mid-nineteenth century. Banfield, while only concerned with the present Park area, commented that there are no references to beaver in the Journals of the explorers. The complexity of the ecological changes that possibly followed the disappearance of the beaver has been outlined in some detail by Mair (1952). One such change was probably a decrease in favourable habitats for the moose. The beaver, by damming streams, created ponds which produced aquatic plants preferred by moose. With the disappearance of the beaver, dams fell into disrepair, water levels dropped and ponds were no longer favourable for moose.

Perhaps the most important consequence of the decrease in game was the disruption of the Indians' way of life. The Indians who survived the smallpox epidemic of 1784 seem to have experienced a brief period of prosperity around the turn of the century, when the acquisition of the firearm made hunting

so much easier. However, by the middle of the nineteenth century many faced starvation. In 1859 the Chiefs of the Rocky Mountain Stoney's complained to Hector that:

> Every year they find it more difficult to keep from starving, and that even the buffalo cannot be depended on as before,...They are very desirous of having tools and a few simple agricultural implements; and, as they are very steady, I have no doubt that if they were supplied with these, and direction given to their efforts, the best part of them would soon settle down, and leave their vagrant mode of life. (Palliser, 1863, p. 146)

Under the guidance of missionaries a few attempts were made by the Stoneys to grow vegetables; however, the frequency of frosts must have been a limiting factor. The Stoneys seem to have remained in dire straits, at least until the founding of a Methodist mission at Morley in 1874, and their signing of Treaty Number Seven three years later.

Economic Activities

By the mid-nineteenth century the fur trade had lost some of its former importance. According to Hector this was not entirely due to the disappearance of the wanted fur-bearing animals. In the Kootenay valley just west of the Divide he saw evidence of beaver and other valuable game:

> ...which animals (i.e. beaver) are very numerous, judging from their tracks, which were like beaten pathways all along the bank....We saw signs of this being a very fine fur country, for marten and other tracks were very abundant, but the absence of game, which is unaccountable, prevents the Indians tending up this way to trap. (Palliser, 1863, p. 104)

The increasing difficulty of subsisting on game was undoubtedly a reason why the fur trade was declining. Palliser himself, in his introduction to the Report, stated:

> First-rate hunters have frequently told me that such hard and constant labour in pursuing thickwood animals for the support of themselves and their families left them neither courage nor time to devote to their traps. (Ibid., p. 18)

Although hunting for furs was declining, the Journals contain occasional reference to the increasing importance of a different form of economic activity, prospecting for minerals. After the discovery of gold in California in 1848, many of the prospectors who had failed to find gold moved north into Oregon and British Territory. They were joined by prospectors who travelled overland from Canada or the eastern States. Evidence of this movement is contained in the Journals, where there are several references to two parties of Americans from St Paul's who were attempting to reach the Smillcomen gold mines on the Fraser river. The first party crossed the Rockies in 1858 by the North Kootenay Pass and experienced great hardships, having left Edmonton as late as October. The second party wintered at Fort Pitt, nearly two hundred miles downstream from Edmonton, and in 1859 split up, some following Palliser's directions crossed by the Kananaskis Pass, others accompanied Palliser and Hector with their branch expeditions across the Rockies.

Because the sedimentary nature of the rocks within the thesis area promised little in the way of precious minerals, it seems unlikely that much prospecting was done until the 1870s. Evidence for this conclusion, and the effect the prospectors had on the landscape, will be discussed in the next chapter.

In conclusion, the thesis area, as seen by the members of the Palliser Expedition, had, in spite of its relative isolation, recently experienced several marked changes. Extensive forest fires, particularly in the valleys of the Spray, Kananaskis, and Bow, had destroyed large areas of timber. For several reasons the wildlife population of the mountain valleys had been

significantly reduced. The Indians who hunted in the area had had their way of life disrupted. Those that had survived smallpox epidemics were faced with starvation. Hunting for furs by the Indian had declined in importance and was being superseded by another exploitive activity, that of prospecting for minerals by the white man.

Because of Palliser's conclusion that a line of communication from Canada to the Pacific, entirely within British territory, was not feasible, it seemed certain that the area in question would revert to its former relative isolation. And for the next twenty years or so this was in fact the case. For the period 1860 to 1880 there is virtually no information as to who passed through the area, or what the area was like. However, the scanty evidence will be discussed in the next chapter.

CHAPTER VI

LANDSCAPE CHANGE IN THE PERIOD BETWEEN THE PALLISER EXPEDITION AND THE ESTABLISHMENT OF THE ROCKY MOUNTAINS PARK, 1860-1887

As was suggested in the previous chapter, Palliser's Report meant that the Banff Park area maintained its relative isolation. During the 1860s and 1870s it was probably entered only by a few prospectors. However, the Canadian Pacific Railway Company's (C.P.R.) decision to use the Bow valley, and the arrival of the railway engineers in 1881, marked the beginning of a new period of development. The exploitation of local natural resources such as copper, coal, timber, the hot springs and scenery began when the railway reached the mountains in 1883. These activities were already transforming the landscape before the Park was established in 1887 and were to be the cause of many problems during the Park's later history. The choice of route also resulted in a marked increase in exploration in the area. The reports of government geologists and surveyors, together with other miscellaneous sources, enable a fair reconstruction of the "pre-Park" landscape to be made. In this chapter, after a brief outline of the scanty evidence for prospecting prior to the arrival of the railway, an attempt will be made to describe the so-called "natural" landscape as it was in the immediate pre-Park period. Finally, the consequences of the arrival of the railway will be described, insofar as they have changed the landscape before the establishment of the Rocky Mountains Park on June 23, 1887.

Prospecting

Throughout nineteenth century North America the deliberate burning of the forest cover seems to have been an integral part of prospecting. Unfortunately it is difficult to estimate how much prospecting was done in the study area during the 1860s and 1870s. The predominantly sedimentary nature of the bedrock must have been a deterrent and probably little was done before the arrival of the railway in 1883. Even in 1884, Dawson (1886, p. 135B) was able to comment that the copper deposits in the Castle Mountain vicinity had prompted "no great amount of prospecting work."

Although prospectors had not been attracted to the area in any great numbers, quite probably many passed through it. The discovery of gold in British Columbia in 1857 has already been mentioned as a reason for the increased use of the passes through the Rockies. While many of the prospectors undoubtedly used the more northerly passes, such as the Yellowhead and Athabasca, the discovery of gold in the Kootenay valley in 1864 may have resulted in the increased use of more southerly routes.

That some prospecting was actually being carried out in the area is implied in a letter from W.J. Christie, Chief Factor at Fort Edmonton, to the Lieutenant Governor of the North-West Territories in 1871. In the letter he states:

> Gold may be discovered in paying quantities, any day, on the eastern slope of the Rocky Mountains. We have in Montana, and in the mining settlements close to our boundary line, a large mixed frontier population who are now only waiting and watching to hear of gold discoveries and to rush into the Saskatchewan. (Morris, 1880, p. 170)

Christie was concerned about the possible lawlessness that might follow

the arrival of a large mining population. However, gold was never discovered in paying quantities and so his fears never materialized.

A local pioneer, Andrew Sibbald, who lived at Morley from 1875 to 1896, stated how a party of four Americans prospected in the Banff area in 1875 (Pearce, 1962). There may be a connection here with the abandoned log hut that Pearce saw at Banff in 1884; he noted that it appeared to have been erected upwards of ten years previously (Crag and Canyon, June 24, 1932).

The marked lack of evidence seems to indicate that prospecting was never significant in the Park area and that the mountain valleys were rarely visited by Europeans during the two decades following the Palliser expedition. However, during this period political events were taking place elsewhere that were to have significant consequences.

The transfer of Rupert's Land to the Dominion of Canada in 1869 was followed by a period of lawlessness in western Canada that prompted the arrival of the North West Mounted Police. Their arrival at Lethbridge in October of 1874 was a major factor in making travel across the prairies feasible during the decade prior to the arrival of the C.P.R.

Of more importance was the entry of British Columbia into the Dominion of Canada in 1871 . Because of this it became necessary, as part of the agreement with that province, to build a transcontinental railway. The C.P.R. syndicate's decision to route the railway up the Bow valley and through the Kicking Horse Pass rather than via the Yellowhead Pass, was probably the most important single factor in the historical geography of the Banff area.

With the arrival of the railway in the mountains the development of

local natural resources such as coal, copper, and timber became possible. The exploitation of another resource, the hot springs at Banff, was to have far reaching consequences. The protection of these springs from free enterprise provided the motive for the original ten-square-mile reservation in 1885. The springs were also a major reason for the establishment of the Rocky Mountain Park two years later.

Exploration

A more immediate consequence of the final choice of route was an increase in the exploration of the area. In 1881 the C.P.R. made their own surveys of possible routes through the Howse, Kicking Horse and Kananaskis passes. However, the author has been unable to uncover any official material from this source, of relevance to the thesis. A source of considerable value is a regional report on the Rocky Mountain region between the international boundary and the upper Red Deer. Submitted to the Geological Survey of Canada in 1886 by George M. Dawson, this report, together with descriptions of timber berth surveys made in 1883 in the Bow, Spray and Kananaskis valleys, and other contemporary descriptions of the area, will be used in the rest of this chapter in an attempt to reconstruct the landscape in the immediate pre-Park period. As in the previous chapter, evidence will be discussed systematically in terms of vegetation, wildlife, Indian population.

Dawson's[1] summary description of tree types in the area presents less

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[1]Later to be the Director of Canada's Geological Survey from 1895 to his death in 1901, Dawson, like his predecessor in the area, Hector, was fortunately not only a geologist but a natural scientist in the broadest sense. His descriptions of the vegetation and comments on forest fires are of particular value to this thesis.

taxonomical confusion than either Bourgeau's or Hector's. In it he also attempts to correlate the distribution of different species with climatic factors, for example 'Larix Lyalli (Lyall's larch) - strictly Alpine; Abies subalpina (Western balsam spruce)[1] - alpine and sub-alpine, and extending downward to the higher and cooler valleys; Picea Engelmanni (Engelmann's spruce) and Pinus Murrayana (black pine)[2] - sub-alpine and extending downward"(Dawson, 1886, p. 36B).

Earlier (1886, p. 35B) he noted the occasional occurrence of limber pine, balsam and aspen poplar. Apart from the apparent confusion between White spruce and Alpine fir, Dawson's summary was remarkably accurate. His description of the grassland areas within the mountain valleys implies that grazing pressure had not increased since the time of the Palliser expedition. He states: "On the eastern slopes...even within the outer range, rather extensive dry prairie-patches and slopes covered with bunch-grass are found in the lower parts of the depressions of the various passes." (1886, p. 34B)

The main value of Dawson's report as far as vegetation is concerned lies in his description of burnt-over forests, and in his comments on the cause and frequency of forest fires. His descriptions of the forest in the Kananaskis, Spray, Cascade, and Red Deer valleys, together with timber limit surveys carried out in 1883 and 1884 for the Department of the Interior, in

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[1] Alpine fir

[2] Lodgepole pine

the Kananaskis, Spray and Bow valleys, provide a fairly comprehensive picture of the condition of the forest cover at that time.

In describing the Kananaskis valley Dawson comments on the same situation that had faced Palliser in 1858. He states: "Owing to comparatively recent fires, the trail is in some places much encumbered with fallen trees, and it had lost much of its old importance as an Indian route across the mountains." (1886, p. 105B)

The surveyor, Louis B. Stewart, divided the Kananaskis valley, and its tributary the Smith-Darrien Creek, into five timber limits (see fig.5). This report on the survey to the Minister of the Interior adds detail to Dawson's description. "After the narrow gap[1] shown in the plan is passed the timber which was once of fair size has been destroyed by fire and in places small second growth spruce, etc. have taken its place." (Stewart, 1883-4)

In limit "H", except for an area of good growth in the south, the timber had been either destroyed by fire or consisted of small second growth. The same area of good growth in limit "H" continued into "I", but most of this limit was covered by burnt windfall or thick growth of small Jack pine. Of limit "J", which included the Kananaskis lakes, Stewart stated:

> The timber has been nearly all destroyed by fire. Along the shores of the lower lake the land is covered with a second growth of Jack pine, but to the east and south-east of the upper lake there is very little green timber, and the country presents a scene of great desolation. (Ibid.)

The valley of the Smith-Darrien Creek, included in timber berth

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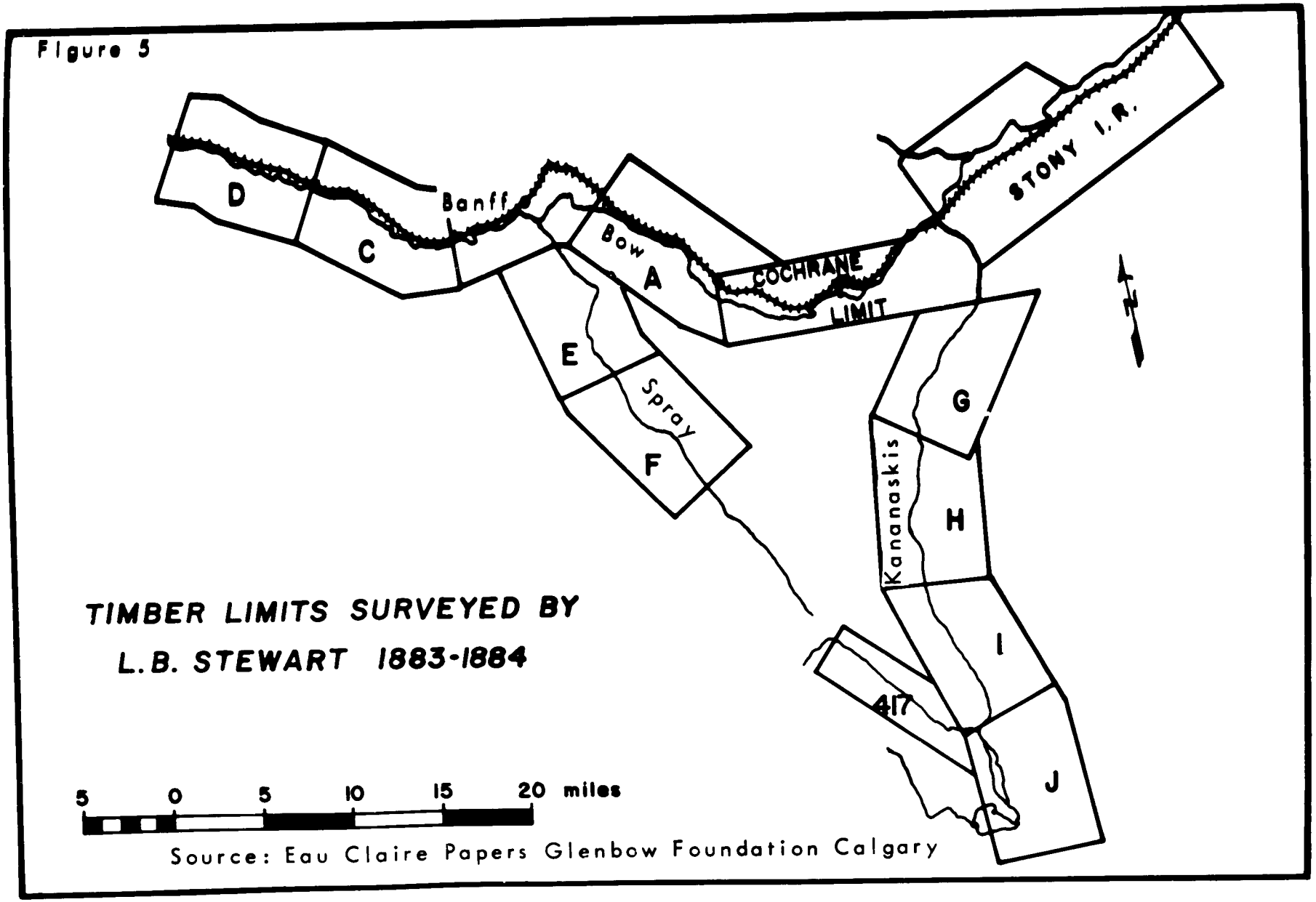
[1] Where the Kananaskis breaks through the front range.

Figure 5



Source: Eau Claire Papers Glenbow Foundation Calgary

number 417, contained some "large to medium size spruce," which presumably had escaped fires because of their isolated position.[1]

Clearly Dawson's and Stewart's reports indicate that large areas of the Kananaskis valley had been burnt over by 1884. Also the descriptions of extensive stands of young lodgepole pine, together with the statement that the valley had lost its importance as an old Indian route, imply that this burning of the forest had been comparatively recent.

In the Spray valley Dawson describes the area above the Spray lakes[2] and Stewart the valley from just north of the lakes to Banff. Dawson states:

> The whole valley, from the defile[3] to the Spray River, has originally been well wooded, but most of the timber has been destroyed by fire, the fallen trees rendering the trail rough and difficult. In the longitudinal part of the valley, some patches of timber still remain unburnt. On the north side of the lake it has been completely destroyed, but on the slopes to the south only about half has been burnt. (Dawson, 1886, p. 113B)

In timber limit "E" on the Spray to the south of Banff, Steward described "two belts of heavy timber," the more southerly of which extended for some two miles into limit "F". The remainder of limit "F" according to Stewart was "of little value, as the timber has all been destroyed by fire, and there remains standing only a second growth of Jack pine."

The Spray valley then, like the Kananaskis valley, had been extensively burnt over by fires at some time prior to 1884. In Dawson's opinion these fires

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[1] This isolation prevented the Eau Claire Company from cutting this timber until the early 1950s, when the Calgary Power Company's developments on the Kananaskis lakes brought roads into the area.

[2] Dawson was probably describing the same area of burnt forest which de Smet had also described in 1845 (see page 73).

[3] The gap in the mountain range west of Canmore.

had destroyed what may have been mature forest.

Stewart, in his descriptions of three timber limits on the Bow, indicates again how extensive burning had been. Limit "A", in his opinion being the least valuable, "large quantities having been killed by fire...most of it still standing." In limit "C" "the bulk of the timber....consists of a thick growth of small Jack pine or Scotch fir in places burnt." In limit "D" Stewart describes how "large quantities of Jack pine along the banks of the river have been killed by fire, especially towards the west end of the limit."

This burning of timber along the river banks was exceptional, the river channels normally acted as fire breaks and the high water table lessened the danger of fire. Stewart commented, "Most of the timber of any value is confined to the immediate banks of the river along which it forms a belt varying in width from one to ten chains."

Dawson did not describe the Bow valley in any detail, because it was to be dealt with in a later report by McConnell (1887). He did, however, make one significant comment: "Northward from Laggan station,[1] to the first of the two lakes in which the Bow rises, the valley preserves similar structural characters, but is more densely and uniformly wooded than before." (Dawson, 1886, p. 139B) This suggests that the upper Bow valley may have escaped forest fires because of its isolated situation away from the railway.

Something of a contrast to the three valleys just described is shown in Dawson's account of his exploration of the Cascade, Red Deer and Pipestone

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[1] Lake Louise

valleys. References to burnt forest in these areas are conspicuous by their absence. From the Minnewanka area to where the main stream is met by the large tributary from the Palliser range (see Fig. 6) the Cascade valley was "for the most part pretty densely wooded." (Dawson, 1886, p. 144B) Near Cut-head Creek, "the slopes of the adjacent hills are rough and wooded." (Ibid., p. 145B) The valley of the Red Deer tributary draining north from Snow Creek Pass was "generally wooded." (Ibid., p. 145B) The Red Deer valley in the area between McConnell and Divide creeks is described as "generally wooded" and the comment is made that "but small areas of the forest have been burnt." (Ibid., p. 147B) The valley of the Little Pipestone is "for the most part thickly wooded." (Ibid., p. 147B)

These statements imply that the relative isolation of these valleys, none of which provided transmontane routes, may have meant that they were less affected by man-caused forest fires, particularly those started by the whiteman. That this implication is valid is suggested in a summary statement by Dawson on the causes and frequency of forest fires. Because of its relevance to this study, the statement will be quoted in full. Having described earlier evidence for prehistoric forest fires, as shown by buried charcoal layers, Dawson states:

> Notwithstanding the evidence previously mentioned of the occasional occurrence of forest fires in ancient times in these mountains, it is only within the historic period for the region (probably not before the beginning of the century) that such fires became common, and during the past few years their frequency has increased in a greatly accelerating ratio. The effect of such fires is most disastrous. Large quantities of valuable timber are destroyed and whole regions became so blocked with tangled burnt woods and wind-fall as to be practically inaccessible, while the fine mountain scenery is seriously marred. These destructive fires in most cases arise through sheer carelessness or wantonness and the most stringent measures should be taken to prevent them before it is too late. As the class of

> persons in this respect is generally that least desirable to retain in any country, the authorities would find the respectable portion of the community in full sympathy with them in any measure to check this evil. It is often stated that the Indians are responsible for much of this destruction, and it is doubtless true that since they find the whole region in process of being ravaged by fires which they can not prevent, they have become more careless than before. They would not, however, willingly destroy their own hunting grounds and the best evidence of their care is found in the fact that, while along the North Kootanie Pass (which so far has been scarcely used, except by the Indians) the woods are generally unburnt, those in the vicinity of the parallel Crow Nest Pass, which has now been for a few years a route used by the whites, are entirely destroyed and represented only by bleaching or blackened trunks. (Dawson, 1886, pp. 36B-37B)

Clearly then, in Dawson's view, the whiteman, particularly since the Bow valley had been chosen as the route for the railway, had been the cause of most forest fires. His recommendation that "stringent measures" be taken to correct the situation was nothing new. As early as 1879 the Lieutenant Governor of the North West Territories had passed an ordinance for the prevention of prairie and forest fires, which carried a "penalty of $100, or imprisonment not exceeding three months." (Interior, 1883, pt. IV, p. 20) However, enforecment of this ruling was understandably difficult and it was not until after the turn of the century that fire prevention became effective in the Park area.

Wildlife

A further indication of the marked environmental changes that had been, and were still taking place, was the condition of the wild game population. After a survey made during the year prior to the establishment of the Rocky Mountain Park, Mr Witcher, formerly Commissioner of Canadian Fisheries, reported that:

> Large game and fish once various and plenty in this mountainous region are now scattered and comparatively scarce. Skin-hunters, dynamiters and netters, with Indians, wolves and foxes, have committed sad havoc. The rapid settlement now progressing in that vicinity will add other elements of destruction. (Interior, 1886, pt. I, p. 86)

Another account is that told by Tom Wilson, the pioneer guide in the area, who had packed food for the C.P.R. surveyors in 1881:

> Game in those days was not plentiful, in fact it was rather scarce...the only explanation for this that he could find was given by the Indians who said that some ten or twelve years previous (c. 1870) during a dry summer most of the wildlife had been driven out or killed by the smoke from many isolated fires, traces of which could still be seen. (Crag and Canyon, July 17, 1931)

The Indians did not suggest what had been the cause of the fires; but, in view of Christie's statement, prospectors may have been in part responsible.

The relationship between the local Indian and his environment underwent further changes during the years after the Palliser expedition. With the signing of Treaty Number Seven in September 1877, the Rocky Mountain Stoneys, no longer dependent entirely on subsistence hunting, seem to have begun hunting indiscriminately. The consequence of this threatened to be the extinction of all the big game on the eastern slopes in southern Alberta. However, little was done to protect game until after the turn of the century. George Stewart in his first report as Park Superintendent clearly indicated that the times were changing: "...it is of great importance that if possible the Indians should be excluded from the Park. Their destruction of the game and depredations among the ornamental trees make their too frequent visits to the Park a matter of great concern." (Interior, 1887, pt. VI, p. 10)

In summary, three aspects of the "natural landscape" had undergone marked changes in the immediate pre-Park period: the forest cover, wildlife, and the local Indian population. Many of these changes were due directly or indirectly to the arrival of the railway. Exploration in 1881, and railway construction in 1883 and 1884, were directly responsible for the cutting of

timber and an increase in forest fires. In an indirect sense the railway, by making possible the exploitation of local natural resources such as copper, timber, coal, the hot springs and scenery, resulted in further changes. Many of these had already been effected before the Park was reserved by Act of Parliament in 1887. In the remainder of this chapter these direct and indirect effects of the railway will be described.

Apart from the clearing of the right-of-way, the most obvious consequence of railway construction was the cutting of timber for ties and fuel. It is worth noting here that the forests along the right-of-way within the mountains were lightly influenced in this respect by comparison with the forests in Ontario, which had to provide for construction across the Prairies. In the Park area, tie camps were established in the Castle Mountain area (Crag and Canyon, December 29, 1939) near the confluence of Vermilion Creek with the Bow (Allen, 1896, p. 230) and possibly elsewhere.

As the early locomotives were wood-burners, local timber was used for fuel. How long this situation continued and how much wood was consumed it is difficult to determine. However, some idea of the scale of this activity in 1883 is given by a statement made by Tom Wilson:

> Between there (Silver City) and Holt City (Lake Louise) several hundred men were employed in getting ties and cordwood from the brush. These supplies were stacked along the right-of-way for the next spring's operations. (Wilson, 1929, p. 69)

A more significant cause of change than the cutting of timber was the forest fires that were either started during the surveying and construction of the track, or caused by sparks from the locomotives. The railway construction workers seem to have been especially careless with camp fires. A C.P.R.

engineer (Bone, 1947, p. 74) has described a situation in the Kicking Horse valley that must also have occurred frequently in the Bow: "Forest fires started shortly after our camp had been set up. The mountain sides were ablaze..." The government surveyor J.J. McArthur included the following irate comment in his report for the year 1886:

> It is a matter of regret that fires incidental to railway construction have devastated much of the country in the vicinity of the railway and have spoiled much of the wonderful beauty of the environs of these mountains[1]...and in most instances these fires have occurred through wanton carelessness. Apart from climatic and other considerations, the large quantities of timber in the tributary passes which have so far escaped destruction, should impress on the Government the necessity of using every means in its power to suppress this species of vandalism. (Interior, 1886, pt. II, pp. 41-42.)

As fire-guards had not yet been perfected, forest fires caused by sparks from the engines were especially common during the early years of the railway's operation. Stewart's timber berth surveys show that much of the Bow valley between the front range and the Divide was burned over before, and during, the early Park period. In an historical survey of watershed conditions in the Bow valley, Ritchie (no date, p. 4), a Department of the Interior official, described "the big fire of the Bow valley":

> In 1882 the Bow Valley from Banff through to the B.C. and Alberta summit was burned over by the engineers during a survey of the Canadian Pacific Main line.

Such fires were not only a local problem but also a transcontinental one, and persisted as such into the present century.

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[1]The Selkirks

Mining

With the arrival of the railway in 1883 a sizeable settlement grew up at Silver City based on the exploitation of local copper ore. The boom was short-lived and by 1886 the population that had at one time reached 1,500 had all but disappeared. The brief history of the development can be traced in the Annual Reports of the Department of the Interior. The copper ore had been discovered in 1881 by an American prospector, Joe Healey. In his annual report for 1882 the Deputy Minister of the Interior, Lindsay Russell, commented:

> The eastern slopes of the Rocky Mountains give promise of being almost, if not altogether, as valuable for deposits of the precious metals as their western slopes have proved to be. Numerous applications are being received for the privilege of exploring for and mining gold and silver. (Interior, 1882, p. XI)

In the following year his successor, A.M. Burgess, was even more optimistic:

> The prospects of successful mining for the precious metals on the eastern slopes of the Rocky Mountains are exceedingly encouraging. A large number of practical miners, drawn from various parts of the world, expended a good deal of time and capital in prospecting at different points in the course of the past summer. (Ibid., 1883, p. XV.)

Some prospecting was being carried out on the North Saskatchewan above Edmonton, but most of it seems to have been done on the Bow and its tributaries. In the Department of the Interior's Annual Report for 1884 is the following statement:

> The total number of applications for mining lands, other than coal, received at this office up to the 31st of October, last, is 361.
>
> The majority...are on streams, tributaries of the Bow River - between Padmore (i.e. Kananaskis)...and the summit of the Rocky Mountains. (Ibid., 1884, pt. I, p. 30)

During 1884 the Deputy Minister visited Silver City and his formerly optimistic tone changed to one of caution: "very little is yet known of the mineral deposits of the Mountains." (Interior, 1884, pt. VI, p. 7) Apparently the absence of placer deposits meant that few prospectors could afford to operate. In 1885 the townsite was rather belatedly surveyed by P.R. A. Belanger, who commented: "The prospects of the town are the working of mines and timber trade, which deserve the attention of capitalists." (Ibid., 1885, pt. II, p. 18)

Probably the prospectors at Silver City were at least in part responsible for the forest fires that in Dawson's previously quoted statement had "during the past few years increased in a greatly accelerating ratio." The prospectors' attitude towards forest fires has been described as: "that fires were inevitable and frequently more beneficial than otherwise...The prospector welcomed fire, since it laid bare the rocks in which he sought his fortune." (Whitford and Craig, 1918, p. 126.)

The coal deposits of the Cascade Basin, to the east of Banff in the north-west to south-east trending valleys of the Bow and Cascade, were discovered in 1883. However, as their exploitation needed more capital investment than was the case with precious and semi-precious minerals, it was not until 1886 that commercial mining on any scale began. In this year the Canadian Anthracite Coal Company began production at Anthracite. Dawson (1886, p. 133B), in view of the anthracitic nature of the coal and the proximity of the railway line, regarded it as being "a circumstance of the first economic importance." In 1884 the Department of the Interior delimited the thirty-six-square-mile Cascade Coal District (see Fig. 6). In this district, which included the area

of the present Banff townsite, the lands therein were "withdrawn from ordinary sale and from settlement." (Interior, 1884, pt. I, p. 37.) Land was offered for sale at first at $20 per acre and in 1885 at $12.50. This compared with a price of $10 per acre for other coal districts in the North West Territories. As usual, there was some early optimism. The Deputy Minister A.M. Burgen, in his report for 1887, stated:

> The discovery and successful development of anthracite coal in the heart of the Rocky Mountains midway between the coal fields of British Columbia on the west and those of the prairie region on the east, situated, too, right on the line of our great transcontinental railway and within easy reach of the Pacific Coast, may furnish to those who are concerned about the possible future relations of Canada and the British Empire, some material for reflection. (Interior, 1887, p. XVIII.)

Although coal mining at Anthracite in the pre-Park years was only on a small scale, later developments at Canmore and Bankhead were to be of some significance, and will be described in the next chapter. Even so, activity at Anthracite undoubtedly had resulted in some landscape changes prior to 1887. The settlement itself, which had three-hundred inhabitants by 1887, is shown to be an eyesore by Dawson's 1884 photograph (see Photograph No. 15). The demand for pit props was satisfied by local cutting. Mining elsewhere in the North West Territories was also responsible for cutting in the Banff area. An article in the Calgary Tribune of December 31, 1886, by the Banff correspondent, gives some indication of this activity: "Quite a stir about our station (i.e. Banff). This week Messrs McCardle Bros. are hauling out mining timber and loading cars at a brisk rate."

Lumbering

Lumbering in the Bow valley and its tributaries, the Spray and Kananaskis

was another extractive industry that developed soon after the arrival of the railway in 1883-84. Owing to the settlement of the prairies, where timber was in short supply, the demand was high. As has been mentioned earlier, the size and quality of timber on the eastern slopes is rather poor and certainly not comparable with that found in large areas of British Columbia. Even so, the few accessible mature stands that had escaped fires, and were in a location where logs could be rafted down stream, were soon reserved in timber berths.

In July 1883, tenders were received at the newly-opened Crown Timber Office in Calgary for ten 50-square mile timber berths on "the Bow River and its tributaries." The money collected by the Timber Agent for these berths was $49,030 (Interior, 1883, pt. I, p. 23). Nine of these berths have already been described earlier in the chapter on the basis of L.B. Stewart's surveys. The tenth was probably the Cochrane limit situated in the Lac des Arcs area (see Fig. 5). Cutting began in 1882 on the last-named berth for the Cochrane Ranche Company, and in the following year James Walker took lumber out of the Kananaskis valley for his mill in Calgary. The largest lumber company in the area, the Eau Claire and Bow River Company, began to operate a mill in Calgary in 1887. This company was from Eau Claire in Wisconsin, where it had probably been in part responsible for the drastic transformation of the lake forests of the Mid-West. Although commercial lumbering had not been developed on any large scale prior to the establishment of the Park, the Rocky Mountains Park Act of 1897 and later legislation recognized the right to cut timber on berths already licensed. This policy created several problems, the consequences of which will be discussed in chapter seven.

Tourism

Of far greater importance in the long-term than either mining or lumbering was tourism. In contrast to the free enterprise exploitation of minerals and timber, the exploitation of the hot springs at Banff was quickly subject to government control. By an order in council dated November 25, 1885, an area of ten square miles around the hot springs (see Fig. 4) was reserved from "sale or settlement or squatting." The springs had been 'developed' prior to this by three local entrepreneurs, McCabe, McCardell, and Keefe. However, tourism prior to government intervention had been insignificant. Superintendent Stewart described the situation in his first annual report:

> Up to the spring of 1886 no permanent residents were found within the Park, with the exception of the section men at Banff Station, on the railway, and the claimant of the discovery of the cave who occupied a rude shanty in its vicinity. A few migrating individuals resided temporarily in tents round the Hot Springs. Our townsite and indeed the whole Park was a wilderness throughout. (Interior, 1887, pt. VI, p. 10.)

During the summer of 1886 Banff townsite was rapidly settled (see Photograph No.12). So the townsite, later to be the cause of so many administrative problems, actually predated the Park.

In conclusion, the landscape of the area at the time of the Park's establishment on June 23, 1887, was in a very changed condition. Since the arrival of the railway surveyors six years previously, forest fire frequency had greatly increased and large areas of the Bow valley and its tributaries had been burnt over. The processes that led to a scarcity of game at the time of the Palliser Expedition had been since accelerated and there was a real possibility that many species would disappear. The exploitation of minerals and timber had already begun to modify the landscape of the Bow, Spray, and

Kananaskis valleys. The contemporary attitude towards the landscape was understandably governed by frontier values. It was part of the process of free enterprise exploitation of natural resources that had already changed the face of much of the United States and eastern Canada. The Rocky Mountains Park in 1887 was therefore far from "its unspoiled original state." It started in a phoenix-like fashion amidst the burnt-over slopes of the Bow valley. Superintendent Stewart's above-quoted description of it being "a wilderness throughout" could not be accepted today even with the most liberal interpretation of the wilderness concept.

CHAPTER VII

LANDSCAPE CHANGE IN THE EARLY PARK PERIOD, 1887-1911

Apart from causing an increase in tourism, the Rocky Mountains Park, during the first twenty-five years of its history, had little effect on the developments that had followed the arrival of the railway engineers in 1881. By 1911 the preservation and protection clauses of the 1887 Act (see Appendix II had achieved little more than an increase in game in the local Banff area. The continuing modification of the landscape during the years between the Act of 1887 and the Forest Reserves and Parks Act of 1911, will be described in this chapter in terms of vegetation, wildlife, and the effects of economic activities.

Vegetation

Because of their importance as a local means of transportation, the number of horses in the Park area increased rapidly during this early period. This increase had several consequences, one of which was the disappearance of the bunch grasses. As mentioned in previous chapters, changes in the dominant species of the subalpine grassland areas had followed the disappearance of the thickwood buffalo and the depletion of other ungulates. A further change followed the increase in the number of horses within the area.

At the Kootenay Plains in 1811, Alexander Henry had seen "very short grass." Hector in contrast had been impressed by the good pasture the bunch grass provided. A government forester, G.H. Edgecombe, in his annual report (Interior, 1913, pt. VI, p. 92), described the Kootenay Plains as he saw them

in 1911:

> Last fall this district appeared to have been overstocked, as the grass was very sparse and light.

Taken together these three descriptions support Larson's argument that bunch grass did not represent the climax cover for the short-grass plains, at least as far as the mountain valleys of the thesis area are concerned. Whether or not the prehistoric plains buffalo maintained a short-grass cover over all the prairies is another question.

As tourism developed, the need for horses increased and the demand for feed threatened to exceed the supply. The superintendent's annual reports give details of how the annual "hay crop" from the Vermilion lakes was given to the highest bidder. Initially it was feared that this crop would "likely diminish in future" (Interior, 1889, pt. V, p. 8) and that seeding would be required. Whether or not this was ever carried out the author has not discovered.

During the period around the turn of the century several grazing licenses were granted in the Park. The Department of the Interior Annual Report for 1904 indicates that John Brewster had a ranch at Banff of 1,280 acres. Government foresters at this time believed that grazing was beneficial since it reduced the fire hazard.

Apart from the cutting of a few small fire breaks around Banff townsite, little was, or could be done to prevent forest fires. As late as 1903 a forest ranger was appointed, and in 1909 three game and fire wardens. The difficulties in getting to fires, and the lack of any effective fire fighting equipment meant that early prevention efforts were limited in scope. Early policy was

of necessity passive, and in 1889 Superintendent Stewart thought that the cutting of fire breaks was "the most economical mode of meeting the difficulties from fires." (Interior, 1889, pt. V, p. 8). The official attitude of the Department of the Interior at this time is shown in the report of the Deputy Minister, A.M. Burgess, for the year 1889 (Interior, 1889, p. XVIII):

> It has been suggested that the Department should take further precautions for the prevention of forest fires. This might possibly be done if the present staff of forest rangers were greatly increased, but the good to be derived from this large additional expense would, I am afraid, not be adequate to the cost incurred.

Only two years after the establishment of the Park in 1889 severe drought conditions (see Fig. 1) were responsible for the spread of extensive forest fires throughout the North West. In June of that year a large fire swept down the Bow valley from the west and threatened to enter the Park. Fortunately it was stopped by a treeless area on the northwestern boundary, having almost completely destroyed the forest on the slopes south of the Bow, from the Vermilion lakes to beyond Baker Creek (see Fig. 7). In the same year fires burnt over the country drained by Forty Mile Creek, the Sawback lakes, the head of the North Saskatchewan, Cuthead Creek, and the Cascade valley (Ritchie, n.d., p. 3). In 1891 a heavy fire three to four miles west of Banff, alleged to have been started by a C.P.R. locomotive, spread eastward to the Vermilion lakes (Calgary Herald, June 3, 1891). In 1894 a large fire came over from British Columbia to the headwaters of the Spray and down the Spray valley to the Spray lakes, where it burnt itself out on the side of the mountains (Ritchie, n.d., p. 2). In 1904 Park Superintendent Douglas reported (Interior, 1904, pt. VII, p. 4) that a serious fire had been started in the

May of 1903 on the north side of the railway track some three miles west of Banff station. According to Mair (1952, p. 12) in the same year another fire destroyed the forest on the north side of the Bow from the east gate to Anthracite. And in 1904 a fire burnt the forest in the Bow valley north of the river from Vermilion lakes west to Baker Creek. During 1910, a severe drought year, forest fires were as widespread and perhaps even more widespread than in 1889. To the east of the Park, in that part of the Rocky Mountains Forest Reserve south of the Red Deer river, an estimated half-million acres (c. 780 square miles) of timber were burnt over. And in the Park the Kananaskis valley was "largely burned over" (White, 1915, p. 243).

The destructive fires of 1910 had the beneficial effect of emphasizing the need for an effective fire prevention organization on the eastern slopes of the Canadian Rockies. And, significantly, in the same year the Rocky Mountains Forest Reserve was set aside by a federal government order in council.

Three inventory reports by government foresters Edgecombe (1910), Caverhill (1910) and Dwight (1913) describe the Reserve as it was before protection became effective. The first two were mainly concerned with delimiting the eastern boundary of the Reserve, but in Dwight's opinion, although larger areas of mature timber occurred to the west, the general condition was much the same. Of particular interest to this thesis are their comments on the extent and frequency of fires. Edgecombe, who was concerned with that part of the Reserve south of the Elbow River, reported that:

> During the last sixty years likely sixty per cent of the eastern slope has been fire swept. Last summer, on account of the exceptional dryness, high winds, lack of assistance at first, and lack of knowledge of the

> interior country, fires started by the carelessness of fishermen, surveyors, and also by incendiaries soon reached unmanageable size. (1910, p. 14)

Caverhill, who surveyed the Reserve from north of the Elbow to the North Saskatchewan, commented:

> Eighty per cent of the territory surveyed has been burnt in the last fifty years, and 60 per cent of this or 48 per cent of the entire country has been burned over in the last twenty-five years. The causes of these fires have been various, many laying the blame to the Indians, who believed if the forest were destroyed new grazing land would be found for the disappearing buffalo. This may be true in some cases, but more I believe to the carelessness of the white trapper and the numerous other campers we find within the borders of the forest. (1910, p. 27)

Dwight, having surveyed all of the Reserve, concluded that:

> Not more than twenty-five per cent of the area of the reserve is covered with mature timber, the rest of the forest being second-growth mostly under fifty years of age...Within the past sixty years, fires have increased greatly in number, judging from the ages of most of the second-growth stands, which lie below that age. (1913, pp. 11, 17)

While recognizing the probability that these young second-growth stands had not all replaced what was formerly mature forest, it is certain that forest fires had greatly increased in frequency during the second half of the nineteenth century and particularly since the arrival of the railway. The connection between increased fires and increased white penetration seems clear but the possibility of changing climate providing increasingly favourable contitions for fire should not be ignored. Schulman's graphs (see Fig. 1) show that 1889 and 1910, the worst years for forest fires in the period 1887 to 1911, were drought years. The same graphs suggest that the years of railway exploration and construction, from 1882 to 1884, were drier than average and produced environmental conditions favourable for the spread of forest fires. As was stressed in earlier chapters, changing environmental conditions, together with the increased white penetration of the area, were probably responsible for the increase in fires.

Whatever caused the increase in forest fires, their consequences were far reaching. One direct result was an increase in the area of grassland within the Park. This was described by the government surveyor Drewry in his report for 1891. He commented:

> Here I must remark on the great change which is taking place in the Bow Pass.[1] During the last five years I have observed it closely, knowing it previously by report. Only ten years ago camping ground, where good feed could be obtained for horses,[2] was comparatively scarce while now it can be found at almost any point. It appears that this has resulted from extensive fires, which sweeping over the country, have seemingly burned so fiercely as to destroy the seed and growth of black pine, spruce and poplar; and grass has gradually covered the surface. Much of the timber now standing is dead and dry, so that when another fire passes over the valley it will practically be prairie. (Interior, 1891, pt. II, p. 32.)

Another consequence of the widespread forest fires was a change in the rates and amount of stream flow on the eastern slopes. The decrease in the retentive capacity of the watersheds was in part responsible for the floods at Calgary in 1884 and 1897. An explanation of the reasons for the 1897 flood was given in the Calgary Herald of June 21, 1897:

> During recent years much of the heavy timber which covered the sides of the mountains has been burnt off, and when the cloud burst between the Gap and Castle Mountain, the steep slopes of the mountains and foothills became chutes along which the floods rushed, swelling the rivers and valleys into a wild torrent of seething, descalating waters.

Increasing settlement on the prairies demanded better watershed management, not only for flood control but also for irrigation, and later hydroelectric power. Because it crossed the often dry area of southern Alberta, and because of the growing settlement at Calgary, attention was soon turned to

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[1] The area between Castle Mountain and Lake Louise.

[2] Part of the increase in "good feed" was probably due to the decline of the settlement at Silver City.

the upper Bow and its mountain tributaries. In a comprehensive report a federal government engineer, M.C. Hendry, examined the possibilities of storage and power development on the Bow and its tributaries. In his report (Hendry, 1914) there is no indication that he envisaged any incompatibility between Park use and possible storage or power development. For example, he stated: "Lake Minnewanka offered a splendid site for storage, and one capable of very economical development." (1914, p. 74)

Contemporaneous with Hendry's investigations, which began in 1911, were the early activities of the Calgary Power Company. Some attention will be given to their Lake Minnewanka development later in this chapter.

Wildlife

Although section 4 of the 1887 Act (see Appendix II) contains a clause referring to "the preservation and protection of game and fish, of wild birds generally," by 1911 the wildlife population of the Park area was probably as low, if not lower, than in 1887. Because of the irrational nature of the Park's boundaries prior to 1902, effective protection had been impossible. Banff was used as an outfitting centre for hunting trips into the mountain valleys outside the Park. The extension of the Park's boundaries in 1902 (see Fig. 4), one of the reasons for which was to improve game protection, hardly improved the situation. With no organized warden system the supervision of 4,500 square miles was an impossible task.

Apart from the big-game hunters, the miners of Canmore and Anthracite were responsible for further reductions in the game population of the Park area during the period 1887 to 1911. According to Millar (1916, p. 112) most of the mining settlements on the eastern slopes were surrounded by a belt of

country, perhaps twenty-five miles wide, in which all forms of big game had become extinct. Even more destructive were the Stoney Indians. Hunting intensively from the Brazeau River to the Crowsnest Pass, they threatened to exterminate all big game on the eastern slopes. Millar commented that there could be no hope for Rocky Mountain big game unless the Stoneys could be compelled to observe the game laws.

Williamson (1916, p. 127) reported that "five years ago the big-horn sheep and the Rocky Mountain goat, which are approaching extermination in the United States, had almost disappeared from the Rocky Mountains Park." In 1913 one of the last remaining elk herds on the eastern slopes was destroyed by the Stoneys. Game protection in the Park was improved in 1910, by the appointment of three game and fire wardens. But not until after 1912 when the Harkin administration began to receive larger government appropriations, did it begin to be really effective.

Apart from changes in the numbers of big game in the Park, changes undoubtedly also took place in other animal populations. A decrease undoubtedly occurred in the numbers of predators in the Park area. In his survey report of game conditions in the proposed Park area, Witcher recommended that "wolves, coyotes, foxes, lynxes, skunks, weasels, wild cats, porcupines, and badgers should be destroyed," as well as "eagles, falcons, owls, hawks if too numerous... also loons, mergansers, kingfishers, and cormorants." (Interior, 1886, pt. I, p. 87) This reduction of supposedly harmful predators was to remain an accepted part of Park management until the 1930s.

Economic Developments

The mining and lumbering concerns, that had been established before

1887, continued to operate during the early Park period under the rather permissive control of Superintendents Stewart and Douglas. Coal mining continued at Anthracite until 1904 when it became no longer economic. In 1889 development of coal mining began at Canmore, ten miles southeast of Anthracite. At Canmore, as at Anthracite, mining began before inclusion into the Park. Anthracite had been included in the 1887 boundaries and Canmore by the extension of 1902. In contrast, the development at Bankhead (see Fig. 6) actually began in what was already the Park. In 1904 the C.P.R. opened a mine only four miles northeast of Banff, on the road to Lake Minnewanka, then one of the main tourist drives. The mine began production in 1905 and Superintendent Douglas in his report for that year described the development favourably:

> The acquisition and development of this property by the Canadian Pacific Railway Company marks a new era, not only in the history of the Rocky Mountains Park, but in the industrial life of the district of Alberta.... The new village of Bankhead, instead of being a detriment to the beauty of the Park, will on the contrary add another to the many and varied attractions of the neighbourhood...nestling under the shadow of Cascade, with its beautiful homes and its teeming industrial life it has already become a popular stopping place for tourists. (Interior, 1905, pt. V, pp. 10-11.)

Douglas also saw Bankhead as "a town that will advance and prosper... a model mining town." However, its prosperity was to be short-lived. In 1923 the mine closed down and, following Silver City and Anthracite, Bankhead became the Park's third abandoned mining settlement. Even so, in 1911 Bankhead had a larger permanent population than Banff, and with Canmore was producing around half a million tons of coal a year. Like Anthracite and Canmore, Bankhead was responsible for the drastic transformation of the local landscape (see Photographs 19 &20) and the creation of some very 'un-parklike' scenery. The effect of the coal mining settlements on the landscape was not

entirely local; the continuous demand for pit props led to further modification elsewhere in the Park.

The growth of Calgary and other settlements in southern Alberta was further reason for the cutting of timber in this early period. In 1897 the Eau Claire Lumber Company relinquished their rights to timber limits "A" and "C" (see map), but retained "E", the only one in the Park at that time. Some cutting on this limit was done in the 1890s and during the first decades of the present century. Logging methods appear to have been careless during this early period, much 'slash' being left as a fire hazard. Paradoxically, the Conservation Commissioner's Report on Forest Protection in Canada 1913-14 contains a photograph (see Photograph 8) showing slash left in the Spray valley within a few miles of Banff.

It seems probable that slash left after cutting on the Eau Claire and Walker berths in the Kananaskis valley was largely responsible for the fires that "largely burned over" that valley in 1910. The fire that in 1912 "swept up both sides of the Spray valley from Banff to Mile 18" (Mair, 1952, p. 12) may have had a similar origin.

With the extension of the Park's boundaries in 1902, 360 square miles of timber berths were included in the enlarged Park. Their extent and location is shown on Figure 4 . The Eau Claire Company continued to cut in the Kananaskis valley and in the Bow valley south of Exshaw. Further cutting was done by the C.P.R. and other companies on berths at Bath Creek, near Lake Louise, on the Little Vermilion Creek, near Healy Creek and in the Canmore area.

The amount of timber cut in the Park during the period 1887 to 1911 was not great, as few accessible stands had escaped fires, and also since timber

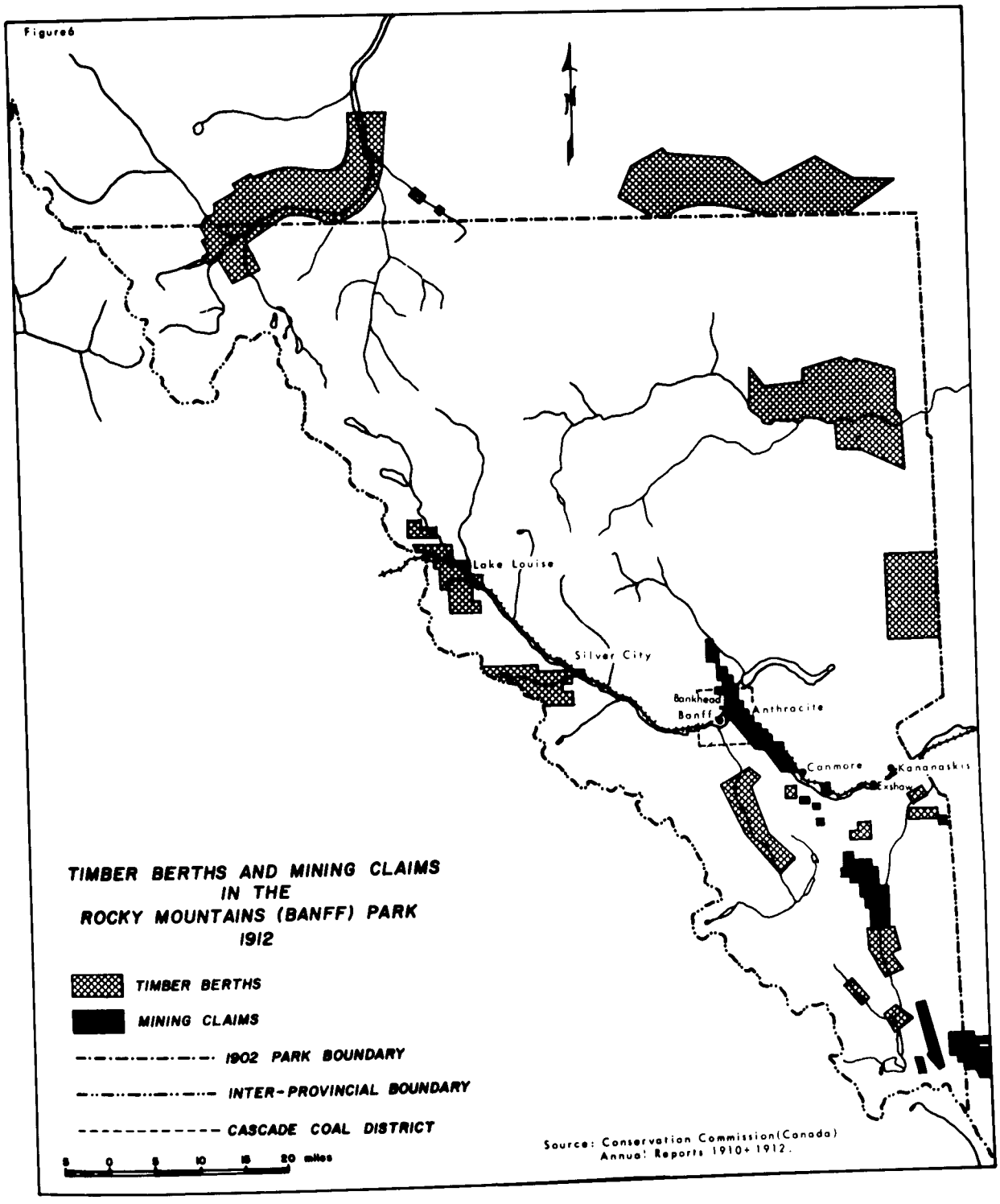
Figure6
Lake Louise
Silver City
Bankhead
Banff
Anthracite
Canmore
Kananaskis
Exshaw
TIMBER BERTHS AND MINING CLAIMS
IN THE
ROCKY MOUNTAINS (BANFF) PARK
1912
TIMBER BERTHS
MINING CLAIMS
1902 PARK BOUNDARY
INTER-PROVINCIAL BOUNDARY
CASCADE COAL DISTRICT
5 0 5 10 15 20 miles
Source: Conservation Commission(Canada)
Annual Reports 1910+1912.

could often be imported from British Columbia at cheaper prices. On the other hand, this lumbering was significant because it caused further forest fires, and also because it "disturbed" most of the few remaining "undisturbed" forest stands in the Bow, Spray and Kananaskis valleys.

The settlement of the Prairies led to a further demand on the natural resources of the Park. The need for cement resulted in the establishment of the Western Canada Cement and Coal Company's plant at Exshaw in 1905, the site being especially favourable with coal, water, limestone and shale in close proximity. Superintendent Douglas was again enthusiastic about this development:

> The industrial assets of the park have been increased since last year by the establishment of a Portland cement mill of large capacity...an important step in the building up of western Canada....the new town of Exshaw, the centre of a great manufacturing industry, has arisen out of the Bow River. (Interior, 1906-7, pt. VI, pp. 14-15.)

A consequence of this cement plant's establishment was a growing demand for power. This, together with the pressing need to regulate the Bow River for irrigation and flood control, led to the Calgary Power Company's activities on Lake Minnewanka in 1911 and 1912.[1] In 1911 a small dam was already in existence at the outlet of Lake Minnewanka; it had been constructed by the Park's authorities to improve the shoreline and to maintain the lake at suitable level for boating. In November 1911, the Calgary Power Company was given permission by the Department of the Interior to break this dam during the winter months, and thereby increase the low winter flow. The need for a higher winter flow when demand for power was greatest was hardly solved by this increase and in February of 1912 permission was granted to build a larger dam across the Cascade River. This river originally narrowly bypassed Lake Minnewanka to the northwest, but the dam diverted its flow into the lake, the level

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[1] Most of the information in the following paragraph was obtained from the Autumn 1961 edition of the Calgary Power Company's quarterly publication, "The Relay".

of which was thereby raised sixteen feet. Later demands by the Calgary Power Company for improved storage on the Bow and its tributaries were to be a cause of considerable concern to the Parks Branch, and were largely responsible for the exclusion of the Spray Lakes area from the Park in 1930.

The Development of Tourism

As will be stressed in the next chapter, the Rocky Mountains Park during this early period was attempting to justify its existence economically. This could only be done by the attraction of tourists. To do this it was necessary to "improve and develop" the Park, which involved making an "attractive"[1] landscape. This policy of improvement and development has had several lasting effects, some of which are seen today as being unfortunate. Perhaps the most obvious has been the growth of Banff.

Banff townsite was originally intended to be more than a place where visitors to the springs could stay. In Sir John A. MacDonald's words: "A portion of the Park offers some beautiful sites for villas... to be leased out to people of wealth who will erect handsome buildings on them." (Canada, Commons Debates, 1887, V. 1, p. 249).

The success of the Park as a tourist attraction (see Table 2) resulted in the rapid growth of the townsite. And as far as can be seen from photographs (13 and 14) by 1912 it had already reached much the same extent that it has today. As motor cars were not officially allowed into the Park until 1912, road development during this early period was rather limited. Nevertheless by 1912 there were already 96.5 miles of graded road in the Park. Roughly a third of this represented the road to Kananaskis; also there were about 25 miles of tourist 'drives' in the

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[1] Paradoxically, Parks' administrators today are embarrassed by the "attractiveness" of the Park.

Banff area, and another 12 miles of road at Lake Louise. (Interior,1911-12,pt.V,p.20

Tourist attractions that now seem incongruous in a National Park were the zoo and the aviary. These developments were significant, in that they were the result of the virtual absence of many forms of wildlife in the Park. It was hoped that this inadequacy would be made up for by a collection of a variety of animals "in confinement." The animals collected were not all native species, and included at various times a polar bear, yaks, Persian sheep, and Angora goats.

Several suggestions as to how the landscape might be "improved" were made by Whitcher (Interior, 1886, pt. I, pp. 86-93). His suggestion as to how "an extensive waste of beaver meadow" might be converted into "a pretty group of small lakes" resulted in the construction of the previously-mentioned dam at the outlet of Lake Minnewanka. He also recommended the introduction of wild rice from Ontario, "to replace the rank weeds and wiry grasses now covering the unflooded portions" (of the Vermilion Lakes), and also to offer "food and concealment to wild geese and ducks." Although since 1886 techniques have changed, wildlife and fishery management are still an important part of National Parks administration.

Another attempted improvement was the introduction of "a greater variety of foliage into the Park." The effect of forest fires on the scenery was a source of disappointment to early tourists. One of them, describing the Rocky Mountains in 1887, commented:

> Seen from Banff this portion of the range has a rugged grandeur, which could be relieved more or less by its pine forests had they not been damaged to an irreparable extent by fires which must at times have made the mountains look as if they themselves were all ablaze. (Barneby, 1889, p. 17)

Superintendent Stewart sympathized, and reported that "the want of variety in our foliage has been constantly remarked and regretted by visitors... large areas of dead timber giving a desolate appearance to the landscape." (Interior, 1888, pt. VI, p. 5) In the previous year, on the recommendation of Professor Saunders of the Experimental Station at Ottawa, some four thousand young trees were ordered from nurseries in the north-western States. The aim was "to add somewhat to the beauty of the Park by the introduction of a greater variety of foliage." Stewart also commented that naturalists and others would be able to see "samples of the whole flora of the mountains displayed in a moderate space." In 1888 some trees were planted at the foot of the waterfall on Castle Mountain. Unfortunately, or perhaps fortunately, most of the trees failed to survive in their new environment.

Clearly then, even scientific advisors to the Park's administration had no idea of preserving the landscape in a primeval, or pristine, condition. While it was thought desirable to prevent forest fires and protect certain species of wildlife, the main objective behind Park management was to 'improve' the Park and make it a more attractive place for the tourist. The question as to what was an improvement was answered by value judgments and understandably values have since changed.

In conclusion, in 1911 most of the landscape of the Rocky Mountains Park could have been described as a frontier landscape, a landscape in which the emphasis was on exploitation. Since the arrival of the railway a variety of natural resources had been exploited, the development of the Park being merely a part of this process of exploitation. Forest fires, mainly from the railway, had increased in frequency and extent. Mining, quarrying, and lumbering

had continued to transform the landscape. Although Anthracite had been abandoned in 1904, the settlements at Canmore, Bankhead and Banff had grown steadily and gave the Park a permanent population of about 2,000 in 1911. In an attempt to improve the landscape of the Park, exotics had been introduced and drainage artificially diverted. Although regulations concerning preservation and protection had been in existence for almost twenty-five years, they had had little or no effect. Effective protection only came during the Harkin era, when, after improvement and development, the Park had justified its existence.

These changes did not, of course, affect all parts of the Park to the same extent. The Bow valley, the Spray, North Saskatchewan, Cascade and Kananaskis valleys were affected much more so than the relatively isolated Red Deer and Clearwater valleys. For example, from the author's own experience in the field, the Red Deer valley above McConnell Creek (see Fig. 7) shows far less evidence of forest fires than the Bow. Whereas young lodgepole pine stands cover much of the Bow valley from the front range to some ten miles above Lake Louise, the Red Deer valley has comparatively few lodgepole stands. Proportionately speaking, neither the frequency nor extent of burning has been as great. Although coal and timber were potentially available in the Red Deer and Clearwater valleys, problems of access prevented their development.

CHAPTER VIII

NATIONAL PARK ADMINISTRATION AND IDEALS DURING THE PERIOD 1885-1911

As was shown in the preceding chapter, National Park policy, or the lack of it, during the period from 1885 until the passing of the Dominion Forest Reserves and Parks Act of 1911, was responsible for many developments now seen as regrettable. Even so, adverse criticism of early Park administration on the basis of present day knowledge and values is unfair. And by the same token it would seem an exaggeration to credit the politicians who voted for the Bill in 1887 with "idealism and wisdom of the highest order" because they set aside "areas of outstanding natural beauty for the enjoyment of all generations." (Northern Affairs [Canada], 1962, p. 4). Ideas as to what a National Park was, were then greatly different from those held today. Most politicians voting for the Bill probably hoped for nothing more than a successful international health resort at Banff.

Before discussing Park policy as such, some attention will be given to the motives that prompted legislation. Apparently the Park was to a large extent a product of the railway. The C.P.R. syndicate, and in particular Sir William Van Horne, was well aware that operating trains through the sparsely populated mountain section would be uneconomical. The building of luxury C.P.R. hotels at Banff, Lake Louise, Field, and Glacier, and the subsequent encouragement of an international tourist trade were part of an attempt to increase passenger traffic. There was close cooperation between the company and the federal government during this period, and it seems likely the C.P.R. lobby

played an important part in getting Parks legislation through parliament. As Reeve states, "the construction of the railway had imposed severe financial and political problems on the company and the federal government, and both were now mutually engaged in ensuring the railway's success." (Reeve, 1962, p. 7)

In the fall of 1883, before the railway had crossed the divide, Van Horne made an unsuccessful attempt to establish a reserve in the Lac des Arcs area. Having visited the mountains for the first time, he was impressed by the beauty of the area, and on his return to Winnipeg met William Pearce, then Inspector of Dominion Lands Agencies. Pearce related how "he met me and urged that a reservation be made of that place for park purposes." (Pearce, 1962, p. 9.) Although, as a result of Van Horne's request, surveyors were sent out to define the required area, for some reason the reservation was never made. Pearce, in the same article, states:

> However, the public is very greatly indebted to Mr Van Horne and through him the C.P.R. for their hearty cooperation in any reservations made for scenic effect or pleasure resorts. Without that cooperation Canada's efforts would not have been anything as successful as they have been. (1962, p. 10)

Apart from the C.P.R.'s eagerness to promote tourism, it seems probable that earlier developments at Niagara Falls may have favoured government control of areas of outstanding scenic beauty. Gilligan (1954, p. 34) has pointed out that the Falls had been desecrated by private enterprise as early as 1865. He quotes Lord Dufferin, the Governor-General of Canada:

> But I am sure that everyone will agree with me in thinking that the pleasure he may have derived from his pilgrimage to so famous a spot, whether as an artist or as a simple tourist, has been miserably marred and defeated by the inconvenience and annoyance he has experienced at the hands of various squatting interests that have taken possession of every point of vantage at the Falls; who tax the pockets and irritate the nerves of the visitors, and by whom, just at the moment when he is about to give his whole being up to the contemplation of the scene before him...his imagination disorganized by a demand for ten cents.

In 1883, partially as a result of Dufferin's efforts, the New York legislature passed an Act to preserve 412 acres including and adjacent to the Falls, as a natural park, the aim being to restore the landscape as nearly as possible to its original condition.

William Pearce, then Superintendent of Mines in the Department of the Interior, visited the Banff area in the summer of 1885. Apparently he was poorly received by the entrepreneurs developing the hot springs and it seems that this may have been part of the reason why he "strongly recommended that a government reservation be made." (Pearce, 1962, p. 12.) On November 20, 1885, by order in council the first reservation was made at Banff.

> His Excellency by and with the advice of the Queen's Privy Council for Canada has been pleased to order, and it is hereby ordered, that whereas near the Station of Banff on the Canadian Pacific Railway, in the Provisional District of Alberta, North-West Territories, there have been discovered several hot mineral springs which promise to be of great sanitary advantage to the public, and in order that proper control of the lands surrounding these springs may remain vested in the Crown, the said lands in the territory including said springs and in their immediate neighborhood be and they are hereby reserved from sale or settlement or squatting, viz.: All of Sections 13, 14, 15, 22, 23, 24, 25, 26, 27 and 28, and those portions of sections 34, 35 and 36 lying south of the Bow River, all in Township 25, in Range 12 West of the 5th Meridian. (P.C. No. 2197, 1885)

According to A.M. Burgess, the Deputy Minister of the Interior (Interior, 1886, pp. XXII, XXIII) Banff was seen as "likely to become one of the greatest and most successful health resorts on the continent of America." It was intended to make the reserve a "creditable National Park," as soon as "the construction of roads and bridges and other operations necessary" were completed. A topographical survey of the reserved area was carried out by G.A. Stewart in February of 1886. His report resulted in the extension of the proposed Park area. H.H. Smith, Commissioner of the Dominion Lands, reported:

> It was discovered soon after his [i.e. Stewart's] arrival that a large tract of country lying outside of the original reservation presented features of the greatest beauty, and was admirably adapted for a national park; and, on representing these facts, he was ordered to extend his operations so as to enclose a wider area, and to include all points of interest within reasonable bounds. (Interior, 1886, pt. I, p. 9.)

Stewart thought that a rectangular area ten miles by twenty-six miles would be reasonable (see Fig. 4). The irrational nature of the rectangular boundary lines, probably the result of Stewart's experience in surveying the grid of western Canada, was later to cause much inconvenience. However, this extension of the reserve indicates that not only the springs but the scenery was to be protected for the tourist. The attitude of the Department of the Interior is probably well shown in a comment by Pearce:

> Within the past year the government has very wisely taken the steps necessary to the creation of public reserves along the route of the Canadian Pacific Railway, to protect the magnificent scenery...it would be an act of national disgrace if every possible step were not taken to prevent in the slightest degree the marring of the wonderful beauties which nature has conferred on the Canadian route. (Interior, 1886, pt. I, p. 24)

There was, however, some strong opposition to the passing of the Bill. In debates in the Commons, several MPs complained that the proposed government expenditure was unwise. It was argued that the taxpayer should not be called upon "to contribute to the comfort and convenience of the wealthy people of this continent, and perhaps of the other, too." (Canada, Commons Debates, V. 1, p. 232.) In historical context this was a strong argument, as at that time few Canadians could afford to take advantage of the proposed Park.

There were also protests of "jobbery" from the opposition. The proposed legislation was seen as creating a monopoly condition favouring the C.P.R. and two former Conservative MPs, Drs Brett and Orton, who had already obtained leases at Banff. The incompatibility, in a Park, of such activities as mining,

grazing, trade and industry, which were allowed for in Section 4 of the Bill, (see Appendix II) was strongly emphasized by several members. Opposition to the Parks idea, for these and other motives, seems to have been especially strong during the formative years of the administration. And probably because of this, more concessions were made in the Park than would have been otherwise the case.

However, in spite of opposition, "Bill No. 16 Respecting the Banff National Park" became law when the Rocky Mountains Park Act was assented to on June 23, 1887. The content of the Act was the work of William Pearce, who admitted it was largely based on regulations made by the U.S. government for the administration of the Arkansas Hot Springs (Pearce, 1962, p. 12). The United States government had pioneered National Parks legislation with the Yellowstone Park Act of 1872, and many of the proposals contained in this Act are reflected in the Rocky Mountains Park Act.

The Act itself, and in particular Section 4, which lists the activities that were to be regulated by orders in council, clearly indicates the government's attitude towards National Park development. The purpose of the Act is stated in Section 2:

> The said tract of land is hereby reserved and set apart as a public park and pleasure ground for the benefit, advantage and enjoyment of the people of Canada.

This was to be realized by the regulation of certain activities outlined in Section 4, several of which, in view of present Park ideals, seem rather incongruous. For example, (c) "the construction of buildings for ... purposes of trade and industry," (d) "the working of mines and the development of mining interests," (e)"trade and traffic of every description," (g) "the

pasturage of cattle, and the management of hay lands." On the other hand, three clauses have a protective intent: (a) "the care, preservation and management of ... watercourses, lakes, trees and shrubbery, minerals," (d) "no lease, license or permit shall be made, granted or issued ... which will impair the usefulness of the Park for the purposes of public enjoyment and recreation," and (f) "the preservation and protection of game and fish, of wild birds generally, and of cattle allowed to pasture in the Park."

The reconciliation of these incompatible clauses was an impossible task for any administration. Even so, it is doubtful whether the first superintendent, Stewart, or his successor Douglas, saw as much incompatibility as the modern reader does. The Prime Minister, Sir John A. MacDonald, had agreed in the Commons that industry in the Park did not necessarily conflict with scenic values.

> It [i.e. the Park] is of the most varied description, broken by glens, valleys and undulations of every kind, and there may be places where the property may be used for industrial purposes without interfering with the beauty of the Park as a whole. (Canada, Commons Debates, 1887, V. 1, p. 246.)

As was emphasized in the previous chapter, the Rocky Mountains Park was part of the developing Canadian frontier, and tourism was just another aspect of this development. That other more economically rewarding activities be prevented, for the benefit of the tourist, was inconceivable The coal mines at Bankhead, so much admired by Superintendent Douglas, were developed by the C.P.R., which company also had an interest in the Cement Plant at Exshaw. If there had been any opposition to these developments on aesthetic grounds, they were probably quickly overruled by the railway company, whose influence in the Department of the Interior at that time was undoubtedly considerable.

The word "preservation," which has led to so much woolly thinking on the subject of National parks, occurs twice in the Act. Understandably in the 1880s, when the current view was that the landscape was essentially static, the idea of preserving the status quo may have seemed feasible. In reality, of course, it is impossible to "preserve" a landscape in the true sense of the word, since every landscape is changing in a complex variety of ways. However, it seems unlikely that Pearce, in using the word "preservation," was suggesting that the landscape of the Park be maintained as it was in the "unspoiled original state" sense often used today (see Northern Affairs [Canada], 1961, p. 1). As was emphasized in chapter seven, the landscape of the Park had already been to a large extent "spoiled." And because of this, much of the early work of the Park administration was concerned with "improvements."

The claim has been made that "the National Parks were established and remain primarily as conservation areas and sanctuaries." (Northern Affairs [Canada], 1962, p. 6.) This may have been the case with later National parks, but it was certainly not so as far as the Rocky Mountains Park was concerned. As has been mentioned above, "preservation" and protection clauses were included in the Act but they were clearly subordinate to the Act's main purpose which was to assist tourists and tourism. In direct contrast to present policy, the Park was not established so much as to protect the landscape, although it certainly needed it, as to protect the tourist. If the 1887 Bill had been primarily concerned with conservation and game sanctuaries, it would never have been given a reading.

It has also been claimed (Coleman, 1962, pp. 2-3) that the 1885 order-in-council shows "a consistent development of governmental attitude towards

parks," and that the Act of 1887 showed "the official attitude of the government was to be protective." The development of government attitude towards the parks has hardly been consistent. Attitudes regarding the relative importance of tourism and protection have changed drastically, just as tourism and protection have also changed. To state that the official attitude of the government in 1887 was a protective one is correct only in the sense that the protection of the Park was to make it a better place for tourists.

Whatever the government's attitude towards Park management was in 1887, for the next twenty-five years the interpretation of the Act was largely the concern of two men, Park Superintendents George Arthur Stewart, D.L.S., and Howard Douglas.

During the early years of Park history, government expenditure was not large enough to support a large administration. As a result, most policy decisions seem to have been made by the Superintendent in Banff. Only in 1910, after the creation of Jasper Park in 1907, did Howard Douglas, then Commissioner of Dominion Parks, move to Edmonton.

This highly decentralized administration was unavoidable, and also unfortunate in the sense that it led to more "development and improvement" than would have been the case had the Superintendent been subject to more control from Ottawa. Stewart, who in 1886 had been given the task of supervising the "improvement" of the proposed Park, was appointed Superintendent in 1887. According to Thomas White, then Minister of the Interior, Stewart was well suited for the position, being "a civil engineer and a clever landscape architect." (Canada, Commons Debates, 1887, V. 1, p. 244.) Stewart's background helps to explain many of the developments mentioned in the previous chapter.

It also helps to indicate what the contemporary view of a National Park was. It might be mentioned here that as early as 1884 the Minister of the Interior had appointed a Forrestry [sic] Commissioner, Mr J.H. Morgan, to study the possibilities of forest protection and tree planting (Interior, 1884, pt. V). And by 1887 many officials in the Department of the Interior were aware of the need for forest protection in the Canadian Rockies. Even so, White appointed a civil engineer and landscape architect to administer the Rocky Mountains Park. Clearly "improvement and development" were Stewart's main duties.

The development of the Rocky Mountains Park as a tourist resort was strongly encouraged by both the government and the C.P.R. As a result of widespread advertising, Banff became internationally known as a spa town and as a centre for mountain climbing, hunting and fishing. A large portion of the Park Superintendent's Annual Reports was devoted to weather statistics, not so much for scientific purposes but for advertising the advantages of the climate.

"Improvements" such as the building of roads, trails, hotels, bridges, and the clearing of dead timber were necessary if the Park was to attract tourists. In attempting to justify the Park's existence the Superintendent proudly reported any increase in tourist attendance. His annual reports quoted at length the nationalities and numbers of visitors to the Park.

In the Deputy Minister of the Interior's Annual Report for 1897 (Interior, 1897, p. IV) it is noted that "Mr Stewart's services were dispensed with on the 1st September last." Apparently complaints had been made about the administration of the Park by "those who frequented the Park, and more especially amongst persons who had business to transact ... in connection with land and other matters." (Ibid. p. IV).

It seems likely that these complaints were merely used as an excuse to follow the common procedure of Party patronage. The Liberals had won the federal election of 1896 and Stewart's successor, Howard Douglas, was a well known Liberal. In private life Douglas had worked for the Construction Department of the C.P.R. until 1895 when he settled in Calgary and operated "a cartage and coal business" (MacRae, 1912, p. 800). During his administration the same policies of "development and improvement" were vigorously followed. Their success was shown by the increase in the number of tourists visiting the Park. Between 1887 and 1901 attendance figures more than doubled, from c. 3,000 to 8,456 (see Table 2). This increase in tourist pressure led to the extension of the Park in 1902 from 260 square miles to 4,900 (see Fig. 4). There was, in Douglas's opinion, a need to extend the bridle roads and to increase the "preservation" of game. Clifford Sifton, then Minister of the Interior, when introducing the Bill to Amend the Act of 1887, stated:

> I may say that the number of visitors to the Park is increasing very rapidly, and it is found that it is likely to become a place of very considerable resort especially for American tourists. We have a thriving herd of Buffalo there and a number of other animals, such as moose, elk, a couple of varieties of goats, and we are trying to get together a collection of animals that will be attractive. (Canada, Commons Debates, 1902, V. 1, p. 3305.)

Significantly he stressed the increasing number of visitors, since this meant the Park was becoming more self-sufficient. And this was the best argument to counter any anti-Park feeling in the Commons. Surprisingly there was no opposition to the Bill, possibly because the area involved was virtually unknown to the politicians. The new Park boundaries were just as irrational as the old ones, as it was impossible to control such a large area. In 1902 the Park appointed its first and only forest ranger. Not until 1911 were the

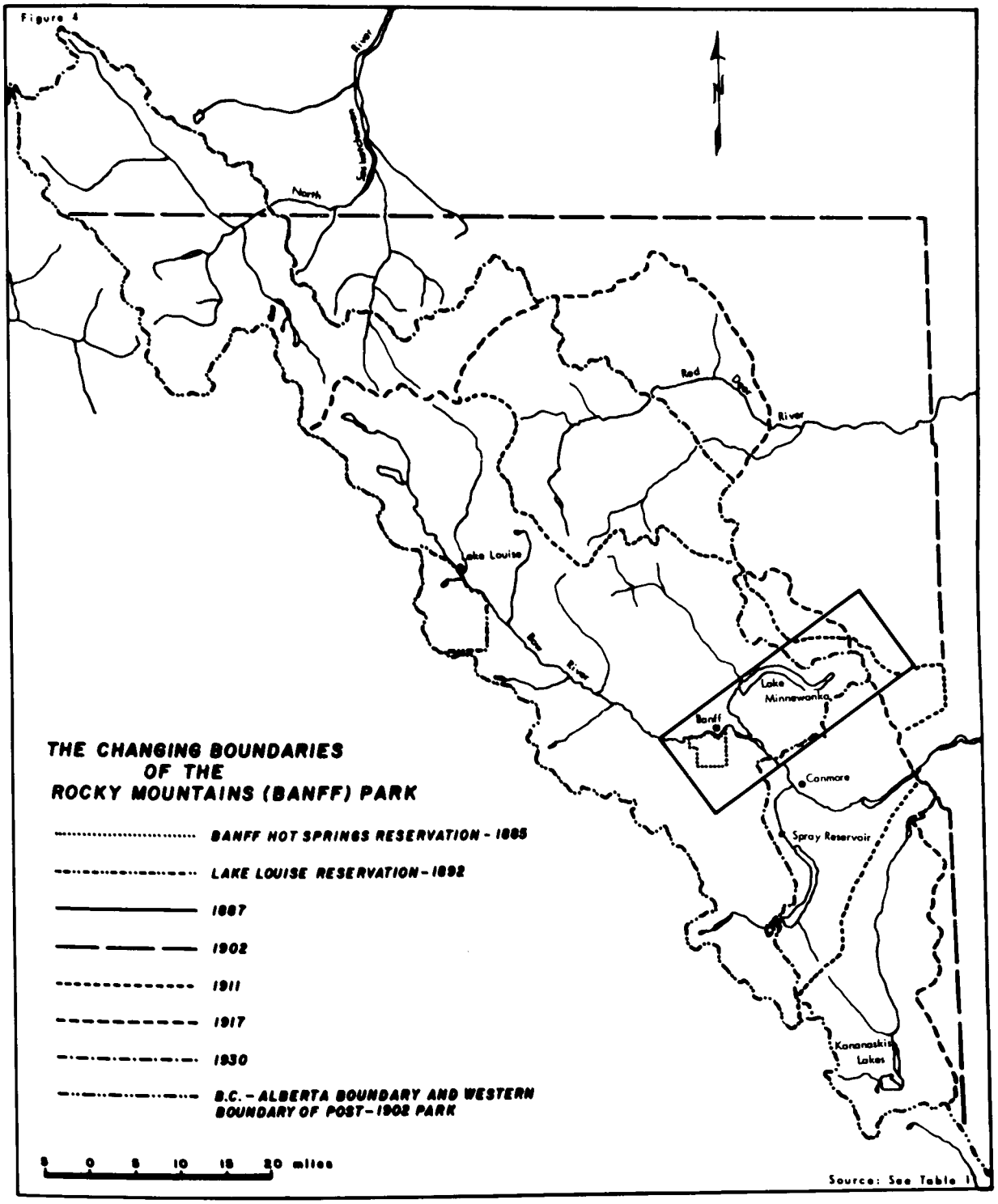
Figure 4
North
Red Deer River
Lake Louise
Bow River
Lake Minnewanka
Banff
Canmore
Spray Reservoir
Kananaskis Lakes
THE CHANGING BOUNDARIES OF THE ROCKY MOUNTAINS (BANFF) PARK
BANFF HOT SPRINGS RESERVATION - 1885
LAKE LOUISE RESERVATION - 1892
1887
1902
1911
1917
1930
B.C. - ALBERTA BOUNDARY AND WESTERN BOUNDARY OF POST - 1902 PARK
0 5 10 15 20 miles
Source: See Table 1

TABLE 1

Legislation and the Changing Area of the Rocky Mountains (Banff) Park.

	Area sq. miles	
1885[1]	10	Banff Hot Springs Reservation
1887[2]	250	Rocky Mountains Park
1892[3]	51	Lake Louise Reservation
1902[4]	c. 4,900	Rocky Mountains Park
1912[5]	1,800	Rocky Mountains Park
1917[6]	2,751	Rocky Mountains Park
1930[7]	2,580	Banff National Park
1964	2,564	Banff National Park

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[1]Order in Council, November 25th 1885.

[2]Chapter 32, 50-51, Victoria, 23rd June 1887.

[3]Order in Council, July 23rd 1892.

[4]Chapter 31, 2 Edward VII, 15th May 1902.

[5]Order in Council, 8th June 1911.

[6]Order in Council, 18th September 1917.

[7]Chapter 33, 20-21 George V, 30th May 1930.

boundaries rationalized.

Apart from the increase in tourism, a further development took place during Douglas's administration, namely the rise of the conservation movement. As mentioned above, the Department of the Interior was informed of the need for conservational measures as early as 1884. In the southern portions of the District of Alberta the apparent need for irrigation during the early 1890s was an important factor in creating an awareness of the necessity of watershed management on the eastern slopes of the Rockies. Officials of the Department of the Interior, William Pearce and J.S. Dennis, were important figures in this development, which was to be in large part responsible for the creation of the Rocky Mountains Forest Reserve in 1910.

On a national level the conservation movement was strengthened by contact with the United States, where the depletion of natural resources had occurred earlier. In Canada the Liberal government took a strong interest in conservation. In August, 1899, "a chief inspector of timber and forestry was appointed," marking the beginnings of organized forest protection, and in 1906 the Dominion Forest Reserves Act was passed. Three years later an "Act establishing a Commission for the Conservation of Natural Resources" was passed. Two members of the Commission were Clifford Sifton, who had formerly been Minister of the Interior, and Frank Oliver, who was then Minister of the Interior. Sifton was chairman, and Oliver a member of the Committee on Forests. Oliver, who had lived in Alberta and was probably aware of the forest fire problem on the eastern slopes, was especially concerned about the protection of the Parks. In 1909 new regulations were passed by order-in-council for, among other things, increased forest protection. Douglas, in his report for 1910, mentions the

appointment of three game and fire wardens, and comments on the increased effort to preserve the forests of the Parks (Interior, 1910, pt. VII, p. 4). However, according to Douglas, in a letter to the local Banff Weekly, the Parks were still primarily tourist resorts:

> The Parks are established as pleasure resorts with the object of inducing people to go into them and to make use of them as freely as possible; but in the remainder of the Forest Reserve the intention is to enforce the Act and regulations for the protection of the forests and game even to the exclusion of the public if necessary. (Crag and Canyon, August 19, 1911.)

Largely due to Oliver's efforts the Park's administration, formerly part of the Forestry Branch, became independent. Shortly after the passing of the Dominion Forest Reserves and Parks Act in 1911 the Parks Branch was established as a separate administrative body in Ottawa. J.B. Harkin was appointed Commissioner of Dominion Parks to administer the new branch.[1]

On June 20, 1912, Harkin arrived in Banff to inspect the Park's administration. On August 3rd the local newspaper reported that Howard Douglas had been dismissed for "excessive partisanship" during the federal election held in the previous year (Crag and Canyon, August 3, 1912). The dismissal of Douglas, whether because of political reasons or because his administrative policy had been too liberal, marked the end of the early period of the Parks development. The creation of the Parks Branch and the appointment of Harkin marked the beginnings of a more "protective" administration. The change was not a drastic one; Harkin was of the opinion that tourism was still the main reason for the Park's existence. Indeed his efforts to encourage tourism were greater than either Stewart's or Douglas's. On the other hand, increased appropriations from the federal government meant that protection of forests and wildlife at last became effective.

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[1] Although Harkin is always given credit for being the first Commissioner of Canada's National Parks, Douglas was Commissioner of Dominion Parks before him.

TABLE 2

Tourist Attendance at the Rocky Mountains Park 1887 - 1912.
(totals estimated or calculated from Banff hotel registrations)

1887	c. 3,000
1888	5,822
1889	c. 4,000
1890	c. 5,000
1891	7,250
1892	5,394
1893	6,826
1894	4,734
1895	4,924
1896	3,996
1897	5,087
1898	5,537
1899	7,387
1900	6,533
1901	8,456
1902	8,516
1903	10,696
1904	11,752
1905	17,605
1906	30,136
1907	28,735
1908	32,209
1909	39,780
1910	56,462
1911	63,494
1912	73,725

Source: Annuals Reports of the Department of the Interior (Canada) 1887 - 1912.

CHAPTER IX

Conclusion

The emphasis throughout the preceding chapters has been on the causes and nature of landscape changes. An attempt has been made to determine the significance of man as an agent of change, but at the same time his influence has been regarded as being intimately related to contemporary non-human processes. Man's role has not been seen as an independent process superimposed upon unrelated 'natural' processes, but rather as a variable closely integrated within the complexity of the changing landscape as a whole.

The main contributions made in this study are four in number, namely:

1) a classification of the historical changes in dominant species in the areas of subalpine grassland within the Park area;

2) the suggestion that during the period c. 1840 to c. 1911 forest fires greatly increased in frequency and extent, due to the combination of changing climate and the arrival of the white man;

3) a partial reconstruction of the early Park landscape; and

4) a survey of early Park policy and its influence on the landscape.

In this summary chapter these four contributions are briefly restated and, finally, the relevance of the study to present Park policy is briefly examined.

The historical changes in grazing pressure and their ecological effects on the areas of prairie within the mountain valleys have been due primarily to the arrival of the white man. The Kootenay Plains, when seen by Henry in 1811, had a short-grass cover, no doubt maintained by the grazing of the thickwood buffalo and other large ungulates. In contrast, Hector in 1858 and 1859 was

impressed by the good pasture offered by the bunch grasses. The rough fescue (Festuca scabrella) association he described was a relatively recent development. It was due to the reduction of native ungulates that had followed the arrival of the fur traders and their introduction of the firearm. In 1911, Edgecombe described the Kootenay Plains as having a short grass cover. The disappearance of the bunch grasses was no doubt due to the increase in the number of horses that followed the arrival of the railway in the mountains in 1883.

In view of the above descriptions, Larson's hypothesis that the short grasses represent the climax cover rather than a disclimax cover would appear to be correct, at least as far as the mountain valleys are concerned. However, to claim that developments in the mountains reflected similar developments throughout the short-grass plains to the east would be premature.

Comments on historical fire frequency by Dawson, Caverhill, Edgecombe, and Dwight clearly indicate that during the period c. 1840 to 1911 forest fires had become increasingly frequent and widespread on the eastern slopes. The transient whiteman, the railway, lumbering, and mining were all in part responsible, but it seems probable that changing environmental conditions were also important. Changes in climate in the Park area during the second half of the nineteenth century involved the onset of warmer and drier conditions. Heusser[1] has endorsed the author's opinion that this climatic change resulted in environmental conditions becoming more suitable for forest fires. If this is correct it would seem important to guard against an overemphasis of the role of fire in forest succession on the eastern slopes, especially in view

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[1]Calvin J. Heusser, personal communication, May 18, 1964.

of the reaction that has occurred as a result of a very effective and 'unnatural' policy of fire protection. The main point to be made is that as far as fire frequency was concerned, the period c. 1850 to 1911 was not typical or 'normal,' and that projections based on evidence drawn from it are likely to be misleading.

The content of chapters six and seven shows clearly that in 1887, or even 1911, the landscape of large areas of the Rocky Mountains Park had recently experienced marked changes. In the valleys of the Bow River and its tributaries large areas of forest had been burnt over. Most of the few surviving stands of mature timber had been, or were being cut to satisfy the rising demands for pit props and lumber. Because of these changes in forest cover, ground-water levels probably changed, as also did the rates and amount of stream flow. Along the line of the railway, mining settlements had grown up at Silver City, Anthracite, Canmore, and Bankhead. The landscape was essentially a frontier landscape, where natural resources were being exploited in a hurried and usually unplanned fashion. These developments were largely a response to the demands for raw materials that arose as a result of the settlement of western Canada. The establishment of the Rocky Mountains Park was in itself merely another attempt to exploit the newly accessible resources along the line of the railway, the resources in this area being the hot springs at Banff and the tourist potential of the mountains themselves.

The development of the Rocky Mountains Park and the hot springs was exceptional in that it was at least nominally government controlled. The policy followed by the Park's administrators during the period 1887 to 1911 was, of necessity, a flexible one. The main concern of the Superintendents seems to have been to make the Rocky Mountains Park a successful tourist attraction.

The attraction of tourists was essential if the Park was to survive at a time when opposition to government expenditure on National Parks was very strong. The contemporary developments in mining and lumbering were probably seen as unfortunate but unavoidable. Most of them were allowed because of rights obtained prior to the establishment of the Park, although exceptions seem to have been the coal mining at Bankhead and the cement plant at Exshaw. At Bankhead and Exshaw development began after inclusion within the Park. It was probably significant that the Bankhead mines were controlled by the C.P.R. and the same company had an interest in the Western Canada Company at Exshaw. Any opposition that there may have been to these industrial developments was probably outweighed by the Canadian Pacific Railway Company which undoubtedly had a strong influence in the Department of the Interior at that time. The main point to be made about early Parks' policy is that it was primarily concerned with the encouragement of tourism and therefore the development and "improvement" of the Park.

Although the 1887 Act contained several preservation and protection clauses, they had had little effect by 1911, mainly because of a lack of money. When they were enforced they were only seen as being part of the effort to make the Park a more attractive place for the tourist.

This study does not provide the answers to the serious problems facing Canadian National parks today, nor was it intended to do so. However, in view of what has been learned, several suggestions that seem relevant to contemporary problems will be made.

At present, when a major review of National Parks' policy is being undertaken, it would seem especially important that any plans made for the

future be based on a scientifically and historically acceptable knowledge of the past. Unfortunately many recent Park. Branch publications perpetuate ideas that can be described as being little more than romantic myths. For example, a National Park has been described as being "an area that is to be maintained forever as closely as possible to its unspoiled original state." (Northern Affairs and National Resources [Canada], 1961a, p. 1) Canada's western Parks are seen as "portions of the original North America", where, " apart from the accommodation of visitors there is no settlement and a mile or two from the trunk highways the country remains just as it was when the first white man saw it." (Northern Affairs and National Resources [Canada], 1957, p. 9) Again Parks are described as, "living museums of nature preserved in their primeaval state... virgin territory...unspoiled nature," etc. etc. (Northern Affairs and National Resources [Canada], 1961b) Similarly the claim is frequently made that any interference by man with the "natural" landscape results in impairment. These claims and statements are all inaccurate and misleading and expose contemporary National Park ideals to some fundamental criticism.

The often used phase "original state" is meaningless. Is it to be taken as meaning pre-Whiteman, pre-Indian, or pre-Cambrian? Clearly such a phrase can not be used to describe any landscape. The implication that the primeaval (pre-human?) landscape was "unspoiled" is again meaningless. In what sense could it be spoiled? Spoiled for what? Even if we accept the use of the word, surely pre-human forest fires, insect outbreaks, and other natural processes of destruction "spoiled" the landscape.

The claim that the Western National Parks, apart from their obvious features of settlement, have remained just as they were when first seen by the white man, is again largely inaccurate and misleading. It implies that

a National Park is an area that is, and has been, maintained in an almost static condition. It therefore underestimates the importance of change, especially that due to man. As was stressed in previous chapters, the landscape of the Banff Park area has always been subject to change, and since the early nineteenth century man has been a significant factor in this process of change. Admittedly these changes have not effected all parts of the Park to the same degree. The Bow valley and its tributaries, particularly the lower valleys crossing the Divide, have been modified to a much greater extent than the relatively isolated Red Deer and Clearwater valleys.

The suggestion that change caused by man is necessarily always impairment is unrealistic. Admittedly the results of man's modification of the landscape in areas of great scenic beauty are often incongruous and unfortunate. Yet by careful management, as the Parks Branch have shown, man can often improve the landscape scenically. The view that "natural" landscape conditions represent ideal conditions is no more true for recreation than it is for forestry, watershed management, or many other activities in which man is concerned with his environment.

On the other hand there is a definite need for areas in which man's influence is kept to a minimum. The value of such areas for investigation in various scientific fields is indisputable. As yet man knows little of the complex physical and biotic processes that surround him. His chances of learning more are lessened when by his often unknowing actions he may increase the complexity of a problem or, indeed, cause changes that can never be reversed. Few areas in the world remain unmodified by man. National Parks, therefore, are especially valuable, as areas in which man's activities, for a certain time at least, have been controlled and comparatively well documented.

Although the present landscape of the Banff Park may not be all that it is claimed to be, it still represents a considerable achievement on the part of the National Parks Branch. Because of protection, the Banff National Park is now an important recreational and scientific resource. However Park protection, or conservation, has not been an end in itself but the means to an end, namely, the benefit, education and enjoyment of the people of Canada. This has been accomplished in a variety of ways, ranging from the casual tourist's appreciation of the scenery, often limited by the circumference of his car windows, to the aesthete's appreciation of wilderness values. There have also been non-recreational benefits such as watershed improvement and the provision of opportunities for scientific research in environments little affected by man.

Obviously not all National Parks are similar and each in turn offers a variety of opportunities. The proposed zoning of the Parks is no doubt the best way to make use of this variety. However any zoning scheme must take into account a knowledge of the extent to which the Parks have already been modified by man. This thesis represents an attempt to do this for the Banff Park area; however, conclusions have been based largely on historical sources and a truly accurate study must clearly include a more detailed analysis of the physical evidence for landscape change.

The need for zoning is largely due to increased tourist pressure on the Parks during the last decade. In contrast, during their early history it was probably only by the successful encouragement of tourism that the Parks survived. At present the rapid increase in outdoor recreation poses a serious threat to the Parks. Demands for increases in road mileage, motels, service stations, restaurants, and other tourist facilities may result in the devalu-

ation of the assets scenic or otherwise that the Parks Branch have carefully protected. If this problem is to be dealt with successfully it would seem important to approach it realistically. To react against it with claims that cannot be substantiated merely exposes the National Parks concept to serious criticism. Although this thesis has been primarily concerned with the past, its findings are relevant to the present insofar as they guard against false assumptions about what a National Park has been and consequently is now. If National Parks in Canada are to survive they must clearly have a sound conceptual basis. This can come not only from an awareness of present problems and future needs, but also from a scientifically and historically acceptable knowledge of what has happened in the past.

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TABLE 1

Thirty year averages for temperature and precipitation at Banff and Lake Louise.

Banff (elevation 4,583 feet)

	J	F	M	A	M	J	J	A	S	O	N	D	Y.
Temp. °F.	13	18	26	37	46	52	58	56	48	39	26	15	36.3
Ppt. inches	1.0	1.1	1.0	1.1	1.7	2.6	1.6	2.0	1.6	1.5	1.3	1.6	18.1

Lake Louise (elevation 5,032 feet)

	J	F	M	A	M	J	J	A	S	O	N	D	Y.
Temp. °F.	6	12	21	33	43	50	54	52	44	34	20	9	31.5
Ppt. inches	2.4	2.3	2.0	1.6	1.8	2.4	1.8	2.1	2.0	2.4	2.8	3.5	27.1

Source: Laycock (1957b, pp. 368-369)

Appendix II

Section 4 of the Rocky Mountains Park Act of 1887.

4. The park shall be under the control and management of the Minister of the Interior, and the Governor in Council may make regulations for the following purposes:-

(a) The care, preservation and management of the park and of the watercourses, lakes, trees and shrubbery, minerals, natural curiosities and other matters therein contained;

(b) The control of the hot springs situate in the said park, and their management and utilization for purposes of bathing and sanitation and in every other respect;

(c) The lease for any term of years of such parcels of land in the park as he deems advisable in the public interest, for the construction of buildings for ordinary habitation and purposes of trade and industry, and for the accommodation of persons resorting to the park;

(d) The working of mines and the development of mining interests within the limits of the park, and the issuing of licenses or permits of occupation for the said purposes; but no lease, license or permit shall be made, granted, or issued under this or the next preceding paragraph of this section which will in any way impair the usefulness of the park for the purposes of public enjoyment and recreation;

(e) Trade and traffic of every description;

(f) The preservation and protection of game and fish, of wild birds generally, and of cattle allowed to pasture in the park;

(g) The issuing of licenses or permits for the pasturage of cattle, and the management of hay lands;

(h) The removal and exclusion of trespassers;

(i) And generally for all purposes necessary to carry this Act into effect according to the true intent and meaning thereof:

2. The Governor in Council, may, by the said regulations, impose penalties for any violation thereof, not exceeding in each case the sum of fifty dollars or, in default of payment with costs, imprisonment for not more than three months.

Source: Statutes of Canada 50-51 Victoria 1887, Vol. 1 p. 120.

Appendix III

List of Common and Scientific names of Major Tree Species in the Park Area.

Coniferous Species (Softwoods)

Pine

Limber	-	Pinus flexilis James
Lodgepole	-	Pinus contorta Dougl. var. latifolia Engelm.
Whitebark	-	Pinus albicaulis Engelm.

Spruce

Black	-	Picea mariana (Mill.) BSP
Engelmann	-	Picea Engelmanni Parry
White	-	Picea glauca (Moench) Voss

Fir

Alpine	-	Abies lasiocarpa (Hook.) Nutt

Larch

Alpine	-	Larix Lyallii Parl.

Douglas Fir

Blue Douglas Fir	-	Pseudotsuga taxifolia (Poir.) Britton var. glauca (Mayr) Sudw.

Deciduous Species (Hardwoods)

Poplar

Trembling Aspen	-	Populus tremuloides Michx.
Balsam	-	Populus balsamifera L.

Source: Laycock (1957 b p. 376) from Flemming, (1955), Native Trees of Canada (4th Ed.)

APPENDIX IV

Photographs

Photograph[1] 1 was taken on the road up Stoney Squaw Mountain to the Norquay ski slopes a few miles from Banff. The Douglas fir in the centre, characteristic of the Montane Forest, are quite common in the Banff vicinity, although they were selectively cut for timber in the late 19th century. On either side of the fir are subclimax trees, lodgepole pine and, to the right of the photograph, a small stand of aspen poplar.

Photograph 2 also taken on Stoney Squaw Mountain a short distance from the road. It shows a comparatively well developed stand of Douglas fir, most of which are probably more than 300 years old. Their thick barks all show scorch marks from old fires.

[1]For the location of photographs the Banff National Park 3 miles to the inch map (in pocket) should be used.

Photograph 1

Photograph 2

Photograph 1

Photograph 2

Photograph 3 was taken just off the Old Banff Highway (Route 1) about six miles west of Banff. A subclimax aspen poplar stand shows the scars caused by elk eating the bark. In the right middle distance is an indication of the assertion of white spruce. In between the spruce and the camera can be seen a large old stump of undetermined type which may indicate a pre-fire stand of some age.

Photograph 4 was taken from the Old Banff Highway looking due west across the Bow Valley towards Redearth Creek. Lodgepole pine appear to be colonising an area of grassland that probably originated because of the frequent fires during the late 19th century. Note the short grasses.

Photograph 3

Photograph 4

Photograph 3

Photograph 4

Photograph 5 was taken on the Old Banff Highway about six miles southeast of Lake Louise. It shows an extensive area of subalpine grassland in part at least of fire origin as the old tree stumps show. Spruce and lodgepole appear to be recovering slowly.

Photograph 6 shows an area of grassland at "Scotch Camp", on the Red Deer River near its junction with Divide Creek. Lodgepole are present along the edge of the grassland area and indicate that it has a possible fire origin. However, the large extent of the area, and the lack of an indication of an advancing tree line, suggest a probable climatic or edaphic origin. The herbaceous cover shows a high percentage of forbs which is possibly an indication of overgrazing.

Photograph 5

Photograph 6

Photograph 5

Photograph 6

Photograph 7 looks east to a summit on the Bare Mountains above Snow Creek Pass, (Tp. 30, R. 13, W.5th). Since a fire in 1927 lodgepole pine, and to a lesser extent spruce, have become reestablished on the lower slopes but the upper tree line appears to have been depressed due to the fire. The fallen snags are not very large and indicate the pre-1927 stand (probably lodgepole), was not very old.

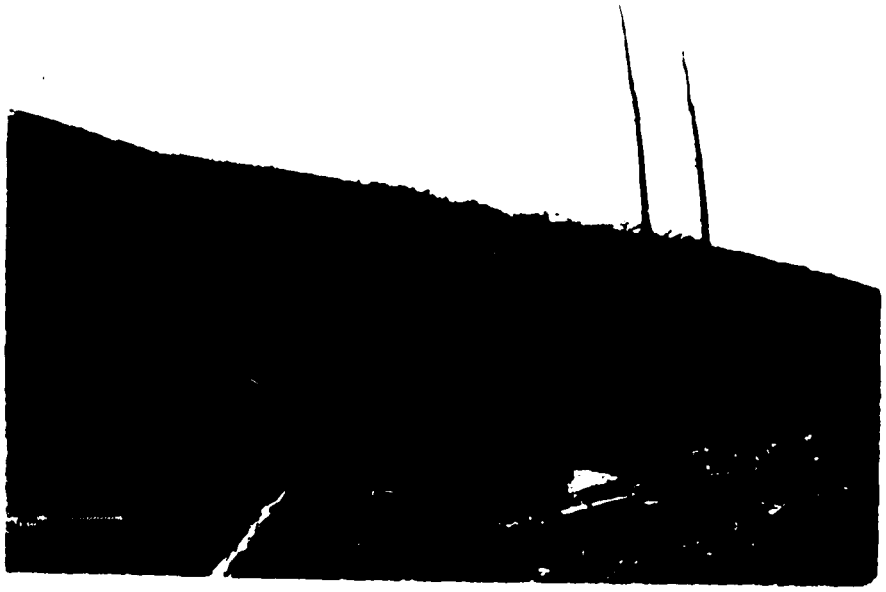
Photograph 8 was included in an article by White (1915) where it has the caption, "typical slash after a lumbering operation. In the Rocky Mountains National Park, within a few miles of Banff. Fire started in this would be quickly beyond human control." The actual location was probably on one of the Eau Claire Lumber Company's timber limits in the Spray valley south of Banff. The photograph is clear indication of the ineffectiveness of forest protection during the early period of the Park's history. Probably largely because of conditions such as this the Spray Valley was burnt over several times in the 1920's and 1930's.

Photograph 7

Photograph 8

Photograph 9 was taken on Snow Creek Pass looking roughly north-west from the same location as photograph 7. On the south-east facing slope in the middle distance tree regeneration has been comparatively slow since the fire of 1927. The severity of the fire may have caused this although aspect and altitude may also have been responsible.

Photograph 10 was taken from the road on Stoney Squaw Mountain, and looks south-west across the Bow Valley to the Bourgeau Range. During the late 19th and early 20th centuries the Vermilion lakes were important as a natural fire break for the townsite at Banff, which is just off the photograph to the left. The relatively even forest cover is largely a post 1911 development and contrasts with the next three photographs.



Photograph 9

Photograph 10

Photograph 11 was taken in 1886, looking due west from Tunnel Mountain, near Banff. Although of poor quality it is possible, if used in conjunction with the next three photographs, to obtain from it some idea of the pre-Park townsite area. The lighter scratch-like features in the valley bottom and on the mountain slopes are mainly the snags remaining from recent fires. The two buildings opposite each other across the Bow, numbered 1 and 3 are the Banff, and Moulton Park hotels respectively. The small white dots around them are the tents of early patrons of the hot springs.

Photograph 12 was probably taken in the late 1880's or early 1890's. The burnt-over areas on the south-facing slopes on the right of the photograph are clearly distinguishable and contrast with the north-facing slopes, although even here lighter patches indicate recent fires. The young lodgepole pine in the foreground were probably also the result of recent fires.

Photograph 11

Photograph 12

Photograph 13 was taken c. 1900 from roughly the same location as the two previous photographs. The obvious change has been the growth of the townsite. If the above approximate date is correct[1] this growth would imply a rapid increase in tourism.

Changes in vegetation since the 1880's are not so apparent, although tree growth in the townsite itself appears to have been considerable. Again an indication is given of the burnt-over appearance of the slopes of Mounts Norquay and Sulphur, in the top right and top left corners of the photograph respectively.

Photograph 14 taken in 1963 shows clearly the effects of fire prevention. The thickened tree growth, particularly along the river banks and on the north facing slopes, contrasts markedly with the 19th century photographs.

[1]This date suggested by the Glenbow Foundation would appear to be rather early in view of the size of the townsite and the presence of motor cars.

Photograph 13

Photograph 14

Photographs 15 and 16 are taken from approximately the same position, the first in 1885 and the second in 1964. The Rundle Massif provides the background, while the Cascade River flows from right to left along the foot of the terrace in the middle distance. The coal mining settlement, Anthracite, is shown in photograph 15 and provides hardly a park-like view. Apart from the disappearance of the settlement, and the innovation of the Trans Canada Highway the main contrast between the two photographs is the change in forest cover. This is seen particularly well along the top of the terrace, where the earlier photograph shows a relatively thin tree cover and evidence of recent burning, and the later photograph a relatively thick growth of coniferous trees. The establishment of the aspen poplar seen in photograph 16 was probably favoured by the disturbed character of the area.

Photograph 15

Photograph 16

Photograph 17 is a view of the loading part of the Anthracite mine as it was in 1885. The same area today can be seen on the left side of photograph 16 in the middle distance. The buildings have of course gone and are replaced by the Trans Canada Highway.

Photograph 18 shows the cement plant at Exshaw in 1964. The view is taken looking to the north-west, and shows Grotto Mountain in the background. As was discussed in chapter seven the plant, which was in the Park at the time, began operation at about the same time coal mining stopped at Anthracite. Photographs 17 and 18 therefore represent more or less continuous industrial activity in the mountain section of the Bow Valley for the last eighty years.

Photograph 17

Photograph 18

Photographs 19 and 20 give a good indication of the scale of the mining activity at Bankhead and also show how well the area has recovered since mining stopped in the early twenties. The earlier photograph was taken around 1912 and shows the briquetting plant with Cascade Mountain in the background. The coal mined at Bankhead was of a very friable nature and therefore briquetting was required. On the same photograph the mountain slope behind the buildings appears to have been either extensively cut over, or burnt over. On the other hand if the photograph was taken in winter some of the slope is probably covered with leafless aspen poplar. This would seem to be the case in the middle right part of the photograph.

Photograph 20, taken during the summer of 1963, shows the foundations of the mine buildings and indicates how well the aspen poplar and coniferous trees, mainly lodgepole, have recolonised the cleared areas.

Photograph 19

Photograph 20

Photograph 21 is a view of Castle Mountain (now Mount Eisenhower) and Silver City, as they appeared around 1887, several years after the copper mining boom had collapsed. Photograph 22 was taken from approximately the same position during the summer of 1964. Apart from the obvious disappearance of the buildings the most striking change is, once again, the increase in tree cover. The difference is particularly noticeable on the terrace slopes, but is also clearly evident on the lower slopes of Mount Eisenhower and on the terrace surface itself. At present the predominant tree species is the lodgepole pine although from the earlier photograph it is impossible to determine what trees were then present.

Photograph 21

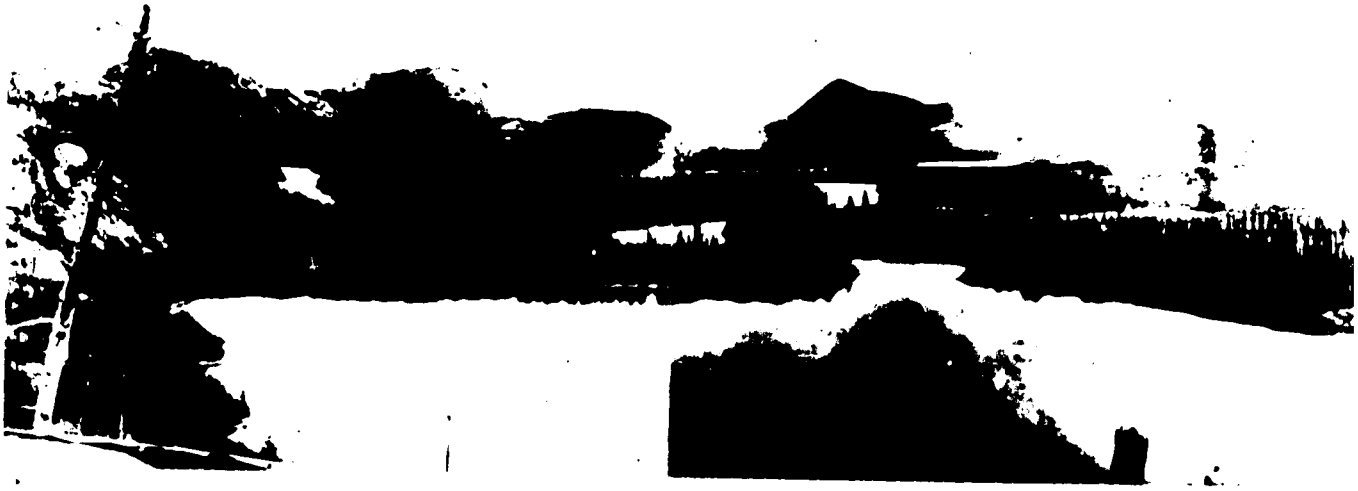
Photograph 22

These two panoramas were taken from an area on the north-west side of Gap Lake, which is situated in the Bow valley just west of the front range (Tp. 24, R. 9, W. 5th). Photograph 23 was taken in 1881 and photograph 24 during the summer of 1964. The most obvious changes, apart from the Old Banff Highway and the railway line, have resulted from the Canada Cement Company's activities in the centre distance. The white scar on the hillside in the recent photograph, indicates the removal of a considerable amount of limestone.

In terms of vegetational change the earlier photograph shows a large number of standing, dead trees. If these were the result of a fire, the fire could not have been a recent one as many spruce of an almost similar size remain unharmed. The extension of tree growth during the period between the two photographs has been significant. To the right of the photographs on the steeper slopes of Pigeon Mountain are large treeless areas on the earlier photograph; the same areas are almost entirely covered by trees on the later photograph. On the gentler slope at the foot of Pigeon Mountain, an extensive, almost treeless area is evident which appears to be covered by what are probably willow or alder shrubs. The same area on the 1964 photograph has an apparently continuous coniferous or aspen poplar cover.

The forested area to the immediate right of the lake, in the 1881 photograph, appears to have completely disappeared in the later photograph. This may have been due to changes in river erosion following the construction of the railway line.

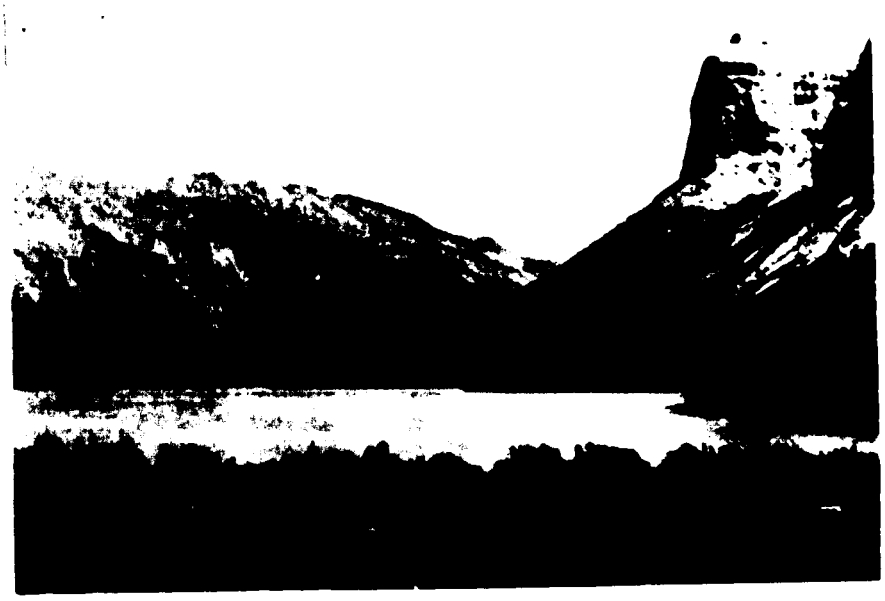
On the left of the photograph in the middle distance there would seem to be an indication that a gravel wash, which appears to be active on the earlier photograph, is now being covered by tree growth.



Photograph 23

Photograph 24

Photographs 25 and 26 are views taken looking to the north-east across Lake Minnewanka. The first was taken in the 1880's and the second during the summer of 1963. Once again the obvious difference is in tree cover. The earlier photograph shows evidence of forest fires on the slopes of Mount Inglismaldie to the right, and particularly along the lake shore. In contrast the later photogra shows a thicker tree cover on Mount Inglismaldie and on the mountain slopes acros the lake. Some of this difference may be due to the comparison between an old an a recent photograph but certainly not all of it. A comparison of the side profil of Mount Inglismaldie gives some indication of the submergence that followed the construction of the Calgary Power Company's dams at the lake's outlet.



Photograph 25

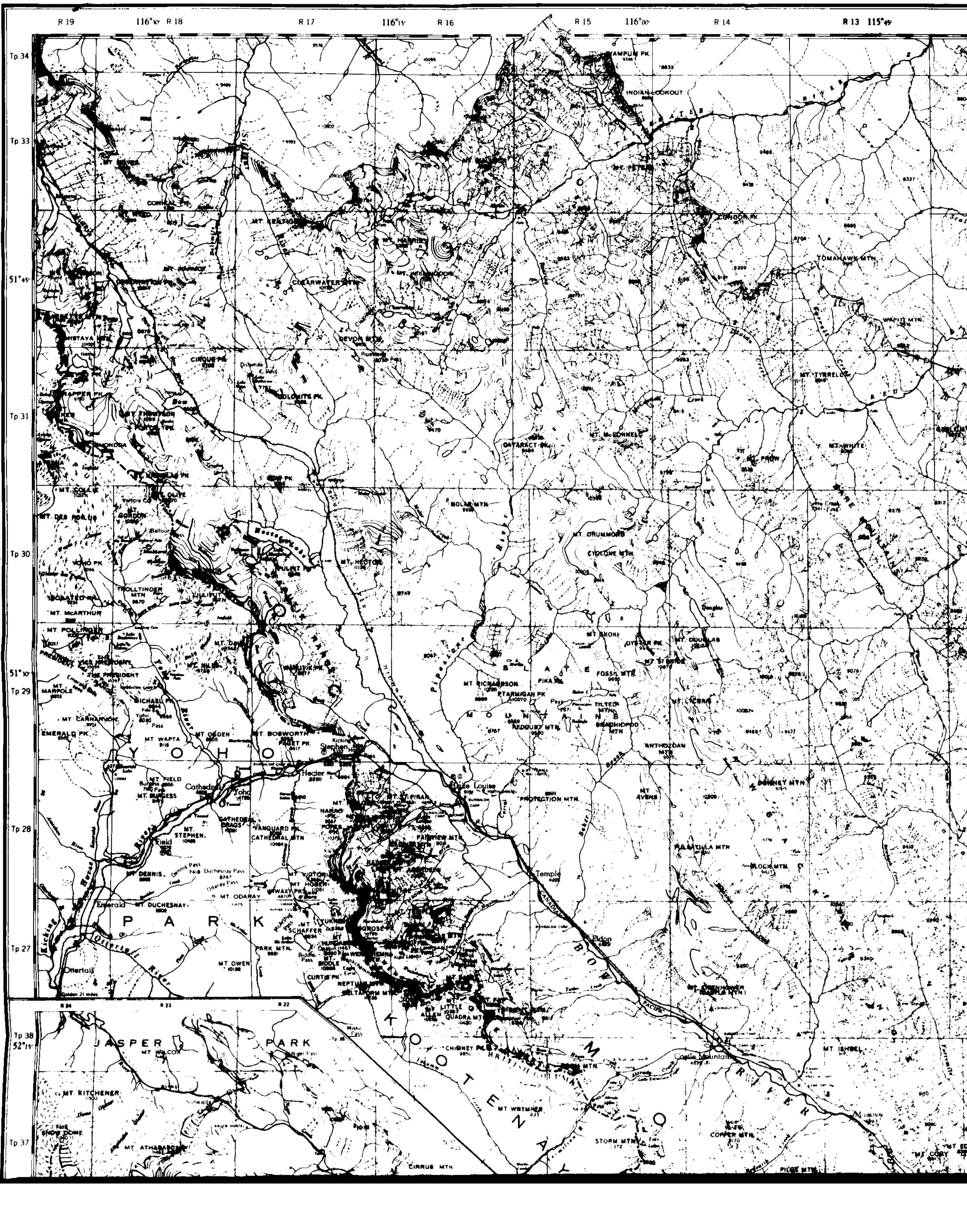
Photograph 26

Photograph 25

Photograph 26

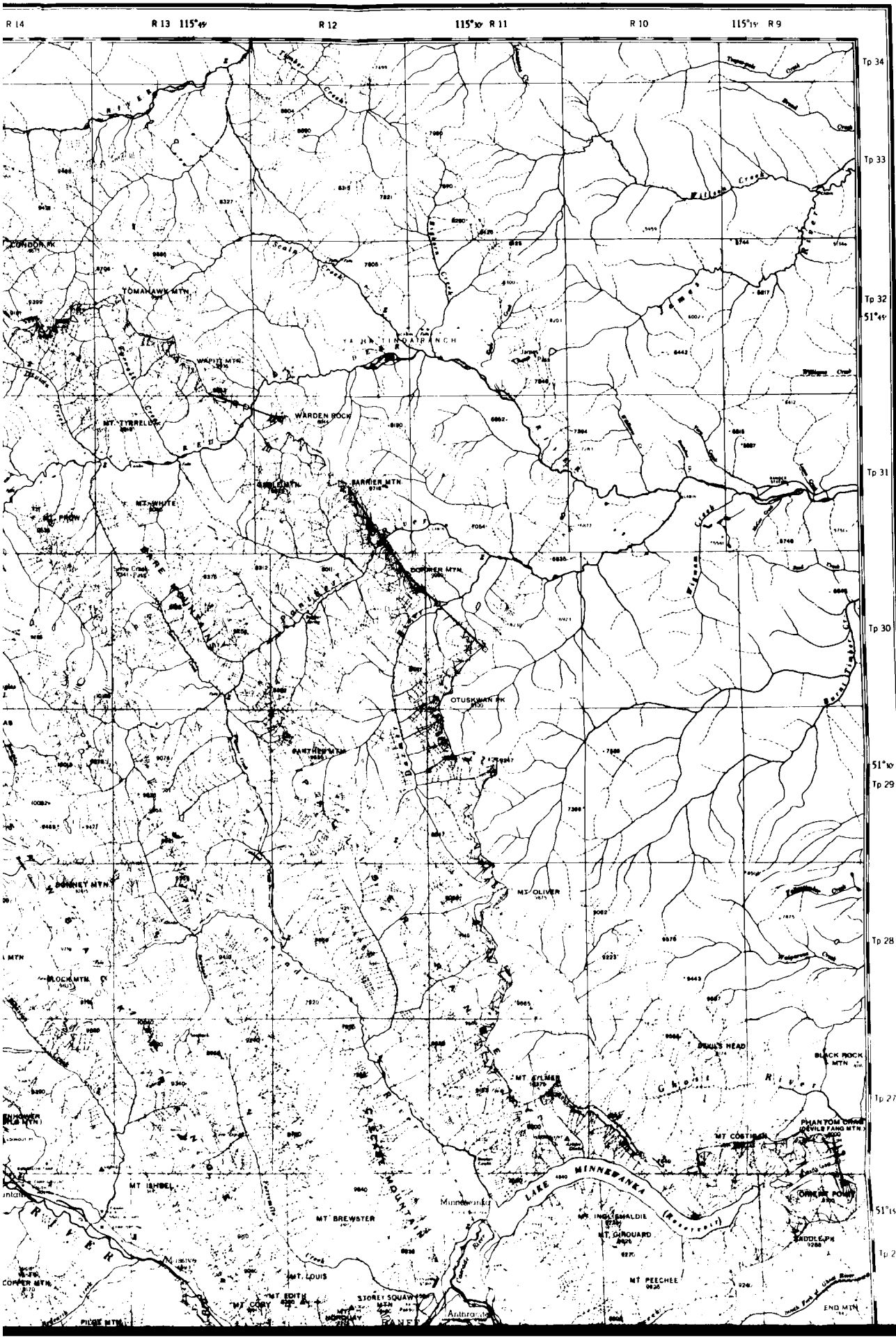
NATIONAL PARKS OF CANADA

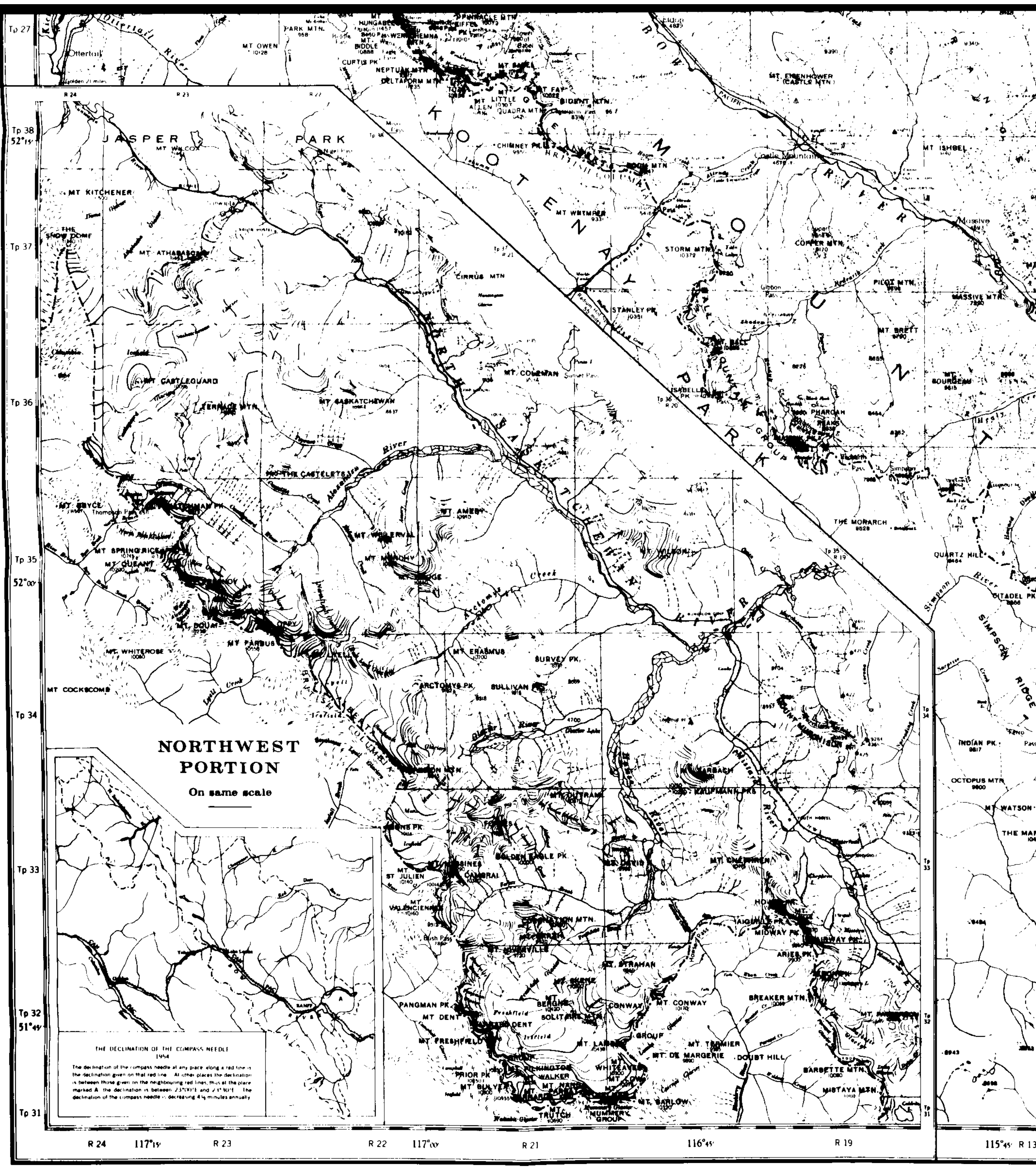
CANADA
MINES AND TECHNICAL SURVEYS
SURVEYS AND MAPPING BRANCH



CANADA
TECHNICAL SURVEYS
AND MAPPING BRANCH

THIRD EDITION





REFERENCE

- Railway, Standard Gauge, Single Track
- Road
- Fire Road not open to public
- Trail
- Telephone Line along Road or Trail
- Boundary, Provincial
- Boundary, National Park
- Boundary, Township
- Glacier
- Sand or Gravel
- Contours, interval 250 feet
- Post Office
- Telegraph Office
- Warden's Cabin with Telephone
- Warden's Cabin without Telephone
- Camera Station
- Park Boundary Monument
- Spot Elevation in feet above mean sea level

Compiled, drawn and printed at the office of the Surveyor General, July 1912
Reprinted with corrections 1946
Reprinted with corrections at the Surveys and Mapping Branch, Ottawa 1955

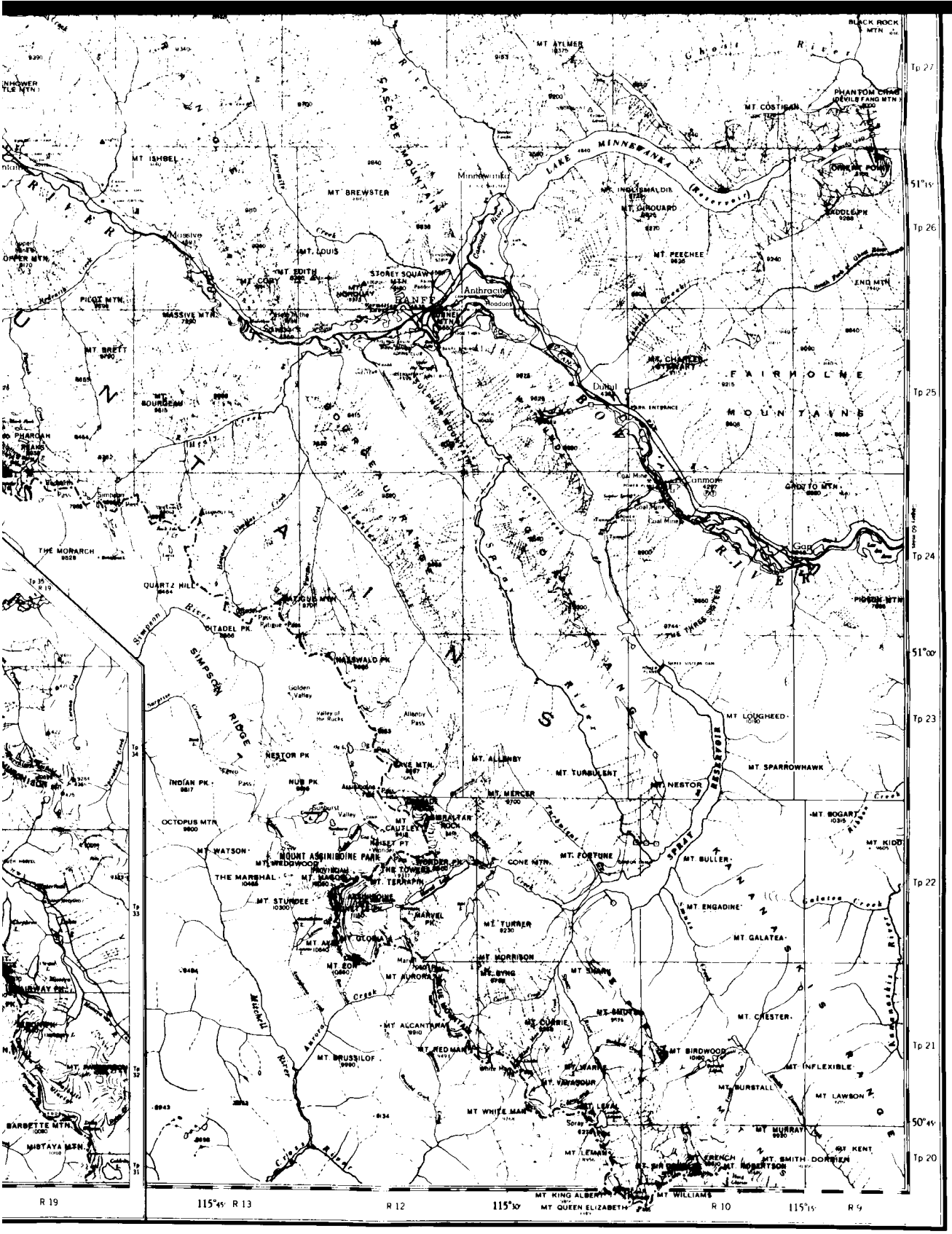
BANFF PARK

ALBERTA

Scale 1:190,080
1 Inch to 3 Miles

Miles 5 0 5 10

Kilometres 5 0 5 10 15



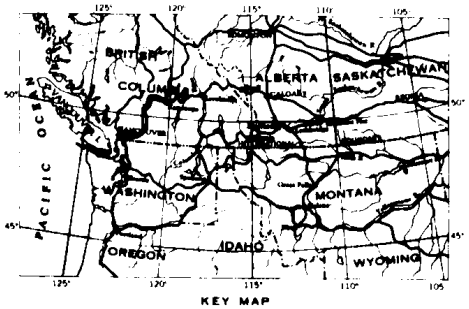
NFF PARK

ALBERTA

Scale :190,080

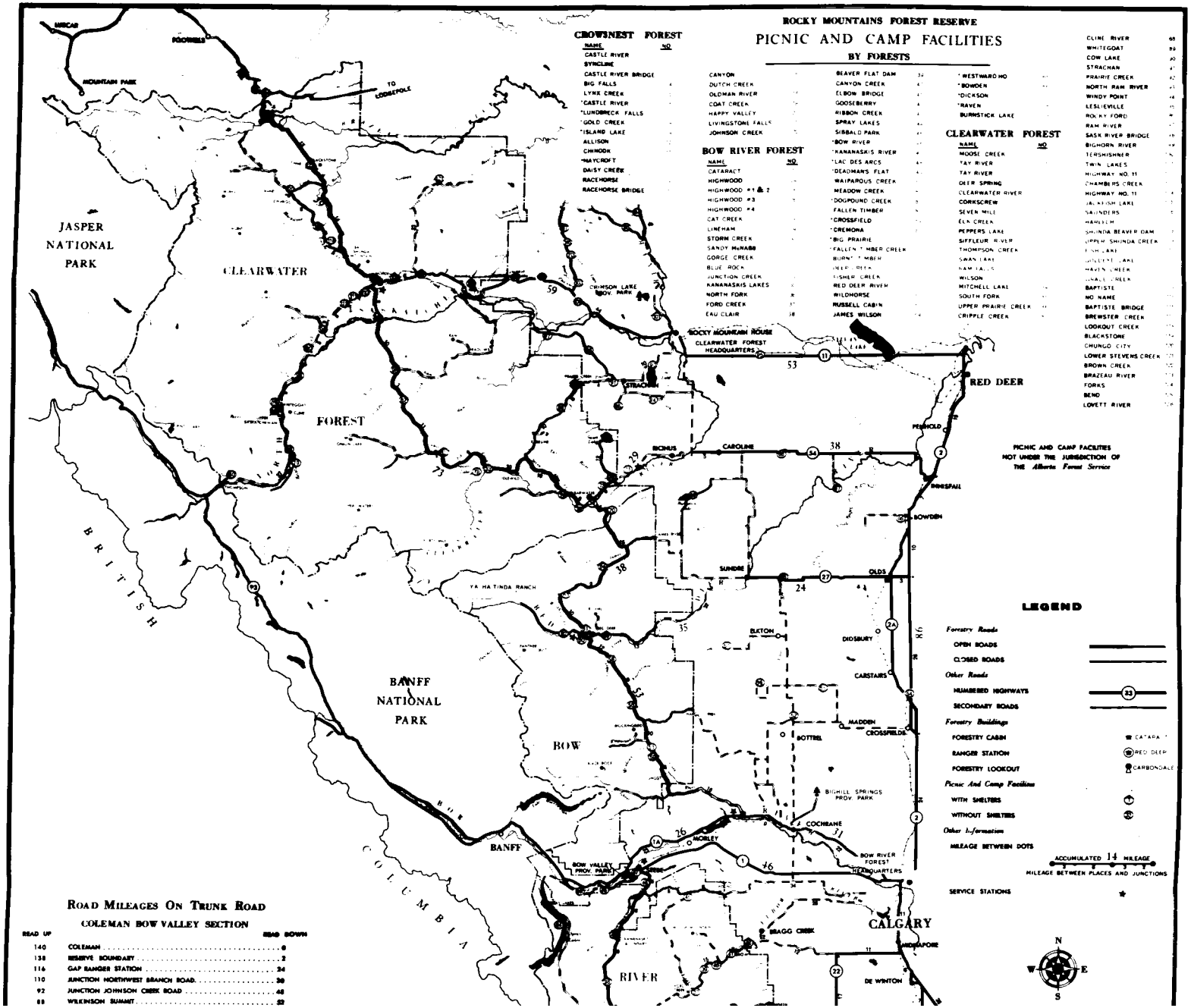
1 Inches 3 Miles

Copies may be obtained from the Map Distribution Office, Department of Mines and Technical Surveys, Ottawa, at 25 cents each



KEY MAP

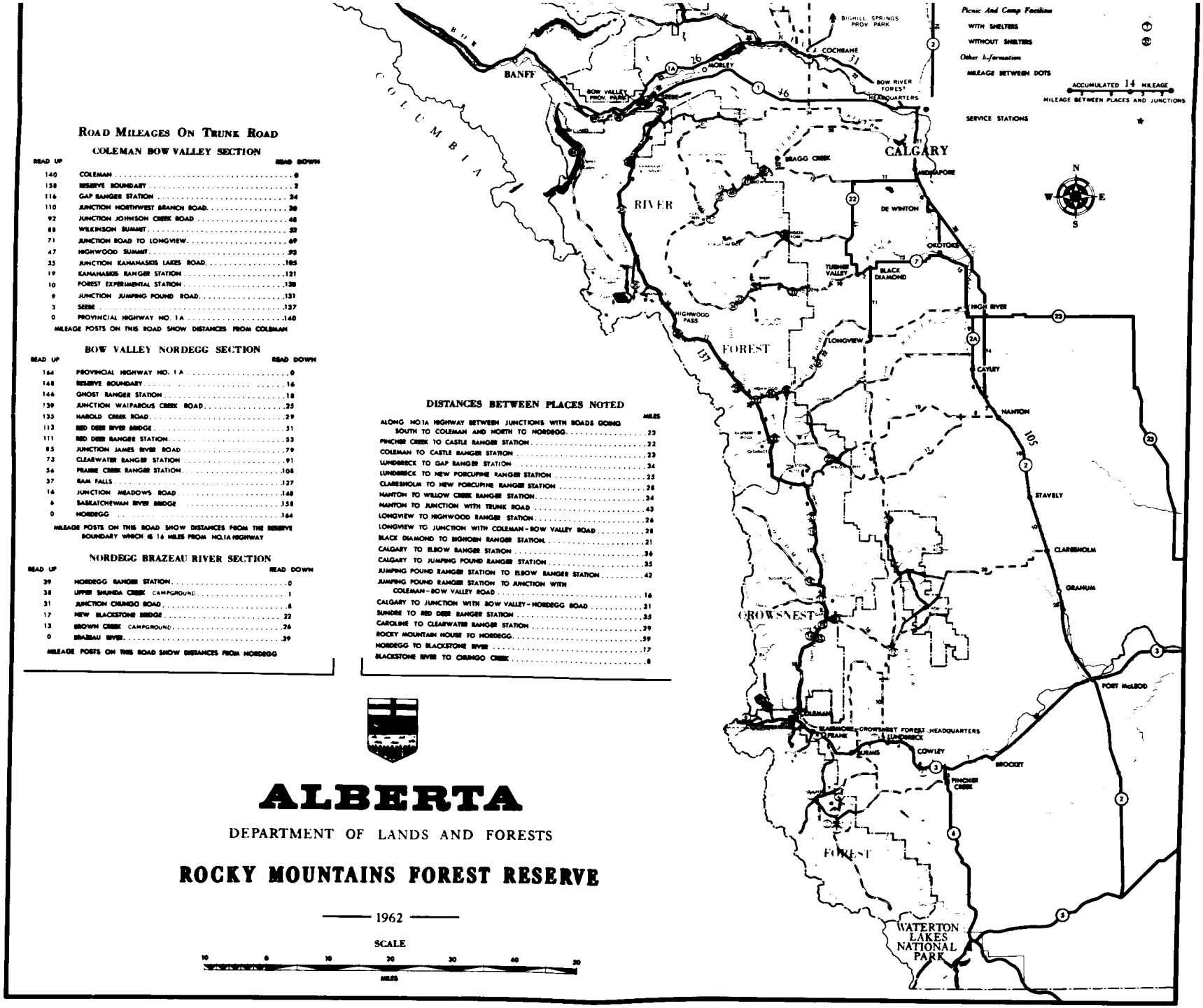
242.



Road Mileages On Trunk Road

Coleman Bow Valley Section

Read Up		Read Down
140	COLEMAN	0
138	RESERVE BOUNDARY	2
116	GAP RANGER STATION	24
110	JUNCTION NORTHWEST BRANCH ROAD	30
92	JUNCTION JOHNSON CREEK ROAD	48
88	WILKINSON SUMMIT	52



Road Mileages On Trunk Road

COLEMAN BOW VALLEY SECTION

Read Up		Read Down
140	COLEMAN	0
138	RESERVE BOUNDARY	2
116	GAP RANGER STATION	24
110	JUNCTION NORTHWEST BRANCH ROAD	30
92	JUNCTION JOHNSON CREEK ROAD	48
88	WILKINSON SUMMIT	52
71	JUNCTION ROAD TO LONGVIEW	69
47	HIGHWOOD SUMMIT	93
35	JUNCTION KANANASKIS LAKES ROAD	105
19	KANANASKIS RANGER STATION	121
10	FOREST EXPERIMENTAL STATION	130
9	JUNCTION JUMPING POUND ROAD	131
3	SEEBE	137
0	PROVINCIAL HIGHWAY NO. 1A	140

MILEAGE POSTS ON THIS ROAD SHOW DISTANCES FROM COLEMAN

BOW VALLEY NORDEGG SECTION

Read Up		Read Down
164	PROVINCIAL HIGHWAY NO. 1A	0
148	RESERVE BOUNDARY	16
146	GHOST RANGER STATION	18
139	JUNCTION WAIPAROUS CREEK ROAD	25
135	HAROLD CREEK ROAD	29
113	RED DEER RIVER BRIDGE	51
111	RED DEER RANGER STATION	53
85	JUNCTION JAMES RIVER ROAD	79
73	CLEARWATER RANGER STATION	91
56	PRAIRIE CREEK RANGER STATION	108
37	RAM FALLS	127
16	JUNCTION MEADOWS ROAD	148
6	SASKATCHEWAN RIVER BRIDGE	158
0	NORDEGG	164

MILEAGE POSTS ON THIS ROAD SHOW DISTANCES FROM THE RESERVE BOUNDARY WHICH IS 16 MILES FROM NO.1A HIGHWAY

NORDEGG BRAZEAU RIVER SECTION

Read Up		Read Down
39	NORDEGG RANGER STATION	0
38	UPPER SHUNDA CREEK CAMPGROUND	1
31	JUNCTION CHUNGO ROAD	8
17	NEW BLACKSTONE BRIDGE	22
13	BROWN CREEK CAMPGROUND	26
0	BRAZEAU RIVER	39

MILEAGE POSTS ON THIS ROAD SHOW DISTANCES FROM NORDEGG

DISTANCES BETWEEN PLACES NOTED

	Miles
ALONG NO.1A HIGHWAY BETWEEN JUNCTIONS WITH ROADS GOING SOUTH TO COLEMAN AND NORTH TO NORDEGG	23
PINCHER CREEK TO CASTLE RANGER STATION	22
COLEMAN TO CASTLE RANGER STATION	23
LUNDBRECK TO GAP RANGER STATION	34
LUNDBRECK TO NEW PORCUPINE RANGER STATION	25
CLARESHOLM TO NEW PORCUPINE RANGER STATION	26
NANTON TO WILLOW CREEK RANGER STATION	34
NANTON TO JUNCTION WITH TRUNK ROAD	43
LONGVIEW TO HIGHWOOD RANGER STATION	26
LONGVIEW TO JUNCTION WITH COLEMAN - BOW VALLEY ROAD	28
BLACK DIAMOND TO BIGHORN RANGER STATION	21
CALGARY TO ELBOW RANGER STATION	36
CALGARY TO JUMPING POUND RANGER STATION	35
JUMPING POUND RANGER STATION TO ELBOW RANGER STATION	42
JUMPING POUND RANGER STATION TO JUNCTION WITH COLEMAN - BOW VALLEY ROAD	16
CALGARY TO JUNCTION WITH BOW VALLEY - NORDEGG ROAD	31
SUNDRE TO RED DEER RANGER STATION	35
CAROLINE TO CLEARWATER RANGER STATION	29
ROCKY MOUNTAIN HOUSE TO NORDEGG	59
NORDEGG TO BLACKSTONE RIVER	17
BLACKSTONE RIVER TO CHUNGO CREEK	8

ALBERTA

DEPARTMENT OF LANDS AND FORESTS

ROCKY MOUNTAINS FOREST RESERVE

1962

SCALE

10 0 10 20 30 40 50

MILES