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TransCanada Ecotours®

Northern Rockies

Highway Guide

A lavishly illustrated driving guide to the landscapes, geology, ecology, culture, people and history of the Northern Rockies Region of Alberta and British Columbia.

133 points of interest, 265 photos, 22 maps that include:

Hinton – Cadomin – Grande Cache – Jasper – Valemount – and the Icefields Parkway

Northern Rockies Ecotour

FRED POLLETT • ROBERT UDELL •
PETER MURPHY • TOM PETERSON

foothills
RESEARCH
INSTITUTE
research growing
into practice.

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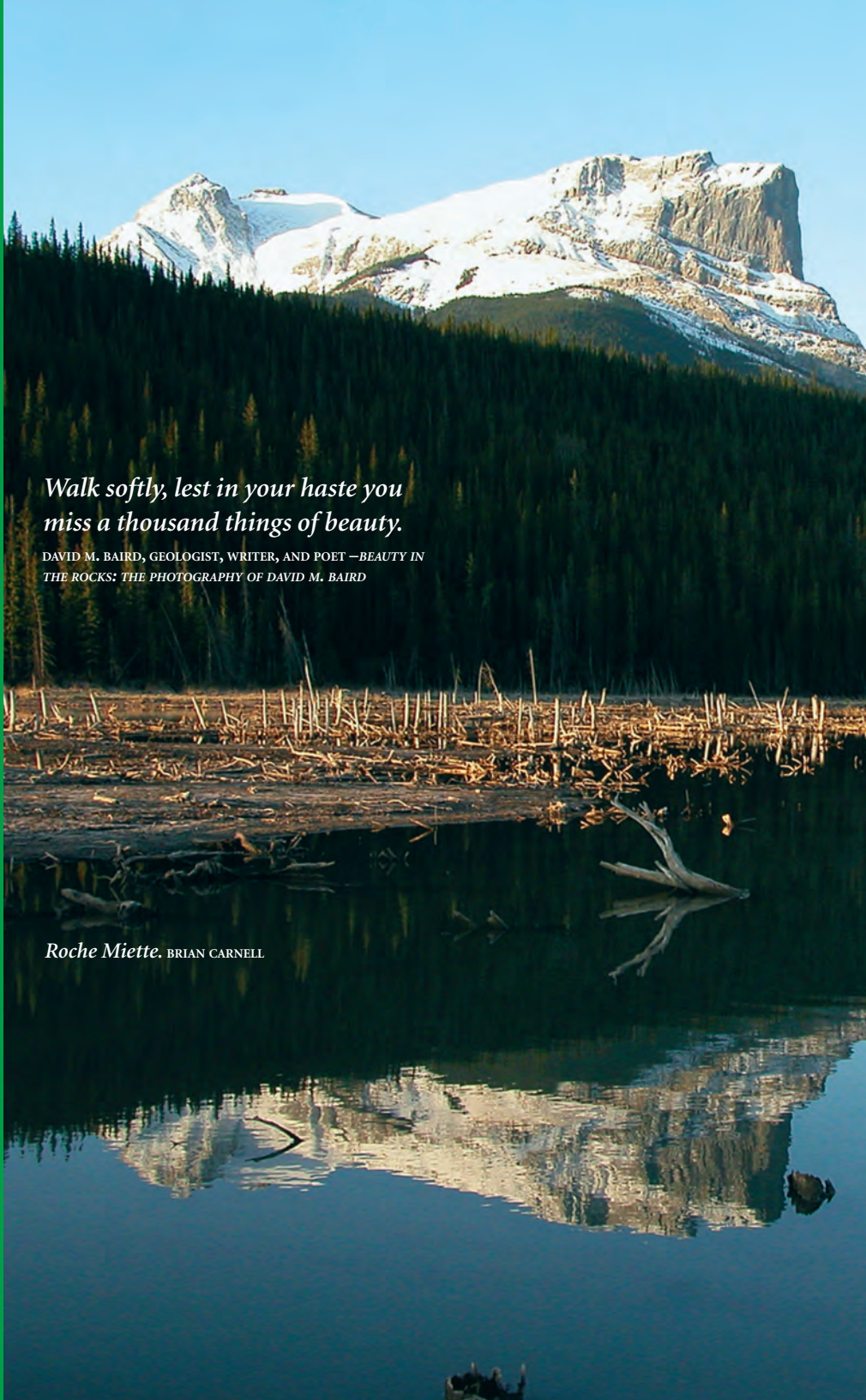
With apologies to those we may have inadvertently omitted. Without the input and expertise of all contributors this book would be much diminished.



Walk softly, lest in your haste you miss a thousand things of beauty.

DAVID M. BAIRD, GEOLOGIST, WRITER, AND POET —*BEAUTY IN THE ROCKS: THE PHOTOGRAPHY OF DAVID M. BAIRD*

Roche Miette. BRIAN CARNELL

Introduction

You're about to embark on a remarkable journey.

You'll be travelling within and around the borders of the northern part of the United Nations Educational, Scientific and Cultural Organization's (UNESCO) Canadian Rocky Mountain Parks World Heritage site. The natural exhibits are immense, inspiring, and ever-changing. Share in the feats of determination and perseverance of those who passed through these mountain corridors in centuries past. While having fun, turn your brain on to the knowledge available from this special place – knowledge of the events that created and shaped this land, the peoples past and present, and the ecological challenges of climate change and sustainable management. This journey will provide information to distill, use, and share with others.

Much of the Northern Rockies Ecotour route lies within the World Heritage site, chosen for its outstanding universal value and importance to present and future generations. If you limit your Ecotour experience to the World Heritage site you'll be amply rewarded. But the entire Ecotour offers you much more as it ventures outside the World Heritage site into surrounding provincial parks, towns, mining sites, and forests. It's your chance to gain an even greater understanding of the northern Rockies.

Where can you begin? You can select any of the "Ecopoints" and continue from there. The five anchor points are Hinton, Grande Cache, Jasper, Valemount, and the junction of the Icefields Parkway and the Southern Trans-Canada Highway near Lake Louise.

In this book we chose to begin the Ecotour story in the town of Hinton, aptly called the "Gateway to the Rockies." Why Hinton? Hinton is at a crossroad of the trails that helped define Canada. Most of these ancient and not-so-ancient trails are unknown to many who pass by.

Centuries before Europeans saw these mountains, a south-north Aboriginal trail followed along the eastern foothills of the Rockies up to Peace River country. This trail was crossed near here by an east-west trail through the Athabasca Valley, linking the prairie grasslands with the Pacific Ocean.

For new travellers from the east, who were following the Athabasca waterway or overland trails, this was a place for rest and contemplation before venturing into the mountains. After a long hard trek across prairie, woodland, and muskeg, they looked westward toward the Rockies, their exhilaration tempered by apprehension of the unknown. What adventure waited beyond this mountain portal?

The Route

The Northern Rockies Ecotour is presented here in three chapters. Each chapter is shaped by the place it occupies in the universe of the Rocky Mountains.

The Eastern Foothills

Chapter 1 is about landscapes, the people of the foothills–whose cultures define this region–and the choices made and being made within the landscape.

The tour first includes the Hinton area and then the north-south trail from Hinton to Cadomin along

Highway 40 South, and from Hinton to Grande Cache on Highway 40 North. Highway 40 South takes you into the Coal Branch to Cadomin and beyond, past the ghost town of Mountain Park onto the Cardinal Divide, then loops back to Hinton. North on Highway 40, the Ecotour crosses the Athabasca River and, after a side trip to the hamlets of Entrance and Brûlé, carries on northward to Grande Cache.

Yellowhead Across the Rocky Mountains

Chapter 2 sifts through the rich episodes of natural and human history that unfolded in this east-west corridor defined by the rivers flowing to the Arctic and Pacific oceans.

The tour includes the journey west on the Yellowhead Highway into the World Heritage site, through the Jasper National Park portal bounded by Roche Miette and Roche Ronde. Along the way there are side trips to Miette Hot Springs, the Moberly Homestead, Maligne Lake, and the town of Jasper. From Jasper we continue west through the legendary Yellowhead Pass, across Mount Robson Provincial Park to the west side of the Rocky Mountains, reaching the Rocky Mountain Trench near Tête Jaune Cache in British Columbia, and ending south of Tête Jaune Cache in the town of Valemount.

The Icefields Parkway

Chapter 3 takes us through the heart of the Rocky Mountains, with its gallery of natural treasures highlighted by great icefields. The journey begins at Jasper and continues south to the Columbia Icefield, into Banff National Park, ending at the junction of the Icefields Parkway and the southern Trans-Canada Highway near Lake Louise.

The Portal into Jasper National Park. BRIAN CARNELL

GRAPHIC IMAGE OF NORTH AMERICA
COURTESY NASA / JPL-CALTECH

ECOTOUR – OVERVIEW OF THE FULL ROUTE

From the Beginning …

The town of Hinton sits just inside the boundary of the plains to the east and the foothills of the Rocky Mountains that begin at the west edge of town.

Why is the vista to the east so flat, so rolling here, and so rugged to the west? Geologists have researched the rocks and origins of the Rocky Mountains, and this work is summarized by Chris Yorath and Ben Gadd in their book *Of Rocks, Mountains and Jasper: A Visitor's Guide to the Geology of Jasper National Park* and in Chris Yorath's book *How Old Is That Mountain: A Visitor's Guide to the Geology of Banff and Yoho National Parks.* The authors take us back in time and unfold the geologic story, answering many of our questions. A second work by Ben Gadd, *Canadian Rockies Geology Road Tours,* is a valuable and complementary reference. We draw on these books extensively throughout this Ecotour.

The Story Begins

As you stand just outside the Green Square Information Centre in Hinton, take in the world around you. You're standing 3.5 km east of the eastern foothills of the Rocky Mountains. Incredible as it may seem, this area once stood as high above sea level as the mountains you see to the west.

To set the scene let's go back 170 million years. There are no mountains, and the land is flat in all directions. Off the coast of western North America, sediments washed off the continent have been accumulating over the past 750 million years, forming a wide continental shelf. The layers of sediments are about 15 km thick, and, under that enormous pressure, the loose sediments have been transformed into a layered mass of sedimentary rock, sitting atop a granitic base that is the core of the continent–the Precambrian Shield. An immense force, caused by the collision of Earth's moving tectonic plates is about to shear this thick underwater sedimentary layer cake off its granite base.

A massive plate of Earth's crust underlying the Pacific Ocean has been speeding northeastward (at about one mm a week) for many millions of years. It has just collided with the northwestward-moving continent of North America. Over the next 100 million years or so, this collision and others will raise the land, like an ocean swell slowly moving eastward.

The sedimentary rock forming the continental shelf, caught between colliding crustal plates, is sheared loose from its granitic base and pushed upward and to the northeast, as Yorath and Gadd say, like "a stack of rugs across a hardwood floor." The mass of rock begins to wrinkle and fold, breaking into thrust sheets, each sheet several kilometres thick, stacked one on top of the other.

A depression forms at the wave front because of the weight of the thrust sheets. Over millions of years sediments eroding from the mountains on the west and the plains to the east fill this depression. As the wave continues eastward, the sediments in the trough are also pushed upward to become part of the stack of thrust sheets. In this way, the eastern Rockies and the foothills are formed. Then, 50 to 60 million-years ago, the pressure ceases and mountain-building is over.

When the pressure stopped, the waves of rock didn't flatten out; they remained to form the continental spine of western North America. Where Hinton is now was a Tibet-like highland at an elevation as high as the mountains to the west are now. What happened to the Hinton mountains? The sedimentary rocks that made up these easternmost mountains were soft and more easily eroded than the hard, more resistant limestone mountains to the west, so, over millions of years, the mountains in the Hinton area were worn down to become the rounded foothills.

Erosion has shaped the Rocky Mountain landscape, as millions of years of mountain-building were also accompanied by millions of years of erosion. As soon as the sedimentary rocks rose above sea level, the forces of nature –rain, running water, moving ice, wind, frost, chemical decay –began to erode them. In fact, more rock has been removed from the Rocky Mountains by erosion than remains today. Does that mean the Rockies are less than half as high as they used to be? No, because as mountains erode, the weight of the rock becomes less and Earth's crust, which was depressed by the massive weight, rebounds. Just as a ship floats higher as it's unloaded, the remaining mountains rose higher, and they're still rising today as erosion continues. Also, as the two-km-thick, Ice Age glacier melted over the past 18,000 years, more rebound has occurred. Remarkably, although the Rockies have lost eight to 10 kilometres of sedimentary rock to erosion, they have maintained much of their height.

With expected rates of erosion in future, however, the Rocky Mountains may be gone in a mere 50 to 60 million years, reduced again to a rolling plain – unless, of course, there's another major tectonic upheaval!

The Rocky Mountains

Geologists have divided the Rockies, east to west, into three distinct physiographic zones: the foothills, front ranges, and main ranges. Here in Hinton, we're at the eastern edge of the most easterly zone, the foothills, which vary from 10-75 km across.

The ranges of mountains visible to the west of Hinton are the front ranges, located in Jasper National Park. About 30 km wide, these mountains consist of a series of thrust sheets arranged like roof shingles, inclined to the southwest. The dominant colour of the front ranges is grey – the colour of the weathered surface of the limestone they are made of.

The third zone of the Rockies is the main ranges, about 75 km wide. The town of Jasper sits in the main ranges. Here, the stack of thrust sheets was highest. Much of the rock was heavily folded deep down, but closer to the surface, in peaks such as Pyramid Mountain and Mt. Edith Cavell, the layers lie at gentle angles. The sedimentary strata have a layer-cake look, in brown and reddish hues. This is where the greatest erosion took place. Older Cambrian and Precambrian rocks are exposed in places.

In Chapters 1 and 3 the routes run parallel to the mountain ranges, but in Chapter 2 the route cuts across the Rocky Mountain ranges. The geological differences are striking.

Rocks of the Rockies

Granitic rock, so characteristic of the Precambrian Shield of eastern Canada – particularly along the Trans-Canada Highway north of the Great Lakes – is less commonly exposed at the surface in western Canada. Throughout much of the Ecotour, the Precambrian Shield lies about 9 km beneath our feet. The Rocky Mountains sit atop the granitic core of the continent and, as we have discussed, the exposed rocks are almost entirely sedimentary.

Geologists explain that the sedimentary rocks consist mainly of either clastics or carbonates. Clastics are made up of erosion products like sand grains, pebbles, and other particles, which form sandstone, shale, and conglomerate rocks. Grains of quartz sand are common in the main ranges, forming the very hard quartzite that makes up many peaks in the western part of the Rockies. Most carbonates, by comparison, consist mainly of calcium with or without magnesium chemically bound to the carbonate ion, CO_3. Carbonates are nearly always deposited in seawater through the action of marine life, especially cyanobacteria (used to be called bluegreen algae), and true algae. Larger organisms like clams and corals contribute their calcareous hard parts. Carbonates form limestone and dolostone (a sedimentary rock made of the mineral dolomite) of Precambrian age, which are common in the World Heritage site and surrounding area, and where fossils of those lifeforms can be found.

Ice and Fire

The interplay of ice and fire can be seen throughout the Ecotour. By understanding these forces, we can gain insights into their roles in shaping the landscape as well as find out more about the broader global issues of climate change, biodiversity conservation, and managing freshwater resources.

Ice

At some points on the Ecotour, you'll see–and if you choose, have hands-on experience with–glacial ice. Most of Canada has been under several kilometres of ice, not once but repeatedly over the past two million years. The last continental-scale glaciation melted away a mere 10,000 to 15,000 years ago.

Globally, 70 per cent of all freshwater is stored in the form of glacial ice, permafrost, or permanent snow. Only Antarctica and Greenland have more glacial ice than Canada does today. In Canada, it is crudely estimated that as much water is locked up in glacial ice as there is in liquid form in all our lakes and rivers.

> From space, the bright white patches of snow and ice in the polar regions and mountain chains shine like beacons, their brilliant surfaces reflecting the sun's radiation. In this way the glacial ice acts as a global air conditioner, keeping the surface temperature of the planet in balance–(Environment Canada)

When part of this reflective snow cover is lost, more solar energy is absorbed by the darker land, causing more melting–a chain of events known as "positive feedback."

In this case, the result is not necessarily positive. As our climate warms, the balance between water in liquid and solid form is changing in Canada.

The Rocky Mountains attract millions of visitors each year, many drawn to the spectacular beauty of alpine glaciers and icefields. A few come to study the links between glaciers, climate, and Canada's water resources. Some glaciologists describe the alpine glacial ice found throughout the Ecotour as "young, warm, and active" as compared to the much older and colder Arctic glaciers and ice caps. Ice has existed off and on in the Rocky Mountains for millions of years. The glacial ice is a store of information about ancient temperatures, pollen rain, and air chemistry. The information of past climates may help to forecast changes we may expect in the future.

In 1911 Philadelphia naturalist, artist, and explorer of the Canadian Rockies, Mary Schäffer (Ecopoints 2-21 and 2-26), concerned about the coming of the railway, was not optimistic about future events in the Rocky Mountains. She wrote:

> …the virgin valleys will soon be a thing of the past… this will bring the timber-cruiser, the hunter, the fast disappearing game will be extinct, and the Indian will be driven back to his reservation; fires will sweep through the virgin valleys and there is but one satisfaction – what are they going to do to get rid of those fields and fields of glaciers.

To date the forests and wildlife of the region have remained largely intact. With global warming, however, "they" may have found the way to eliminate Mary Schäffer's one satisfaction – the icefields and glaciers.

The entire Ecotour landscape has been sculpted by ice. Valley glaciers, such as the Athabasca Glacier, flow into pre-existing stream valleys, which are usually V shaped,

Cirques and Arêtes along the Icefields Parkway.
FRED POLLETT

widening them to U shaped. A more common feature is the cirque glacier (such as Angel Glacier on Mt. Edith Cavell), which erodes a horseshoe-shaped basin (a cirque) in the side of the mountain. Other features caused by the erosion of multiple cirque glaciers include long serrated ridges (arêtes) and pointy peaks (horns). These features will be highlighted along the route.

Fire

Fire is a natural feature of the northern forests of Canada, and the Ecotour area is no exception. As soon as the ice retreated, 10,000 to 15,000 years ago, and forest vegetation was re-established, there was fire. Near Pyramid Lake in Jasper, an old Douglas fir bears the scars of no less than 9 fire events. With climatic warming, we can expect that drought and fires will become more common in this area.

This is a dire forecast. Since the formation of Jasper National Park a century ago, fire as a natural agent of forest renewal has been suppressed. Much of the forest is now past the time when it would normally have been renewed by wildfires. Park managers are concerned, because without periodic natural fires, dropped branches and needles accumulating on the forest floor provide fuel that increases the risk and compounds the severity of catastrophic wildfires. Excluding fire from the park has decreased biodiversity and increases the risk of losing wildlife and plants that depend on fire to renew ecosystems. For these reasons, Parks Canada specialists are reintroducing fire into park ecosystems through prescribed burning.

The Great Divides

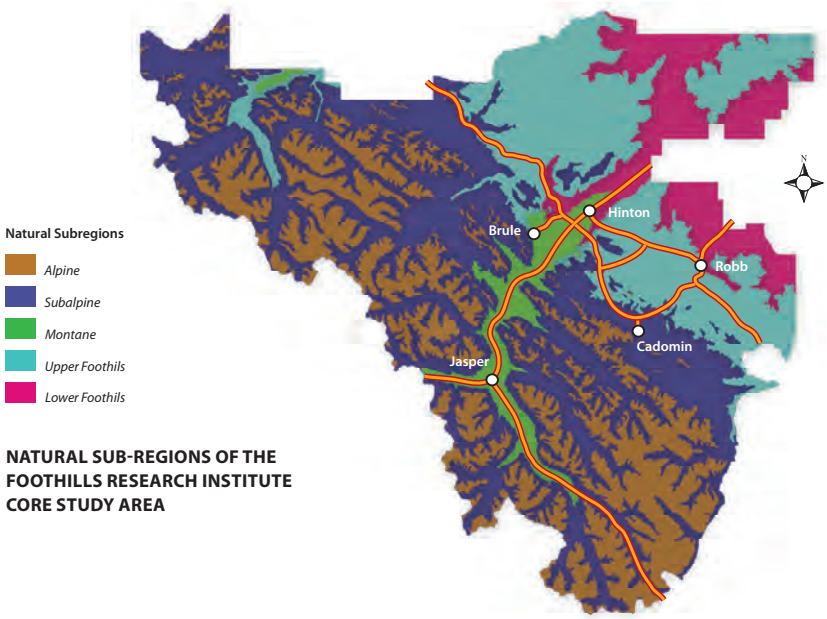
"The person interested only in the beauty of the scene will find it even more moving when he [or she] reflects on the intricately woven pattern of events that have, through the millions of years, produced the rocks and the mountains, the rivers and the glaciers." – David M. Baird, *Jasper National Park: Behind the Mountains and Glaciers.*

Writing about Jasper National Park, geologist David Baird challenged the imagination by speculating that a single drop of rain or a solitary crystal of snow falling on one special place in the Columbia Icefield may split into droplets that end up in the Arctic, Atlantic, and Pacific oceans after flowing for thousands of kilometres in completely different river systems. How is this possible?

The ice-covered summit of the Snow Dome in the Columbia Icefield is the hydrographic apex of North America. The three continental divides of North America that separate Pacific, Arctic, and Atlantic drainage systems intersect here. This means that water from this point flows to three oceans, through the Saskatchewan and Nelson river systems to the Atlantic, through the Columbia system to the Pacific, and through the Athabasca and Mackenzie systems to the Arctic.

Vegetation

The vegetation of a landscape is an expression of the climate, soil, natural processes (like fire or landslides), and human interventions (like fire suppression). The map covering most of the Ecotour area shows that there are five main zones of



NATURAL SUB-REGIONS OF THE FOOTHILLS RESEARCH INSTITUTE CORE STUDY AREA

vegetation. You will have stops in all of them, so you'll be able to appreciate the differences on the ground.

East of the front ranges of the Rockies are the boreal forests of the subalpine and the Lower and Upper Foothills. The steeply sloped subalpine region is typically clothed with forests of lodgepole pine, white spruce and Engelmann spruce, and subalpine fir in older stands. The Upper Foothills Subregion has rolling terrain containing stands of lodgepole pine, white spruce, black spruce, and balsam fir, often intermixed with aspen and balsam poplar in the younger forests.

Three ecological zones in the front and main ranges are documented by Parks Canada literature: montane, subalpine, and alpine. The montane zone is located in the valley bottoms. There are lodgepole pine, Douglas fir, and aspen stands and some grasslands at these lower elevations. This is the driest and warmest of the three zones. In Jasper National Park, it represents only seven per cent of the landscape, very important as wildlife habitat and, also most sought after and used by the human species. Local climate variations produce a diverse array of plant communities that changes rapidly over short distances. The grassy open slopes and mixed-wood forests of the montane make for ideal grazing. For wildflower enthusiasts, the montane zone is home to brown-eyed susans, crocus, forget-me-nots, paintbrush, wild rose, wild strawberry, and yellow lady's-slipper.

The subalpine zone covers about half of Jasper National Park. Open Engelmann spruce and subalpine fir forests intermix with scattered whitebark pine and herb-rich meadows at higher elevations, and white spruce and fire-succession lodgepole pine stands at lower elevations. Multicoloured columbine and the orange western wood

Retreat of the Athabasca Glacier below Roche Miette. HOWARD CONEYBEARE

lily cling to the mountain slopes.

The alpine zone occupies the highest lands in Alberta and includes all areas above the treeline in the front and main ranges. A cold harsh climate, along with steep and unstable rocky substrates, active glaciers, and permanent snowfields, limits plant growth and soil development to sheltered areas. The alpine zone has its spring display of flowering alpine meadows, and lichens are abundant, some of them hundreds of years old.

Slight changes in climate may cause an abrupt change in an ecosystem such as insect outbreaks, wildfire, and forest dieback. Some of these responses may be benign and beneficial – in any case we need to reduce our impact on climate and learn to adapt to changes.

People and Cultures

The repopulation of this area after the continental glaciers melted is not yet well understood. Some of the earliest signs of people are found near Brûlé Lake and Cold Sulphur Spring, both of which we will visit on the tour. From the type of stone tools found at these sites, both sites have been dated to 9,000 years BP (before present).

Over the past two or three centuries, Shuswap people have lived in the Jasper and Mt. Robson areas. Beaver and Sarcee, both members of the Dene Nation, and scattered Sekani (all with languages of Athapaskan origin) are among the endemic First Nations groups. Beaver people inhabited a vast territory between the present-day Alberta–Saskatchewan border and the Peace River. They lived in relatively small family groups for most of the year.

The Stoney Nation (originally part of the Sioux), also known as the Assiniboine, was allied with the Cree. During the early nineteenth century, the Stoney and Cree people moved westward with the fur trade, along the Saskatchewan River system where they claimed territory for themselves between the Peigan (Blackfoot) and Gros Ventre (related to the southern Arapaho and Cheyenne) to the south and the Beaver nation to the north. The Cree are the largest Aboriginal

group in northern Alberta and, although there are variants of Cree language, their language is associated with the larger Algonquian group of languages. The Ojibwa, also known in the west as the Saulteaux, and of the Algonquian language nations, migrated here from the Great Lakes region drawn in part by the expansion of the fur trade.

Trappers from the east in the service of the fur trade became a small but highly influential Aboriginal presence. The men were recruited largely from villages along the St. Lawrence River near Montreal, and, although most were Iroquois, they also included a few Nipissing and Abenaki, both Algonquian. Some trappers stayed on in the area as "freemen" after their contracts expired, and many married local Aboriginal women and adopted the Cree language. Their role in the cultural history of this area will be explored in many parts of the Ecotour.

Beginning in the mid-eighteenth century, European fur traders and explorers came into the area from the east and north. Those who passed through, and those few who settled in the Ecotour area, will be introduced along the journey.

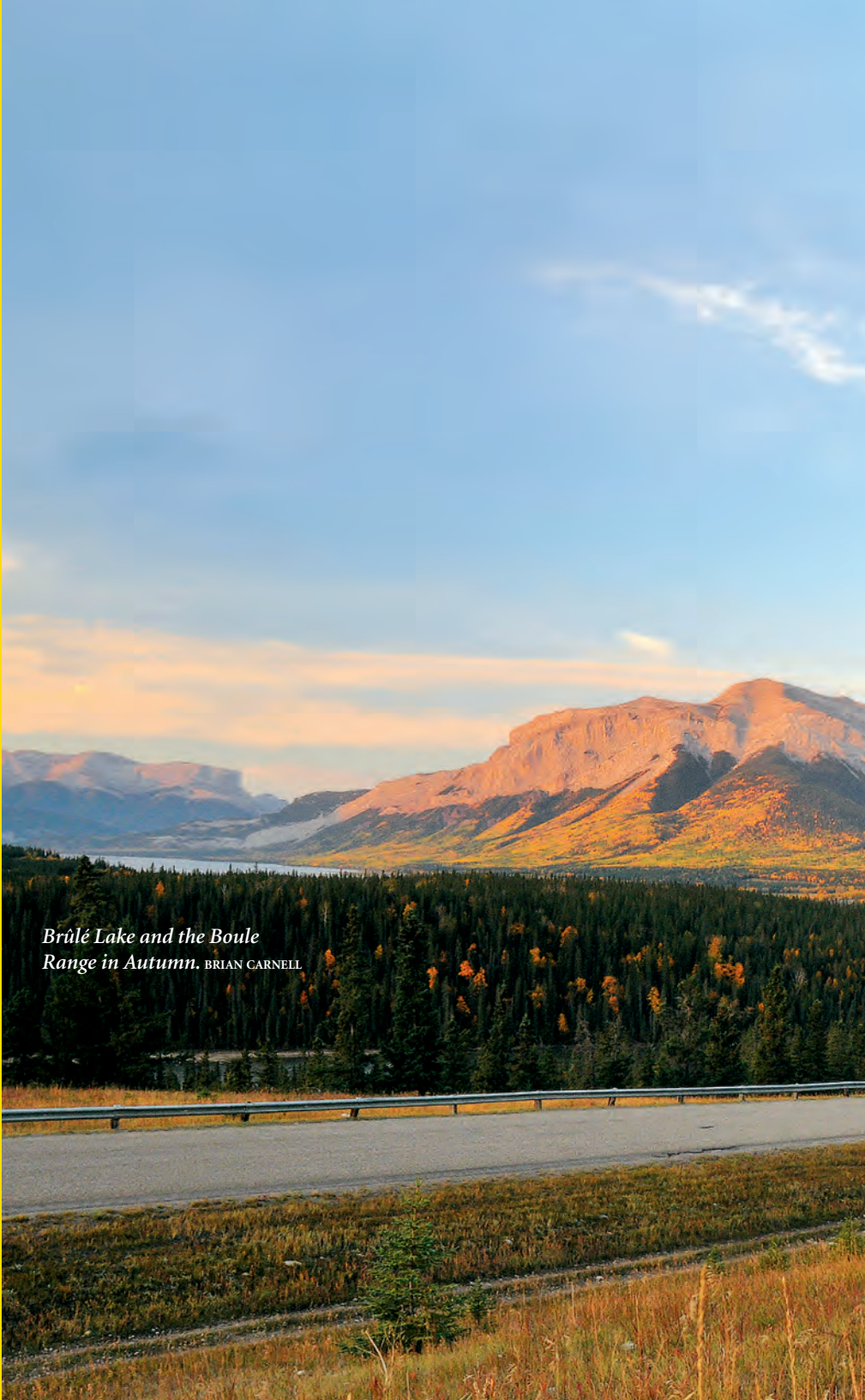
A Word about Distances

In this Ecotour we have tried to record distances as accurately as possible and, in most cases, have shown the distances in two directions – from the start of a reference "leg" of the tour to the end and back again. Because vehicle odometers do not always record distances the same, we use different scales. From 0-50 km we record to a tenth of a kilometre; from 50-100 km to the nearest half-kilometre, and over 100 km to the nearest whole kilometre. Because people are encouraged to take side trips we also show distance between consecutive Ecopoints. For further insurance, we provide the GPS coordinates in latitude north and longitude west. Finally, the information is presented in a manner that allows the traveller to navigate in either direction through a particular Ecotour section. See the following example, taken from one point in Chapter 2:

West from Icefields Highway 93	**102**	East from Valemount	**18.7**
West from last Ecopoint	**5.0**	Distance West to next Ecopoint	**5.6**
Latitude North	**52°58.152**	Longitude West	**119°25.541**

In this case, if travelling west, you would see that this Ecopoint is 102 km west of the Highway 16/Icefields Parkway junction and it is 18.7 km to Valemount. Your last Ecopoint was 5.0 km back (Column 1), your next is 5.6 km farther west (Column 2). If you are travelling east, the to/from distances are reversed.

Now – on with the Ecotour!



Brûlé Lake and the Boule Range in Autumn. BRIAN CARNELL

CHAPTER ONE

The Eastern Foothills