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GREAT DIVIDING RANGE IN VICTORIA*

INTRODUCTION

The Eastern Highlands of Australia reach their highest point in Mt Kosciusko (2,228 metres), in an area where they change direction quite abruptly. The westerly trend of the Highlands in Victoria is in marked contrast to their generally northerly trend through New South Wales and Queensland. The area in which the change of direction occurs, variously known as the Australian Alps and the Snowy Mountains, is the source of the Murray River, its major tributary, the Murrumbidgee, and of the Snowy River. The significance of this area to the hydrology, irrigation, and hydro-electricity supply of south-eastern Australia is the greater because of its uniqueness. The highlands to the north in New South Wales and to the west, in Victoria, share with the Snowy Mountains the roles of water catchment, timber producer, recreation area, and wilderness for the greatest concentration of population on the continent. They also share the name, Great Dividing Range, bestowed on parts of the highlands in the early years of European settlement and later extended to include a wide variety of terrain between Cape York and the Grampians. Even the Victorian section, with which this chapter is mainly concerned, includes large tracts that are plateaux rather than ranges, ranges that do not carry the main divide, and considerable lengths of divide that are neither great in altitude nor mountainous in appearance.

While geographers have long deplored the use of the name, Great Dividing Range, laymen in Victoria accept it as a general term embracing a broad tract of hilly and mountainous country bounded on the north by the Wimmera and Riverine Plains, and on the south by the Volcanic Plains, the La Trobe Valley, and the coastal plains of East Gippsland. This tract is some 750 kilometres long and up to 200 kilometres wide. It includes a wide variety of rock type, terrain, resources, and land-use. It includes the goldfields that so dominated Victoria's history in the second half of the nineteenth century, as well as areas so remote and unspoiled as to warrant preservation as wilderness. It is an important factor influencing weather and climate, and, especially in the eastern half of the State, is a considerable obstacle to movement between north and south. Even in the west, its gaps attract routeways and foster the growth of towns.

Of these gaps, none is more important than the Kilmore Gap (approximately 350 metres in elevation) north of Melbourne, which combines with Port Phillip Bay to endow Victoria's capital with a nodality unrivalled by any other Australian city. It also divides the Victorian section of the Great Dividing Range into two parts, often called the Western and Eastern Highlands of Victoria (to distinguish the latter from the Eastern Highlands of Australia).

Nomenclature

The Eastern Highlands of Australia are geologically distinct from the Central Lowlands and from the Western Plateau, but they are also diverse in form, rock type, and topography. In Victoria, the older geological formations, other than granite, trend north-west to south-east, and many rivers are aligned in a similar fashion, suggesting that the dissection of the highlands has been strongly influenced by geological structure. Seen from

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the air, or from many mountain tops, the uniform height of so many summits suggests that Victoria's mountains are the remains of an extensive plateau, deeply etched by valleys that fall either to the north-west or to the south-east.

Between the headwaters of the coastal rivers and those flowing to, or towards the Murray River, a dividing line can be traced. It follows a very devious route that does not include many of the more conspicuous high-points — Bogong, Feathertop, Buller, or Buffalo in the north, or Baw Baw, Wellington, or Ellery in the south. West of the Kilmore Gap, volcanic activity in Quaternary times has greatly modified the topography by filling valleys with lava flows and dotting the landscape with volcanic cones that are often higher than older hills nearby. Tracing the line of water-parting across the basalt surfaces is difficult, and the geological map reveals that before the eruptions, the divide, west of Ballarat, lay further south than it does now. Neither then nor now could the divide between the waters be fairly described as a range. It is even less satisfactory to describe the whole complex of mountains and hills running westwards across Victoria as a Great Dividing Range. But that is what it is called, and it is interesting to inquire how the name came to be used.

Old maps offer some clues as to the origin of the term. A map of New South Wales, dated 1825, showing *Surveys of the Interior* (J.Aspin, del.) carries the words "Irregular chain of hills dividing eastern and western waters" just north of Lake George (which drains neither east nor west). On what is now the New England tableland, these words appear: "Supposed dividing Range of the Eastern and Western Waters". On a similar map published by Arrowsmith in 1837 this area is marked "Principal Range dividing . . . etc.," with hachures indicating the "range" in a very diagrammatic way.

Major Mitchell's maps of south-eastern Australia showing his exploration routes have the name "Coast Range" on the New England area and his Journal suggests the same term for the hills west of Mt Macedon separating the headwaters of the Loddon from the rivers flowing to Port Phillip Bay. This idea seems to have been rejected, for a plan dated 1839 shows the "Loddon-Yarra Dividing Range". By 1849, this had been elevated to "Great Dividing Range". This may have been done to distinguish the main water-parting from other dividing ranges between river basins. Old maps of the County of Polwarth use the words "The Dividing Range" to indicate the Otway Range.

The emphasis placed on the plotting of river courses in the early surveys is understandable in the context of the pastoral occupation of the interior by squatters. Needing water for their sheep, the squatters located their stations near rivers. To find the squatters, the government surveyors had only to map the rivers. Any rivers that slipped through this net would be tracked to their sources by gold prospectors in the decades that followed the squatting age. Once the rivers were mapped, divides could be added without the need to survey the height of these "ranges". The convention of using hachures to indicate the position of divides helped to compound the error.

When the cadastral counties were gazetted, to enable land titles to be described, the main rivers and the divides were frequently used as county boundaries, especially the "Great Dividing Range". The adjective "great" was not always used, and the use of capital letters for some or all of the three words was likewise haphazard and inconsistent. By 1852, a map of counties could show the main divide as a continuous line of hachuring from the Darling Downs to a point near Ararat. The line was not extended into the Grampians, as the ranges there had already been mapped fairly thoroughly by Major Mitchell, who had commented on the "remarkable break of the mountain-chain" between Mt William and the hills further to the east. In any case, the headwaters of the Wannon and the Glenelg and the tributaries of the Wimmera form such a complex drainage pattern in the Grampians that it is inappropriate to apply the concept of a dividing range to this set of strongly defined linear ranges.

West of the Grampians the sandy country dotted with salt lakes has no organised drainage to divide. South of the Glenelg River the highlands reach their western extremity in the Dundas Tableland, but, being surrounded by the Glenelg and its tributary, the Wannon, this geologically distinctive region hardly qualifies as part of the Great Dividing Range. This exemplifies the whole problem of using this term for Victoria's mountains. The Divide is a line, not a region, and that line is not a range in the normal sense of the word, connoting linearity and strong relief.

Main sections of the Great Divide

The Kilmore Gap, a low saddle in the Great Divide north of Melbourne, marks the division between the two main sections of the Great Divide. West of it are the rounded hills and the plains of the Western Highlands, and to the east, with progressively increasing elevation and depth of dissection, is the mountainous terrain of the Eastern Highlands.

GEOGRAPHY

Western Highlands

From the Kilmore Gap, tributaries of the Goulburn River flow northwards along open valleys separated by moderate interfluves of folded Silurian mudstone and sandstone occasionally capped with basalt flows. To the south, drainage is over basalt plains with several steep eruption points.

Between Kilmore and Lancefield, the Great Divide follows the hogback of the Mt William Range northwards to reach the southern part of the broad rounded Cobaw-Pyalong granitic massif, about 650 metres high. It then turns abruptly southwards to Mt Macedon. The Mt William Range is aligned along an important major fault exposing old Cambrian rocks, and dividing the Silurian rocks of central and eastern Victoria from the Ordovician bedrock of western Victoria.

The Mt Macedon Massif, of Devonian dacites intruded by granite and overlain in part by Pleistocene trachyte, rises sharply to 1,000 metres above the surrounding plains and ridges of dissected plateaux. It is a denuded remnant of the oldest recognisable landscape in Victoria, a plain-like surface dating back before even the Mesozoic. Uplifted at the close of Triassic time, this ancient surface has been reduced to isolated high points such as Mt Macedon, Mt Langi Ghiran near Ararat, and the Pyrenees.

West of Mt Macedon, the Great Divide follows a path through a sea of steep ridges — but not very deep valleys — carved into sharply folded Ordovician mudstone, slate, and sandstone. Ridge levels at 600–650 metres suggest a dissected erosion surface younger than that represented by Mt Macedon, and as at Bullarto, basalt flows fill some old valleys to give minor flat plateaux. The Great Divide passes 10 kilometres south and 10 kilometres west of Daylesford until it reaches, without loss of elevation, the wide flat Ballarat Plateau, where it is difficult to distinguish. Sheets of Pliocene basalt cover the Ballarat Plateau, but eruption points for lavas form conspicuous hills.

Near Ballarat, the Loddon and Avoca Rivers drain to the north and the Barwon system and Mt Emu Creek drain to the south in valleys not deeply incised. The buried valleys or "deep leads" beneath the basalt show that the pre-basaltic divide lay some 20 kilometres to the south, and the Avoca and Loddon Rivers have since lost their heads to the Leigh River.

From the edge of the basalt plain north-west of Ballarat, the Great Divide crosses the Ordovician slate ridges of the Pyrenees then climbs sharply to Mt Buangor and Mt Langi Ghiran (both about 950 metres), high points on a granitic intrusion, before dropping to about 320 metres at Ararat. The alluviated and broad valleys of the Avoca and Wimmera Rivers, neither of which reaches the Murray River, drain to the north and the Hopkins River drains across the basalt plains to the south.

West of Ararat and Stawell granite outcrops in Mt Ararat and the Black Range, but these ridges are overshadowed by the impressive sandstone escarpment of the Mt William Range, the eastern-most and highest of the ranges known collectively as the Grampians. The Grampians are drained by the Glenelg and its tributary, the Wannon, flowing south, and by tributaries of the Wimmera, flowing north. To the west lies the dissected Dundas Tableland, a laterite-capped plateau cut in Palaeozoic rocks of many types. The Glenelg River skirts its northern margin, separating it from a sandy plain dotted with salt lakes and sand ridges.

Exploration *

In June 1836, Major Mitchell had followed the Murray River from its junction with the Darling to the vicinity of Kow Swamp. Here, he noted the country was "richer in point of grass than any we had seen since we left Sydney". He also encountered hills for the first

* A map showing the explorers' routes is shown opposite page 86 of the *Victorian Year Book* 1973.

time in several hundred kilometres, and from the summit of Mt Hope, near Pyramid Hill, he saw country to the south "too inviting to be left behind us unexplored". He determined to "turn into it without further delay . . . a land so inviting and still without inhabitants". (This, however, ignores the Aboriginals being encountered almost daily.) His route took him close to the site of Wedderburn and a little south of that of St Arnaud. From Mt Bolangum he saw the Grampians — "a noble range of mountains rising . . . to a stupendous height and presenting as bold and picturesque an outline as ever painter imagined".

He climbed Mt William, commenting on the gap that lay between the Grampians and the forested mountains to the eastward. Rather than pass through the gap, however, he chose to travel westwards as far as Mt Arapiles before turning south-westwards. He crossed the Glenelg River onto the Dundas Tableland, skirting round near its western edge until he crossed the Wannon River. He noted that the terrain was "bold and round, but only so inclined that it was just possible to ride in any direction without obstruction: a quality of which those who have been shut up among the rocky gullies of New South Wales must know well the value". He was also impressed with the soil and the bountiful supply of water.

After using his portable boats to sail down the Glenelg to its mouth, Major Mitchell resumed his overland trek towards Portland Bay, where he found the Henty Brothers established. His description of the Wannon Valley seems to have led them to venture inland and to settle at Merino Downs and Muntham, thus initiating the pastoral occupance of the Western Highlands.

From Portland, Major Mitchell crossed the Volcanic Plains to the southern end of the Grampians and climbed Mt Abrupt before setting off to the north-east. He headed first for Mt Cole, crossed the divide between Chute and Lexton, and threaded his way through the "Hills of Lava", as his map calls them. (His Journal dubs them the "Mammeloid Hills").

Crossing the Loddon near Newstead he negotiated Expedition Pass, near Faraday, to emerge into the lowland drained by the Coliban and Campaspe Rivers. From here he climbed Mt Macedon and saw the tents of the infant township of Melbourne beside the Yarra.

He crossed the Goulburn at Mitchellstown and continued his homeward journey skirting the highlands much as the Hume Highway does today.

His enthusiastic reports led to a pastoral invasion of *Australia Felix*, as he called it, with many squatters following the "Major's Line", the marks of his bullock-drawn carts, on their homeward journey.

Mitchell's journey and his assiduous surveying produced a map of *Australia Felix*, that was very much more detailed than anything known previously. The relative positions of the many hills he climbed in order to extend his triangulation can be shown to be accurate by applying angles from his maps to modern maps. In the same way, hills named on his maps but lying off his route can be identified. Mitchell's "Mt Clarke", for example, may be located in relation to Mts Napier, Abrupt, and Cole, and shown to be Mt Elephant. His "Mt Hotspur" is Tower Hill, and his "Mt Beckwith" is Mt Misery and not the modern Mt Beckworth.

Mistakes in identifying features named by the explorer were made with rivers as well as with mountains. The most serious mistake was made by Mitchell himself, when he decided that the river he crossed near the site of Newstead was "probably the Loddon". It was in fact the upper portion of the stream he had called the Yarrayne. His "Loddon", named when he crossed it near Logan, is now known as the Avoca, which was the name Mitchell gave to the modern Sandy Creek, a tributary of the Avon River. The sequence of mistaken identifications ends with Mitchell's "Avon Rivulet", now known as Anderson Creek.

The names given by Major Mitchell to peaks and ranges in the Grampians have persisted, but his rather tentative naming of "the Pyrenees" has run into difficulties. His map seems to apply the term to the group of granite summits around Mt Buangor, including Ben Nevis, Mt Lonarch, and Mt Cole. Only the last of these was named by the explorer. Modern maps apply the singular term "Pyrenee Range" to a range running from Mt Avoca through Landsborough Hill. On Mitchell's map this is shown as a spur of the

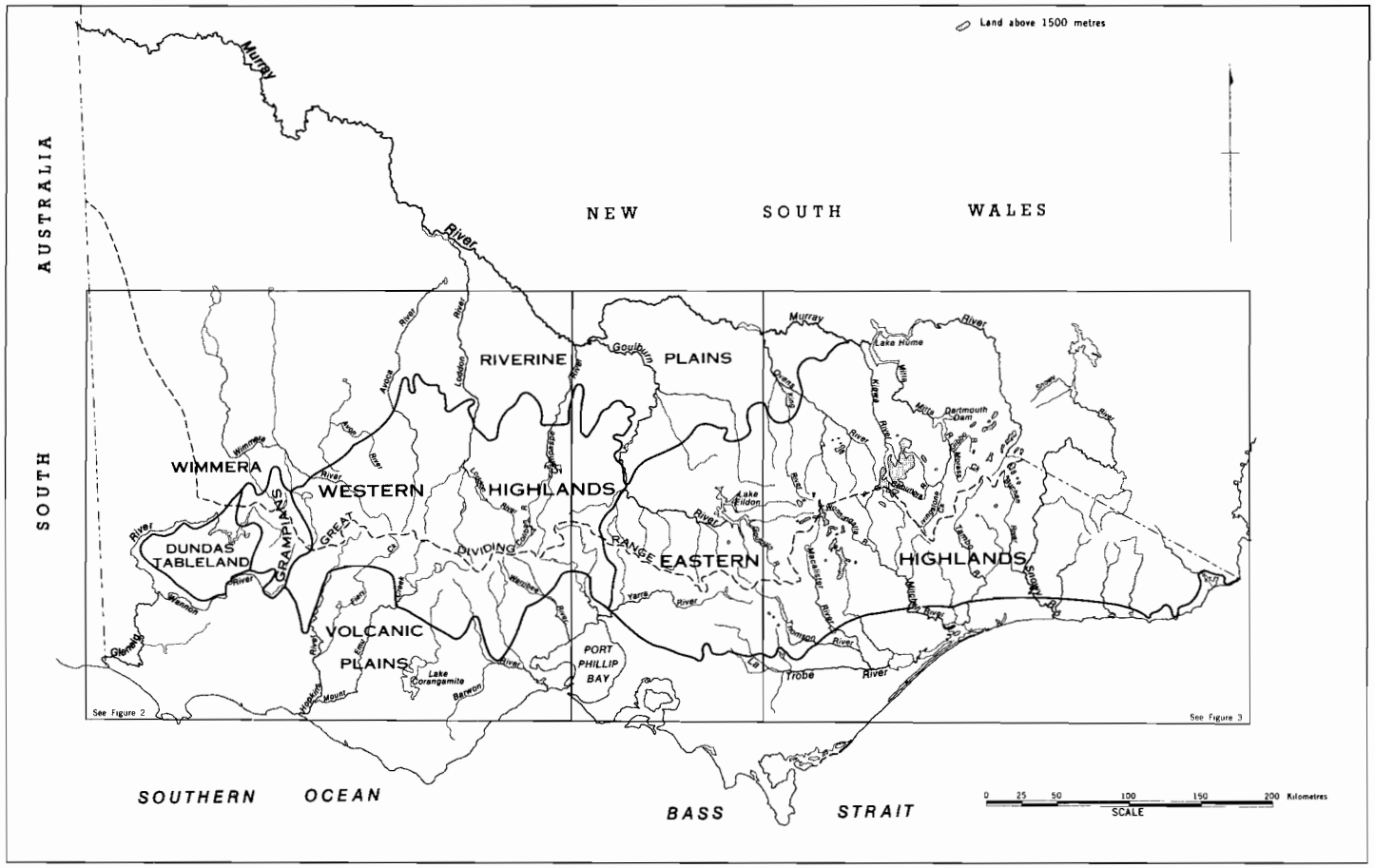


FIGURE 1. Eastern and Western Highland areas of Victoria.

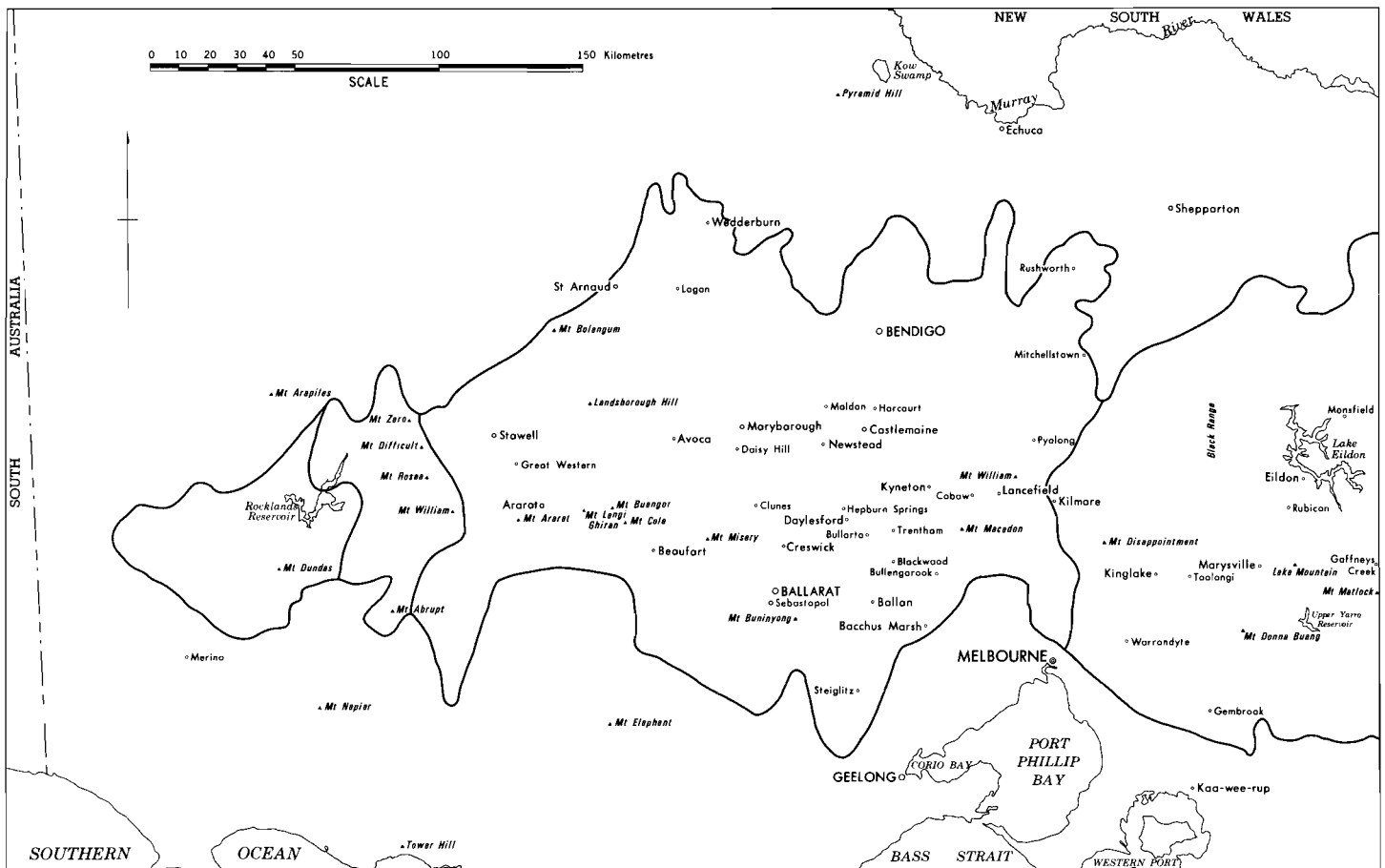


FIGURE 2. Victoria—Western Highlands.

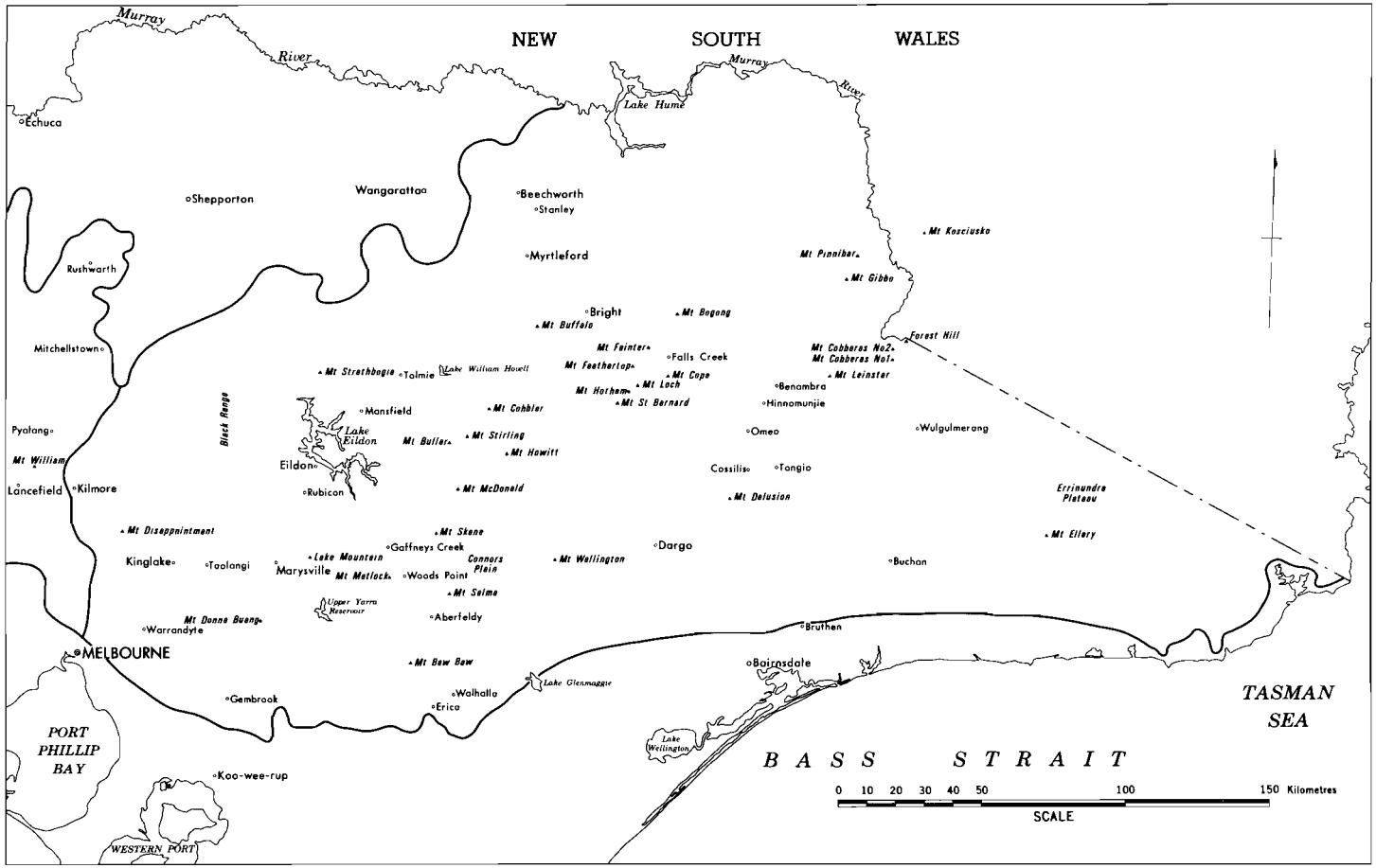


FIGURE 3. Victoria—Eastern Highlands.

granite group. From the top of Mt Cole, Mitchell could not have seen the break in that line, north of Ben Nevis, through which the Wimmera River, the Pyrenees Highway, and the Maryborough-Ararat railway all pass. As the southern granitic group is significantly higher than the northern sedimentary range, it seems likely that the former was intended to bear the name. However, the granitic mass separates the headwaters of the north-flowing Wimmera from those of the south-flowing Fiery Creek, and it was therefore incorporated into the concept of a Great Dividing Range, a term not used on Major Mitchell's maps.

Pastoral invasion

The pastoralists who followed "the Major's Line" into *Australia Felix* had been preceded, not only by the Henty Brothers at Portland, but by other settlers from Tasmania at Port Phillip Bay. They were attracted first to the volcanic plains and their open grasslands rather than to the forested hill country. Before long the wide corridors of basalt that led into and through the Western Highlands attracted the sheepmen to the country round Ballarat, Kyneton, and Kilmore. Within a decade most of the country traversed by Mitchell had been occupied, leaving only the most mountainous and heavily timbered areas untouched. By 1851, when Victoria was declared a separate Colony, the pastoral occupance had spread north beyond the Highlands into the Wimmera and the Riverine Plains.

As an economic basis for pioneering, sheep farming had the great merit of producing a valuable, imperishable commodity in steady demand overseas. Wool could stand the cost of a long haul by bullock-wagon from sheep station to port, as well as the long sea voyage to Britain. Wheat was much less valuable and had to wait for the cheap transport of the railway era before it could become an economic export. The agricultural frontier lagged far behind the pastoral frontier until the influx of goldminers provided a local market.

Gold rush era

As his bullocks dragged their drays up to Expedition Pass, Major Mitchell could have had no idea that the alluvial soil was rich in gold, nor could he have foreseen that fifteen years later the locality would be the scene of a major gold rush. The Mt Alexander Diggings was only one of several fields that were rushed in the spring of 1851, following the virtually simultaneous announcements of discoveries of gold at Clunes, Buninyong, and Warrandyte in July of that year. Some of the discoveries had been made earlier but had not been made public, and these included the find at Forest Creek. The town that grew up there was called Castlemaine.

Gold, it soon transpired, was to be found almost everywhere in the Western Highlands, from the Kilmore Gap to the Grampians, as well as in many parts of the Eastern Highlands. Within three years the extent of the goldfields in the Western Highlands had been fairly clearly established, as a rough quadrilateral with corners at Stawell, Wedderburn, Rushworth, and Steiglitz. This area, about 17,500 square kilometres in extent, or 7.7 per cent of Victoria, was to be the economic base of the Colony's prosperity in the forty years that followed 1851. In the search for gold, the alluvial soils of the area would be destroyed and the forests cut down for timber and firewood.

The first discoveries were of alluvial gold, and some of the alluvial deposits proved to be very rich, as at Ballarat, Bendigo, and Castlemaine. Although the shallow deposits were quickly worked out, they may well have yielded more gold than was later won by deep mining. More importantly, while alluvial working lasted, it attracted a great influx of population, stimulated urban growth, notably in the ports of Melbourne and Geelong, and led to the building of roads and telegraph lines.

Deep mining began at Bendigo in 1854, as quartz reefs were discoverd to be the source of the alluvial gold. Shafts were sunk to follow the reefs underground, often for hundreds of metres. Other shafts were sunk through basalt in order to work sands and gravels in old creek beds buried beneath the lava flows. This type, known as "deep lead" mining, was especially important at Ballarat, while quartz reef mines were most significant at Bendigo. The more elaborate operations of deep mines ensured greater stability for towns like Ballarat, Bendigo, Stawell, and St Arnaud, and sustained towns like Clunes and Maldon for half a century or more. The building of railways reinforced the economic strength of the larger towns and of junctions such as Maryborough and Ararat.

Many of those who took part in the Victorian gold-rushes later moved on to newly discovered fields in Queensland, New South Wales, Tasmania, and New Zealand. Others quit the diggings to settle down as farmers, often on farms that proved to be uneconomically small. Rural depopulation and farm amalgamation are characteristic of the Western Highlands even now.

The continuing domination of the region by mining up to the First World War can be illustrated from the 1891 Census, which lists the main economic activities of some 250 boroughs and townships. For roughly half of these, mining is listed as the leading activity, or as one of two main occupations. These places accounted for over three-quarters of the total population in listed places, thanks to the pre-eminence of Ballarat and Bendigo.

The region as a whole had a population of over 270,000, nearly one-quarter of Victoria's 1,158,372 persons in 1891. The population today is slightly less, and the proportion living in Ballarat and Bendigo has risen from 28 to 48 per cent. The last mine in Bendigo closed in 1954. These two cities and several other large towns have survived the loss of mining by attracting manufacturing industries, and by serving much wider hinterlands in the motor car era than was feasible in the days of horse-drawn vehicles. No fewer than seventeen smaller mining towns, that once boasted borough status, have had to surrender their independence and merge with their surrounding shires. Many of the smaller places listed in the 1891 Census have all but disappeared from the landscape.

Eastern Highlands

Introduction

The main divide of the Eastern Highlands is the watershed which determines which streams flow directly towards the sea and which form part of the Murray River system. On its sinuous course from Forest Hill in the east to Kilmore Gap in the west, it by-passes the highest mountains and is situated above the 1,800 metre level at only two points (Cobberas No. 1 and Mt Hotham). Only in the Omeo district are there gaps in the Divide below 800 metres, on the Omeo Highway at the Tongio Gap, and nearby at the Cassilis Gap.

For most of its length, with the notable exception of a section which forms the southern boundary of the Omeo District, the Divide is flanked on both sides by deeply dissected country. The valleys between the long spurs which originate from it are steep-sided; in some cases the stream beds are situated at levels 950 metres below the interfluves.

The steepness of the approaches to the elevated Divide, the paucity of low gaps, and the persistence of winter snow on high ground make it a formidable barrier between Gippsland and the Murray Valley. No railway crosses it east of the Kilmore Gap and only two roads, designated as highways, do so. However, there are other viable roads both over the Great Divide, near its summit in various parts, and along its crest.

The Great Divide climbs steadily for 20 kilometres east of the Kilmore Gap as a well defined ridge with major spurs, carved in Siluro-Devonian folded mudstones and sandstones, to reach an 800 metre summit in the Mt Disappointment granitic mass. To the east, the Great Divide drops slightly, again in the Siluro-Devonian rocks, to continue as a broad ridge-top with red-brown residual soil at Kinglake, to Toolangi. Depth of dissection increases towards Toolangi, but in general the south flowing streams occupy deeper and less alluviated valleys than the north-flowing streams.

Both relief and elevation increase, as the Great Divide, reaching in parts 1,200 metres, follows resistant dacites of Upper Devonian age north-east to near Marysville. It then drops about 300 metres to follow eastward around the head of the Yarra River in less resistant Siluro-Devonian folded mudstones through Mt Selma, separating headstreams of the Goulburn River from those of the Thomson and Aberfeldy Rivers. In this section it maintains a steady elevation of about 900 metres, with an exceptional height of about 1,200 metres at Mt Matlock. A spur leading south from Mt Matlock rises much higher as it reaches the top of the granitic Baw Baw Plateau, about 1,500 metres.

Swinging north, the course of the Great Divide is influenced by the Mansfield-Barkly major fault forming the western edge of the Upper Devonian belt of gently folded, hard, resistant sandstones, conglomerates, and rhyolites. It follows an obscure path across faulted Cambrian and Ordovician rocks to reach a peak at Mt Skene (1,700 metres); it then falls to a very low saddle near the head of the Barkly River, before rising quickly

once the Upper Devonian rocks are encountered near Mt McDonald and following their general 1,500 metre level, with steep scarp and gentle dip slopes reflecting the low dips of these resistant rocks. A major spur runs southwards to Mt Wellington with little drop in elevation. To the north a spur leads to the high Cobbler Plateau and the Tolmie Highlands, both in Upper Devonian rocks of similar type.

Beyond Mt Howitt (1,746 metres) the Upper Devonian belt ends, and the Great Divide crosses Ordovician slatey mudstones at a lower level before climbing again at the Twins and reaching 1,861 metres at Mt Hotham. Again high spurs stretch north to Mt Feathertop and south to the Dargo High Plains, an ancient basalt-filled valley.

Major streams rise in the high area between Mt McDonald and Mt Hotham: the McAlister and Mitchell systems flowing southwards and heads of the Ovens River flowing northwards.

From Mt Hotham, the Great Divide turns to the south-east, following approximately the line of the Kiewa Fault which separates the schists and gneisses of the Omeo area from the Ordovician slatey rocks of Gippsland. At Groves Gap (near Mt Delusion), otherwise known as the Jirnkee Gap, it makes a sharp turn to the north-east and continues on this course to Forest Hill, traversing a variety of geological formations which range in age from Ordovician to Triassic. Broad summits are characteristic of the Great Divide between Mt Hotham and Forest Hill. Some of those within 15 kilometres of Mt Hotham are residuals of Lower Tertiary basalt flows. Others are the relics of still older land surfaces. Between Hinnomunjie and Forest Hill the generally smoothly undulating profile of the Divide is interrupted by prominent higher peaks at The Sisters, Mt Jambo, Mt Leinster, and the Cobberas. These mountains are residuals consisting of harder rocks than those of the surrounding country. The rhyodacites of the Cobberas are Lower Devonian. Mt Tambo consists of Lower Carboniferous-Upper Devonian rhyolites. The syenites and trachytes of The Sisters and Mt Leinster are Triassic.

Evolution

The northern and southern boundaries of the Eastern Highlands are defined by fault plains. The Highlands themselves owe their origin to the elevation and subsequent dissection of part of an ancient peneplain (referred to as the Baw Baw surface) which was in existence at least as early as the Mesozoic. Since then, the Highlands have been subjected to continuous denudation, and to many episodes of differential earth-movements. Both the rate and extent of denudation are influenced by such factors as the hardness and structural peculiarities of the underlying rocks and by proximity or otherwise of the areas concerned to the knick-points of streams rejuvenated as a result of uplift. Some of the earth-movements mentioned above had only local effects, others were of major importance and will be the only ones discussed.

Two episodes of uplift occurred during the Mesozoic and initiated new cycles of denudation. The first cycle was prolonged and resulted in the formation of a second peneplain (the Kinglake surface). Remnants of the Baw Baw surface persisted as plateaux and hills which stood 600 metres or more above the general level. The second cycle of denudation was interrupted by volcanic activity during the Early Tertiary. Locally, basaltic lavas flowed down many of the characteristically broad valleys and over undulating country of the surface, with the result that stream patterns were modified. Drainage was diverted to the edges of the flows where new streams cut steep-sided valleys. Block-faulting, accompanied by uplift, tilting, and warping occurred during the Middle Tertiary.

In their modern form the Eastern Highlands still include remnants of the Baw Baw and Kinglake surfaces. They exist as tablelands and as broad crests of the Divide and associated spurs. All are at high elevations and most are bordered on at least one side by deeply-dissected country. The larger remnants of the Baw Baw surface which form part of the Divide are Mts Howitt and Hotham and the Cobberas. Others close to the Divide but not part of it are Mt Bogong, Mt Feathertop, the eastern end of the Bogong High Plains, and the country surrounding Mt Buller.

Remnants of the Kinglake surface are numerous both on the Divide and adjacent to it. The largest areas are the Omeo and Morass Creek basins which owe their preservation to faulting and down-warping during the Middle Tertiary.

The residuals of the Early Tertiary basalts are all at high elevations. The larger occur as undulating plateaux (Dargo High Plains, Baw Baw, Nunniong, and Wulgulmerang

Tablelands and an area at the western end of the Bogong High Plains). Of the areas mentioned only the Baw Baw Tableland is situated on the Divide. Smaller residuals occur as cappings on mountains and spurs. They are more or less flat-topped and their steep sides reflect the columnar structure of the basalt. Such cappings occur at Connor's Plain, Mt Clear, Mt Magdala, and Mt Higginbotham. Others are at some distance from the Divide.

Positions of the Divide

Parts of the Divide appear to have occupied their present positions since the Mesozoic, but elsewhere migration occurred during the Tertiary. Between Kinglake West and Toolangi, the Divide has migrated four miles northward as a result of rejuvenation of south-flowing streams. A much greater change occurred in the areas between Mt Hotham and Mt Gibbo. Prior to the Middle Tertiary the Divide is thought to have taken a comparatively straight course between Mt Kosciusko and the vicinity of Mt Buller. The present tributaries of the Mitta Mitta which head between Mts Hotham, Bogong, and Gibbo, then formed the headwaters of the Tambo. Their former courses are indicated by air gaps, the most prominent of which are the Cassilis and Tongio Gaps. Differential earth movements enabled the Mitta Mitta to capture the headwaters of the Tambo and divert them into the Murray River system. All the streams affected show abrupt changes of course known as elbows of capture. These events resulted in a great southward migration of the Divide (as much as 62 kilometres) and a reduction in its elevation by over 1,000 metres.

Exploration and settlement

There is abundant evidence to show that the Aboriginals had a thorough knowledge of the Eastern Highlands. Some of the exploring journeys made by Europeans would not have been possible without their assistance. They are known to have shown the way from the Monaro to Omeo Plains and beyond into Gippsland and to have told the Gray Brothers of Wangaratta about Cobungra and led them there via the Gibbo River country. During summer, native tribes converged on the mountains from their winter quarters at lower elevations. They went to the high tablelands in seasons when the Bogong moth was abundant and to areas of open woodland at lower elevations to hunt and to obtain animal skins. Here, and elsewhere, they found materials suitable for tool-making and use as pigments.

The first Europeans to cross the Great Dividing Range in Victoria were searching for overland routes from the settled areas of New South Wales to Western Port and Port Phillip Bay. It was known that there was land suitable for occupation on the shores of both these bays, but it was not at the time practicable to stock it by sea from Port Jackson. Meanwhile, there was an increasing demand for fresh pastures. One reason for this was that the only defence against drought and outbreaks of disease among stock was to move on to virgin land.

The first journey was made by Hamilton Hume and William Hovell. It took them from Lake George to Corio Bay. They first crossed the Divide on 12 December 1824. A few days earlier, they had been forced back from the slopes of Mt Disappointment by rocky terrain, dense scrub, a tangle of fallen trees, and "cutting grass". An easier route was found to the west. Their discoveries and those of later explorers (both official and unofficial) led to the occupation of Central and Western Victoria and the upper Murray.

The next attempt to find an overland route from New South Wales into Victoria was made by a party led by George McKillop of the Monaro. Early in 1835, the party crossed the Divide into extremely rough country at the head of the Snowy River. They re-crossed it close to Forest Hill (in what is now Victoria) and went on to discover the Omeo Plains. They did not proceed any further. The area was stocked with cattle about a year later. By 1837, Edward Buckley had pushed on from this outpost into the Tambo Valley. The quest for an overland route was taken up by Angus McMillan. He made five journeys in all and on the last located a shipping place at Port Albert on Corner Inlet. This discovery was made on 18 February 1841 and led to some land being taken up in Gippsland.

The next explorer to attempt to find a route to the west was Count Strzelecki. In 1840, he travelled across the mountains to Omeo and followed McMillan's track to the edge of

the South Gippsland Ranges. He and his party succeeded in crossing these steep, densely-timbered mountains to Western Port but suffered great privations and encountered many difficulties on the way. They also found the onward journey to Melbourne "of the most rigorous and uncivilised character". Port Albert and the tracks from the north were to remain as the only means of access to Gippsland for many years.

As far as is known, no further efforts to explore the Dividing Range west of Omeo were made until gold was discovered in the mountains. Then the situation changed with dramatic suddenness. The Eastern Highlands were thoroughly combed by prospectors and official survey made necessary.

Occupation of the land to the north of the Eastern Highlands was almost complete by 1840, but in the Omeo District and Gippsland it proceeded at a much slower rate. Distance from markets and the difficult long routes to and from them were limiting factors. A move into the Omeo District which was to have important consequences took place in 1851 as a result of the great fire of that year. The Gray Brothers of Wangaratta lost all their pasture and, as mentioned earlier, took up land at Cobungra. They had with them two bushmen, Jim Brown and Johnny Wells, who realised that the route they had taken was circuitous as well as difficult. They set out to find a more direct and easier route back to the lowlands of the north-east. From the Bogong High Plains they found a way over Mt Fainter to Beechworth. On the return journey they pioneered the route over Mt Hotham. Their discoveries were important because a link was established between the north-east and Gippsland, and lessened that district's isolation.

The discovery of gold, although it created a shortage of labour in industries other than mining, increased the demand for meat and other supplies. As a result, herds were built up, grain was grown, and roads made to ease the difficulties of transport and travel for the more remote parts of the highlands. Beef cattle remained for many years a much more important product than sheep. One of the reasons for this was that sheep had to be shepherded by day and yarded and watched by night to protect them from dingoes.

Weather stations

Throughout Victoria's history, about 2,500 weather stations have been established throughout the State. Most of these have been rainfall observing stations manned by volunteers, about half of which are currently operational. Historical record periods vary from less than a year to more than a century.

About one-tenth of the weather stations which have been established are, or have been, located within the Divide. Approximately one-fifth of these have observed at least one other parameter in addition to rainfall (river height or rainfall intensity, for example). Some transmit their observations to the Bureau of Meteorology once or more daily, while the remainder record their readings and mail them at the end of each month.

Although a large number of station reports may appear to convey an adequate picture of weather and climate conditions, this is not always the case. Reports must be regular, reliable, and representative. In the Great Divide, the set of stations which meets these requirements is small. Most existing stations are sited at relatively low altitudes at, or near, population centres, commonly in valleys. Stations above 1,000 metres are very rare.

Efforts to establish observation stations in the higher mountains date back to the late nineteenth century. Before the advent of balloon-borne meteorological instruments with attached radio transmitters, the observations from mountainous areas were considered to be of great importance in obtaining information about the higher atmosphere. In Victoria, a station was established at Mt St Bernard (1,540 metres) by 1882. The Scottish meteorologist Clement Lindley Wragge (1852–1907) was a tireless advocate of such efforts. Although Wragge took no known observations in Victoria, he arranged for recordings to be taken from Mt Lofty (South Australia) in 1884, and in 1897 established a meteorology station on Mt Kosciusko in the New South Wales part of the Great Divide.

True mountain stations could be considered as those situated at 1,000 metres altitude and above. The station at Mt Buffalo Chalet (1,375 metres) is in this category. This was established in 1923, and has quite a satisfactory record of observations. Three other such stations — Falls Creek (SEC) (1,585 metres), Hotham Heights (1,783 metres), and Aberfeldy (1,067 metres) have also, at one time or another, recorded climatic

observations, but the observation records there are not as good. For example, Hotham Heights has only nine complete years of record since its establishment in 1925.

As the records which have been collected from these stations are insufficient to allow an adequate analysis of the complex patterns associated with mountain regions, it is only possible to discuss the climate of the Eastern Highlands in general terms.

Climate

The Great Divide is an important climatic boundary, separating the north of the State, with its hot, dry summers, from the south where milder temperatures prevail and where cold fronts bring rain.

It is well known that, in general, precipitation increases and temperature decreases with altitude. It is, therefore, not surprising to find that the more elevated parts of the Eastern Highlands are snow-covered in winter and include the highest rainfall areas of the State. They are extremely important as sources of water and, in addition, provide excellent sites for its storage. The value of the water is enhanced by two factors, both of which contribute to its purity. The delay between snowfall and thaw is important in regulating stream-flow and in encouraging percolation of water through the soil rather than allowing direct run-off to streams. Further, oceanic salts carried by on-shore winds are scrubbed out with the rain which falls as the moisture-bearing air mass rises over the foothills. The result is that only traces of the salts remain by the time the higher slopes are reached.

Certain factors serve to complicate the general rainfall pattern described above. Some of the rain-bearing cyclonic disturbances which pass across the State do not penetrate inland beyond the Divide. In other cases, long high spurs shelter the valleys in their lee from rain. These effects give rise to rain-shadows. On the other hand, the "canyon" effect may serve to increase rainfall over deep, steep-sided valleys. Warm air currents rising from them may give rise to local storms.

LAND-USE

Western Highlands

The prime activities in the Great Dividing Range are timber production, agricultural pursuits, and recreational pastimes. While both the Eastern and Western Highlands provide for similar activities, the topography of each region, in association with other factors, governs the intensity of these uses.

In the Western Highlands the lower relief and gently undulating terrain has allowed access to most areas. This has led to the alienation and clearing of much of the formerly timbered areas. In most shires less than one-third of the total land area remains in public ownership.

Of the Western Highlands area not in public ownership, some 40 per cent of the fertile though thin volcanic soil is used as sown pasture for sheep grazing (about 6 million sheep) providing both fat lambs and wool production, beef production (about 400,000 head), pigs (some 50,000), and dairy cattle (some 35,000 head). Unimproved pastures cover a further 13 per cent of the occupied area, while a further 6 per cent is devoted to the cropping of wheat, barley, and oats. The rest of the area comprises urban, forestry, and other minor uses. In a regional context the Western Highlands provide grazing for 30 per cent of Victoria's sheep population and land for over a quarter of Victoria's oat production. At the western end of the highlands the Grampians, which are mainly forested, support intensive recreational uses of bushwalking, camping, and touring. Visitors also show interest in the wildflowers in season and wildlife, as the major portion of the area is a wildlife sanctuary.

The towns on either side of the Western Highlands such as Ballarat, Bendigo, Maryborough, and Castlemaine act as centres for local industries and services and act as bases for tourists. Many of these towns have a common origin of goldmining as most of the Western Highlands are auriferous in nature and this has also resulted in a more complex road and rail communication system than occurs in the Eastern section.

Most Victorian rivers rise in the Victorian Highlands and their forested areas provide important catchment areas for the major water storages in Victoria. In the western half major storage for domestic, irrigation, stock, and industrial purposes are at Rocklands, Cairn Curran, and Lake Eppalock; in the Eastern half there are many major dams and

reservoirs providing both domestic water for Melbourne and the major irrigation supplies at Eildon, Hume, Dartmouth, and Glenmaggie.

Eastern Highlands

The Eastern Highlands are far more extensive, rugged, and higher — factors which have limited the area of country suitable for alienation. This has resulted in a much lower population density with a resultant lower demand for a transport network.

The principal land-use activities traditionally carried out in these areas have been forestry and broad acre grazing with some more intensive agriculture in the fertile valleys on either side of the ranges.

The ranges up to an altitude of approximately 1,200 metres have remained forested with eucalypt species such as mountain and alpine ash in pure stands and mixed gum-stringybark on the lower foothills. These have provided Victoria with the majority of the seasoning and scantling timber for more than 50 years. At present the Eastern Highlands provide more than one-third of the hardwood milled as the large scale logging moves into the more remote areas of the State. Within a few years the mountain ash regeneration following the 1939 fires, which covers very large areas of the ranges closer to Melbourne, will be available for controlled forest operations.

The other main use of the public lands, especially the open mountain plateaux, has been summer grazed under a licence or lease operation. Some 600,000 beef cattle are moved up to the high plains in late spring and mustered before the first snow falls. This mountain grazing is often a supplement to the limited areas available in the alienated lands in the valleys adjoining the high country. The area alienated is less than 50 per cent of the total land area, the remainder being either reserved forest, national park, or unalienated Crown lands.

While the area has a low population today, there have been times when the ranges attracted large populations of miners to what are now deserted mining towns or isolated workings. There is a renewed interest in mineral exploration and this could result in new workings of gold and other minerals.

Another increasing land-use is that of recreation activities. These can be divided into the specialised snow resorts on the higher peaks of Mts Buller, Hotham, and Buffalo, and the Bogong and Falls Creek areas, while the more widely based activities such as bushwalking, deer hunting, touring, camping, rock climbing, and trail bike riding are evident in other parts.

The Eastern Highlands constitute an important resource for forest grazing and recreational activities without affecting its ability to act as Victoria's major water catchment area.

SOILS

The nature of soils along the Great Dividing Range has been examined as part of broad-scale ecological surveys by the Soil Conservation Authority. Two zones of soils exist, one in the eastern mountains, the other in the central and western hills.

Eastern mountainous zone

In the mountains, climatic changes in conjunction with elevation have profound effects on the soils. On the high plains above approximately 1,300 metres, high precipitation and low temperatures have led to notable organic matter accumulation in the alpine humus soils and the peat soils. These areas are either treeless or they support snow gum (*Eucalyptus pauciflora*) woodlands.

Just below the high plains, the slopes support tall forests which, in many cases, are dominated by mountain ash (*E. regnans*). This is the zone of friable brown gradational soils, the term "gradational" indicating a gradual increase in clay content with depth, frequently from loams at the surface to light clays at depth. Unlike the alpine area, the temperatures are sufficiently high to enable the weathering of rocks to clay.

On particularly steep slopes, and on the drier northern and western aspects, there are lower-grade forests of the peppermint (*E. radiata*) type. Here there are shallow stony soils. Red and yellow gradational soils predominate on the lower mountain slopes.

The main product from the mountains is water, and the highly organic soils are well suited to the natural regulation of stream flows. Rain and snow-melt are readily absorbed,

to percolate through the porous soils and through rock fractures, thus producing permanent streams of clear water rather than turbid flash floods. It is important that this infiltration should not be impaired by disturbance of soils through overgrazing, forest mismanagement, or other pressures.

Central and western hilly zone

In the hills at lower altitudes, differences in soils are not notably related to elevation. Other influences are more significant; for example, the retention in landscapes of soils of variable age, and the nature of the soil parent material. Basalt, for example, tends to produce clayey soils of relatively high fertility, whereas surfaces on granite are sandy and gravelly.

The more widespread soils are red and yellow gradational soils in the higher rainfall and steeper areas, red duplex soils, and finely structured red gradational soils. The native vegetation is forest, mainly of the messmate (*E. obliqua*) — peppermint (*E. dives*) type, except on the shallow soils where lower grade, open forests of species such as stringybark (*E. macrorrhyncha*) occur.

Much of the land has been cleared and is used mainly for grazing, while uncleared land is used largely for forestry, nature conservation, and recreation. Water supply is an important function.

Soil groups

The soils in both zones are characteristically acidic and, apart from those in the alpine areas, have accumulations of clay and iron in the subsoils. Thus the soils have been named podzols of various kinds. However, in spite of apparently similar soil-forming processes, the appearance is quite unlike classical podzols of the northern hemisphere.

The broad soil groups already listed have been identified by their characteristic field appearance, particularly in relation to colour and the nature of textural changes with depth. There are variations within each group, but the general features are as follows.

Peat soils

In the alpine country, peats occupy depressions beneath bog or fen vegetation, under anaerobic conditions marked by high water-tables. These bogs and fens are sensitive to disturbance and thus require careful management.

Dark, variably decomposed plant materials which are greasy when wet but friable when dry, can be a metre or more deep in bogs. Thin dry peats occur on outcropping rocks, particularly on escarpments.

Humified peats are found near entrenched streams where the lowering of water-tables aerates bog peats, producing black friable material.

The alpine country has the highest precipitations, and the peats play a vital role in regulating stream flows, a role which is enhanced by their large water-holding capacities.

Alpine humus soils

Away from the drainage lines on the high plains, the predominant soils have thick, highly organic upper horizons which overlie bedrock or brown light clays. The organic horizon consisting of dark brown to black loam with excellent structure permitting ready infiltration of water commonly extends to half a metre in depth. The fertility is low, and nutrients are concentrated near the surface.

The shallower soils predominate at the highest elevations, under grassland, heathland, herbfield, and snow gum woodland. Deeper soils carry snow gum woodlands, extending downslope into forests in cold air drainage valleys.

When the vegetation and ground surfaces are disturbed, the violent rainstorms and winds of the high country can be the cause of serious erosion.

Brown friable gradational soils

In tall forests below the zones of persistent winter snow, the soil surfaces are dark brown, with high humus contents to 20 centimetres or more depth, and with good structure. Subsoils are weakly structured but porous and notably softer than the subsoils at lower elevations. Profiles are mostly more than one metre deep, with high water-holding capacities, except on the steepest slopes with stony soils. Fertility is low to moderate.

Stony loams

The effects of aspect in the mountains are extreme. Handsome forests with deep soils give way abruptly to low forests on steep ridge tops or dry northern and western aspects where there are shallow soils consisting largely of stones.

With their low water-holding capacity, steepness, and weakly structured surfaces, disturbance can lead to considerable erosion, resulting in accelerated run-off and consequent siltation of drainage lines and streams.

Red and yellow gradational soils

On the footslopes of the mountains, and on the steeper slopes of the hills further west, the dominant profile form is gradational, with loamy upper horizons gradually changing to clay subsoils. Surfaces are moderately structured and grey-brown. Red or yellow subsoils are variably structured, and this is reflected in quality of timber produced. Water-holding capacities are moderate to high, depending on soil depth and stone content, and fertility is moderate to low. Most of the land remains under forest.

Red duplex soils

On gentler hill slopes, where older clays appear to have been preserved from natural erosion, grey-brown loamy surface horizons are sharply underlain by more strongly structured red clays. This sudden textural change characterises "duplex" profile forms. Water-holding capacities are variable depending on soil depth, and fertility is moderately low.

Many areas of this and the preceding group have been cleared of timber, and are used mainly for grazing. As is general for Victorian soils, agricultural uses require the levels of phosphorus and nitrogen to be built up. This is done by using superphosphate and legumes.

Finely structured red gradational soils

Although the red soils in districts such as Ballarat and Trentham are limited in extent, mention must be made of these prized soils, highly suited for potatoes and other crops. Developed on basalt, profiles are well structured throughout and clayey to depths of 2 metres or more, thus giving high water-holding capacities and permeabilities. These excellent physical qualities, plus the added nitrogen, phosphorus, and potassium required under cropping, and finally the good rainfall, make for good yields. Remnants of forest on this type of land are few.

VEGETATION

Plant distribution is largely determined by geography, that is, by latitude and altitude, rock and soil and aspect, rainfall and temperature; and since the Dividing Range is complex, so is its flora. Some of the many plant communities are clear-cut (as, for example, those on exposed northern slopes and the cooler south), while others grade into each other irregularly.

Over 1,450 species have been recorded for the eastern part of the Highlands, and of these about 130 are not found below 700 metres. In the west there are 750 in the Grampians alone. The eastern and western floras are very different and plants in the east are of three types, characteristic of different altitudes and aspects. These are:

"Alpine", from regions usually over 1,400 metres (sometimes 1,500 metres) in Victoria's latitude;

"Sub-alpine", 1,100 to 1,400 metres; and

"Montane", (of the slopes), usually below 1,100 metres and subdivided into wet and dry sclerophyll forest, and rainforest. Broadly they vary in the following ways.

Alpine

This is the flora of the high summits, where plants are subject to icy winds and covered by snow for three to five months every winter. During that time, soil-water and surface water are frozen, so growth is impossible. As the snow melts, water is abundant, but

plants have little shelter from sun or wind, so conditions are hard. The growing period is limited to late spring or summer, and autumn.

The plants that can survive such conditions are the dwarf shrubs, annual and perennial herbs, mosses, and clubmosses. Each has its own defence against the cold and the weight of snow.

Although the species differ, these alpines have much in common with desert plants. Both have long periods when water is unavailable, one through drought and the other through cold. In both environments annuals survive as seeds and perennials withdraw underground or into low tufts and rosettes, while shrubs have small leaves which minimise evaporation. Plants on exposed coasts have some of the same characteristics, enabling them to survive exposure to drying winds and salt spray. A few of the coastal species are even the same as in the Alps.

Dwarf shrubs

Shrubs in the alpine regions mainly occupy the drier rocky outcrops. Many are gnarled and old, although dwarf, others spread as wiry carpet-plants or are espaliered flat against rocks. They may be bent, but are too resilient to be broken by snow as lowland plants would be. Many are species of heath, often berry-bearing, including *Leucopogon, Richea, Epacris,* and *Pentachondra.*

Leafy Bossiaea, wiry-stemmed, with tiny leaves and yellow pea flowers, Alpine Phebalium, fragrant *Grevillea australis,* the abundant purple-flowered *Hovea,* and a number of myrtles (*Baeckea, Callistemon, Kunzea*) form a dense low cover of small leaves and wiry stems which spring erect soon after the snow releases them.

Annuals

Annuals are in less variety. Most are white, yellow, or pink and white everlastings (*Helichrysum* and *Helipterum*). Their seeds have been safe underground, unhurt by snow, ready to spring up when warmth, light, and moisture are suitable.

Perennial herbs

These are the most characteristic alpines — deep rooted and long lived. They survive as tufts, cushions, or rosettes, or simply as roots, until the thaw encourages growth. They grow mainly in the open grasslands, or hollows in snow plains, where the snow lies longest, and in beds of sphagnum moss which, though they have suffered more than any other alpine plant association in the past, are still the most valuable water holders in the high country. They control much of the run-off of water, holding it as if in a sponge from one to several metres thick, and controlling its release into lowland streams so that, instead of eroding spring floods, there is, where they are unspoiled near the sources of streams, a more even flow of water for agriculture, electricity, and domestic use. Through the moss, usually from below its living surface, the herbs spring up. Eyebright grows there, with Fairies' Aprons, Bluebells and Buttercups, pink Willow-herb, and blue Veined Sun-orchids. Some of these are also lowland plants, but here they are adapted to life above the tree line, and they are usually more dwarf, deeper coloured, and with larger flowers. Fairies' Aprons, normally 15 or 20 centimetres high, are there almost stalkless on the moss. Trigger-plants turn hectares of the high plains deep magenta-pink, while lowland plants of the same species are paler and taller.

Other herbs are peculiar to the highlands, although some are related to lowland plants. Silver Astelia of the mountains, with pineapple-like shining dark green leaves surrounding stalkless scarlet fruits, is very unlike the rare Tall Astelia of damp forests, with ridged leaves 2 metres high and erect clusters of small orange fruits.

First of the herbs to flower is *Caltha* (Marsh-marigold). Where melting snowdrifts are undercut several metres in October, there are hundreds of their 2 centimetre white flowers with crimson stamens, watered by drops from the melting snow-roof, some 30 centimetres or more above them.

For other plants, spring hardly begins above the tree line until November, when Hovea purples the high moors and the widespread Silver Daisies begin to flower, first at 1,100 metres on Mt William in the Grampians, but much later at 1,800 metres on Mt Bogong. They have tufts of narrow silver-backed leaves, rather firm, erect, and perennial, while the

later Silky Daisies have annual leaves, straplike and silky grey. When the snow melts along the few high streams where they grow, there is nothing to be seen but carpets of interlacing roots, often finger-thick, soon breaking into stars of pale yellow leaves often covered by the water of snow runnels, and later changing to soft grey, 15 to 20 centimetres long. Both Silver and Silky Daisies have 4 to 5 centimetre white flowers on tall stems, the latter in late January.

In the alpine zone December and January are high spring, when Everlastings, *Gentianella*, Sky Lilies, countless daisies, *Podolepis* and Alpine Groundsel are in flower. Most of the carpeting herbs have abundant small flowers. Knawels form bright cushions; Edelweiss grows in silver carpets. The narrow leaves of White Purslane are hidden by delicate flowers and the short grassy turf of Sky Lilies is inset with large waxen sky-blue or white stars. There is apparently no record of the number of entirely alpine species in the Dividing Range.

Sub-alpine

Below the highest summits the snow-plains are interspersed with snow gum woodlands. The trees are gnarled and spreading; their limbs shaded and splashed with red, bronze, and green, unlike those with tall white trunks which grow in the lowlands. The weight of winter snows gives the mountain trees their low gnarled branches. Like sphagnum bogs, snow gums play an important part in equalising the flow of streams fed from melting snow, for drifts accumulate deeply and thaw slowly under their boughs. Many alpine plants extend into the sub-alpine region, but they are usually taller there, and snow gum woodlands and shrubs are numerous, grading into forests of taller species at about 1,400 metres.

Montane

Wet sclerophyll forest

Snow gums, bordering the sub-alpine region, are slender, with crowded trunks, grading into wet sclerophyll forest, which on the cooler (mainly southern) slopes is a place of luxuriant growth, extending along wet gullies into the dry sclerophyll of the foothills.

Sclerophyll (literally hard-leaf) forest is dominated in Victoria by tough-leaved eucalypts. Wet sclerophyll (i.e., of wet places) is where the tallest eucalypts grow, neither dwarfed by cold above nor by heat and exposure below, in a region of high rainfall and temperate climate, where snow may fall but rarely remains long. Tall broad-leafed shrubs grow under the eucalypts, with ferns and mosses in gullies. There is ample moisture but restricted light, so broad light-absorbing leaf surfaces replace the tiny leaves of dry exposed places. The higher part of this forest in the Bogong region is dominated by alpine ash.

In the far east of the Dividing Range the high country from Errinundra Plateau to the Snowy is mostly between 600 metres and 1,200 metres, so there is little alpine or sub-alpine vegetation. Except on high summits and dry northern aspects tall trees extend from the mountain tops far down the slopes. Alpine ash (900 to 1,400 metres), mountain ash (150 to 900 metres) with shining gum and cut-tail overlapping them down to 600 metres, are most important. Here, and westward to the Baw Baws and Black Range, are the great mountain forests of Victoria. Blue gums, kindling gum, messmate, and other tall trees, as well as ash, grow in the wet sclerophyll of the Divide.

Messmate is also common in the drier areas from east to west. Its habit varies with environment, often over 60 metres in wet sclerophyll; shorter and spreading in dry.

Dry sclerophyll forest

Rainfall is less on the lower slopes and evaporation is greater, so it is on the lower, and hotter northern slopes that the vegetation is mainly dry sclerophyll, where plants, having ample light, must conserve moisture. Because of many modifying factors the transition from wet sclerophyll to dry is not always clear cut. Tree species are varied. Messmate, peppermint, red stringybark, long-leaf box, red box, candlebark, and ribbon gum are common, with other species of box, gum, and stringybark. In the east, silvertop forests grow on the well drained foothills.

In dry places each tree needs a larger area from which to gather enough moisture for growth, so trees in dry sclerophyll are usually well spaced, encouraging the growth of tough small-leaved shrubs with varied and colourful flowers. According to circumstances shrubs crowd in dense thickets or are widely spaced. The small undershrubs are often of the same species as those of lowland heaths.

Rainforest

Sub-tropical rainforests grow along sheltered streams of the far Eastern Highlands. The upper storey of broad-leafed moisture loving trees, with rarely any eucalypts, is encouraged by the mild climate and well distributed rainfall of the east and is often overgrown by a tangle of luxuriant creepers. Typical wet sclerophyll shrubs grow with Kanooka, Mock-olive, Gippsland Waratah, Lilly Pilly and other species characteristic of the brushes of south-eastern New South Wales. Westward towards, but not west of, Melbourne, there are pockets of temperate rainforest with myrtle-beech, Sassafras, Austral Mulberry, and others, in sheltered valleys with mild temperatures and high rainfall.

Grampians and Western Highlands

West of Macedon and Blackwood, which have the most western remnants of the eastern type forests, the vegetation of the Dividing Range can hardly be distinguished from that of the lowlands. Although the Divide is there, it is rarely and intermittently over 600 metres and sometimes only a slight rise dividing the northern from the southern streams. Then the Grampians cut across the east-west line of the main Divide in an 80 kilometre crescent of four parallel sandstone ranges with abrupt eastern scarps and worn grey slopes to the west and north.

The Grampians have a distinctive highland, though not alpine, vegetation, largely dry sclerophyll, with some wet sclerophyll in the gullies. Even Mt William, the highest summit (1,167 metres) is not high enough for alpine flora, though a few sub-alpine plants grow there.

The Grampians are a meeting place for plants typical of widely differing localities. Over 700 species of flowering plants grow in soils derived from the eroded sandstone, and over 20 species are unknown elsewhere. Pincushion Plant, common in south-east Western Australia grows nowhere outside that State except on one Grampians peak, while two Tasmanian plants are known on the mainland from the Grampians only. Several species which grow in New South Wales and/or far eastern Victoria reappear there, with the length of a State between the two localities. Among the twenty endemic Grampians species are the magenta *Bauera sessiliflora*, now widely cultivated, pink *Boronia latipinna* of the Mt William range, and the indescribably bright rosy magenta *Pultenaea subalpina* of Mt Rosea and the valley behind it, and Mt William. Four other bush-peas, shining white Thryptomene, starry *Calytrix sullivanii*, and Tinsel Lily with iridescent purple or blue stars, grow only in or near the Grampians. (The Tinsel Lily just crosses into South Australia, while a similar but distinct species grows in Western Australia.) There is even a small woodland of the otherwise coastal *Banksia integrifolia*, and of more than 70 orchids recorded for the Grampians, several are endemic.

There are no snow gums on the western end of the Dividing Range, but the Grampians gum on dry windblown summits has the same gnarled spreading habit.

Dundas Highlands, lower than the Grampians, are so much cleared and grazed that mere remnants of native vegetation survive; scattered trees and bits of a heathland vegetation are much less diverse and colourful than that of the Grampians.

Forestry

Milling timbers in the Dividing Range are almost as diverse as its terrain (see pages 18-19 for distribution). The more important native species are messmate, mountain ash, alpine ash, shining gum, cut-tail, silvertop, candlebark, manna gum, grey gum, and various blue gums.

In the west (Macedon, Portland, etc.), most timber is grown in plantations of exotic pines. In the Eastern Highlands, pines, though extensively planted in the north-east, are of less importance than the native forests. Although there are native hardwood forests in the Otway and Strzeleckis, Victoria's main commercial forests are in the Dividing Range.

Cinnamon Fungus damages trees in some foothill forests but is most serious on poorly drained lowlands. Cleaning all soil from vehicles before they enter eastern forests is

enforced by the Forests Commission to limit spread of the fungus. The natural controls of the fungus live in the surface layers of soil, and some shrubs, e.g., *Acacias*, encourage their development. The effects of protective burning and of some forest management practices on activity of the fungus are still being examined to determine whether they favour the fungus and hasten tree decline. Plagues of stick insects (Phasmids) in the north-east and central highlands are dealt with by aerial spraying. In normal conditions they are largely controlled by other insects and by birds, including Currawongs, which eat their eggs.

In the early years, some timber was wasted through only the very best trees being felled for cartage to the sawmills. This is now controlled following improvements in transport, harvesting technology, and forest management. Fires are a danger every summer. They are fought with an efficiency and equipment unknown in the past — but at a cost also unknown then.

Milling extended eastward following destruction of mountain ash forests by the 1939 fires. Regeneration of new forests after logging is good, but rotations are about 80 years. The needs for reference areas and parks with buffer zones wide enough to ensure viability are also recognised and a fine series of parks and reserves is being established and protected by the Forests Commission.

SCIENTIFIC AND COMMON NAMES OF PLANTS IN ORDER OF REFERENCE

Leucopogon	Beard-heath
Richea	Candle Heath
Epacris	Heath
Pentachondra	Carpet Heath
Phebalium squamulosum var. alpinum	Alpine Phebalium
Grevillea australis	Alpine Grevillea
Baeckea	Heath-myrtle
Callistemon	Bottle-brush
Kunzea muelleri	Yellow Kunzea
Helichrysum	Everlasting
Helipterum	Sunray
Utricularia dichotoma	Fairies' Aprons
Wahlenbergia	Bluebells
Ranunculus	Buttercups
Epilobium	Willow-herb
Thelymitra venosa	Veined Sun-orchid
Stylidium graminifolium	Grass Trigger-plant
Astelia alpina	Silver Astelia
A. nervosa	Tall Astelia
Caltha intraloba	Alpine Marsh-marigold
Celmisia asteliifolia	Silver Daisy
C. sericophylla	Silky Daisy
Gentianella diemensis	Mountain Gentian
Herpolirion novae-zelandiae	Sky Lily
Podolepis jacioides	Showy Podolepis
Scleranthus	Knawel species
Ewartia nubigena	Silver Edelweiss
Montia australasica	White Purslane
Eucalyptus pauciflora	Snow Gum
E. delegatensis	Alpine Ash
E. regnans	Mountain Ash
E. nitens	Shining Gum
E. fastigata	Cut-tail
E. globulus	Blue Gum
E. dalrympleana	Kindling Gum
E. obliqua	Messmate
E. radiata	Peppermint
E. macrorrhyncha	Red Stringybark
E. goniocalyx	Long-leaf Box
E. polyanthemos	Red Box
E. rubida	Candlebark

E. viminalis	Ribbon Gum
E. sieberi	Silver-top
E. cypellocarpa	Mountain Grey Gum
Tristania laurina	Kanooka
Notelaea venosa	Large Mock-olive
Telopea oreades	Gippsland Waratah
Eugenia smithii	Lilly-pilly
Bauera sessiliflora	Showy Bower
Boronia latipinna	Grampians Boronia
Pultenaea sub-alpina	Rosy Bush-pea
Thryptomene calycina	Thryptomene
Calytrix sullivanii	Grampians Fringemyrtle
Calectasia cyanea	Blue Tinsel-lily
Eucalyptus alpina	Grampians Gum
Nothofagus cunninghamii	Myrtle-beech
Hedycarya angustifolia	Austral Mulberry
Atherosperma moschatum	Southern Sassafras

FAUNA

In 1896, Professor Baldwin Spencer stressed the influence which the Great Dividing Range had exercised on the early dispersal of animals throughout the Australian continent and on their subsequent evolution.

It was postulated that a primitive fauna may have developed in the west of Australia but that successive waves of other animals had reached the continent across land-bridges from Asia in the north and from South America through Antarctica and Tasmania. Some of these moved from the south across western Victoria and around the extremity of the Range to reach the western and central parts of the continent which then enjoyed abundant water and rich vegetation. There they became isolated by the Range from the northern and southern migrants which had colonised the eastern coast so that each group developed its own characteristics in response to the prevailing and changing conditions of its domain, and we can still recognise in the distribution of modern species the shadow of that early history.

A number of more sophisticated schemes have since been proposed to accommodate modern knowledge about zoogeography and geophysical processes but in all these the significance of the Great Dividing Range is still evident.

Whether for any particular animal group the most important effect of the Range has been to determine patterns of migration, colonisation, and isolation, or whether it now exercises its effect by influencing contemporary weather and vegetation is not always clear.

Some kinds of animals more readily colonise new habitats than others, either because they are more versatile in their environmental demands or because they are able to traverse quickly the intervening, inhospitable areas. Therefore no simple lines on a map can equally well define Spencer's faunal sub-regions for all species, but in broad terms the Eyrean sub-region which covers most of inland Australia extends into Victoria and comprises the relatively flat, warm, dry country in the north and north-west of the State as well as the northern foothills of the Dividing Range itself. The higher, cooler mountains and their southern slopes, together with the cool moist areas between the Range and the coast fall within the Bassian sub-region.

Reptiles

An analysis of Victoria's reptile fauna in relation to these sub-regions is very instructive because different groups of reptiles have clearly differentiated environmental needs which profoundly influence their distribution.

Early reptiles were poorly adapted to cold environments. They reproduced by laying eggs and their body temperatures were determined by the temperature of the air or substrate with which they were in contact. Many modern reptiles retain these primitive characteristics. Technically they are described as "oviparous thigmotherms". For such animals the availability of generally warm conditions and suitable nest sites where eggs will hatch is critical.

The reptiles which have been most successful in cold habitats have two major adaptations. First, they have become "viviparous" so that the embryos are incubated within the mother's body and born alive. Second, they have become "heliothermic" and developed patterns of behaviour which allow them to bask and elevate their body temperatures by absorbing solar radiation. Victoria's reptile fauna as presently known consists of 108 species which are distributed among nine families.

Although the Eyrean sub-region occupies only about one-third of Victoria, nevertheless 79 species of reptiles occur there, representing 73 per cent of the State's reptile species. Only 47 species of reptiles (44 per cent) have been recorded from the Bassian. Six of Victoria's nine reptile families are best represented in the Eyrean sub-region.

The three most primitive families of terrestrial reptiles in Victoria are the geckos, snake-lizards, and blind-snakes (Gekkonidae, Pygopodidae, and Typhlopidae). These comprise twenty-seven species in Victoria. All occur in the Eyrean sub-region but only four have been recorded in the Bassian. All are oviparous thigmotherms.

Only the dragon-lizards (Agamidae), the skinks (Scincidae), and the elapid snakes (Elapidae) have succeeded in both sub-regions; the Eyrean has 6, 24, and 16 species, respectively, and the Bassian has 5, 27, and 8.

All Victoria's viviparous heliotherms are either skinks or elapids and these have been the most successful species in the Bassian sub-region.

The Range itself supports a distinctive Bassian reptile fauna associated with the three major altitudinal habitats. Predominant in the montane forests are seven species of skinks such as the Black Rock Skink *Egernia saxatilis* and Spencer's Skink *Pseudemoia spenceri*, and one elapid snake — the Eastern Tiger Snake *Notechis scutatus*.

Typical of the sub-alpine woodlands are four skinks, including the Alpine Water Skink *Sphenomorphus kosciuskoi;* two snakes — the Copperhead *Austrelaps superbus* and the White-lipped Snake *Drysdalia coronoides*, and the Mountain Dragon *Amphibolurus diemensis* which is an oviparous agamid.

The White-lipped Snake and the Grass Skink *Leiolopisma entrecasteauxii* are the only reptiles to intrude into the high treeless alpine areas to any great extent.

Fish

For fish the separation into a coastal and inland fauna is imposed primarily by their inability to negotiate the barrier of a major watershed.

There are about eleven species of fish which, in Victoria, occur naturally only in streams which flow north from the Dividing Range to join the Murray River. These include Murray Cod *Maccullochella peeli*, Silver Perch *Bidyanus bidyanus*, Trout Cod *Maccullochella macquariensis*, Bony Bream *Nematalosa erebi*, Central Australian Hardyhead *Craterocephalus eyresii*, Catfish *Tandanus tandanus*, Golden Perch *Plectroplites ambiguus*, and Macquarie Perch *Macquaria australasica*.

About nineteen species are confined to the southern streams, for example, the Freshwater Herring *Pomatalosa richmondia*, Short-finned Eel *Anguilla australis*, and Long-finned Eel *A. reinhardtii*, Striped Gudgeon *Gobiomorphus australis*, Australian Bass *Percalates novemaculatus*, Australian Grayling *Prototroctes maraena*, and Pouched Lamprey *Geotria australis*. The three latter species have close relatives in South America providing evidence of an ancient link.

Many fish of the coastal streams are diadromous, migrating during their lives between the freshwater and the open sea. Of Victoria's 41 freshwater species, eleven are widespread or have doubtful regional affinities. Undoubtedly some of these did enter the Murray system via the sea, but many other diadromous species such as the eels seem to have been prevented from doing so by the westerly currents in Bass Strait.

The clear, fast, snow-fed streams of the Dividing Range itself have proven most suitable for the introduced Brown Trout *Salmo trutta* and Rainbow Trout *Salmo gairdneri*. The effect of such introductions on native fish is hotly debated, but galaxiids are particularly susceptible to displacement by trout.

Amphibians

All Victorian amphibians need surface water for part of their life-history, but the species vary greatly in their environmental needs and this is reflected by complex patterns of distribution in the Great Dividing Range and its vicinity.

The Baw Baw Frog *Philoria frosti* is found only in sphagnum bogs on the Baw Baw Plateau and Verreaux's Alpine Tree Frog *Litoria verreauxi alpina* occurs as a series of disjunct populations above 1,250 metres as far west as Echo Flat, Lake Mountain. Where *Litoria verreauxi alpina* is absent from some high areas, it may be replaced in the west by the Brown Tree Frog *Litoria ewingi* or, on the Mt Buffalo Plateau, by the Plains Tree Frog *L. paraewingi.*

The Common Eastern Froglet *Ranidella (=Crinia) signifera* has an essentially Bassian distribution, but also occurs in the country between the Great Dividing Range and the Murray River. Its environmental tolerance is evident from its altitudinal range which extends from alpine areas to sea level. The Victorian Smooth Frog *Geocrinia victoriana* is also found over a similar range of altitudes.

The Eastern bullfrog *Limnodynastes dumerili*, and the Brown Tree Frog *Litoria ewingi* are common species at intermediate and lower elevations throughout the Ranges.

The Striped Marsh Frog *Limnodynastes peroni*, and Dendy's Toadlet *Pseudophryne dendyi*, may occur up to altitudes of 1,000 metres in the eastern part of the Range. Spencer's River Frog *Litoria maculata* is restricted to the shallow, rocky streams of the Ranges, and three other river frogs which also occur on the coastal plains of East Gippsland, become progressively restricted to these river valleys in the west: the Blue Mountains Tree Frog *Litoria citropa* and the Leaf Green Tree Frog *L. phyllochroa* reach Walhalla, and Lesueur's Frog *L. lesueuri* reaches to near Ararat. The Giant Burrowing Frog *Heleioporus australiacus* is confined to the forested southern slopes of the Range, but rarely encountered.

The Ranges generally act as a barrier to the distribution of plains taxa and a distinctive north-eastern complement abuts the northern slopes comprising such species as *Litoria paraewingi*, Sloane's Froglet *Ranidella sloanei*, and the Red-groined Toadlet *Uperoleia rugosa*. However, three other northern plains species penetrate the Ranges through the Kilmore Gap and around the western limit of the Dividing Range near Moyston — the Eastern Spade-foot Toad *Neobatrachus seudelli (=pictus)*, Bibron's Toadlet, *Pseudophryne bibroni*, and the Plains Froglet *Ranidella parinsignifera.*

Two other typical low country species, the Spotted Grass Frog *Limnodynastes tasmaniensis* and *Litoria verreauxi verreauxi*, have been able to extend their distribution into the Great Dividing Range along the Tambo River Valley and the lower relief of the Omeo-Benambra Basin.

Birds

Birds are physically capable of very wide and rapid dispersal but the Range influences their ecology in complex ways and the broad Eyrean-Bassian patterns of distribution are still discernible.

The eastern foothills provide continuity with the habitat of the New South Wales coast for such typically Bassian species as Satin Bowerbird *Ptilonorhynchus violaceus*, Leaden Flycatcher *Myiagra rubecula*, Black-faced Monarch *Monarcha melanopsis*, and Rose Robin *Petroica rosea*. The precise role of the Range in connexion with occasional southern movements of the Emerald Dove *Chalcophaps indica*, the Indian Koel *Eudynames scolopacea*, and the Scarlet Honeyeater *Myzomela sanguinolenta*, is not clear.

Farther west the Range represents the southern ecological edge of the drier interior and the limit of distribution of Eyrean species, as for example, Crested Bellbird *Oreoica gutturalis*, Crested Pigeon *Ocyphaps lophotes*, Red-backed Kingfisher *Halcyon pyrrhopygia*, Shy Hylacola *Sericornis cautus*, White-backed Swallow *Cheramoeca leucosternum*, and White-browed Babbler *Pomatostomus superciliosus.*

Similarly it represents a broad northern limit for the Olive Whistler *Pachycephala olivacea*, Chestnut-rumped Hylacola *Sericornis pyrrhopygius*, White-throated Nightjar *Caprimulgus mystacalis*, Gang-gang Cockatoo *Callocephalon fimbriatum*, and Brush Bronzewing *Phaps elegans.*

The Dividing Range is a hybridisation zone for southern and northern forms of the Australian Magpie *Gymnorhina tibicen*, and a dry tongue of land extending south to the You Yangs overrides the barrier effect and gives occasional southern access to inland species such as the Grey Falcon *Falco hypoleucos*, and Australian Pratincole *Stiltia*

isabella. The dry pockets north of the Snowy River attract the inland form of the Yellow-tufted Honeyeater *Lichenostomus melanops*.

The eastern forested slopes provide an altitudinal summer breeding range for the Flame Robin *Petroica phoenicea* and Pied Currawong *Strepera graculina* and the High Plains a habitat for grassland species such as Richard's Pipit *Anthus novaeseelandiae*. The remnants of rainforest in the Victorian Range appear to be too small to harbour species peculiar to that habitat.

Mammals

There are about forty-five species of native mammals extant in Victoria of which about twenty-eight have clear Bassian affinities and at least twenty of these occur in the Dividing Range together with about ten others whose affinities are less certain so that the Range has been a very important area for the conservation of the State's remaining mammals.

Four mammals in Victoria occur only in the Dividing Range if we include the Grampians as its westernmost outlier. The Brush-tailed Rock Wallaby *Petrogale penicillata*, has broad rough soles and a long sinuous tail which enable it to move unerringly over the broken rocky cliffs. In the high, wet forested areas the Bobuck or Mountain Possum *Trichosurus caninus* replaces the more familiar Brushtail Possum of the low country. Leadbeater's Possum *Gymnobelideus leadbeateri* is known only from Victoria's mountain ash forest and one of the rarest marsupials, the Mountain Pigmy Possum *Burramys parvus*, lives in the alpine and sub-alpine heath and shrublands at Mt Hotham and Falls Creek. Otherwise this species is now known to occur only on Mt Kosciusko in New South Wales.

The Grey-headed Fruit Bat *Pteropus poliocephalus* and the Little Red Fruit Bat *P. scapulatus* are essentially Torresian species, but migrate south in the autumn and although a few filter through the moutains, the Dividing Range generally marks the limit of their migration.

Insects

Two major determinants of insect distribution are temperature and vegetation and the Great Dividing Range with its diversity of microclimates and habitats harbours well over half of Victoria's insect species.

The degree to which a species may be dependent on a narrowly defined habitat is well illustrated by three groups within the one order of stoneflies (Plecoptera). Three flightless species of the genus *Thaumatoperla* occur almost exclusively in cold, alpine streams above the tree line. Other stoneflies such as *Trinotoperla irrorata* occur in small, high-altitude forest streams, while a third group including *Trinotoperla nivata* is found in larger and warmer foothill streams.

There is little evidence to suggest that the Victorian ranges have prevented the movement of insects from one sub-region to another. However, they have had an important influence on the evolution of some taxa by providing an archipelago of widely separated, cool, high peaks in the general mosaic of habitats. In these places colonisers from the one parent stock established a number of isolated groups each of which evolved into a distinct species. In the primitive stonefly genus *Thaumatoperla*, one species, *T. robusta* is found on southern peaks, including Mts Donna Buang, Erica, and Baw Baw. *Thaumatoperla flaveola* occurs on Mt Buller and Mt Stirling, while *T. alpina* has been collected only from mountains around the Falls Creek area. The same phenomenon is exhibited by many flightless species of other groups, both aquatic and terrestrial.

Many freshwater groups originally evolved in and radiated out from cool, running water. As a result, the most primitive descendants of the old southern "Gondwanaland" fauna, including many species of stoneflies, caddis-flies (Trichoptera) and non-biting midges (Chironomidae) are now found only in cool, alpine, and mountain streams. The ruggedness and inaccessibility of the Range these days provides some protection against human interference. However, because alpine ecosystems are extremely fragile, and because many of the species surviving in the Range exist as remnant populations only, their last refuges could very easily be disrupted.

Crustaceans

The highlands provide habitats for a somewhat limited assemblage of crustaceans but in their distribution they provide some interesting parallels with the primitive insects. Most crustaceans are to be found in streams, creeks, rock-pools, bog-pools, and even the water held in sphagnum moss-beds. The terrestrial environment is also exploited by the isopod *Styloniscus* sp.

The largest crustaceans are freshwater crayfish belonging to the genera *Euastacus* and *Engaeus*.

Smaller, but still macroscopic, is the isopod *Colubotelson joyneri* which occurs in bog-pools and creeks. The microscopic fauna includes the cyclopoid copepods: *Mesocyclops leuckarti, Eucyclops agilis, E. ruttneri, Paracyclops timmsi, Tropocyclops* sp., and three undescribed species belonging to the genera *Acanthocyclops, Mixocyclops*, and *Paracyclops*. The harpacticoid copepods comprise at least six species including *Attheyella australica*, and the ostracods include *Ilyodromus smaragdinus* and a new species of *Darwinula*. The copepods *Macrocyclops albidus* and *Microcyclops australis*, and the cladoceran *Daphnia nivalis* have been recorded from the Kosciusko Plateau and probably also occur in the Victorian highlands. *Daphnia angulata* is at present known only from Lake Omeo.

The occurrence of some of these animals in the Great Divide is noteworthy in that they have not been recorded at low altitudes on the Australian mainland and apparently represent outlying northern populations of species that occur at lower levels further south — in Tasmania or on subantarctic islands. Such is the case with *Colubotelson joyneri, Styloniscus, Acanthocyclops* sp. nov., and *Mixocyclops*. The latter, considered at the generic level, is known only from the Crozet Islands in the southern Indian Ocean, Tasmania, and a sphagnum bog on Mt Baw Baw. *Daphnia nivalis* may have the same type of distribution.

Non-marine molluscs

A study of non-marine molluscs provides further evidence of faunal movements across the old land bridges from Tasmania. The Great Dividing Range has presented a barrier to this movement so that almost half the mollusc species which today occur in Tasmania and southern Victoria are found nowhere else.

The Great Dividing Range provides two major habitat types almost unavailable elsewhere in Victoria. These are the temperate rainforest with its eucalyptus and tree-fern association providing wet conditions and deep ground litter favourable for many land molluscs; and the alpine region with its snow gum stands and acid bogs.

The molluscs of the rainforests of the Divide are characterised by several small species (2 to 5 millimetres diameter) of charopid snails with *Rhophodon problematica, Pillomena meraca*, and *Pillomena dandenongensis* being peculiar to this area. The largest and most spectacular snail of the rainforest is the black carnivorous snail, *Victaphanta atramentaria*, which occurs only in the central Victorian Divide. The only slug native to Victoria, *Cystopelta petterdi* is also found in the forests of the Divide.

Glacidorbis hedleyi is an aquatic snail of particular interest, so far known only from four mountain streams and alpine bogs in Victoria and one locality on the Kosciusko Plateau. Two other species in the genus are known from Tasmania while a fourth was recently described from southern Chile.

MINING

The rocks of the Central Highlands are the host to metallic mineralisation in Victoria, which has been predominantly a province of gold mineralisation with a total recorded production to the end of 1978 of 2,447,934 kilograms. The value of the gold produced is far in excess of the value of tin and antimony which are the next most valuable minerals. Apart from gold mining the only other mining to take place on or near the Great Divide has been on a minor scale near Marysville (tungsten) and near Omeo (lead-silver).

The large brown coal and petroleum and natural gas deposits in Victoria are located outside the Central Highlands.

There were between 6,500 and 7,000 quartz reef gold mines in Victoria, but only those on the Ararat, Ballarat, Daylesford, Blackwood, Woods Point, Mt Loch, and Cassilis

goldfields are on or close to the Great Divide. The discovery of these fields was frequently influenced by the steep topography and generally difficult terrain. The result of these extremely adverse conditions is shown at Woods Point which was not discovered until 1861, ten years after the first gold discoveries at Clunes and Warrandyte in 1851. Places such as Ararat and Ballarat have long since ceased to rely on mining, but others such as Woods Point have only recently ceased to be mining towns after more than 100 years of mining.

Ararat

Gold was first discovered near Ararat in June 1854 when a party of miners prospecting from Daisy Hill and Avoca discovered gold approximately 5 kilometres west of Ararat.

One of the largest gold rushes in Victoria occurred at Ararat in 1857. This rush followed the discovery of a rich lead (pronounced "leed" and essentially a Victorian term referring to an ancient water course containing gold-bearing gravels) of gold by Chinese miners who landed in South Australia in order to avoid paying a $20 poll tax imposed by the Victorian Government.

Most of the gold production from Ararat came from the shallow alluvial deposits and deep lead (a lead buried beneath younger rocks, commonly basalt, and usually worked from shafts and extensive underground drives) deposits. The best known of the deep lead deposits are the Langi, Logan, and Cathcart deep leads.

Ballarat

The Ballarat goldfield is one of the most famous and with Bendigo the richest Victorian goldfield. Ballarat is one of the few places in Victoria where there was large production from the three types of gold mining — shallow alluvial, deep lead, and quartz reef mining.

The discovery of gold at Ballarat followed the discovery of gold at nearby Buninyong in August 1851. The early miners worked small 2.4 metre by 2.4 metre alluvial claims down to a clayey gravel layer up to 50 centimetres thick resting on pipe clay. These deposits yielded satisfactory but not spectacular returns and by early 1852 the number of miners had decreased from approximately 8,000 to about 300.

It was only after some miners sank through the pipe clay that the true worth of the Ballarat goldfield was revealed. Beneath the pipe clay were the fabulously rich leads of Ballarat and by the end of 1853 the population of Ballarat and its environs had reached about 30,000.

During the period after the discovery of the rich leads below the pipe clay it was not uncommon for claims to have yielded many kilograms of gold in a few days. A further indication of the richness of the deposits is in the annual gold return for Ballarat for the years 1853 to 1856. These returns far exceed the return from any other Victorian goldfield for any similar period.

VICTORIA — GOLD PRODUCTION, 1853-1856

Year	Ballarat	Victoria
	kilograms	kilograms
1853	9,925	85,353
1854	18,194	69,004
1855	23,932	87,692
1856	28,627	94,984

It was during the working of these rich deposits that excessive zeal on the part of police in collecting licence fees ultimately led to the Eureka Stockade incident on 4 December 1854. As a result of this confrontation, the Miner's Right was substituted for the monthly fee which had caused so much dissension among the miners. The Miner's Right still exists today and entitles the holder to prospect for gold and minerals on Crown land and to peg a claim on Crown and private land.

The Victorian goldfields are notable for the large number of gold nuggets found. Of the 1,327 recorded with weights in excess of 0.62 kilogram, 131 came from Ballarat. Nuggets from Ballarat include the "Welcome" with a net weight of 68.26 kilograms and the second largest nugget found in Victoria.

To the west of Ballarat the leads were covered by thick flows of basalt which were first penetrated in 1855. This heralded the commencement of the second phase of mining at Ballarat, that of the basalt covered deep leads beneath Sebastopol. This period continued until about 1876, by which time alluvial mining at Ballarat was almost a thing of the past. Mining of the deep leads necessitated specialised techniques to penetrate the hard basalt layers with intervening layers of clay and sand often containing groundwater under considerable pressure.

Total production from deep leads at Ballarat is estimated to be 62,200 kilograms with the most notable producers being the Band of Hope and Albion Consol (16,338 kilograms), United Extended Band of Hope Co. (5,862 kilograms), and Prince of Wales Co. (5,247 kilograms).

Gold-bearing quartz was found in the shallow alluvial and deep leads and mining of quartz reefs commenced at least as early as 1854. Mining of quartz reefs on the Ballarat East goldfield commenced in earnest in 1860 and continued until the First World War. At Ballarat East the quartz reefs occur on west dipping faults intersecting steeply east dipping beds. The faults and reefs which dip west at about 45 degrees recur at vertical intervals of 80 to 100 metres. The most notable example was the New Normanby mine in which there were six repetitions. This mine is the site of the Sovereign Hill Historical Park.

On the Ballarat East goldfield the intersections of thin laminated quartz veins and beds of pyritic or carbonaceous slate with the quartz reefs were frequently marked by the occurrence of very coarse gold and slugs up to 18 kilograms in weight. The large alluvial nuggets undoubtedly came from such structures.

Rich quartz reefs were discovered in the Band of Hope and Albion Consol deep lead mine at Ballarat West in 1878. These reefs are beneath the deep lead deposits of Ballarat West and Sebastopol and were frequently mined from the same shafts. Thus a second era of gold mining began in this area and lasted until about 1910. The Ballarat West lodes are beneath about 150 metres of basalt and are essentially bedded reefs on the western limb of anticlines.

Recorded production from the Ballarat East and Ballarat West goldfields is 34,000 kilograms and 23,900 kilograms, respectively.

Daylesford

The Daylesford goldfield has many similarities to the nearby Ballarat goldfield. Like Ballarat, shallow alluvials, basalt-covered deep leads and quartz reef mines were worked although they did not match the Ballarat goldfields for richness in either facet of mining.

The official gold discovery was in August 1851 and the place was then known as Jim Crow. Little information is available on returns from either the shallow alluvial or deep lead mines.

Mining of quartz reefs commenced in 1856 and continued at a reduced scale until the 1950s. The reef pattern was similar to the Ballarat East goldfield with vertical repetition of reefs along west dipping faults.

Total recorded production from quartz reef mines at Daylesford is 18,500 kilograms.

Woods Point

The Woods Point goldfield is in one of the most inaccessible regions of the State, and for this reason it was one of the last major goldfields to be discovered. The nearby Gaffneys Creek goldfield was discovered in January 1860 and in May 1861 gold was discovered at Gooleys Creek near Woods Point. The rich Morning Star reef later to become the Morning Star mine was discovered at about the same time.

Although the alluvial deposits were rich, the steep topography and narrow valleys meant that the quantity of alluvial material was small and it was the rich quartz reefs of the Morning Star and the Loch Fyne mines which were to make the area famous. In these mines flatly dipping quartz reefs occurred cutting across steeply dipping dyke bulges which in cross section appeared much like the rungs of a ladder. The Morning Star mine was worked to a depth of 760 metres and produced 19,599 kilograms of gold. The Morning Star and the A1 mine near Gaffneys Creek were the only mines to operate in Victoria virtually continuously for 100 years.

Mt Loch

The Red Robin mine, discovered in 1941 just below the summit of Mt Loch, is one of the few mines in Victoria above the snow line. The mine is at an elevation of 1,675 metres and the harsh winter conditions have made working the mine extremely difficult. The mine is characterised by narrow high grade quartz reefs. The mine has operated intermittently in recent years and total production to date is approximately 165 kilograms.

Cassilis

Despite its relative isolation near the crest of the Great Divide, the Omeo district was settled as early as 1835. It is not surprising, therefore, that alluvial gold was discovered near Omeo in the latter part of 1851, although there are reports of gold being won as early as 1850. In contrast, mining of quartz reefs did not commence until 1866 and the most important mine, the Cassilis mine, was not discovered until 1890.

Unlike most other Victorian gold mines in which the gold occurred free in quartz containing minor amounts of sulphide minerals, the Cassilis ores were gold-sulphide ores requiring complex treatment. Total production from the Cassilis goldfield is estimated to be 3,275 kilograms of which the Cassilis mine produced an estimated 2,892 kilograms.

Present day activities

Although mining was so instrumental in the opening up and development of towns and settlements along the Great Divide, mining activity is now almost a thing of the past. Current mining activity is restricted to intermittent working of the Red Robin mine.

Announcements by Western Mining Corporation during mid-1978 of base metal intersections east of Benambra suggest that mining could again become a major activity on the Great Divide. At the time of writing, one intersection 25.5 metres in length assayed 4 per cent copper and 7.3 per cent zinc and the other with a length of 16.3 metres assayed 9.9 per cent copper and 4.8 per cent zinc. These intersections occur in a geological environment similar to the now worked out Captain's Flat and the recently established Woodlawn mines in New South Wales.

FARMING

Mountain regions offer a wide variety of local conditions, some favourable to agriculture, some distinctly hostile to it. Victoria's Eastern and Western Highlands are no exceptions, and exhibit the usual "spotty" distributions of products of intensive farming, separated by large areas of extensive grazing and forest. The limitations imposed by steep slopes and harsh winters are more apparent in the rugged Eastern Highlands than in the lower land and further west. But the problems of remoteness, difficult access, and susceptibility to soil erosion are evident in both parts.

The difficulties and hazards are offset in part by higher rainfalls than are enjoyed on the adjoining lowlands, and by pockets of fertile soil developed on volcanic rocks. Some of these, for example, around Trentham, experience mean rainfalls over 850 mm, with a growing season of 9 to 11 months. At higher altitudes, precipitation in excess of 1,200 mm combined with low temperatures inhibits agriculture. In the west, rainfall totals under 700 mm are associated with growing seasons broken in summer by dry conditions for three months or more.

The chocolate clay loams derived from basalt are among the best soils in Victoria — deep, well-drained, friable, and moderately fertile. They are suitable for growing a wide variety of crops and for pastures of high carrying capacity, up to 15 dry sheep equivalents per hectare.

Soils derived from the more widespread sedimentary and granitic rocks are much less attractive. Often shallow and of poor structure, their low fertility requires annual dressings of superphosphate, occasional dressings of potash and, perhaps once in ten years, small amounts of molybdenum. On valley floors or gentle slopes (even on hill tops in western foothill areas) it is often worthwhile to take such measures in order to grow crops or improve pastures, but steep hillsides have generally been left in forest.

Where forest clearing has been attempted, farming has often failed and large areas have subsequently been planted with exotic softwoods such as *Pinus radiata*. These plantations, together with the remaining stands of native eucalypts and the areas of regenerating

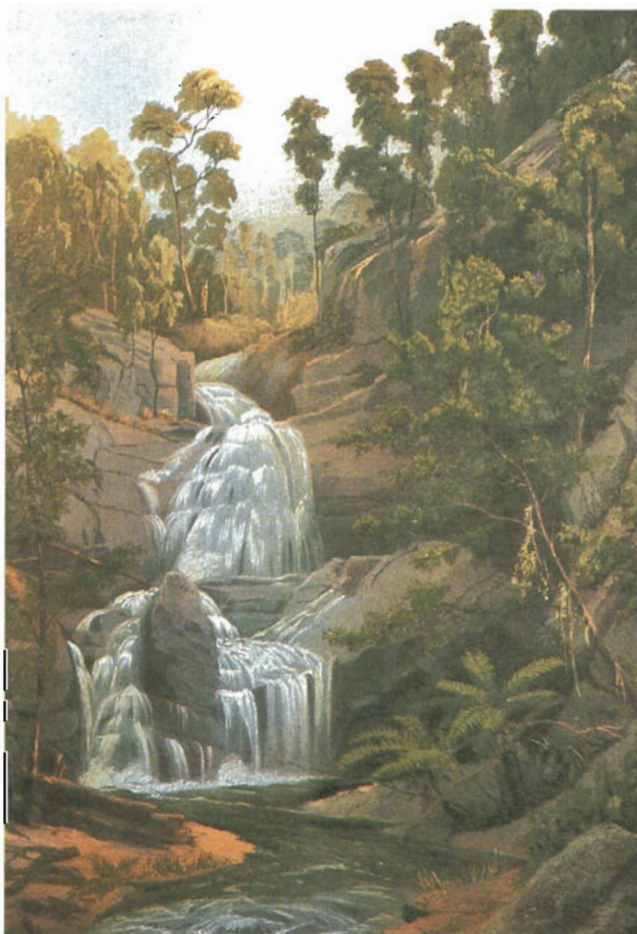
GREAT DIVIDING RANGE IN VICTORIA

Hoping to view the sea, Hamilton Hume (see below) and William Hovell ascended the highest part of the Great Dividing Range at Mt Disappointment on their journey from southern New South Wales towards Western Port which, however, they failed to reach. With much difficulty they found a gap a short distance to the west of Mt Disappointment, through which they found their way to Geelong. This journey opened the first link between the Colony of New South Wales and what was later to become the Port Phillip District.

Portrait of Hamilton Hume painted by Edward a' Beckett in 1887.
La Trobe Library

A landscape of the mountains near the head of the Mitta Mitta River painted by Eugene von Guerard.

La Trobe Library

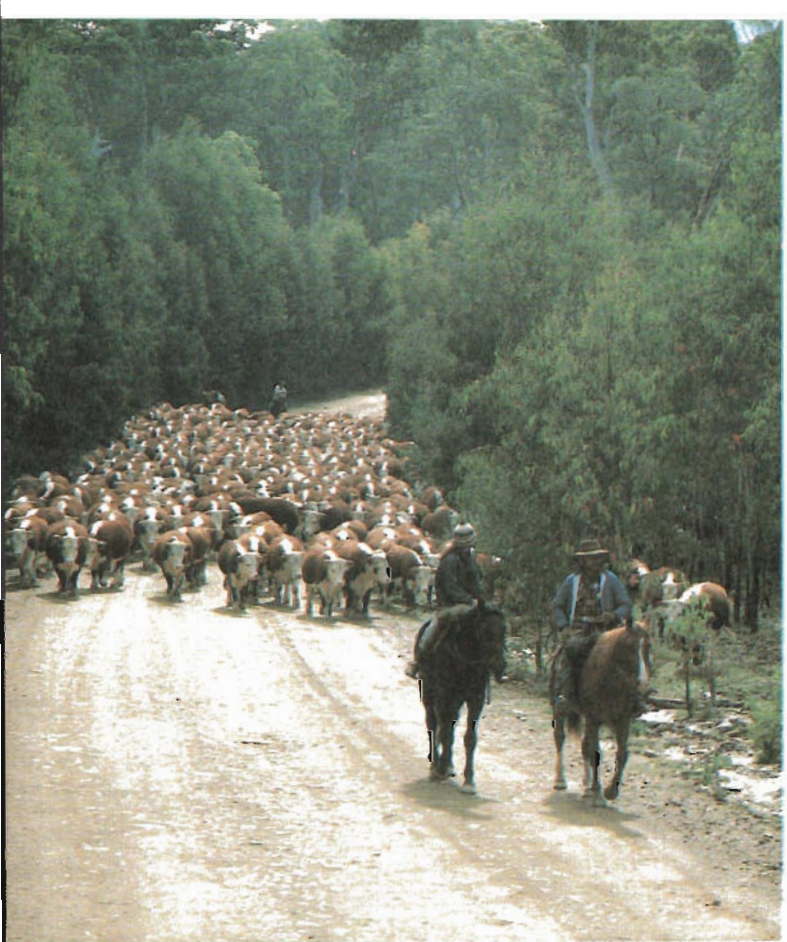


The Serpentine Creek Falls on the McAllister River, Gippsland, painted by Nicholas Chevalier in 1865.

La Trobe Library

A typical "rooftop" view of the high country taken near Mt Bogong.

Neil McLeod



Cattle mustering in the high country where the animals graze in spring and summer. They are brought back to the lower altitudes during the cold months of the year.

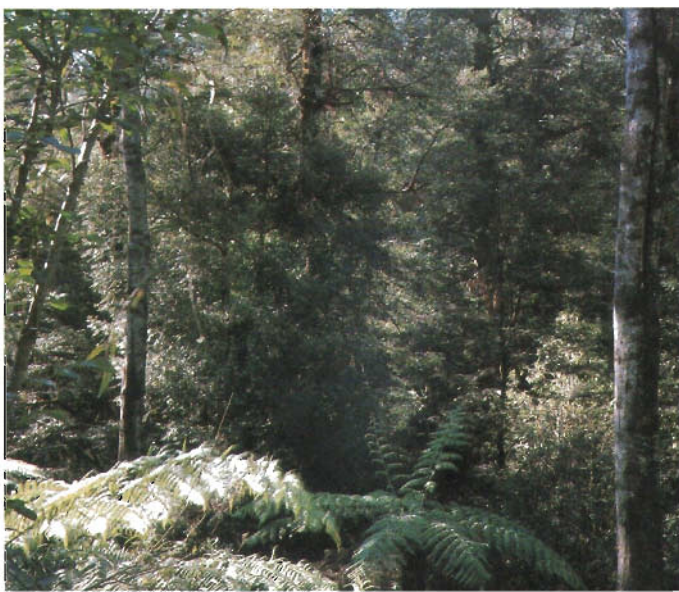
Neil McLeod

Wet Sclerophyll forest: Mountain Ash with understorey of acacias.

R. Incoll

Sub-tropical or jungle rainforest: vegetation of the Errinundra River, East Gippsland.

Forests Commission Victoria



Temperate rainforest, Myrtle Beech, Sassafras, and tree ferns in the Toolangi district.

R. Incoll

Alpine flora, mainly Everlastings, Podolepis, and other Composites on Mt Howitt.

O. Thompson

Alpine bog, Wellington Plains, showing Sphagnum holding pool.

E. Chesterfield

Caltha flowers under large snowdrift on Bogong High Plains.

I. Watson

Alpine flora in the Great Divide. A grassy heath with Kunzea muelleri and scattered shrubs of Hakea microcarpa.

E. Chesterfield

Dry Sclerophyll forest showing abundant growth of shaggy pea.

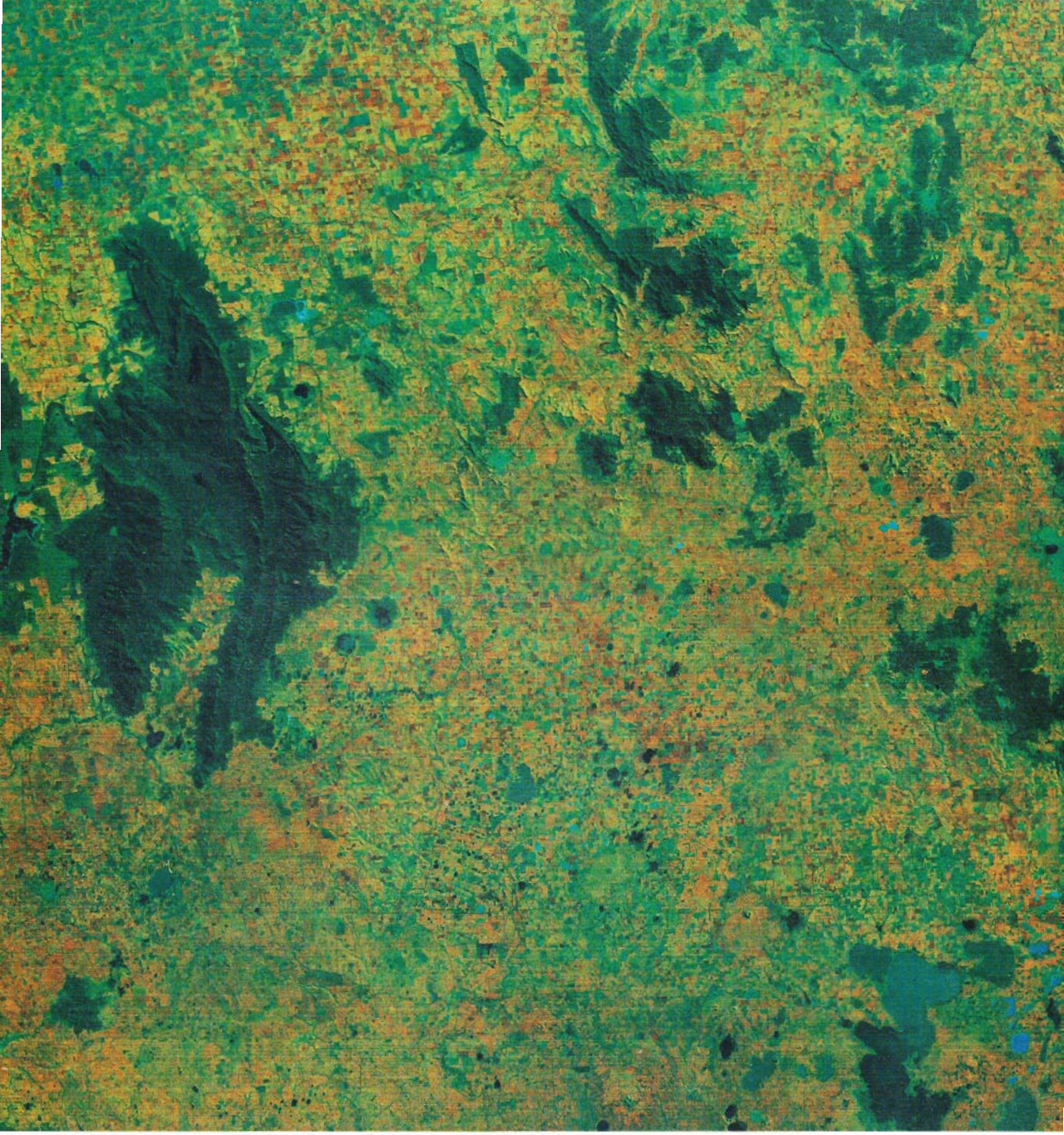
E. Chesterfield

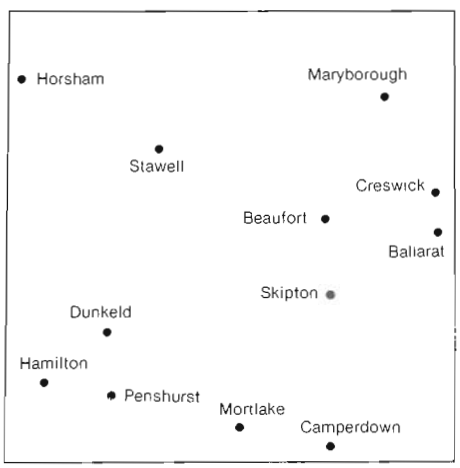
Sub-alpine flora showing Snow Gum and Alpine Mintbush near Mt Howitt.

O. Thompson

Guy's hut, Bryces Plains near Mt Howitt, in Snow Gum woodland. Log huts of this kind were built by early cattlemen and are still used for shelter during the autumn muster of cattle which have grazed on the High Plains during the summer.

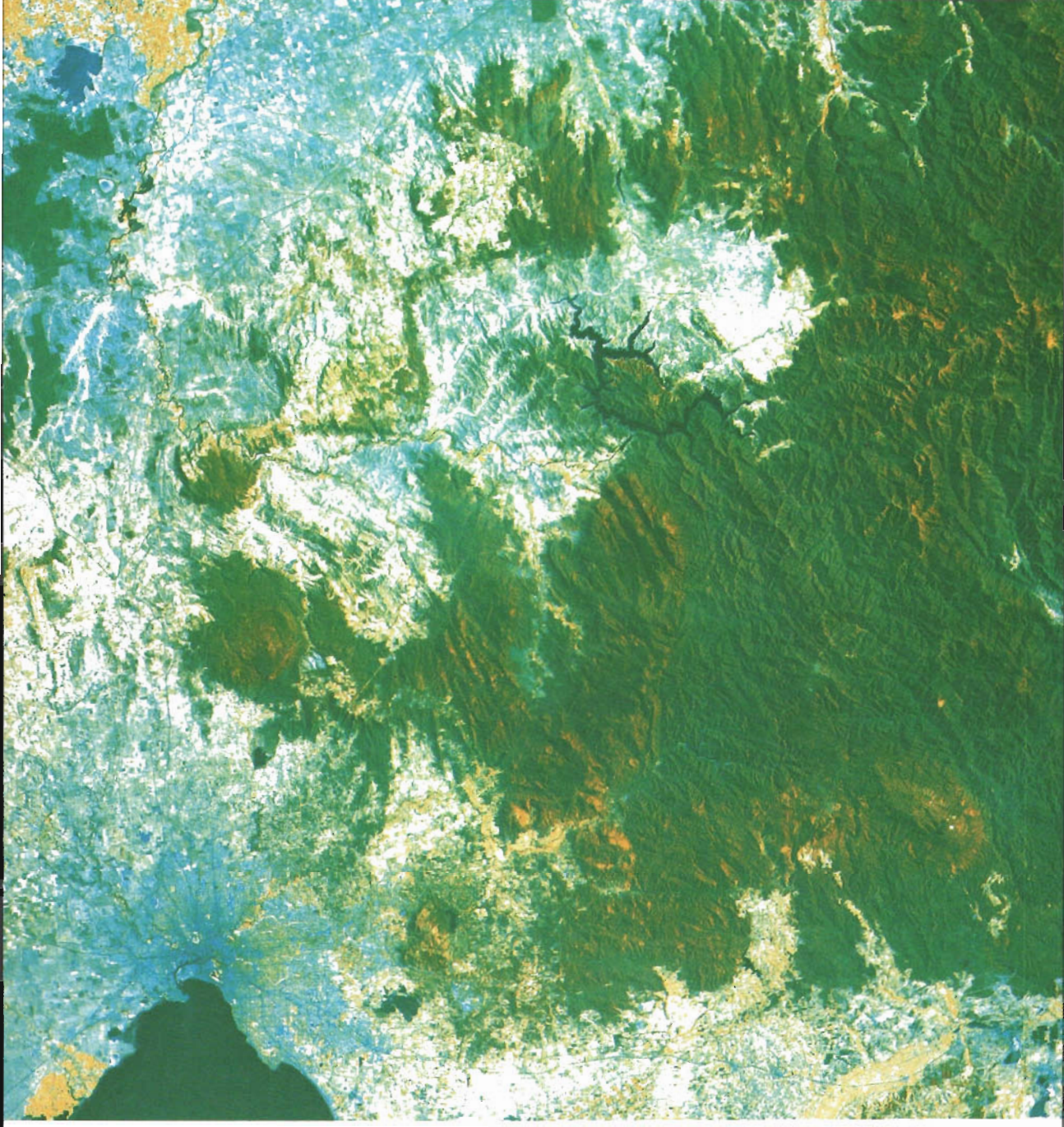
E. Chesterfield

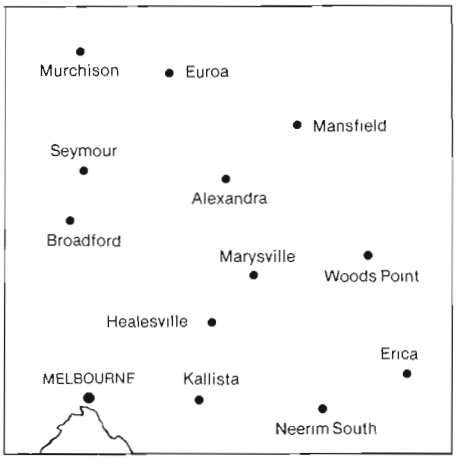




Satellite view of the Grampians and surrounding area. This photograph was taken by Landsat II on 18 September 1977 at 0906 hours and is reproduced from negatives supplied by the United States National Aeronautics and Space Administration (N.A.S.A.). The altitude at which the photograph was taken is approximately 920 kilometres above earth level.

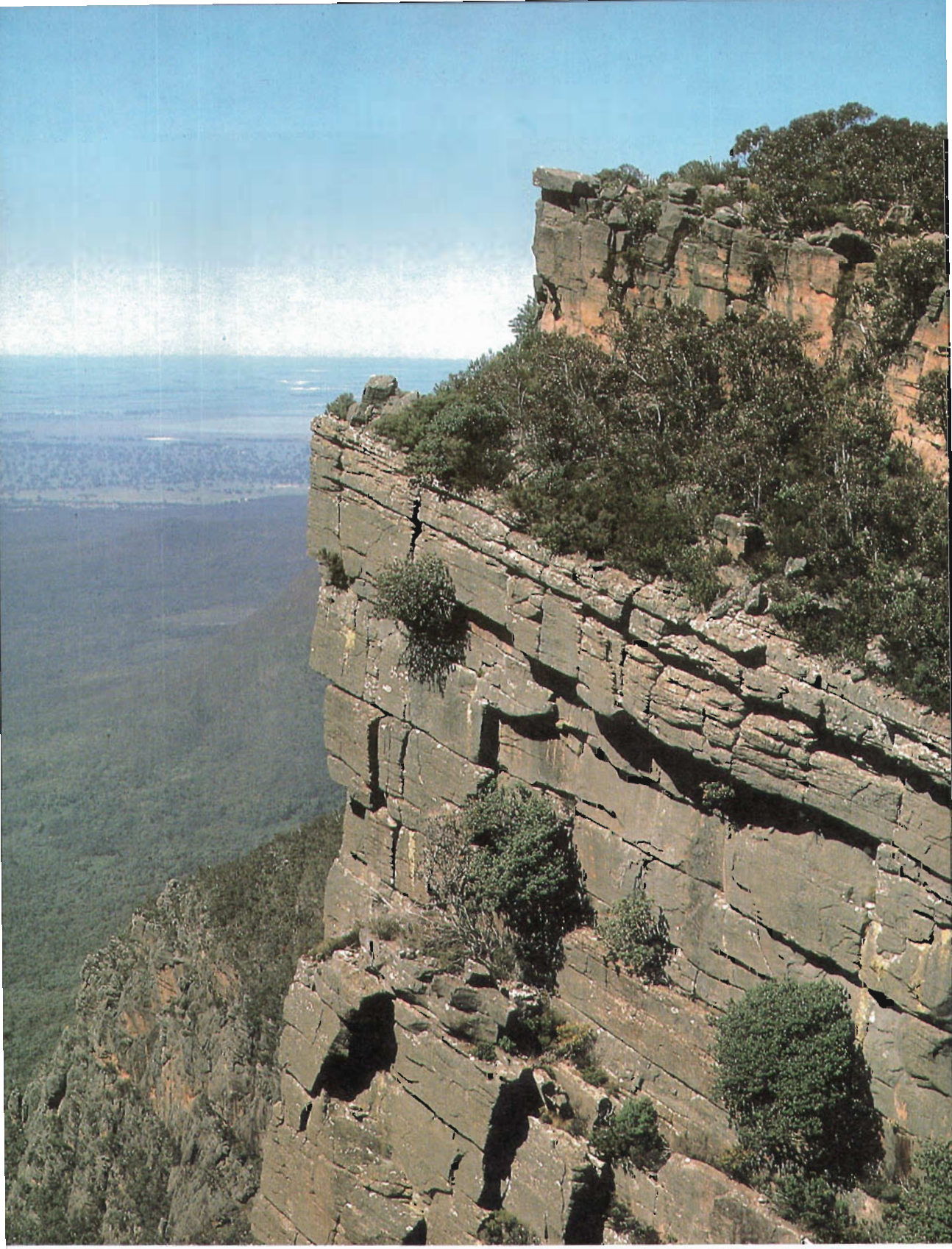
Forests Commission, Victoria





Satellite view of Melbourne and surrounding northern and eastern areas. This photograph was taken by Landsat I (Erts I) on 19 January 1973 at 0932 hours. The reproduction is derived from computer compatible tapes supplied by the United States N.A.S.A. and digitally enhanced by the C.S.I.R.O. Division of Mineral Physics on 30 April 1979. The altitude at which the photograph was taken is approximately 920 kilometres above earth level.

C.S.I.R.O Division of Mineral Physics



Eastern Scarp of Major Mitchell Plateau, Grampians.
J. H. Willis

View of Fyans Creek Valley from Boroka Lookout, Grampians.
J. H. Willis

Blue Mount, near Trentham, with Mt Macedon in the distance.
J. H. Willis

The south end of Serra Range from Mts Abrupt and Sturgeon, Grampians.
J. H. Willis

Pink Swamp Heath *(Sprengelia incarnata)* growing over a swamp in the Wannon Valley, Grampians.

J. H. Willis

A hand-coloured lithograph drawing of Walhalla as it was in 1924, by Geoffrey H. Mewton.

La Trobe Library

Tulloch Ard Gorge, Snowy River, eastern Victoria.

State Rivers and Water Supply Commission of Victoria

Stand of one hundred year old Alpine Ash *(Eucalyptus delegatensis)* at Granite Peak, north-eastern Victoria, adjacent to the Omeo Highway.

Forests Commission, Victoria

(Above) Various cultivars of seed potatoes growing in certified crops at Clarkes Hill near Ballarat.
(Right) Cultivar Coliban crop of sweet potatoes growing at Kinglake.

Department of Agriculture

The male lyrebird is found in many parts of eastern Victoria, especially in the Great Dividing Range. This photograph shows him displaying and tending his mound.

Ron Ryan — Photographic Agency of Australia

(Above) The Gang-gang Cockatoo *(Callocephalon fimbriatum).*

Neil McLeod

(Above right) Platypus *(Ornithorhyncus anatinus)* at Sir Colin McKenzie Fauna Park, Healesville.

Neil McLeod

The Australian Bush Rat *(Rattus fuscipes)* is found in the Great Dividing Range and coastal forests of Victoria.

Division of Fisheries and Wildlife

(Below) The White-lipped Snake *(Drysdalia coronoides).*

Fisheries and Wildlife Division

(Below right) Freshwater crayfish belonging to the genera Euestacus and Engaeus.

Fisheries and Wildlife Division

mountain ash that date from the widespread fires of January 1939, give the Eastern Highlands in particular a special importance to the timber industry.

The forests are an important resource, too, for the State's bee-keepers, who exploit the seasonal nectar flows by moving their hives from place to place. The cold and cloudy conditions of the higher mountain areas are unsuitable, but in the Grampians and the Pyrenees, in the ironbark-box forests of the Midlands and in the stringybark forests of the foothills several hundred itinerant apiarists ply a rewarding trade.

In the former goldfield areas the attack on the forests began early and there has been a long period in which the consequences of clearing could become apparent. On the sedimentary rocks in particular, the ravages of soil erosion are significant over wide areas, notably in the Midlands, and on the Dundas Tablelands. Gullying and slumping both result from increased run-off after rain, a consequence of removing trees that formerly transpired more moisture than is now taken up by pastures or crops.

While cropping is locally important, it is mostly intensive and confined to small areas. Livestock farming is the dominant form of land-use over most of the farmland in the highlands. It ranges from small, intensively grazed properties with improved pastures, through extensive pastoral properties relying mostly on native grasses, to summer grazing leases on the high plains of the Eastern Highlands. The cattle are driven up on to the plateau grasslands in spring and mustered in the autumn for the return journey to valley and plains properties. Evidence of gradual deterioration of the plant cover and of increasing erosion hazards has led to restrictions being imposed on this practice, notably in the catchment areas of the Kiewa hydro-electric scheme.

Very few sheep are grazed in the Eastern Highlands because of the depredations of dingoes. In the foothills, however, from the Strathbogie Ranges westwards, sheep farming is important, both for wool production and for the breeding and fattening of prime lambs. Fine wool producers run Merinos, Polwarths, and Corriedales, with either spring or autumn lambing. In the latter case, Merinos are mated to lamb in March, Corriedales in May. Shearing is usually done in spring. Prime lambs, usually the progeny of Border Leicester cross ewes and Merino rams, are born in July or August and are sold for slaughter in December or January. Some lambs are sold as stores in November to be fattened on fodder crops (rape, turnips, or lucerne) and sold in the autumn. This is an important source of late lambs in Victoria. Where woolgrowers might run from 6 to 8 dry sheep per hectare, stocking rates on prime lamb properties may be twice as heavy. However, these farms often buy in the ewes rather than breed their own replacements so that stocking rates are not directly comparable.

On many farms beef cattle were for long a secondary enterprise, but beef specialist properties have been increasing in number, notably in areas where hobby farms have become popular and where dairying has been abandoned as uneconomic. Dairy farming persists in some valleys in the north-east, and on specialist farms close to towns and cities, but has declined in importance in most parts of the highlands over the past twenty years.

Beef producers practise both autumn and spring calving, and either sell calves at weaning (or soon after), or rear them to sell as vealers at 1½ to 2 years of age. Others buy the weaners and fatten them for sale when around 2 to 2½ years old.

Both cattle and sheep farms depend on hay to supplement pasture growth in autumn and winter and occasionally in a dry summer. Most hay is cut from improved pastures, but lucerne is grown for hay on some of the well-drained creek flats on the northern slopes. The area between Beaufort and Ballarat usually produces a sizeable surplus of pasture hay for sale to other regions, especially to dairy farmers in Gippsland.

Pigs are kept on many farms as a minor enterprise, but changes in dairying have removed an important source of food, while urban expansion has displaced many pig farms. The weekly pig market at Ballarat remains the largest of its kind in Victoria.

Poultry farming, too, has undergone major changes in recent years, notably a concentration in large units in the Mornington Peninsula, but it remains of local significance around towns like Bendigo and Stawell.

Potatoes are probably the most characteristic crop in the Highlands, especially on the volcanic soils around Trentham and Ballan, Gembrook, and Tolmie, but also on other soils, at Kinglake and Toolangi, for example. The Department of Agriculture has its potato research station at Toolangi. Main and late crop potatoes are planted in November,

spray-irrigated from private dams and bores during the summer, and harvested between April and October. Most are grown for table use, with a significant proportion being produced under contract for processing into frozen French fries. An important fraction is grown for certified seed in districts experiencing winter frosts and high rainfall, and isolated by distance from other potato farms.

A typical potato grower would plant 10 to 15 hectares to potatoes on a farm considerably larger. The rest of the farm is used for several minor enterprises, perhaps six or seven in all that may include cereal growing (e.g., oats) wool growing, lamb fattening, pig rearing, dairying, beef production, or the growing of lucerne for hay or ryegrass for seed.

Tobacco growing is virtually confined to the King, Ovens, and Kiewa Valleys in the north-east, but is locally of great importance, notably around Myrtleford. A key factor is the availability of high quality water, with a very low salt content, for irrigating the crops.

Minor crops grown in various parts of the highlands include hops in the Ovens Valley, apples at Stanley and Harcourt, olives on the northern fringes of the Grampians, walnuts at Bright and Dargo, and maize at Bruthen. At Toolangi a particularly valuable speciality is the growing of virus-free runners of strawberries. These runners have been responsible for a very large increase in the yields of strawberries over the last fifteen years. Vineyards are widely scattered along the northern slopes from the Ovens Valley to Great Western, and have recently been making a comeback in the Yarra Valley, which held great promise before the phylloxera invasion in the 1880s.

This diversity of land-uses demonstrates the variety of opportunities offered by the more favoured sites in the ranges, foothills, and valleys along the Divide, but their limited extent is a reminder of the limitations imposed by terrain and climate. It is unlikely that more land will be alienated and cleared for farming in the future. Indeed the decline of farming in some areas due to erosion and soil exhaustion may see more land being replanted in forest. The need for long-term planning to maintain the supply of timber makes this reversion more than a simple admission of failure.

LANDSCAPE AND RECREATION

Eastern Highlands

The Eastern Highlands contain some of the most spectacular landscapes of inland Victoria. The environment varies from alpine high plains such as the Bogong High Plains near Falls Creek to the dry cypress pine woodlands in the rain shadow area near Suggan Buggan. The alpine areas offer great seasonal contrast due to the presence of snow during winter and the wildflowers in spring and summer. A few of the snowfields are readily accessible such as those at Falls Creek, while others such as those at Mt Bogong, the Nunniong Plains, and the Pinnibar Plateau are less accessible in winter. Downhill skiing is a popular sport at places where the facilities are available, such as at Falls Creek, while cross country skiing is a growing sport on the relatively flat undulating lands behind Falls Creek. It is in this area also where the major wilderness experiences can be derived in the mountains. The Snowy Range, the Barry Mountains, and the Mt Bogong area present opportunities for bush walking and solitude.

Area-wide pursuits are popular. Over much of the area fossicking is possible. Many derive pleasure from the challenge of driving in all-terrain vehicles. Hunting for deer in the forest and rabbits and foxes on the cleared agricultural land and on the periphery of the forest is widespread. The area contains many streams suited to high quality fishing, particularly for trout. There are also a number of good locations for rock climbing.

Canoeing is also a sport gaining in popularity and the higher elevations of the Great Divide produce the waters which are used in the foothills for canoeing. Some popular rivers for this activity are the Snowy, Tambo, Wonnangatta, Macalister, Mitta Mitta, and the Murray. The standard of white water varies from streams within which life and limb are endangered to quite placid waters.

While most of the area is in public ownership and is forested, there are large fingers of private land which extend well into the area such as around Omeo and Benambra, near Wulgulmerang, and along the valleys in the north-east.

Two of the landscapes of the valleys in the north-east have been classified by the National Trust; the sinuous valley of the Mitta Mitta and the spectacular contrasts in landform of the Upper Kiewa.

Throughout the area there are particular features of a landscape which are renowned for their beauty. Examples include the exotic trees near Bright with their brilliant autumn foliage, and the magnificent isolation of some of the mountains such as Mt Cobbler.

The near eastern mountains are more accessible and generally of lower elevation. Their accessibility has given rise to a much more intensive use. To the east of Mansfield the spectacular Viking-Cross Cut Saw-Mt Cobbler area is famed for its bushwalking potential. The snow resort of Mt Buller and the very accessible Donna Buang and Lake Mountain areas are particularly popular and suffer the problems of intensive use in peak periods.

In the areas close to Melbourne the water storages are important for recreation. For example, Lake Eildon is heavily used for speed boating, water skiing, fishing, house boating, and general water sports. Some of the reservoirs closer to Melbourne are very popular for picnicking activities although, in general, on-water use is not permitted.

Western Highlands

The Western Highlands present a different landscape to the Eastern Highlands. The dramatic differences in elevation are generally absent. The Western Highlands are more intensively settled and there is a greater diversity in the cultural aspects of the landscape.

To the west of the Kilmore Gap occurs a belt of strongly undulating country between Bacchus Marsh and Trentham. This is forested for the most part and contains a number of geological features of great beauty such as basalt running from Bullengarook towards Bacchus Marsh and the Lerderderg Gorge area which is popular with hikers. The forested land, the Wombat Forest, is a multiple-use area for many forms of recreation, and water and timber production.

Remnants of the gold mining era are plentiful between Trentham and Ballarat including the Daylesford, Creswick, and Ballarat diggings. Historic houses, quaint villages, poppet heads, mining shafts, and alluvial washings are all reminders of the Victorian heritage and their value is prized in this area, only a short drive from Melbourne. The spas at Hepburn Springs are variously regarded as a health resort, a curiosity, a relic of a past age, and a tourist asset.

The land has been generally cleared of trees to the north-west of Ballarat, consisting of flat to undulating plains on which are dotted volcanic remnants with the characteristic shapes of volcanic cones. This is an area where the parting of the waters by the Great Divide is indistinguishable from the surrounding countryside. Occasional hills occur such as those between Beaufort and Ararat (Mt Cole) where magnificent examples of messmate stringybark can be seen.

While the physical structure of the Grampians forms an awe-inspiring landscape of great beauty, the detail within that structure is also of great interest: the patterns and textures of the rock structures, the wildflowers, kangaroos that are a feature of Zumsteins, the cascading waterfalls that form after heavy rains, and appearances of endemic wildflowers that are unknown elsewhere throughout the State.

To the west the Great Dividing Range extends once more in a series of undulating plains so that the Grampians can be perceived to form a fitting termination to a magnificent range extending from Victoria to the Cape York Peninsula.

CONCLUSION

Geographers prefer to call the Great Dividing Range the Eastern Highlands of Australia. They object to the adjective "great" because the mountain chain is insignificant in comparison with ranges overseas. They also point out that as it is made up of a series of discrete blocks, it is not a range in the strict sense of the term. The divisive nature of the watershed and the difficult approaches to it impressed the early settlers. Those who live and work close to the Divide at present are still aware of it. They speak of places being above or below or at the foot of the gap.

Those responsible for the survey and sub-division of Victoria also recognised the Divide as a natural boundary. They used it as the line which separates the provinces and counties

which lie to the north and south of it. On the other hand, for reasons dictated by the pattern of settlement and ease of access, it was disregarded in defining shire and other municipal boundaries. The name "Great Dividing Range" preserves a folk-memory and to abandon it would mean losing a piece of history.

The search for gaps was an early pre-occupation and their continuing importance is shown by the fact that their positions are still indicated by roadside signs. The gaps in the Divide were important factors in determining the patterns of travel and of settlement. In the days of horse and bullock teams it was the custom to camp for the night at the foot of any gap to be crossed so that the draught animals would be fresh for the climb next day. In the coaching days staging posts were established in the same positions to provide not only a change of horses but meals and accommodation for travellers. Many towns have grown from these simple beginnings.

During gold mining times travel and transport across the Divide, although difficult, was persevered with. With the decline of gold many towns and settlements, particularly those established in rough steep country, were abandoned. The flow of traffic between the Ovens Valley and Omeo dwindled and was further reduced when the factors which had previously restricted the development of Gippsland were overcome. The Koo-Wee-Rup swamp was drained, a navigable channel was cut between the Gippsland Lakes and the sea, and finally the Gippsland railway was constructed. These developments resulted in the abolition of the area's former partial dependence on the country to the north of the Divide.

When gold mining declined, agricultural and pastoral pursuits remained as important industries. They were concentrated in areas of lesser slope and formed the focus for the grazing of stock on Crown lands, as they still do. Some timber was harvested but only in areas where it was readily accessible.

More recent developments, including the improvement of transport facilities and road making techniques as well as increasing demand, have resulted in harvesting of timber from steep country at high elevations. This, and the necessity for protecting forests as well as other lands from fire, has led to the construction of a network of roads and forest tracks throughout the mountains. Some are situated on or close to the Divide. Today's ease of access would astonish those who first struggled across the Divide on journeys of exploration or in search for gold.

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