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GEOGRAPHY

SETTLEMENT OF VICTORIA

Exploration and the pastoral period, 1800-1851

Early explorations of Victoria were made by Lieutenant Murray in 1802 when he discovered the harbour of Port Phillip Bay, and by Hume and Hovell in 1824-25 when they crossed the centre of the Port Phillip District of New South Wales (as Victoria was then known). Two small settlements had also been established on the coast at Sorrento in 1803 and at Corinella in 1825, but it was not until 1834 that the Hentys from Van Diemen's Land founded the first permanent agricultural settlement in the District at Portland.

One factor which deterred settlement of the District was the New South Wales Government's refusal to allow permanent occupation south of the Nineteen Counties of New South Wales in accordance with its policy of concentrated settlement. However, the shortage of pasture land in Van Diemen's Land, and the effect of a new Impounding Act encouraged unauthorised occupation in the District. Various persons initiated settlements in 1835 including Batman (on behalf of the Port Phillip Association) at Port Phillip and McKillop in Gippsland.

By 1836, only a small number of squatters from both New South Wales and Van Diemen's Land had followed the early settlers and occupied parts of the District, but the rush of squatters which occurred after Major Thomas Mitchell's enthusiastic reports of his exploration of the rich western district in that year prompted a keener interest in the settlement of the District.

Authorised settlement under the Imperial Land Acts and Regulations of the time commenced when Governor Bourke authorised the location of settlers on 9 September 1836. The first sale of Crown land was held on 1 June 1837 when allotments surveyed by Robert Hoddle, Surveyor-in-Charge, were auctioned in Melbourne and Williamstown.

In those years sale by auction under the Imperial Acts was the usual method of disposal of Crown land. Special Orders in Council were also part of the system: nine blocks of 2,072 hectares each and one of 12,700 hectares being sold without public competition. These lands were commonly termed Special Surveys and well known examples of this type of alienation of Crown land are Elgar's Special Survey at Box Hill and Dendy's Special Survey at Brighton. The Orders in Council also provided for the pastoral occupation of Crown lands and in 1847 authority was given to enable lessees of pastoral runs to purchase areas up to 259 hectares of each run; these usually embraced the homestead and the best land adjoining, and were known as Pre-emptive Rights.

In 1840, the population of Victoria was 10,291 persons and there were 782,283 sheep. By 1851, the start of the gold rushes, there were 97,489 persons, 6,032,783 sheep, and 378,806 head of cattle.

During the period from the first settlement to 1851 pastoralists were dominant. At first they occupied a large proportion of the Port Phillip District without written authority and later were successful in having the Imperial schemes modified for expansion of settlement. This period saw some efforts to promote closer settlement as an alternative to restricting the pastoralists, but these efforts were hampered by lack of markets for agricultural

products, poor information about resources, and the lack of a serviceable transportation network.

Gold rush period and agricultural establishment, 1851-1890

Two important events occurred in 1851: first, the discovery of gold and second, the separation of the Port Phillip District from New South Wales and its creation as the Colony of Victoria.

The gold rush, which caused an increase in the population of Victoria from 97,489 in 1851 to 539,764 in 1861, also brought about a social, political, and economic revolution. The great influx of gold seekers created a huge demand for all types of primary products. In addition, the influx coincided with technical advances in agriculture and improvements in transport. This increased population, many of whom were turning from gold seeking to more stable occupations, was the main factor responsible for the next phase of land settlement. The opening of the lands was seen as the prerequisite for a programme of encouraging closer settlement and immigration.

Although Victoria was granted self government on Separation in 1851, Great Britain retained control of the Crown lands until Royal Assent was given to the Constitution Act in 1855. By that Act, the laws then in force for New South Wales were to continue in operation in Victoria until altered by the Victorian legislature and it was not until 1860 that the first Land Act was enacted in Victoria. This was known as the Nicholson Act and "selection" as commonly understood dates from this period. The system of alienation by auction sale and pre-emptions by pastoral tenants of their homestead areas had by this time disposed of nearly 1.8 million hectares — about 8 per cent of the Colony's area.

When about 323,750 hectares had been sold (about half to selectors) under the 1860 Act, a further important Act was passed in 1862. This marked the adoption of distinctive principles of land legislation now emerging in Victoria, namely, selection after survey, and conditions which showed that settlement, and not merely alienation, was the aim. About 567,000 hectares was disposed of under the 1862 Act. However, the use of "dummy" selectors who were paid by the squatters, and other ruses defeated the intention of both pieces of legislation to provide land for genuine new settlers.

Further legislation in 1865 abolished the system whereby affluent selectors could obtain the freehold of allotments by immediate payment of the purchase money and substituted a full leasing system under which allotments from 16.2 hectares to 259 hectares could be selected but not freeholded until three years had elapsed and improvements to a value of two dollars per 0.4 of one hectare were effected. Under this Act about 1.2 million hectares were selected but only about 600,000 hectares matured into freehold titles. This Act also met the demands for occupation of land adjacent to goldfields by authorising the issue of licences for residence or cultivation for areas up to 8 hectares. Licensees were later given the right to freehold these sites.

In 1869, a new and very comprehensive Land Act was passed. It was perhaps the most successful in Australia in this period as by 1878 nearly 4.5 million hectares, mostly in Gippsland and the plains of the north-west, were selected under its provisions. "Dummying" was almost eliminated and none of the large estates increased. Some important features of the 1869 Act were selection on the basis of merit, a limit of 130 hectares only to be held by one person by selection, and a limit of 81,000 hectares which could be sold by auction each year.

Later Acts introduced modifications and provisions in respect of specific types of land such as Mallee land. The total area of land alienated by 1884 was approximately 10 million hectares of which 7.5 million hectares had been disposed of by selection. A consolidated Land Act was passed in 1890.

As authorised settlement proceeded, towns and villages were surveyed and proclaimed, commons were proclaimed, and many areas of land were reserved for various public purposes. A notable reservation occurred in 1881 when virtually all the significant rivers, streams, and lakes in Victoria and the frontages thereto were reserved for public purposes.

Agricultural development and intensification since 1890

This period saw gradual sub-division and development of land for better utilisation. Victoria had established its distinctive land laws in a period of prosperity and had pushed

a network of railways into the agricultural districts. These factors were instrumental in encouraging higher production and consequently were responsible for steady sub-division and development.

By the early 1890s, however, the land situation in Victoria as in all the Australian Colonies, had become unsatisfactory. The area under cultivation had not kept pace with the alienated area of land, and rural population was not increasing. There was a general land hunger and intending settlers had difficulty in obtaining suitable land.

Many large holdings of alienated land were undeveloped, and the Victorian Government eventually decided to pass legislation for a closer settlement scheme enabling the State to purchase such land and to sub-divide it. Early in this century, the re-purchase was effected by voluntary means, but after the First World War compulsory acquisition was also provided. Later a similar scheme was introduced for ex-servicemen of the Second World War.

Irrigation schemes, the first of which commenced before 1900 enabled the more intensive development of various areas which would otherwise have remained in large and comparatively under-developed holdings.

Settlement since the 1830s has resulted in some 60 per cent of the land of Victoria having been alienated from the Crown, and some 12 per cent having been reserved for national parks, forests, and other public purposes. In line with modern practice, virtually all the remaining Crown land in the State is being or will be reserved for the conservation of natural resources.

PROTECTION OF THE ENVIRONMENT

Ministry for Conservation

Introduction

The Ministry for Conservation was created by an Act of Parliament in December 1972. It is an "umbrella" organisation bringing together the following government agencies concerned with conservation and environment protection: Environment Protection Authority, Fisheries and Wildlife Division, Land Conservation Council, National Parks Service, Port Phillip Authority, and Soil Conservation Authority. The Ministry also includes the Divisions of Assessment, Environmental Studies, and Administration.

At the head of this organisation is the Minister for Conservation, who is advised by the Director of Conservation and his staff. The Minister is responsible for achieving the objects of the *Ministry for Conservation Act 1972*, which are, first, the protection and preservation of the environment, and, second, the proper management and utilisation of the land and living aquatic resources of Victoria. Through the Minister, the Ministry for Conservation provides a central focus of advice to government on a wide range of environment, management, and protection matters.

The Ministry's central Divisions have a total staff of approximately 140 officers. Besides providing administrative, financial, and technical support to the agencies, these Divisions carry out a number of specialist and inter-disciplinary activities.

Environment Assessment Division

This group advises government and private developers on the possible environmental effects of proposed undertakings, before work begins. This approach is designed to ensure that potential environmental problems are recognised and discussed at the planning stage. The *Environment Effects Act 1978* is outlined later in this section.

Conservation Planning

The Conservation Planning Branch of the Division works with agencies in the Ministry to co-ordinate reports and submissions on planning issues for presentation to planning tribunals, municipal councils, and other bodies. Its staff are frequently called upon for advice on government purchases of land for conservation purposes, such as for addition to national parks, wildlife reserves, and other conservation areas. Advice is also given to members of the public seeking assistance in finding the best environmental solution to planning problems.

Environmental Studies Division

The Environmental Studies Division, which has branches for Environmental Studies, Marine Studies, and Technical Services, serves the needs of the Ministry for Conservation including its agencies, and the Victorian Government in general. By means of multi-disciplinary research programmes, it provides environmental information to assist planning, management, and use of resources throughout the State. It also provides statistical and computing services needed to acquire and handle environmental data.

Major regional studies on Port Phillip Bay, Western Port Bay, and the Gippsland Lakes, together with their respective catchments, have been carried out. Current tasks include investigations on alpine and river ecology, dry land salting, energy, water-based recreation needs, and the use of environmental data in planning.

The Marine Studies Branch provides data relating to marine chemistry and biology, to assist the management and protection of marine resources. It also undertakes research to benefit the commercial fishing industry. The Branch moved to new headquarters at Queenscliff early in 1980.

Administration Division

A wide range of services is provided through the Administration Division: Accounts, Personnel, Drafting, Information and Extension, the Library, Registry and Mail, Transport, Property, and Stores. The Division is also responsible for the framing of legislation, the administration of national estate matters, environmental architecture and landscape design, and the Victoria Archaeological Survey.

Legislation

The Minister for Conservation administers eighteen Acts of Parliament, as follows: **Archaeological and Aboriginal Relics Preservation Act 1972*, **Environment Effects Act 1978*, *Environment Protection Act 1970*, *Fisheries Act 1968*, *Land Conservation Act 1970*, **Land Conservation (Vehicle Control) Act 1972*, **Ministry for Conservation Act 1972*, *National Parks Act 1975*, *Port Phillip Authority Act 1966*, **Protection of Animals Act 1966*, **Reference Areas Act 1978*, *Royal Society for the Prevention of Cruelty to Animals Act 1968*, *Soil Conservation and Land Utilization Act 1958*, *Victoria Conservation Trust Act 1972*, *Victorian Fishing Industry Council Act 1979*, *Victorian Institute of Marine Sciences Act 1974*, *Wildlife Act 1975*, and *Zoological Parks and Gardens Act 1967*. The *Environment Protection (Noise Control) Act 1978* is unproclaimed.

The central divisions of the Ministry are responsible for implementing the six Acts marked with an *. The other Acts form the basis of the activities of most of the agencies which combine to form the Ministry for Conservation. For example, the National Parks Act gives the responsibility for management of national parks and other parks to the National Parks Service. Details of the most recent developments involving new legislative responsibilities for the Ministry are given below.

Environment Effects Act

The object of this Act is to ensure that the environmental effects of proposed new developments which could be of environmental significance are carefully described and considered before any decisions are made. The Act provides for the preparation of an Environment Effects Statement by the proponent of the development. This report describes the proposal, any alternatives to it, and expected effects on the environment, social effects, cost, and need. Where appropriate, public comment is invited. An assessment by the Minister for Conservation weighs all this information and provides advice to the decision makers. Although the Act refers specifically to *public* works, it also provides for advice to be sought from the Minister in other significant cases.

Protection of Animals Act

This Act, together with the Royal Society for the Prevention of Cruelty to Animals Act, was transferred from the administration of the Chief Secretary to that of the Minister for Conservation on 1 July 1979. In essence, the Act makes cruelty to an animal an offence. It provides for the registration of practitioners for the purpose of carrying out animal experiments and for the issue of permits for rodeos.

Reference Areas Act

Under the Reference Areas Act, the Governor in Council may declare an area of public land to be a reference area. The Act also provides for the appointment of advisory committees. Their task is to recommend how reference areas should be protected, controlled, and managed "so as to preserve the areas in perpetuity as a reference to which persons concerned with the study of land may be permitted to refer for comparative purposes, particularly when solutions to problems that arise from the use of the land by mankind are being sought".

Statistics

The total expenditure of the Ministry and its agencies amounted to \$33.7m in the financial year 1978-79. Of this amount, salaries accounted for \$16.4m. Staff of the Ministry and its agencies totalled 1,223 persons at that time.

VICTORIA—REVENUE AND EXPENDITURE OF THE MINISTRY FOR CONSERVATION AND ITS AGENCIES (\$'000)

Particulars	1974-75	1975-76	1976-77	1977-78	1978-79
REVENUE					
Ministry and agencies	2,707	3,622	3,924	4,595	5,321
EXPENDITURE					
Ministry					
Salaries, grants, and expenses	2,797	3,164	3,035	4,301	4,951
Land purchases	1,127	4,095	1,361	2,658	2,310
Environmental studies	906	1,181	1,614	2,211	2,516
Agencies					
National Parks Service	2,566	4,621	4,666	6,083	6,459
Environment Protection Authority	3,167	4,156	4,923	5,684	5,913
Soil Conservation Authority	3,184	4,325	4,096	4,553	4,736
Fisheries and Wildlife Division	3,266	4,433	4,348	5,145	5,944
Other (incl. Port Phillip Authority and Land Conservation Council)	384	631	698	908	892

Further reference: *Victorian Year Book* 1980, pp. 36-9

Environment Protection Authority

The Environment Protection Authority, constituted under the *Environment Protection Act* 1970, is responsible for protecting and improving the air, land, and water environments of Victoria through the management of wastes, control of noise, and prevention of pollution, including litter. The three-member Authority is responsible to the Minister for Conservation and is supported by about 240 professional, technical, and administrative staff. The Authority is one of several agencies within the Ministry for Conservation.

The major activities of the Authority centre on the management of air quality, water quality, wastes on land, environmental noise, and waste control systems.

Air quality control in Victoria

Industrial development and the establishment of large urban areas with high densities of motor vehicles have inevitably resulted in increased emissions of pollutants to the atmosphere. The impacts of air pollution may include chronic and acute health effects, damage to plants and materials, and undesirable changes in the natural and aesthetic environment. Although the costs of these impacts are very difficult to assess, a growing level of public concern has prompted the establishment of air quality control programmes by most industrialised nations.

The simplistic approach to improving air quality is to reduce the rate at which pollutants are discharged into the atmosphere. In reality, however, an effective control programme is very complex, involving numerous environmental, technical, social, and economic factors. The Environment Protection Authority has endeavoured to develop an effective control programme with a draft *State Environment Protection Policy for the Air*

Environment of Victoria. Declaration of the State Environment Protection Policy by the Victorian Government assists in resolving many difficulties and uncertainties for both the Authority and emitters of pollutants, previously hampered by the lack of an overall policy. The draft Policy recommends air quality objectives and an integrated approach to air quality control.

The Authority has been controlling emissions to the air through a licensing system and regulations since 1972. Compared to many industrialised countries, Victoria is relatively free of serious air pollution. However, in some areas, notably the Port Phillip Region (which takes in Melbourne, Geelong, and Western Port) and the La Trobe Valley Region, levels of pollution have been rising steadily. If the existing controls were permitted to remain unchanged, emissions of the five most common contaminants (carbon monoxide, nitrogen oxides, hydrocarbons, sulphur oxides, and particulates) could be expected to increase by about 70 per cent by the year 2000.

The aim of the draft Policy is to keep the concentration of the most common contaminants below an acceptable level most of the time and below a detrimental level all the time. The Authority sees the licensing and regulation systems as the main means of control for factories and other stationary sources.

Further reference: *Victorian Year Book* 1980, pp. 39-40

Land Conservation Council

Increasing concern throughout the 1960s regarding the management of Victoria's natural resources culminated in the 1969 controversy over land-use in the Little Desert. This controversy resulted in the proclamation of the *Land Conservation Act* 1970 which established the Land Conservation Council in February 1971 to replace the Land Utilisation Advisory Council originally formed in 1950.

The Council consists of twelve members and comprises an independent chairman; the heads of government departments concerned with soil conservation, agriculture, forests, lands, rivers and water supply, minerals and energy, fisheries and wildlife, and national parks; as well as three other members with experience in various aspects of conservation. The latter three members are appointed by the Governor in Council, two being selected from a panel of names submitted by the Conservation Council of Victoria.

The primary function of the Council is to carry out investigations and make recommendations to the Minister for Conservation on the balanced use of public land in Victoria the *Land Conservation Act* 1970 requires that the Council must take into account the present and future needs of the people of Victoria in relation to:

- (1) Preservation of ecologically significant areas;
- (2) conservation of areas of natural interest, beauty, or historical interest;
- (3) creation and preservation of areas of reserved forest, areas for leisure and recreation, and reserves for the conservation of fish and wildlife;
- (4) preservation of species of native plants; and
- (5) land required by government departments and public authorities in order to carry out their functions.

For this purpose the Council has divided Victoria into 17 study areas. It has completed descriptive reports for 14 of these areas and has submitted final recommendations on land-use to the Victorian Government for 11 of the 17 areas. A map of these study areas can be found on page 30 of this *Year Book*.

The allocation of land for various uses in the alpine area is an issue which generates much interest with individuals and groups holding strong, and, in many instances, opposing views. The community's interest in the area is indicated by the unusually large number of submissions which were made to the Land Conservation Council. Approximately 15,500 submissions were received.

It is not possible to satisfy all of the competing demands. However, the recommendations attempt to achieve balance in providing for the present needs of most forms of use, while retaining flexibility and the opportunity to adjust to future changes in the demands. The recommendations provide for timber production to be an important use for over 70 per cent of the public land. They also provide for the many recreational activities that take place in the area as well as other uses such as environmental education,

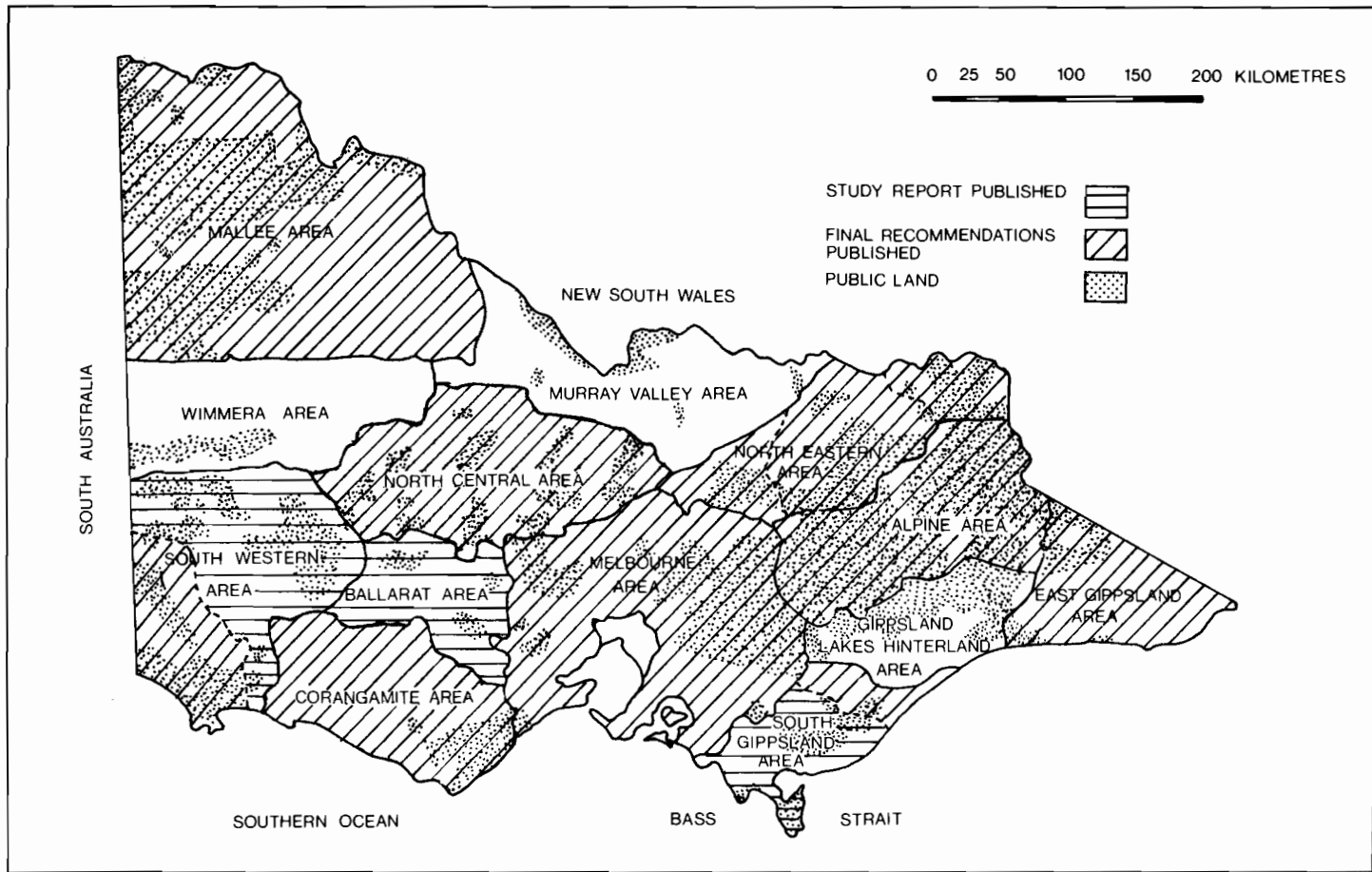


FIGURE 2. Victoria—Land Conservation Council study areas.

mineral and stone production, and the use of land for surveys and utilities. Grazing under licence is permitted to continue throughout 95 per cent of the public land.

The value of the area for water production has been a major consideration during formulation of the policies on which the land-use recommendations are based.

In addition, at the request of the Governor in Council, a special investigation was undertaken for the Stradbroke Area situated in the South Gippsland District 1 Area. A descriptive report and final recommendations have been published for this area.

Over a period of ten years, an important effect of the Council's recommendations has been the substantial increase in the area of the State permanently reserved for conservation purposes. This has been achieved mainly through a system of national, State, and regional parks dedicated for conservation and/or recreation purposes. In addition, the Council has established several new categories of land-use primarily for conservation, or low intensity recreation, or education. These uses include reference areas, wilderness areas, natural features and scenic reserves, flora reserves, flora and fauna reserves, bushland reserves, coastal reserves, river, stream and lake reserves, education areas, and historic areas.

In February 1971, there were 22 national parks in Victoria covering some 196,000 hectares, or 0.86 per cent of the State. Since that time the Land Conservation Council has reviewed land-use for just over two-thirds of Victoria's public land and, as a result of its recommendations, many of the existing parks have been enlarged, new parks have been created, and two wilderness areas established.

As well as its role in preserving areas of special conservation significance, the Council has a responsibility to ensure that sufficient natural resources are available to meet the current and future needs of the community. One of the most important resources affected by the Council's recommendations is timber. Throughout rural Victoria the timber industry is an integral and often principal component of the total regional economy and many rural communities rely heavily on the timber industry for their economic viability.

In each of its study areas the Council has recommended, therefore, that large areas be reserved for hardwood production. These areas generally include the most highly productive hardwood stands, and although they are managed primarily for timber production, provision is made for other uses such as water production, conservation of flora and fauna, and many forms of outdoor recreation. To ensure these other values are protected adequately the Council has published principles for forest operations covering soil conservation and catchment protection, recreation and aesthetics, nature conservation, and historic sites. In addition to the timber reserved for hardwood production, the Council has also allocated large tracts in some study areas for softwood production.

Some additional resources are also retained in areas left as uncommitted land. This category of land-use ensures that sufficient areas are retained to meet future requirements, although the land may also be used to meet certain present needs provided the use does not bring about changes in the land that are difficult to reverse. In addition to these major categories of land-use, the Council has recommended smaller areas for agriculture, mining, and public utilities.

Alpine area

The alpine area of Victoria includes a large portion of the Victorian Eastern Highlands, extending along a part of the Great Dividing Range from Mansfield and Licola, eastwards to the Snowy River and the Murray River headwaters. Topography ranges from the sharp-crested ridges and spurs rising between deeply incised valleys, typical of the mountainous tract, to tablelands and plateaux—which at higher altitudes are known as the "high plains", and the flat or undulating river basins.

About one-quarter of Victoria's river system rises in the area and drains into the Murray River system to the north, the Gippsland Lakes to the south, and the Snowy River to the east. A wide range of natural environments from dry "rain shadow" valleys to wet montane forests are included in the area, as are most of the sub-alpine and all of the alpine environments of the State.

The broad range of plant species, from alpine communities, such as mosslands and herbfields, to "jungle" gully associations typical of East Gippsland, and the vegetation of the dry and warm Snowy River Valley, forms a variety of habitat which is highly significant for the conservation of many species of animals.

In June 1979, the Land Conservation Council made recommendations to the Victorian Government for the future use of the public land in the alpine area. These recommendations have included the most outstanding areas in terms of scenic and recreational quality, vegetation communities and natural features in two new national parks, a wilderness area, and extensions to two existing national parks in East Gippsland. Various other areas where nature conservation will be a major objective of management include reference areas, natural features and scenic reserves, and historic areas.

In all, more than 30 per cent of the public land of the alpine area will be managed primarily for nature conservation. The allocation of land for various uses in the alpine area is an issue surrounded by considerable controversy, with individuals and groups holding strong and, in many instances, opposing views.

The conflicts which arise when the livelihood, recreational pursuits, and special interests of user groups compete for a given area of land are indicated by the unusually large number of submissions from the public which were made to the Land Conservation Council. Altogether some 15,500 submissions were received.

It is not possible to satisfy all of the competing demands. However, the recommendations attempt to achieve balance in providing for the present needs of most forms of use, while retaining flexibility and the opportunity to adjust to future changes in the demands. The recommendations provide for timber production to be an important use throughout nearly 70 per cent of the public land. They also provide for the many recreational activities that take place in the area as well as other uses such as environmental education, mineral and stone production, and the use of land for surveys and utilities. Grazing under licence is permitted to continue throughout 95 per cent of the public land.

The value of the area for water production has been a major consideration during formulation of the policies on which the land-use recommendations are based.

Further reference: *Victorian Year Book* 1980, pp. 40-1

Soil Conservation Authority

The Soil Conservation Authority is charged under the *Soil Conservation and Land Utilization Act* 1958 with the prevention and mitigation of soil erosion; the promotion of soil conservation; the determination of matters relevant to the use of all land including Crown land, in such a manner as to achieve the above two objectives; and the promotion of efficiency in the use and development by landholders of the water resources available to them.

Working through Committees of Management, the Soil Conservation Authority provides advice and financial assistance for control of erosion on the 1,600 kilometres of Victoria's coastal foreshores. Responsibility for supervisory control of earthworks and grazing on land over 1,200 metres has the aim of minimising erosion in Victoria's valuable alpine snowfields and water catchment areas.

To achieve these aims, the Authority carries out a variety of tasks. It gives technical advice to individual landholders, local government organisations, and other government departments on the prevention and control of wind and water erosion and soil salting. It provides a service to farmers on the siting, design, and survey of dams and pipeline water supply systems for stock and domestic purposes and outside irrigation areas, and it also advises farmers on irrigation development.

In the catchments to town water supplies and major storages, the Authority has responsibilities for determining land-use which will ensure the continuing production of high quality water.

Many of the above activities demand continuing research. Data on land, including geology, soil, topography, vegetation, and climatic characteristics, is being documented by the Authority on a State-wide basis. This data is used to assess the capability of land for various uses. Planning authorities are major users of this information.

The Authority carries out studies into water movement and water yield in pastured and forested catchments, as well as laboratory studies into a variety of soil characteristics related to its constructional or agronomic qualities. Field operations are also supported by agronomic research into the prevention and control of erosion.

In seeking to make the community aware of the problems associated with soil erosion and what can be done to check them, the Authority encourages and conducts educational excursions for schools, universities, and colleges; appraises the economics of soil conservation and land-use practices; and organises field days, competitions, and exhibits for farmers. As a further service, in association with the Victorian Education Department, the Authority prepares teacher and class project materials and guides for field excursions on soil conservation related to secondary school syllabuses.

The Authority provides assistance to encourage landholders to participate in approved erosion control schemes and to adopt soil conservation management practices. Grants are provided towards the cost of approved works and long-term loans are provided for extensive soil and water conservation programmes.

Further references: Destruction of vermin and noxious weeds, *Victorian Year Book* 1963, pp. 491-2; Soil, land-use, and ecological surveys, 1966, pp. 465-6; Group conservation, 1969, pp. 295-6; Land Utilization Advisory Council, 1975, pp. 288-9; 1978, pp. 41-3; Dryland farming and land restoration, 1979, pp. 31-2; Dry salting in Victoria, 1980, pp. 41-3.

Port Phillip Authority

The Port Phillip Authority was established in 1966 to advise the Victorian Government on methods of co-ordinating development within, and preserving and improving the condition of, the Port Phillip area. This area is defined as a belt of public land 200 metres to 800 metres wide; and the inshore waters and seabed approximately 600 metres wide around the coastline of Victoria from Barwon Heads in the west to Cape Schanck in the east, including Port Phillip Bay.

Around this coastline live two-thirds of the population of the State, and in very hot weather crowds of up to 300,000 persons can be expected to visit its many beaches. Besides its recreational importance Port Phillip Bay provides this population with some of its food, many of its commercial facilities, and the two main ports of Melbourne and Geelong through which the largest proportion of Victoria's sea trade is conducted.

The government agencies having representatives on the Authority are the Town and Country Planning Board, Public Works Department, Soil Conservation Authority, and the Department of Crown Lands and Survey. Attached to the Authority is a Consultative Committee which comprises representatives from the Department of State Development, Decentralization and Tourism, Municipal Association of Victoria (four councillors), State Rivers and Water Supply Commission, Department of Police and Emergency Services, Melbourne and Metropolitan Board of Works, Fisheries and Wildlife Division, and two persons nominated by the Minister representing other interests.

The Authority exercises an overview of all developments within its area. No structures can be erected or works commenced without its consent. Its approach to granting consent is based on the criteria of permitting those activities which must be located near the shoreline. The Port Phillip Coastal Study was based on a concept by the Port Phillip Authority and aims to provide the Minister for Conservation with a set of comprehensive coastal management guidelines. Segments of the coastline are allocated for recreation of high, medium, and low intensities, for nature conservation, for ports; and some segments are left unallocated to meet future demands. The Authority permits activities appropriate to these designations to occur to varying extents. Further to this, a strategy has been prepared which aims to rationalise the provision of boating facilities around the bay.

The Authority has been producing a series of coastal feature maps of Port Phillip Bay. They are detailed maps depicting the geographical features of the foreshore, status of the land, vegetation growth, man-made structures, car parks, sporting areas, etc. An 80 page *Topography and Vegetation Inventory* has been completed. Cross-sections of all the main areas around the Bay have been taken and their topography and vegetation detailed in a legend form.

A number of studies aimed at providing data from which guidelines can be determined for the optimum use and enjoyment of the coastline have been undertaken. The subjects covered include existing facilities; beach use; beach population; attitudes to the foreshore; vegetation of the Port Phillip Bay; and shoreline unit classifications. A number of booklets and pamphlets of an informative nature have been produced for general public information. They deal with areas of the foreshore, as well as aspects of use of the Bay such as boating safety.

The Authority operates a coastal plant nursery at "Seawinds", Dromana, where coastal species indigenous to the Port Phillip region are propagated and grown. They are available to Committees of Management, conservation groups, and other bodies dealing with foreshore land. The Authority's Coastal Vegetation Service provides advice on aspects of vegetation management and landscaping.

Further references: Port Phillip Bay Environmental Study, *Victorian Year Book* 1975, pp. 48-50, p. 382; Western Port Bay Environmental Study, 1975, pp. 50-1; Gippsland Lakes Environmental Study, 1975, P. 51; 1980, pp. 43-4

National Parks Service

Recent legislation and existing parks

In December 1978, the *National Parks Act* 1978 was passed by the Victorian Parliament. The effect of the new legislation has been to increase the area included under the National Parks Act to approximately 775,000 hectares—almost three times the area previously included under the Act. The Act came into force on 26 April 1979, but some of the new parks were declared from 26 April 1980.

New parks

Four new national parks were declared on 26 April 1979. These are Croajingalong (86,000 hectares), Snowy River (26,000 hectares), Tingaringy (18,000 hectares), and Baw Baw (13,000 hectares). At the same time, a number of other parks came under the Service's control, including the Big Desert Wilderness (113,500 hectares) and Coopracambra State Park (14,500 hectares).

A feature of these new parks is that this is the first time parks in Victoria adjoin parks across the borders of New South Wales and South Australia. On the New South Wales border, Croajingalong National Park links with the Nadgee Nature Reserve, Coopracambra State Park links with Nungatta National Park, and Tingaringy National Park links with Kosciusko National Park. On the South Australian border, the Big Desert Wilderness links with the Scorpion Springs and Mt Shaugh conservation parks.

Another feature is the considerable length of coastline brought under the National Parks Act. The three coastal parks (Discovery Bay, Cape Schanck, and Gippsland Lakes) and three national parks (Port Campbell, Wilsons Promontory, and Croajingalong) cover approximately one-third of Victoria's coastline.

On 26 April 1980, seven further new parks were declared. These are the Chiltern, Eildon, and Wabonga Plateau State Parks, Lake Albacutya, Murray-Kulkyne and Yea River Parks, and Beechworth Historic Park. In addition, three existing national parks—Kinglake, Mt Buffalo, and Hattah Lakes — were significantly enlarged, the last becoming the Hattah-Kulkyne National Park.

Several of these new areas are not in an unspoiled natural state, and long-term programmes of vermin eradication and weed and erosion control will be needed to restore them. The latest additions bring the area of land managed by the National Parks Service to 774,559 hectares, which is 8.5 per cent of the State's public land, and 3.4 per cent of the total area of the State.

Areas other than national parks managed by the National Parks Service

Most Victorians are familiar with their State's established national parks, such as Mt Buffalo, Port Campbell, and Wilsons Promontory. But far fewer are aware that as well as the 27 national parks in Victoria there are also 30 other areas throughout the State managed by the National Parks Service, and that these "other parks" offer scenic, historical, and educational values, a wealth of flora and fauna, and a wide variety of opportunities for recreation.

Twenty-four national parks were established in Victoria at intervals between 1898 and 1970, generally as a result of the interest and enthusiasm of local groups, often of field naturalists. Some were small, such as Bulga, declared in 1904 with an area of only 20 hectares, and others large, like the 9,583 hectare Wyperfeld National Park, permanently reserved in 1921 and later enlarged; but all were given the name "national park" as an indication that they were areas to be preserved undisturbed as examples of the nation's natural heritage.

With the growing interest in conservation in the 1960s came the realisation that national parks had to be large to be effective in protecting habitats and plant and animal species. A

meeting of State conservation ministers in 1970 agreed to formally define a national park as "a relatively large area set aside for its features of predominantly unspoiled landscape, flora, and fauna, permanently dedicated for public enjoyment, education, and inspiration, and protected from all interferences other than essential management practices so that its natural attributes are preserved". The United Nations has stated that 10,000 hectares is the minimum acceptable size for a national park.

Based on these criteria, many of Victoria's existing national parks do not qualify as such, but as their names were laid down in legislation and had become widely accepted, it was thought undesirable to change them.

The National Parks Service was given authority to manage areas other than national parks by the *National Parks Act 1975*, which retained the concept of the traditional national park, but in addition made it a responsibility of the Service to manage in an appropriate manner other types of parks where recreation, education, preservation of historic features, or some other activity may be the primary use, rather than conservation of the natural environment as in national parks. However, nature conservation in these parks is usually one of the main objectives.

Schedule Three of the *National Parks Act 1975* made provision for Victoria's first "other parks", Warrandyte State Park and Cape Schanck Coastal Park. Now, fifteen State parks, ranging from the 50,700 hectare Pink Lakes State Park in the Mallee to Melba Gully State Park in the Otways, only 48 hectares in size, and two coastal parks (Discovery Bay and Gippsland Lakes) are managed by the Service. Other areas which have also come under National Parks Service management in the last five years are the Big Desert Wilderness (Victoria's first officially designated wilderness and its largest park); Steiglitz and Beechworth Historic Parks, which comprise Crown land areas containing historic features around the two towns; "Seawinds" and "Pirianda", two ornamental gardens; and Haining Farm, an operating dairy farm at Launching Place, which is open for school visits, and has become very popular as an excursion destination.

Victoria's new diversified system of parks, still developing as the Land Conservation Council continues its work, will cater for both conservation and recreation needs in the years to come. The National Parks Service, which has grown considerably in the past decade, is planning and developing the parks with both these needs in mind.

VICTORIA—PARKS UNDER THE CONTROL OF THE NATIONAL PARKS SERVICE, MAY 1980

National parks	Area	Other parks (a)	Area
	(hectares)		(hectares)
1. Alfred	2,300	1. Beechworth H.P.	1,130
2. Baw Baw	13,300	2. Big Desert Wilderness	113,500
3. Brisbane Ranges	7,470	3. Cape Nelson S.P.	210
4. Bulga	80	4. Cape Schanck C.P.	1,075
5. Burrowa-Pine Mountain	17,300	5. Cathedral Range S.P.	3,570
6. Churchill	193	6. Chiltern S.P.	4,250
7. Croajingalong	86,000	7. Coopracambra S.P.	14,500
8. Fern Tree Gully	459	8. Discovery Bay C.P.	8,450
9. Fraser	3,750	9. Eildon S.P.	24,000
10. Glenaladale	183	10. Gellibrand Hill P.	(b) 266
11. Hattah-Kulkyne	48,000	11. Gippsland Lakes C.P.	15,500
12. Kinglake	11,270	12. Haining Farm	64
13. The Lakes	2,380	13. Holey Plains S.P.	10,450
14. Lind	1,166	14. Lake Albacutya P.	10,700
15. Little Desert	35,300	15. Langwarrin	(b) 206
16. Lower Glenelg	27,300	16. Lysterfield	(b) 1,216
17. Morwell	140	17. Melba Gully S.P.	48
18. Mt Buffalo	31,000	18. Mt Samaria S.P.	7,600
19. Mt Eccles	400	19. Mt Worth S.P.	423
20. Mt Richmond	1,707	20. Murray-Kulkyne P.	1,550
21. Organ Pipes	85	21. Nepean S.P.	1,050
22. Port Campbell	700	22. Nyerimilang	(b) 176
23. Snowy River	26,000	23. Pink Lakes S.P.	50,700
24. Tingaringy	18,000	24. Pirianda Garden	(b) 11

VICTORIA—PARKS UNDER THE CONTROL OF THE
NATIONAL PARKS SERVICE, MAY 1980—*continued*

National parks	Area	Other parks (a)	Area
	(hectares)		(hectares)
25. Tarra Valley	140	25. Steiglitz H.P.	655
26. Wilsons Promontory	49,000	26. Wabonga Plateau S.P.	17,600
27. Wyperfeld	100,000	27. Warby Ranges S.P.	2,821
		28. Warrandyte S.P.	218
		29. Werribee Gorge S.P.	375
		30. Yea River P.	220
		Miscellaneous areas (mainly purchased lands)	1,630
Total national parks	483,623	Total other parks	294,164

(a) C.P. = Coastal Park; H.P. = Historic Park; P = Park; S.P. = State Park.

(b) Managed by National Parks Service but not declared under the National Parks Act.

A special article on national parks in Victoria, supported by photographs and a map, appears on pages 1-35 of the *Victorian Year Book 1975*.

Further reference: *Victorian Year Book 1980*, pp. 44-6

ROYAL BOTANIC GARDENS AND NATIONAL HERBARIUM

The Royal Botanic Gardens and National Herbarium form a Division of the Department of Crown Lands and Survey.

The Gardens were established on the present site in 1846 and now occupy 36 hectares approximately 2 kilometres from the centre of Melbourne. They contain a reference collection of plants from all over the world which are used for scientific, educational, and pleasure purposes, and are beautiful examples of the English landscape tradition of the eighteenth and nineteenth centuries.

The basic landscaping was carried out by W.R. Guilfoyle in his period as Director from 1873 to 1909. Baron von Mueller, his predecessor, was responsible for the importation of much of the plant material used by Guilfoyle. Mueller, who was Government Botanist for 43 years prior to his death in 1896, was also responsible for the establishment of the National Herbarium. The collection of dried and pressed plant specimens, the largest in the southern hemisphere, contains over 1 million sheets including many of the specimens collected on early historic exploratory journeys. Associated with the herbarium is an archival library of taxonomic and horticultural material.

The Gardens, with the Herbarium, form a resource for scientific, educational, legal, horticultural, and recreational purposes for which there is an ever increasing demand.

In addition to the main gardens in Melbourne, is the native plant garden at Cranbourne to the south-east of Melbourne, and the mansion gardens of Werribee Park to the south-west of Melbourne.

Cranbourne Annexe

The Cranbourne Annexe of the Royal Botanic Gardens was purchased in 1970 from the Commonwealth Government. The initial area of 160 hectares was enlarged in 1977 by the purchase of 22 hectares on the southern boundary. Included in this area was a section that had been sand mined which threatened the viability of the annexe.

Apart from the past sand mining and limited military use, the area has remained in a near natural state of the original heathland that characterised parts of the Mornington Peninsula and served as the habitat for many faunal species, including the rare New Holland Mouse.

A report on the area of the Annexe, released in 1979 by the Ministry for Planning, has recognised that the area is the largest remaining area of acid sand heathland close to Melbourne and is an important asset to the State of Victoria, deserving the utmost care in its development and management under the provisions of section 8A of the Third Schedule to the *Town and Country Planning Act 1961*. The report also recommended the acquisition of the adjacent small area of the last remaining flat clay soils that support

Eucalyptus radiata woodland, with native grass understorey, orchids, and other plants that were cleared for agricultural development over most of the Mornington Peninsula.

In order to understand fully and document the ecology of this reserve, postgraduate research by students from the Faculty of Science at Monash University has been encouraged. As a result, a number of botanists and zoologists have published their findings in journals of international standing.

Up to date, development of the Annexe has been confined to the north-west corner where 1,600 plants representing 362 Australian species have been planted by the Royal Botanic Gardens by October 1979. Losses have been low at some 10 per cent. Specialist societies have provided valuable collections of *Banksias* and orchids, and it is planned to establish national collections of *Acacia*, *Banksia*, *Casuarina*, and Conifers at the Annexe.

One of the major prerequisites for success of this project is constant supervision. A house has been constructed to accommodate a senior gardener, and work is proceeding on the installation of water reticulation and a reservoir to supply the north-western area.

Further references: *Victorian Year Book*, 1979, pp. 706-7; *Illustrated flora of Victoria*, 1979, p. 36; *Werribee Park*, 1980, pp. 47-8

ZOOLOGICAL BOARD OF VICTORIA

Royal Melbourne Zoological Gardens

In 1857, a Society known as the Zoological Society of Victoria was formed and this led to the Royal Melbourne Zoological Gardens being the first to be established in Australia. The original site of the Zoological Gardens was known as Richmond Paddock, and was located opposite the Botanic Gardens, on the Yarra River. The collection was moved to the present site of 22 hectares in 1862.

In 1910, the Society, which had been incorporated with the Acclimatisation Society, was granted a Royal Charter, and became known as the Royal Zoological and Acclimatisation Society of Victoria. This Society controlled the Zoological Gardens until 1937, when the Victorian Government assumed responsibility for the administration of the Gardens through the Zoological Board of Victoria. The responsibility for ministerial jurisdiction of the Zoo was transferred from the Chief Secretary's Department to the Ministry for Conservation from 1 June 1973.

A reconstruction programme for the Zoological Gardens commenced in 1965 and embraced all aspects of animal exhibition, essential services, catering, and gardens beautification. The most recent projects are an Arboreal Primate Exhibit; a Platypus Exhibit where Australia's most unique mammal can be viewed inside through glass and outside in a Billabong setting; the Great Flight Aviary (the longest in the world) in which birds of three distinct Australian habitats can be seen in a background of appropriate plants; and Bushland, a fauna park for native birds and mammals.

In 1969, the Zoological Board of Victoria established an education service with the appointment of a trainee education officer. The following year a teacher was seconded to the Zoo on a half-time basis from the Victorian Education Department. There was such a substantial demand for lessons in the Zoo during 1970 that the next year a teaching staff of four full-time and three half-time teachers was seconded from the Education Department. The Zoological Board provided office space and appointed a full-time administrative officer to the Service. By 1977, the total teaching and administrative staff in the Zoo's Education Division had risen to fifteen, including a teacher experienced in handling handicapped children. The Board, through the generosity of donations from industry, community service groups, and foundations, had by this time also provided four classrooms, as well as a building specially equipped for handicapped children.

In 1977, a major step forward in the Zoo's education programme was the completion of an Education Resource Centre, achieved by reconstructing the former tea rooms. The old world charm of its exterior was retained while the interior was completely altered to permit comfortable teacher accommodation to be combined with modern resource capabilities and meeting rooms for kindred institutions.

On 6 October 1977, 120 years following the first meeting of the then Zoological Society, the Gardens received the Royal prefix, and became known as The Royal Melbourne Zoological Gardens.

Werribee Zoological Park

In 1975, the Board was given powers to manage areas other than the Melbourne Zoological Gardens, and this applied in particular to the Werribee Zoological Park, a rural area of 120 hectares, which formed part of an estate purchased by the Victorian Government in 1973 to preserve the area and the historic home on the site. The development of Werribee Zoological Park, predominantly for hoofed mammals, Australian animals, and water-birds, commenced in 1975. A conceptual master plan was prepared in 1978 with particular emphasis on visitor movement, relevance of existing buildings, the types of enclosures required, and educational opportunities.

Sir Colin MacKenzie Fauna Park

At the foothills of the Great Dividing Range, about five kilometres south of Healesville and about 65 kilometres north-east of Melbourne, is the Sir Colin MacKenzie Fauna Park. The Park occupies 173 hectares of timbered country with tall native trees, chiefly eucalypts, and smaller shrubs. In 31 hectares of this area the public can move quite freely among many of the animals. The remaining 142 hectares are kept as a permanent reminder of the original appearance of the countryside. This part is called the Coranderrk Bushland. It was once part of the old Coranderrk Aboriginal Reserve, where members of the diminishing Yarra Yarra tribe were housed by former governments.

The Aborigines who lived in the area before the arrival of European settlers were led by "King" Barak. They called the valley through which Badger Creek flows and the mountain from which it rises Coranderrk. This name was given by them to a plant which flourished over the whole area and which always flowered there early in summer.

The Fauna Park was established in 1922 as a research station by Dr Colin MacKenzie, an anatomist from Melbourne. He studied the arrangement of the bones, particularly in the front legs of Australian animals and found a way of making special splints to help children who had infantile paralysis.

When Sir Colin went to Canberra in 1928 to become the first Director of the Australian Institute of Anatomy, all the animals and cages at Healesville became part of a public reserve where visitors could go and picnic and see the animals. In 1944, the Victorian Government, realising the importance of this area as a sanctuary for scientists and tourists, appointed a small committee to manage it. In 1978, this Committee was replaced by the Zoological Board of Victoria.

NATIONAL MUSEUM OF VICTORIA

The National Museum of Victoria was founded in 1854 and is constituted by an Act of Parliament, the *National Museum of Victoria Council Act 1970*. The control and management of the museum is vested in the National Museum of Victoria Council, a body corporate responsible to the Minister for the Arts for the State of Victoria. Staff are appointed under the *Victoria Public Service Act 1974*.

Soon after it was founded, the Museum was established at the University of Melbourne with a subsequent move, in 1899, to the current premises in Russell Street. The Museum is a centre for scholarship and research in the fields of natural history (zoology and geology) and anthropology, and for education in these fields. It also functions, under the Act, as the repository for the State collections of natural history, ethnological, and archaeological specimens. The collections provide the basic materials for both the research and education activities of the Museum.

Collections

Through the efforts of its staff and the generosity of Victorians, the National Museum of Victoria has amassed collections of major international standing during its 126 years of activity.

These collections include millions of zoological and geological specimens and over 100,000 human artefacts. Although the emphasis is on the natural history and anthropology of Victoria and the south-eastern corner of Australia, the collections include a great deal of material from other parts of Australia and from other countries. The

collections of Australian and Oceanic ethnology are particularly significant, ranking among the finest in the world.

The collections form a valuable resource for scientific study. The records associated with the specimens form a "data base" of zoological, geological, and anthropological information which may be used in many ways in the service of the community. The collections are also a vast source of material which may be used in exhibitions and other ways to inform and inspire the public about Australian wildlife, geological history, and the cultural achievements and life-styles of the peoples of the region.

Research

Research in the National Museum is principally collection-orientated. In Zoology, most research concerns the classification, distribution, evolution, and descriptive ecology of Australian fauna. It includes environmental surveys on behalf of other Victorian organisations in terrestrial, inland water, and marine environments. Palaeontologists in the Division of Geology study the taxonomy and distribution of fossil species giving a time dimension to the understanding of the Australian fauna and environment. In mineralogy and petrology, the main objective is to record and describe systematically the minerals and rocks of the region. In Anthropology, the emphasis is on material culture of Aboriginal and Oceanic societies.

Although research emphasis is given to the natural history and anthropology of south-eastern Australia, the study of comparative material from elsewhere is generally necessary to keep the results in scientific context.

Research results by staff are published in professional journals throughout the world and in the Museum's own journal entitled *Memoirs of the National Museum of Victoria* (which is also available to other scientists who have studied material in the Museum's collections or matters of interest to the Museum).

Education

The National Museum plays a diverse role in public education. The "schools programme" is run by teachers seconded from the State Education Department and the Catholic Schools System. During the school year, classes attend the Museum and are instructed by the teachers in the exhibition galleries and in special teaching facilities. In addition, many children visit the Museum supervised by their own class teachers assisted by written material produced in the Museum's Education Office.

Public gallery exhibitions of specimens from the collections, put into environmental, cultural, or other context, tell of the wildlife and geological history of the region and of the life-styles and material cultures of the peoples inhabiting it from pre-historic times to the present. Although the exhibitions at present are often old-fashioned and limited in scope, the National Museum has enormous potential to provide a quality exhibitions programme because of its possession of such extensive historic collections. A long-term exhibitions development programme is now under way.

A modern museum can be a place where learning is fun and entertaining, where persons can participate in activities as well as observe and enjoy beautiful and interesting items exhibited in glass cases. Given the limitations of the existing building this is difficult to achieve in the National Museum. But plans are under way for a new building where the people of Victoria may enjoy a museum service appropriate to the extraordinary richness of the scientific and cultural collections they have inherited.

Friends of the National Museum Society

In 1979, through initiatives from the public and with support of the National Museum of Victoria Council, the Friends of the National Museum Society was established. By the end of that year there were over 800 members. The Society has an ongoing active programme of lectures, films, field-trips, workshops, and social events. The objectives of the Society are to lend its support to the re-development of the Museum and stimulate contact between the Museum and the public.

Further reference: *Victorian Year Book* 1980, pp. 48-9; *Victorian Institute of Marine Sciences*, 1980, pp. 49-50

PHYSICAL FEATURES

Boundaries and areas

Creation of Victoria

The boundaries of the Port Phillip District of New South Wales were defined in *Imperial Act 5 & 6 Victoriae* c.76 of 30 July 1842 ("An Act for the Government of New South Wales and Van Diemen's Land") as follows:

'... the Boundary of the District of Port Phillip on the North and North-east shall be a straight Line drawn from Cape Howe to the nearest Source of the River Murray, and thence the Course of that River to the Eastern Boundary of the Province of South Australia.'

Previously, by *Imperial Act 4 & 5 William IV* c.95 of 15 August 1834, *Letters Patent* of about 19 February 1836, and *Imperial Act 1 & 2 Victoriae* c.60 of 31 July 1838, the eastern boundary of the Province of South Australia was fixed as '... the One hundred and forty-first Degree of East Longitude ...'.

By *Imperial Act 13 & 14 Victoriae* c.59 of 5 August 1850 ("An Act for the better Government of Her Majesty's Australian Colonies"), the District of Port Phillip was granted the right to separate from New South Wales.

Boundaries

On 2 May 1851, The Victoria Electoral Act of 1851 was passed (*New South Wales Act 14 Victoria* No. 47) which provided for the division of the Colony of Victoria into electoral districts. A schedule to the Act set forth the boundaries of the electoral districts, being based on the boundaries of the counties then in existence. Those boundaries of the electoral districts which formed the boundaries of Victoria were described as:

'a line running in a westerly direction from Cape Howe to the source of the nearest tributary of the Murray';

'the River Murray';

'the South Australian frontier';

'the 141st meridian being the line dividing the Colony of New South Wales from South Australia';

'the sea';

'the sea shore';

'the sea coast';

'including the Lawrence and Lady Julia Percy's Islands';

'including all the islands at Port Fairy';

'Port Phillip Bay';

'the shores of Port Phillip Bay';

'the waters of Port Phillip';

'including the small islands near the channels at the mouth of Port Phillip and those of Geelong Bay';

'including French and Phillip Islands and the small islands in Western Port Bay'.

Writs for the election of a Legislative Council in Victoria were issued on 1 July 1851, thereby establishing the Colony of Victoria.

Murray River

The separation of Victoria from New South Wales in 1851, and the successful navigation of the Murray by steam vessels, encouraged widespread evasion of New South Wales customs duties on articles taken across from Victoria and South Australia. The question arose as to which Colony had jurisdiction over the waters of the Murray River. The position was determined by the New South Wales Constitution Statute (*Imperial Act 18 & 19 Victoriae* c.54 of 16 July 1855), which decreed that the whole watercourse of the Murray River from its source to the eastern boundary of the Colony of South Australia was thereafter to be within the Territory of New South Wales, thus fixing the left bank as the boundary between Victoria and New South Wales.

In May 1980, the High Court of Australia clarified the situation further by ruling that the northern boundary of Victoria followed the top of the southern (left) bank of the Murray River, all territory to the north being within New South Wales.

Cape Howe to the Murray River

In 1866, following the discovery of gold on the tributaries of the Snowy River near where the boundary was thought to be, it became evident that the remaining portion of the New South Wales-Victoria boundary should be marked on the ground. A definitive point at Cape Howe was agreed upon by the two colonies following an on-site conference between the New South Wales Surveyor General (P. F. Adams) and the Victorian Government Astronomer and Superintendent of Geodetic Survey (R. L. J. Ellery). This point was marked and named Conference Point.

Late in 1869, Alexander Black, a Victorian geodetic surveyor, was directed to determine the headwaters of the Murray River. These he identified as a certain spring near Forest Hill. Black then proceeded to clear and mark the western portion of the boundary while another Victorian geodetic surveyor, Alexander C. Allan, marked the eastern portion. The marking was completed in early 1872 and the line, which extended some 115 kilometres through extremely rugged country, passed within 5.6 metres of the provisionally established Conference Point.

The official technical description of the boundary gave as the initial azimuth $116^{\circ} 58'09'' .42$ from the spring to Station No. 1 on Forest Hill (452.6 metres away), while from a point on the coast at Cape Howe, 176,492.1 metres from the spring, the azimuth of the same line extending out to sea was given as $115^{\circ} 53'41'' .36$ to a point distant one league (5.56 kilometres) from high water line at Cape Howe.

The total length of the New South Wales boundary including the Murray River is about 2,050 kilometres.

Victoria-South Australia border

The boundary between South Australia and Victoria has had an interesting history, involving heroic work by surveyors and later much litigation between the colonies which culminated in an appeal to the Privy Council.

Prior to the creation of the Province of South Australia, New South Wales covered all of the mainland of Australia as far west as the 135° east meridian. South Australia was established in the 1830s, the boundaries being '... on the North the Twenty-sixth Degree of South Latitude, on the South the Southern Ocean, . . . , and on the East the One hundred and forty-first Degree of East Longitude . . .'. Thus the western boundary of New South Wales between the 26° south parallel and the coast was defined by the 141° east meridian.

By the late 1830s, it had become apparent that the south-eastern corner of South Australia would need to be located and marked on the ground, as the Hentys of Portland Bay had extended their pastoral activities over the Glenelg River to Mount Gambier and there were disputes as to which Government (South Australia or New South Wales) had jurisdiction there.

Late in 1846, surveyors Henry Wade from New South Wales and Edward R. White from South Australia commenced the marking of the 141° east meridian. Their starting point was some 2 kilometres west of the Glenelg River which had previously been determined to be the most likely position of the meridian. In July 1847, after completing 198 kilometres of the boundary, the party was forced to discontinue the survey due to sickness. Subsequently both colonies issued proclamations adopting the boundary as marked. Surveyor White was requested to proceed with the survey and in December 1850 reached the Murray River after suffering months of overwhelming privations which contributed to his early death.

Doubts about the accuracy of the determination of the 141° east meridian (upon which Wade's and White's surveys were based) were expressed in the 1840s and grew in the 1850s, but no action was taken until the late 1860s. Although there was no conclusive evidence, the Governments of South Australia and New South Wales were agreed that it was desirable to verify the longitude of the line marked by Wade and White, before proceeding with the marking of the boundary between those two colonies north of the Murray River.

There was reason to believe that a more accurate location of the 141° east meridian could be established. Since the determinations of the position of the 141° east meridian near the coast between 1839 and 1845 there had been increases in scientific knowledge, larger and more accurate instruments were available, and the electric telegraph had been developed. Furthermore, as the result of the appointment of government astronomers in Sydney and Melbourne, there were more accurate values for the longitudes of these cities. In May 1868, a temporary observatory was established at Chowilla and as a result of precise observations, and with the aid of the newly developed electric telegraph, George Smalley, New South Wales Government Astronomer, and Charles Todd, South Australian Superintendent of Telegraphs, determined the 141° east meridian to be approximately 3.60 kilometres east of the boundary marked by White.

After many years of vain efforts asking Victoria to relinquish the land between the marked boundary and the more accurately determined 141° east meridian, the South Australian Government in 1911 appealed to the High Court of Australia. When this appeal failed, it appealed to the Privy Council which ruled in favour of Victoria in 1914. Thus ended the dispute; the boundary as marked, approximating to a longitude of 140° 58' east, was confirmed as the State boundary.

There remains the question of the location of the border in the far north-western corner of Victoria, along the Murray downstream from the 141° meridian (as determined by Smalley and Todd) to Wade and White's line. The length of this section of the river is about 10 kilometres with Victoria to the south and South Australia to the north of the river.

Recent legal opinion suggests that ordinary common law principles would apply; consequently, the boundary is presumably the centre thread of the Murray as at 1842 (as modified by slow and imperceptible natural changes in its course since then).

Offshore boundaries

The *Imperial Act 13 & 14 Victoriae c.59* of 5 August 1850 which separated the Colony of Victoria from New South Wales described only the land boundaries of the new Colony; no southern boundary was defined. However, the northern boundary of Van Diemen's Land (Tasmania) was defined in 1825 as the latitude 39° 12' south and this has generally been accepted as the southern limit of Victoria's jurisdiction. It lies about 7 kilometres south of Wilsons Promontory. The lateral offshore boundaries between Victoria and the adjoining mainland States have not been defined.

In 1973, the Commonwealth Government passed the *Seas and Submerged Lands Act 1973* (No. 161), and it received the Royal Assent on 4 December 1973. The Act declares that the sovereignty in respect of the territorial sea of Australia, and in respect of the air space over it and in respect of its bed and subsoil, is vested in and exercisable by the Crown in right of the Commonwealth. The Act gives the Governor-General power to proclaim the breadth of the territorial sea, and the power to proclaim the baseline from which the breadth of the territorial sea is to be measured. The Act declares that the sovereignty in respect of the internal waters of Australia (that is to say, any waters of the sea on the landward side of the baseline of the territorial sea) not within the limits of a State, and in respect of the airspace over those waters and in respect of the sea-bed and subsoil beneath those waters, is vested in and exercisable by the Crown in right of the Commonwealth.

Baselines from which the territorial sea is to be measured are delimited according to procedures spelt out by the Convention on the Territorial Sea and the Contiguous Zone which was signed at Geneva on 29 April 1958, and under which Australia has obligations under international law.

The six Australian States challenged the validity of the *Seas and Submerged Lands Act* in the High Court of Australia, but in the decision handed down on 17 December 1975, the High Court dismissed all actions thereby confirming that, broadly speaking, the sovereignty of the Crown in right of the States extends only to low-water line. This applies both to the mainland and to islands off the coast which belong to the State, which in the case of Victoria would probably mean all islands between 140° 58' and 149° 58' east longitude (approximately) to the north of 39° 12' south latitude.

Depth

Although no depth limitation for Victoria was given in the Imperial Statutes defining the boundaries of Victoria, it has always been accepted that the Crown has sovereignty to the centre of the earth. The Land Act of 1891 imposed a depth limit in new Crown grants and, since 8 August 1892, 99 per cent of Crown grants issued have been limited to the surface and down to a depth of 15.24 metres below the surface. Since 3 July 1973, the depth limitation for new Crown grants has been 15 metres. A well or spring to obtain water from the ground is not necessarily subject to the depth limitation imposed in the Crown grant.

The exceptions to the 15 metres depth limitation on freehold tenure are:

- (1) In areas close to coal mines, gravel deposits, etc., where the depth limits were fixed in 1909 at 7.62 metres, sometimes 6.10 metres, or 9.14 metres — e.g., Wonthaggi, Kirrak, Korumburra, Woolamai, and Tarwin. Crown grants issued since 3 July 1973 in Wonthaggi and Kirrak are to be the same as elsewhere, namely 15 metres;
- (2) on sites for buildings with deep foundations, e.g., 30 metres, 60 metres;
- (3) some land at Morwell and Churchill — 305 metres; and
- (4) lands vested in the Commonwealth. The depth limitation is usually 76 metres (occasionally 15 metres) but by sections 8 and 10 of the *Lands Acquisition Act 1955-1973*, the Commonwealth can compulsorily acquire Crown lands to unlimited depth, thus implying that the State of Victoria extends to the centre of the earth.

Height

Although no height limitation for Victorian territory was given in the Imperial Statutes defining the boundaries of Victoria, it has generally been accepted that the Crown has complete and exclusive sovereignty over the air space above its territories.

The Convention on Civil Aviation of 1944 (the Chicago Convention), to which Australia was a party, recognises that every contracting State has complete and exclusive jurisdiction over the air space above its territory. Territory is defined for the purposes of the Convention as being the land areas and territorial waters adjacent thereto under the sovereignty of the contracting State.

The Commonwealth Parliament has the constitutional power to legislate to give effect to the Chicago Convention and in relation to air navigation with respect to trade and commerce with other countries and among the Australian States.

The Victorian Parliament has power to make laws relating to the control and use of the air space above its territory which are not inconsistent with laws made by the Commonwealth Parliament on the matter.

In pursuance of its constitutional powers the Commonwealth Parliament has passed legislation regulating air navigation within the air space over the whole of Australia. The Victorian Parliament has passed the Air Navigation Act of 1958 which provides that the Air Navigation Regulations made under the Commonwealth Air Navigation Act, to the extent that they do not apply to the air space over Victoria of their own force, apply to air navigation within that air space as Victorian law.

Geographic position and area

The most southerly point of Wilsons Promontory, in latitude 39° 08' S., longitude 146° 22½' E., is the southernmost point of the mainland of Victoria and similarly of the mainland of Australia; the northernmost point is where the western boundary of the State meets the Murray, latitude 33° 59' S., longitude 140° 58' E.; the point furthest east is Cape Howe, situated in latitude 37° 31' S., longitude 149° 58' E. The westerly boundary lies upon the meridian 140° 58' E., and extends from latitude 33° 59' S. to latitude 38° 04' S.—a distance of 451 kilometres.

Victoria covers an area of about 227,600 square kilometres. It is therefore slightly smaller than Great Britain which (if inland water is included) contains 229,900 square kilometres.

The following table shows the area of Victoria in relation to that of Australia, the other States, and mainland Territories:

AUSTRALIA—AREA OF STATES AND TERRITORIES

State or Territory	Area	Percentage of total area
	square kilometres	
Western Australia	2,525,500	32.88
Queensland	1,727,200	22.48
Northern Territory	1,346,200	17.52
South Australia	984,000	12.81
New South Wales	801,600	10.44
Victoria	227,600	2.96
Tasmania	67,800	0.88
Australian Capital Territory	2,400	0.03
Australia	7,682,300	100.00

Mountain areas

A wedge of mountainous country extends across Victoria; it tapers from the high peaks of the north-east and far east of the State to the western limits of the highlands at the lower Dundas Tableland near the South Australian border. This belt of high country, which includes the Great Dividing Range, separates the Northern, Wimmera, and Mallee Plains from the plains and uplands of the coastal areas and forms the watershed dividing the northern flowing tributaries of the Murray River from the southern flowing streams. Further information on the Great Dividing Range in Victoria can be found in Chapter 1 of the 1980 edition of the *Victorian Year Book*.

Considerable physiographic and geological variation occurs in the highlands with granitic intrusives, volcanic complexes, and sedimentary, metamorphic, and tectonic structures all in evidence. Broad plateaux, high plains, and extensive ridge and valley terrain are the chief topographic characteristics with only occasional high peaks and deep gorges occurring. A broad low pass to the north of Melbourne (the Kilmore Gap) provides an easy route across the highlands and this is utilised by the major road and rail links to the north. The Kilmore Gap provides a convenient reference point at which to divide the highlands into eastern and western sections.

Eastern section

The highlands of eastern Victoria consist of strongly dissected and steeply sloping forested country with narrow ridges and deep V-shaped valleys. The area which includes the highest peaks is contiguous with the Kosciusko massif in New South Wales, but the Victorian mountains lack the clear evidence of past glacial activity that can be found in limited areas of Kosciusko. Frost weathering has been intensive at higher elevations and some spectacular accumulations of weathered rock occur as block streams or rock rivers such as at Mt Wombargo near the headwaters of the Murray River.

The high country is not typically alpine in character: sharpened peaks and precipitous bluffs are rare, although the Cobberas, The Bluff, and the Mt Buffalo gorge all have impressive cliffs. One distinctive feature of the generally dissected mountain landscape is the High Plains country. Flat to gently undulating topography at elevations of 1,300 metres and above occurs, for example, as the Nunniong, Bogong, and Dargo High Plains, and the High Plains of the Snowy Range. These plains are remnants or residuals of formerly more extensive upland surfaces and include many different rock types—the basalts of the Bogong and Dargo High Plains being two of the best known.

Although snow capped for the winter season with a snow line at about 1,000 metres, even the highest peaks—Mt Bogong (1,986 metres) and Mt Feathertop (1,922 metres)—become free of snow in summer.

Western section

The highlands here are of much lower relief than the eastern section and in places lack the clearly defined watershed of the eastern ranges. A notable feature is the concentration of volcanic activity (Newer Volcanics) extending from just north of Melbourne to the Ballarat district in the west. Over 200 eruption points have been identified with many of

the lava flows now forming ridges which bury the pre-volcanic stream channels and give rise to auriferous deep leads (gold bearing gravels). Diversion and modification of river courses by lava flows has led to the formation of waterfalls, for example, on the Coliban River at Trentham Falls where the river runs across lava and cascades over 20 metres onto bedrock.

The following table lists some of Victoria's highest mountains:

VICTORIA—HEIGHT OF SELECTED MOUNTAINS
(metres)

Mountain	Height	Mountain	Height
Bogong	1,986	Niggerhead	1,843
Feathertop	1,922	McKay	1,843
Nelse North	1,883	Cobberas No. 1	1,838
Fainter South	1,877	Cope	1,837
Loch	1,874	Spion Kopje	1,836
Hotham	1,861	Buller	1,804

The most rugged section of highland in western Victoria is The Grampians, a series of resistant sandstone ridges etched out by differential weathering and removal of softer siltstones and shales. The highest peak, Mt William (1,167 metres), has a spectacular easterly facing escarpment and a broad plateau-like summit surface. The Grampians form a major water catchment for the Wimmera and Glenelg systems and provide recreation and wildlife preservation opportunities.

Coastline

The Victorian coastline comprises many types of environments. Broad sandy beaches and impressive cliffed headlands along the ocean coast contrast with mangrove-fringed mudflats and marshland of the sheltered embayments and estuaries. There are approximately 1,200 kilometres of ocean coast between Cape Howe and the South Australian border; in addition three large embayments—Port Phillip Bay (260 kilometres), Western Port (140 kilometres), and Corner Inlet (80 kilometres)—partially enclose protected waters and provide opportunity for port and harbour development.

Much of the ocean coast is exposed to high wave energy from strong and regular ocean swells and storm wave activity generated in the Southern Ocean. In western Victoria, swells arrive predominantly from the west and south-west, while the coastline of eastern Victoria (particularly east of Wilsons Promontory) is subject to swell from the south-east across the Tasman Sea. The shape of the long gently curving Ninety Mile Beach from Corner Inlet to Lakes Entrance is determined by wave action from this swell.

Three general coastal types may be recognised: cliffed coasts, sandy coasts, and salt marsh and swamp coasts. The most extensive cliffed section is west of Port Phillip Bay from Torquay to Warrnambool, including a zone where the Otway Ranges lie adjacent to the coastline. The sandstone rocks of the Otways generally dip seaward and form steep cliffs, commonly with a level rock bench called a shore platform lying between high and low tide marks. Intricate weathering and erosion forms develop, etching out details of rock structures in the cliffs and platforms. Along this sector, sandy beaches are rare, being confined to small embayments or river mouths and often containing a high component of gravel.

West of Cape Otway to Warrnambool and particularly from the Gellibrand River to Peterborough is a spectacular cliffed coastline cut into soft horizontally bedded limestones and clay rocks. Wave action has eroded along fractures and weaknesses in the rock to produce near-vertical cliffs up to 60 metres high and forming blowholes, arches, and isolated rock stacks. Many of these features may be observed in the Port Campbell National Park.

High cliffed sectors are formed in volcanic rocks near Portland where Cape Duquesne and Cape Bridgewater illustrate many of the features associated with volcanic explosions and lava flows. As well, the coast at Cape Schanck and the ocean coast of Phillip Island is cliffed into layers of early Tertiary lava flows. Along the Gippsland coast sandstones form high cliffs at Cape Paterson and Cape Liptrap, while the plunging cliffs of Wilsons

Promontory are of granite. Shore platforms occur in both the sandstone and the volcanic rocks but no such feature is found along the granite sectors.

Sandy beaches backed by extensive dune topography extend around Discovery Bay in far western Victoria. In many places these sand ridges are actively eroding and sand is spilling and blowing inland to cover coastal vegetation. Similar erosion is noted along the Ninety Mile Beach and on the sandy beaches and dunes further east between Lakes Entrance and Cape Howe.

Estuary and lagoon systems occur at river mouths or where embayments have been partially or wholly enclosed by sand. Rivers such as the Snowy, the Barwon, and the Glenelg have lagoons occupying their lower reaches and the river mouth may be constricted by the growth of sandy spits. These may be breached and modified by flood discharge: in the floods of early 1971 the Snowy River shifted its outlet over one kilometre to the west by breaking through the dune-capped barrier that deflects the entrance eastward of Marlo.

The Gippsland Lakes are an extensive lagoon system enclosed behind broad sandy barrier systems. In the sheltered lake waters deposits of silt and mud have accumulated among the reed swamps at the mouths of rivers to form long silt jetties or deltas. The largest of these, the Mitchell delta, and its companion at the mouth of the Tambo River are no longer extending, but are subject to erosion by wave action.

In the shallow and sheltered waters of Western Port and Corner Inlet, mangrove swamps and salt marsh form a broad coastal fringe. Creeks and channels cross the soft, sticky mud-flats exposed in front of the mangrove fringe and form intricate patterns of tidal drainage. Smaller areas of mud and mangrove occur in the estuaries of the Barwon River and the Tarwin River; in the latter, the rapid spread of an introduced, salt-tolerant plant (*Spartina anglica*) is of particular interest.

Physical divisions

The chief physical divisions of Victoria are shown in Figure 3 on page 48. Each of these divisions has certain physical features which distinguish it from the others, as a result of the influence of elevation, geological structure, climate, and soils, as is recognised in popular terms such as Mallee, Wimmera, Western District, and so on. The following is a table of these divisions:

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Murray Basin Plains: <ol style="list-style-type: none"> (a) The Mallee (b) The Riverine Plains (c) The Wimmera 2. Central Highlands: <ol style="list-style-type: none"> A. The Eastern Highlands B. The Western Highlands: <ol style="list-style-type: none"> (a) The Midlands (b) The Grampians (c) The Dundas Tablelands 3. Western District Plains: <ol style="list-style-type: none"> (a) The Volcanic Plains (b) The Coastal Plains | <ol style="list-style-type: none"> 4. Gippsland Plains: <ol style="list-style-type: none"> (a) The East Gippsland Plains (b) The West Gippsland Plains 5. Southern Uplands: <ol style="list-style-type: none"> (a) The Otway Ranges (b) The Barrabool Hills (c) The Mornington Peninsula (d) The South Gippsland Highlands (e) Wilsons Promontory |
|---|--|

Murray Basin Plains

These plains include the areas commonly known as the Mallee, the Wimmera, and the Northern Plains or Riverine Plains. The plains are effectively subdivided by a north-south fracture known as the Leaghur Fault which runs sub-parallel with the Loddon River immediately west of Kerang.

From the Murray River to the Central Highlands, eastwards of the Leaghur Fault, is the remarkably flat landscape of the Riverine Plains, which are coalescing alluvial plains of the Murray, Loddon, and Campaspe Rivers, formed by fluvial sedimentation. Crossing the Riverine Plains is an extensive system of dry abandoned stream courses known as prior streams.

West of the Leaghur Fault the landscape and soil are very different. Here the *Mallee* country starts, with its surface cover predominantly of fine sands. Parallel north north-

east to south south-east orientated Pliocene beach ridges or dunes which ripple the landscape are the basic landscape element of the Mallee, and formed on the margin of retreating sea. Hollows between these ridges are partly filled by Pleistocene fluvio-lacustrine clays; the ridges are partly obscured by younger east to west orientated longitudinal dunes, parabolic dunes, and sand plains. Of significance are areas of groundwater discharge such as the gypsum playas and salinas, as exemplified by Lake Tyrell.

The Mallee is the marine plain from the former Murray Basin, with a veneer of wind-blown sands overlying fossiliferous marine Tertiary sands and silts, which reach eastwards to the Gredgwin Ridge on the Avoca-Loddon divide near Kerang. Westward of the Loddon River all the Mallee streams, because flow volumes are low and percolation and evaporation high, fail to reach the Murray River and terminate in brackish or saline shallow lakes commonly bordered by lunettes.

The *Wimmera* is essentially the low alluvial fans, alluvial plains, and abandoned river channels lying between the Western Highlands and the Murray Basin or the Mallee, as the sand-strewn surface of this basin is commonly known.

Central Highlands

Extending east to west across Victoria is a mountainous and hilly backbone known as the Central Highlands. In eastern Victoria, it is rugged and mountainous, and with plateau-like features commonly capping elevated mountain areas. Known as the *Eastern Highlands*, these mountains in eastern Victoria attain elevations of above 1,800 metres at the highest points such as Mt Bogong and Mt Hotham, and elevations of at least 1,200 metres are common. The major rivers of Victoria with high flow-rates, with the exception of the Glenelg River, all rise in the Eastern Highlands, and characteristically show steep-sided deep and narrow valleys. Residuals of Lower Tertiary basalts occur in the Eastern Highlands, filling old valleys as at the Dargo High Plains and the Bogong High Plains.

The topography of the Eastern Highlands has been strongly influenced by the variety of rock types and structures present. Thus a flat-topped and step-like landscape is found in the hard almost flat-lying Upper Devonian sandstones and rhyolites between Briargolong and Mansfield; plateaux are preserved in granite at Mt Buffalo and the Baw Baws; and lower elevations with dendritic drainage are generally seen in areas of folded Lower Palaeozoic mudstones.

The *Western Highlands*, in contrast to the Eastern, are much lower in elevation and generally are subdued hills rather than mountains. Rugged areas are mostly found only near fault scarps. The general elevation reaches a maximum of about 600 metres at Ballarat, but elevations are usually considerably less. Resistant masses of igneous rocks such as Mt Macedon and Mt Cole rise well above the general level, but fall well short of the main peaks in the Eastern Highlands. Extensive flat and only slightly dissected areas of basalt from the Upper Tertiary cover parts of the Western Highlands, conspicuously in the Ballarat area where they have yielded rich soils, and above the basalt flows rise prominent eruption points such as Mt Warrenheip near Ballarat.

The Grampians, sharp-crested strike ridges of hard sandstone reaching 1,200 metres in height, are prominent mountains rising far above the declining general level of the highlands as they trend westwards. The westerly extremity of the Western Highlands is the Dundas Tablelands, a warped plateau reaching to Dergholm, formed in contorted Lower Palaeozoic rocks capped with laterite and dissected by the Glenelg River system.

Valleys in the Western Highlands are generally broad rather than deep, apart from where rejuvenating movements have occurred along fault scarps to cause, in some cases, gorges.

The Central Highlands owe their elevation—and relief caused by resultant erosion—to varied upwarping movements and faulting during Tertiary time.

Western District Plains

The Western District Plains stretch westwards from Werribee to Camperdown, Hamilton, and Portland. They subdivide naturally into volcanic plains and coastal plains.

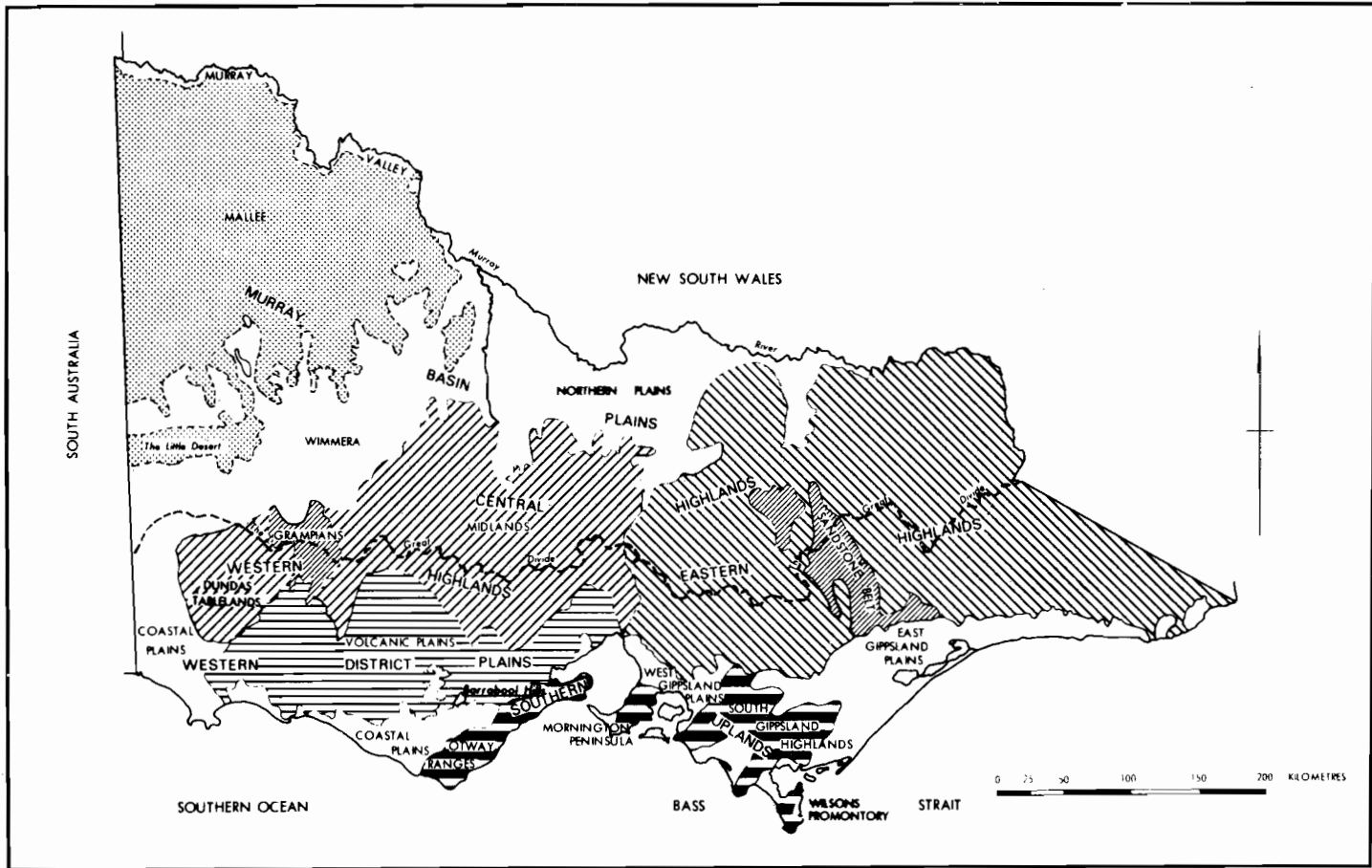


FIGURE 3. Physiographic divisions of Victoria.

Volcanic Plains

With an area of 2,300 square kilometres, the Volcanic Plains are the third largest volcanic plains in the world. They begin at an east-west line through Colac and Warrnambool and reach northwards to the foot of the Grampians.

The Volcanic Plains are almost horizontal, with only a slight southward inclination, and are composed of Pliocene to Holocene basalt flows and some basaltic ash. The Camperdown area shows extensive minor irregularities known locally as "Stony Rises", formed by lava collapse during solidification; these are so young that they are unmodified by erosion and soil formation. Volcanic cones, frequently of scoria, rise sharply from the plains as at Mt Elephant (394.4 metres) and Tower Hill (98.4 metres), and to some cones can be traced extensive areas of basalt. Much of the scoriaceous basalt of the "Stony Rises" can thus be linked with Mt Porndon (289.2 metres). Crater lakes in some cones occupy craters formed by explosive vulcanism.

The plains are crossed by some streams such as the Hopkins River with narrow incised valleys, but much drainage is internal, with precipitation finding its way to shallow lakes and underground.

Coastal Plains

Coastal plains, interrupted by the Otway Ranges, extend from Torquay to Warrnambool and northwards to Colac. They are flat or undulating, and are essentially the uplifted surface of Tertiary sedimentary rocks, including limestones, partly dissected by streams and commonly veneered with Quaternary dune limestone and sands. The limestones beneath the plains are cavernous, and are high yielding aquifers for groundwater. A broad coastal plain, bounded by a fault-scarp to the north-east, extends to the west and north-west from Portland.

Gippsland Plains

As a planar surface, the Gippsland Plains begin near Yallourn and Port Albert, and spread eastwards to the Bairnsdale area, between the ocean and the Eastern Highlands. Further east, through Orbost to Cann River, they form coastal downs—a dissected coastal plain—rather than a plain.

West of Yallourn, the Gippsland Plains continue, but they are fractured by late Tertiary block faulting to give the Moe Swamp and the Western Port Sunkland down faulted blocks, and uplifted areas such as the Drouin block and the Haunted Hills which are now maturely dissected. Faulting is responsible for related plains bordering the South Gippsland coast in the Wonthaggi area and landward from Cape Liptrap.

The present plains are the upper surface of a Tertiary and Quaternary basin, in which thick sequences of marine and fresh-water sediments have accumulated, including the major brown coal seams of the La Trobe Valley. The plains are generally covered with piedmont-type sands, sandy clays, and gravels, which originated from the Eastern Highlands during the final late Tertiary movements which elevated them to their present height, and into these gravels the streams have cut broad alluvium-filled valleys with flights of terraces that can be traced back into the Highlands.

A former coastline can be recognised behind the present coastline in the Bairnsdale-Lakes Entrance area. The conspicuous Ninety Mile Beach is a barrier bar which has cut off some of the Gippsland Lakes from the sea, and both spits and islands inland from the beach betray a complex history of barrier formation and erosion related to changed sea levels. Present-day coastal dunes are prominent along sections of the Ninety Mile Beach, and earlier dunes and beach ridges are found on the barriers; earlier dunes are even found north of Woodside and east of Stratford.

Southern Uplands

South-west of the Gippsland Plains is a steep mountainous region, the Southern Uplands, formed by upwarping and faulting, and separated from the Eastern Highlands by the westerly extension of the Gippsland Plains appropriately named by J.W. Gregory as the "Great Valley of Victoria". These mountains, together with the Barrabool Hills near Geelong and the Otway Ranges, are formed of freshwater Cretaceous sandstones and mudstones, and all display a characteristic rounded topography, due in part to very extensive land-slipping and structural weakness in these rocks.

Areas of weathered basalt from the Lower Tertiary are found on the Uplands in plateau-like form at Thorpdale and Mirboo North in South Gippsland, and many smaller remnants are found elsewhere in these ranges; the basalts yield rich soils.

The Otway Ranges similarly originated by upwarping and faulting during Tertiary time.

A further element in the Southern Uplands is the Mornington Peninsula, which is a raised fault block of Palaeozoic granites and sedimentary rocks separating the downwarped Western Port Sunklands and the Port Phillip Sunklands. A subdued spit of calcareous dune rock extending westwards from the Peninsula to Portsea almost closes Port Phillip Bay.

Land surface of Victoria

The present topography of Victoria is the result of interaction between the rock types present, themselves events in geological history, changes in elevation and deformation recorded in that history, processes such as weathering and erosion—including climatic effects—and the stage of development reached by these processes. Hard resistant rocks, for example, will after prolonged erosion tend to stand out in relief, whereas softer more weathered rocks will be topographically more depressed. Over extensive lengths of geological time without major sea-level changes, erosion will tend to wear down a land mass to a surface of low relief—known as an erosion surface—not far above sea-level. In the highlands of Victoria remnants of several such erosion surfaces can be recognised as plateau-like features raised to elevations of hundreds of metres by uplifts.

Jurassic erosion surface

In the Eastern Highlands, plateau remnants are widespread as, for example, the Cobberas, the Mt Hotham area, Mt Buffalo, the Snowy Plains, Mt Wellington, and the Baw Baw Plateau: they are all in hard rocks such as granite, rhyolite, and massive sandstone. These plateau remnants, and ridge tops at similar levels are relics of the most ancient landscape or erosion surface preserved in Victoria. They are the surviving parts of a sub-planar surface which was close to sea-level in Jurassic time, before uplift and warping late in the Jurassic commenced its destruction, and began to form troughs or sedimentary basins in which the sediments represented in the Otways and the South Gippsland Highlands were deposited during Cretaceous time. These upwarps had already begun to define the Central Highlands.

Later evolution

Uplift and downwarping continued intermittently during Tertiary time, with the development of sedimentary basins such as the Murray Basin in north-west Victoria and the Gippsland and Otway Basins in southern Victoria. In the basins was deposited detritus carried down by streams from the rising Highlands, and in swamp conditions great thicknesses of brown coal were laid down in the Gippsland Basin. Deep valleys were cut into the Central Highlands, which were then lower than their present height; in some of these valleys gold-bearing gravels were deposited. Parts of the landscape and some of the valleys were filled with Lower to Mid-Tertiary basalts.

Erosion proceeded to advanced stages during parts of the Tertiary Period, as attested by remains of younger erosion surfaces, preserved at lower levels than the Jurassic erosion surface on the Kinglake Plateau, the hill summits immediately east of Melbourne and around the Dandenong Ranges to Gembrook, and elsewhere in the Central Highlands.

By Miocene time, downwarping movements were at their maximum. Embayments of the sea covered much of Gippsland, the Port Phillip Basin, an extensive area of western Victoria south of Lismore and the Grampians (the Otway Basin), and north of the Grampians the Murray Basin spread as far as Broken Hill, New South Wales. The record of this transgression is left in limestones and other sedimentary deposits. Retreat of the sea towards its present position during the Pliocene was accompanied by further uplift of the Central Highlands, leading to further erosion, valley deepening, and the accumulation of extensive sheets of sands, clays, and gravels both on the lowland plains and as piedmont gravels on the spurs leading down to the lowlands.

The Upper Tertiary and even Quaternary saw vast volcanic activity in central and western Victoria. From Melbourne to Hamilton basalts and tuffs were outpoured and ejected. Flows followed pre-existing valleys in the Western Highlands, burying auriferous gravels as deep leads in the Ballarat district.

Final downwarpings, assisted by the melting of glacial ice at the end of the Pleistocene, led to the drowning which has given Port Phillip Bay and Western Port their present configurations, and concomitant upwarps in the Central Highlands elevated them to their present level.

Changing climate has played a role in this physiographic evolution. Thus the Mid-Tertiary, with the rich flora evident in the brown coals, appears to have been a time of higher rainfall than at present, with the result of larger streams with more erosive power, and changing Quaternary climates are recognised in the changing regimes evident in the former lakes and prior streams of the Riverine Plains.

Further reference: *Geology of Victoria, Victorian Year Book 1976, pp. 77-80*

Hydrology

Water resources

The average annual rainfall over Victoria is about 660 mm. As the area of the State is 227,600 square kilometres, the total precipitation is, therefore, about 148 million megalitres. Only 21 million megalitres appear in the average annual flow of the State's river systems. It is not yet known how much of the remainder soaks underground to recharge groundwater resources, but this will be elucidated by a long-term programme of investigation being carried out by the Victorian Mines Department.

Victoria's surface water resources are unevenly distributed in both space and time. Their distribution in space can be conveniently described by considering the State as being divided into four segments, by an east-west line along the Great Dividing Range and a north-south line through Melbourne. The north-west segment contains 40 per cent of the State's area, and the other three segments 20 per cent each. Surface water resources, represented by average annual river flow, are heavily concentrated in the eastern segments, each accounting for about 40 per cent of the total. The western segments account for only 20 per cent of total flow, with only 3 per cent in the north-west segment.

Quality of stream flow also deteriorates from east to west. Waters of the eastern rivers mostly contain less than 100 parts per million of total dissolved solids. In the western rivers the figure is generally above 500 parts per million, except near their sources, and increases downstream to figures in excess of 1,500 parts per million.

River flows in Victoria exhibit a marked seasonal pattern, and marked variability in annual flow from one year to another and from place to place, affecting the usability of the transitory local surface supplies of fresh water.

Over the State as a whole, about 60 per cent of the average annual flow is accounted for between July and October. In western streams this percentage approaches 75 per cent. Everywhere, flows typically recede in the summer and autumn, at the time of year when water requirements for most uses are at a peak.

Rivers

Topography

The topography of Victoria is dominated by the Great Dividing Range, which extends from a triangular mountainous mass in the east, through the narrower and lower central highlands, and terminates at the Grampians in the west. This divide separates the State and its rivers into two distinct regions: those rivers flowing northwards towards the Murray River and those flowing southwards towards the sea. The only other significant high country within Victoria is formed by the Otways in the south-west and the Strzelecki Ranges in South Gippsland.

Geography

Of all the major Victorian rivers, the Snowy River is the only stream not wholly situated within the State, the headwaters of this river being in the Snowy Mountains of New South Wales. The Murray River, although an important water supply source for Victoria, is legally wholly in New South Wales as the State boundary coincides with the southern bank of this stream. (See page 40.)

Of the major northern rivers, all except three flow into the Murray River. The three exceptions—the Avoca, Richardson, and Wimmera Rivers—finish their course at inland

lakes in the Wimmera-Mallee region, with the Avoca, on rare occasions, overflowing its lakes system, to reach the Murray River.

Of the major southern rivers, the La Trobe, Thomson, Macalister, Avon, Mitchell, and Tambo Rivers all flow into the Gippsland Lakes system, which is linked with the sea by an artificial cut constructed many years ago for navigation purposes. The Woody-Yaloak River in the west flows to the inland Lake Corangamite, while the remaining southern rivers find their way directly into the sea.

Water availability

The eastern rivers of Victoria, both northerly and southerly flowing and those rising in the Otway Ranges, have their sources in high rainfall country and provide abundant water resources, while those in the western portion of Victoria, with the exception of the Glenelg, have limited useful yield and many are frequently dry in summer. In fact, approximately 78 per cent of Victoria's available water resources originate in the eastern half of the State and only 22 per cent in the lower ranges to the west.

Physical properties

The actual physical properties of Victorian rivers differ markedly from the east to the west. Rivers in the far east to north-eastern regions of Victoria flow for most of their journey through mountainous terrain in deep gorges, and then into flood plains, before reaching either the Murray River or the sea. Heavy shingle has been scoured from the bed and banks of these fast flowing mountainous streams and finally deposited downstream in the plain area. Water quality of these streams is clear and free from excessive suspended mud and silt.

Rivers in central and western Victoria, on the other hand, have comparatively short mountainous sections, and for the majority of their length wander sluggishly through undulating to flat country. Velocities of flow are far less than for their mountainous counterparts, and material carried by these streams consists of fine silt and clay which causes the muddy turbid waters, distinctive of these central and western rivers.

For those rivers that flow to the sea, there is a tendency at the river mouth to form sand spits and dunes, with the consequent obstruction of the mouth. Some of the smaller streams become blocked entirely and breach only in times of flood.

Salinity

Rivers in the Eastern Highlands, flowing mainly through heavily timbered mountain tracts, generally have very good quality water suitable for all purposes. In the lower Central Highlands, salinities vary from stream to stream but generally flows are fresh in the winter and spring and slightly saline in the summer and autumn. In the south-west regions of Victoria, catchments consist mainly of grasslands, with scrub regions in the north-west, and streams here are slightly to moderately saline for most of the year.

Flooding

Rainfall throughout Victoria is erratic during the year and hence the majority of the State's rivers are prone to flooding at any time, with rivers in Gippsland often subject to summer flooding. Flooding problems on a number of major streams have been markedly reduced by the construction of dams which, although designed for the supply of water and not for flood mitigation, provide substantial temporary storage above the full water supply level.

VICTORIA—MAIN STREAM FLOWS

Stream	Length	Drainage area	Annual stream flows in million cubic metres				
			Mean	Max.	Min.	No. of years gauged	Site of gauging station
	kilometres	square kilometres					
NORTHERN RIVERS							
Murray	1,926 (from source to Victorian border)	6,527 (upstream of Jingellic)	2,507	6,148	675	90	Jingellic, N.S.W.
Mitta Mitta	286	5,058	1,411	4,256	250	49	Tallangatta
Kiewa	185	1,145	567	2,071	166	94	Kiewa
Ovens	228	5,827	1,312	4,897	221	64	Wangaratta
Broken	193	1,924	227	1,091	19	94	Goorambat

VICTORIA—MAIN STREAM FLOWS—*continued*

Stream	Length	Drainage area	Annual stream flows in million cubic metres				
			Mean	Max.	Min.	No. of years gauged	Site of gauging station
	kilometres	square kilometres					
NORTHERN RIVERS							
<i>—continued</i>							
Goulburn	566	10,772	2,211	7,369	145	98	Murchison
Campaspe	246	3,212	236	820	1	78	Elmore
Loddon	381	4,178	235	740	9	85	Laanecoorie Reservoir
Avoca	270	2,624	76	395	3	80	Coonooer
Wimmera	291	4,066	128	589	—	77	Horsham
SOUTHERN RIVERS							
Snowy	162 (in Victoria)	13,421	1,838	4,002	381	43	Jarrahmond
Tambo	200	943	58	121	21	15	Swifts Creek
Mitchell	251	3,903	959	2,834	193	42	Glenaladale
Thomson	209	1,088	400	680	175	50	Cowwarr
Macalister	202	1,891	502	1,533	45	61	Lake Glenmaggie
La Trobe	251	4,144	937	3,240	271	65	Rosedale
Bunyip	63	661	153	304	69	47	Bunyip
Yarra	246	2,328	783	1,494	176	62	Warrandyte
Maribyrnong	183	1,303	107	327	4	49	Keilor
Werribee	124	1,155	92	314	7	63	Melton Reservoir
Moorabool	153	1,114	76	221	1	34	Batesford
Barwon	188	1,269	141	328	7	14	Inverleigh
		(excluding Leigh and Moorabool Rivers)					
Hopkins	282	1,347	32	127	1	48	Wickliffe
Glenelg	457	1,570	127	540	3	60	Balmoral

Lakes

Lakes may be classified into two major groups: those without natural outlets which are called closed lakes, and those with a natural overflow-channel which may be termed open lakes. For closed lakes to form, annual evaporation must exceed the rainfall: this is the case over most of Victoria.

Closed lakes occur mainly in the flat western part of the State. They fluctuate in level much more than open lakes and frequently become dry if the aridity is too high. For example, Lake Tyrrell in the north-west is usually dry throughout the summer and can consequently be used for salt harvesting.

The level of water in an open lake is more stable because as the lake rises the outflow increases, thus governing the upper lake level and partially regulating streams emanating from it. This regulation enhances the economic value of the water resources of open lakes, but Victoria does not possess any natural large lake-regulated streams. However, there are small streams of this type in the Western District, such as Darlots Creek partly regulated by Lake Condah and Fiery Creek by Lake Bolac.

Salinity is often a factor which limits the use of lake water; even the use of freshwater lakes is not extensive in Victoria due to the cost of pumping. The average salinity of closed lakes covers a wide range depending upon the geological conditions of the catchments and the water level.

Lake Corangamite is Victoria's largest lake. It can be regarded as a closed lake, although during the wet period in the late 1950s it rose to within 1.2 metres of overflowing. The total salt content of the Lake is about 16.32 million tonnes, giving it a salinity somewhat higher than seawater under average water level conditions.

The Gippsland Lakes are a group of shallow coastal lakes in eastern Victoria, separated from the sea by broad sandy barriers bearing dune topography, and bordered on the ocean shore by the Ninety Mile Beach. A gap through the coastal dune barrier near Red Bluff, which was opened in 1889, provides an artificial entrance to the lakes from the sea. However, seawater entering this gap has increased the salinity of some lakes, which in turn has destroyed some of the bordering reed swamp and led to erosion. The Gippsland Lakes have been of value for commercial fishing and private angling and also attract many tourists.

A number of Victorian lakes and swamps have been converted to reservoirs. Waranga Reservoir is an example of this, as are Lake Fyans, Batyo Catyo, and Lake Whitton in the Wimmera. A good example of lake utilisation is the Torrumbarry irrigation system on the riverine Murray Plains near Kerang in north-west Victoria.

Groundwater resources

Groundwater resources move slowly through pores and cracks in soil and rock and respond sluggishly to seasonal and annual fluctuations in recharge. For this reason, groundwater can be regarded as a generally more reliable source of water through drought periods. However, mapping of resources in terms of depth, yield, and quality is much more complex than the mapping of visible surface resources.

The present position, very broadly stated, is that there are groundwater resources of reasonable quality and yield for domestic and irrigation purposes over about 4,000,000 hectares or about one-sixth of Victoria's area, mainly in the far west and south-west and in alluvial valleys in the north and south-east.

On the other hand, there is about half the State's area, in the central and western sectors, where groundwater is generally not available at qualities better than 3,000 parts per million of total dissolved solids.

Groundwater has played a very important part in providing supplies of water for domestic and stock use in pastoral settlement. It is also used for some isolated town supplies, and is being increasingly used for irrigation, the area irrigated from groundwater now being about 12,000 hectares.

For the future, there are prospects of generally increased use for irrigation, and for the augmentation of town water supplies on the south-west coast, in the Barwon Valley, and in Gippsland. However, these prospects can only be clarified by continuing investigation.

Further reference: Natural Resources Conservation League, *Victorian Year Book*, 1965, p. 47

Survey and mapping

The Division of Survey and Mapping of the Department of Crown Lands and Survey is responsible for the development of the National Geodetic Survey within Victoria; the preparation of topographic maps in standard map areas; the survey of Crown lands under the provisions of the *Land Act* 1958; the co-ordination of surveys throughout the State under provisions of the *Survey Co-ordination Act* 1958; surveys for the Housing Commission, the Rural Finance and Settlement Commission, and other departments and authorities; and the documentation of these surveys.

An Australia-wide primary geodetic survey was completed in 1966, and in Victoria this is continuously being extended to provide a framework of accurately fixed points for the control of other surveys and for mapping. A State-wide network of levels was completed in 1971. The datum, based on mean sea level values around the whole coast of Australia, is known as the Australia Height Datum (AHD), and its adoption obviates the multitude of local datums formerly in use throughout the State. Issued lists of level values on the AHD are in metres.

An official map of Victoria showing highways, roads, railways, watercourses, towns, and mountains, together with other natural and physical features, has been published in four sheets at a scale of 1:500,000. A less detailed map of Victoria is also available in one sheet at a scale of 1:1,000,000. Topographic maps at a scale of 1:250,000 providing a complete map coverage of the whole State have been published by the Division of National Mapping of the Department of National Resources and the Royal Australian Survey Corps. A joint Commonwealth-State Government mapping project, commenced in 1966, is proceeding with the production of topographic maps at a scale of 1:100,000 with a 20 metre contour interval. A number of these maps have been published. The Mines Department and the Forests Commission also contribute to State mapping by publishing maps for geological and forestry purposes.

A series of 26 maps at a scale of 1:25,000 showing streets, rivers, creeks, and municipal boundaries in Melbourne and its suburban area, including the Mornington Peninsula, has been produced. A long-term programme for production of general purpose standard topographic maps, at 1:25,000 scale with a 10 metre contour interval, has been planned to extend this map coverage over the greater metropolitan area, and to embrace many of the

large provincial centres. Other maps of urban and suburban areas at 1:10,000 scale, showing full subdivisional information, are being prepared of the Mornington Peninsula area; similar maps of various rural centres are on programme in conjunction with Commonwealth Government maps at the same scale required for census purposes.

Large scale base maps have been prepared for rapidly developing areas throughout the State, including the outer metropolitan area, Mornington Peninsula, Ballarat, Geelong, Bendigo, Phillip Island, and a number of other rural areas. These maps were originally compiled at a scale of 1:4,800 (400 feet to 1 inch) with a 5 foot contour interval. However, with the introduction of the metric system, all new maps will be prepared at a scale of 1:5,000, generally with a 2 metre contour interval. The publication *Official Map and Plan Systems Victoria* has been issued setting out the standard format size and numbering systems which have been adopted for the production of maps and plans at the standard scales of 1:20,000, 1:16,000, 1:10,000, 1:5,000, 1:2,500, 1:1,000, 1:500, and 1:250. The systems are based on the Australian Map Grid (AMG), which fulfils the basic principles necessary for the complete integration of surveys.

The Division carries out cadastral surveys of Crown lands for the purpose of defining boundaries and for determining dimensions and areas of reservations and of allotments for the subsequent issue of Crown grants. This information forms the basis for the compilation of county, parish, and township plans, which are published at various scales and show details of the original subdivision of Crown lands. Recently further investigations have been made with the object of introducing a fully integrated topographic-cadastral map and plan system. Although cadastral requirements may result in the publication of plans using an additional range of scales, it will be a fundamental principle that the Australian Map Grid will be the basic framework of their compilation.

As part of its mapping activity, the Department provides an aerial photography service. Belonging to the Central Plan Office, a Map Sales Centre now operates at 35 Spring Street, Melbourne, where an Aerial Photography Library comprising approximately 300,000 photographs is maintained. Photographs may be inspected and orders lodged for the purchase of prints and enlargements. Maps and plans are also available for purchase from the Map Sales Centre.

Recent land legislation

Land (Amendment) Act 1978

This Act made several amendments to the *Land Act 1958*.

The first amendment gave power to the Minister of Lands to constitute a Local Land Advisory Committee for any area. Such a Committee comprises representatives both of relevant government bodies and of the local farming community. Its purpose is to encourage co-operation between all concerned with the care, management, and use of Crown land occupied under cultivation leases, grazing licences, or agistment permits. It is also expected to advise the Minister on any related matters, and to recommend whether or not specific areas of Crown land should be made available for use for these purposes at any time.

Other new powers provide for the granting of agistment permits and the issue of cultivation leases.

The Act also increased the maximum term of a grazing licence from 7 to 21 years and introduced provision for land management conditions to be imposed. The provision by which rental for non-freeholding leases has been reviewed every ten years was amended so that reviews will be effected every five years.

The new legislation introduced an amendment to the power to remove easement-type conditions from Crown grants to allow the removal of such a condition for part only of the affected land in any grant. The remainder of the Act repealed some obsolete provisions of the Principal Act.

Crown Land (Reserves) Act 1978

This Act updated the law relating to the reservation of Crown lands for public purposes and the control and management of those reserved lands. Many of the provisions of the Act merely improved the administration of certain matters concerning reserves or their management, but several new provisions were also enacted.

One of the new provisions enabled land, including existing reserved land, to be reserved for the protection of the coastline. A Coastal Management and Co-ordination Committee was constituted and given powers to ensure that use and management of the coastal lands satisfies the needs of the general public, while also retaining its capability for giving that satisfaction. Other new provisions give power to Committees of Management to allow grazing or cultivation of a reserve in certain circumstances, and control the powers of committees of management to effect works and improvements on land reserved for the protection of the coastline.

The Act provided new powers for the vesting of local amenity reserves, except those within any reserve for the protection of the coastline, in the municipality, and for the municipality to grant leases or licences of any such vested land for the purpose of the reservation. The legislation also enables a committee of management of a reserve, other than one for the protection of the coastline, to grant licences or enter into agreements for any service or facility whose function matches the purpose of the reservation.

So that very large areas of Crown land reserved for multi-purpose uses can be appropriately managed, a new provision allows reserves to be placed under the management of certain State authorities. The Act also empowers the Minister of Lands to accept gifts or bequests of real or personal property where those gifts or bequests are to give effect to the objects of the Act.

Further references: Hydrography. Coastline. *Victorian Year Book* 1966, pp. 33-6; Coastal physiography, 1967, pp. 32-6; Plant ecology of the coast, 1968, pp. 31-7; Marine animal ecology, 1969, pp. 36-40; Marine algae of the Victorian coast, 1970, pp. 39-43; Erosion and sedimentation on the coastline, 1971, pp. 44-6; Conservation on the Victorian coast, 1972, pp. 37-43

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