



**WESTERN  
AUSTRALIAN**

# **YEAR BOOK**



**1989**

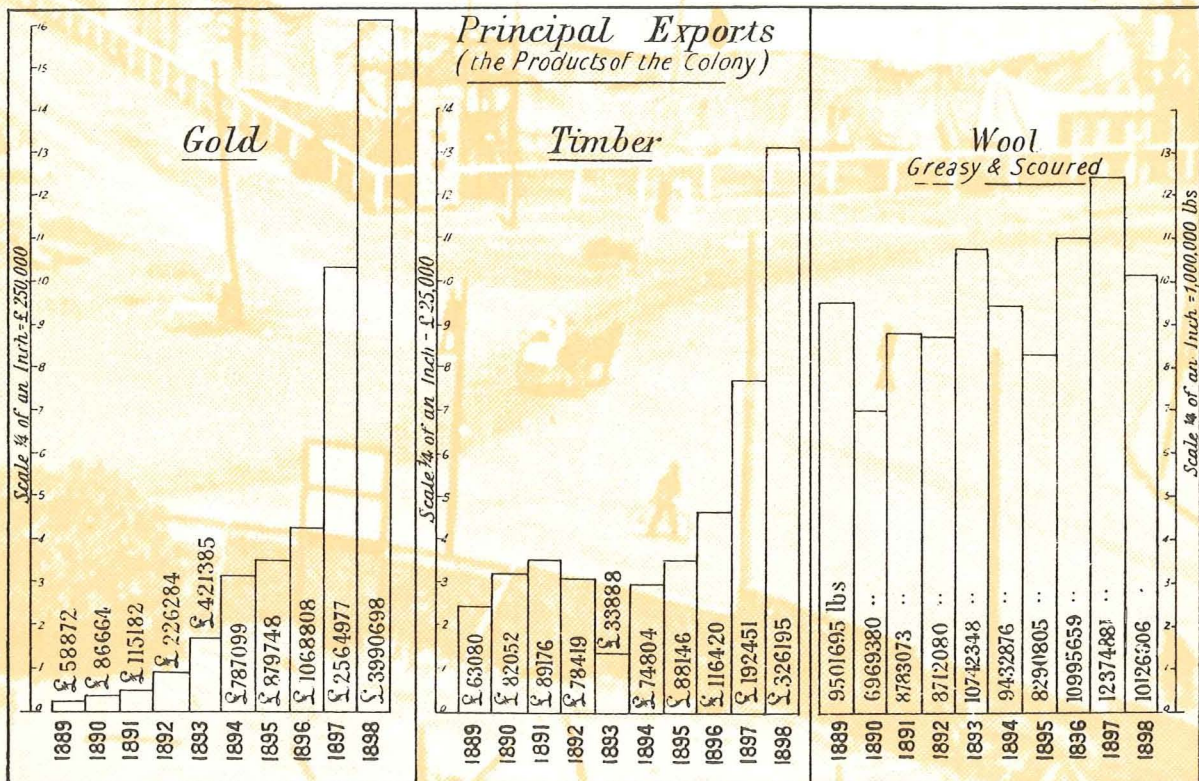
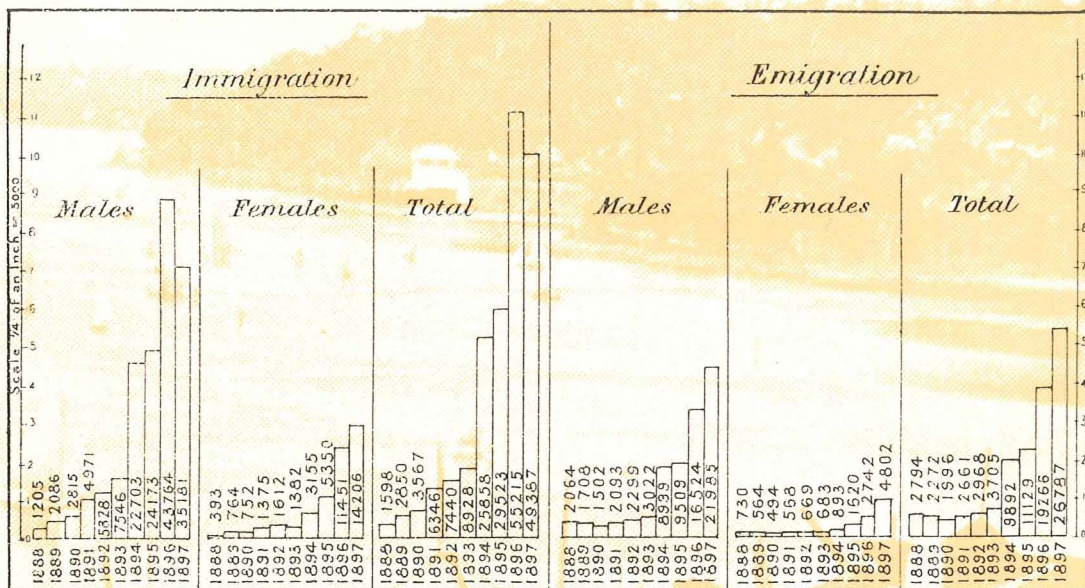
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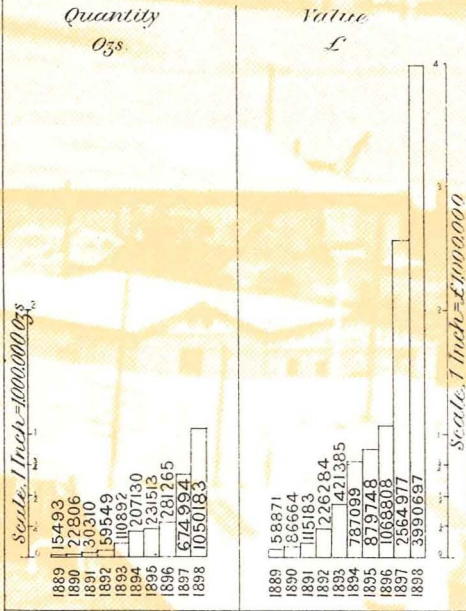
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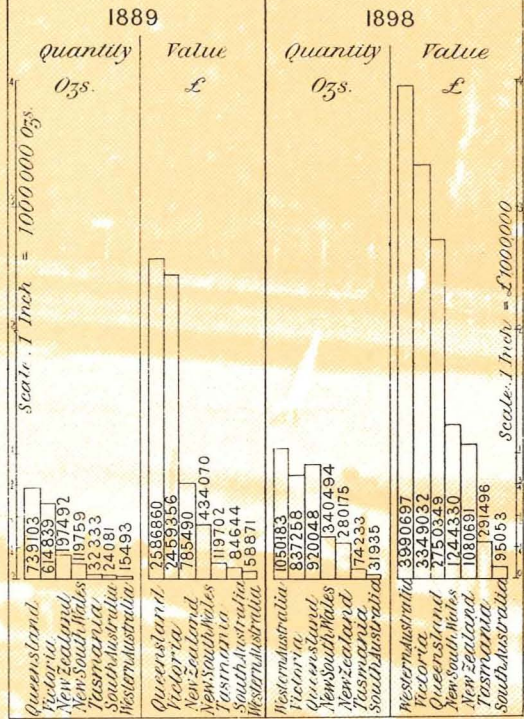




# GOLD YIELD OF WESTERN AUSTRALIA (1889 to 1898)

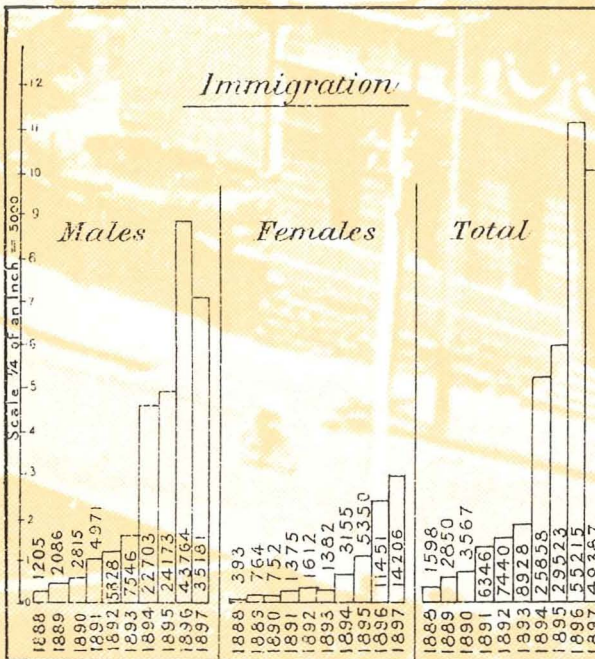


## GOLD YIELD OF AUSTRALASIA

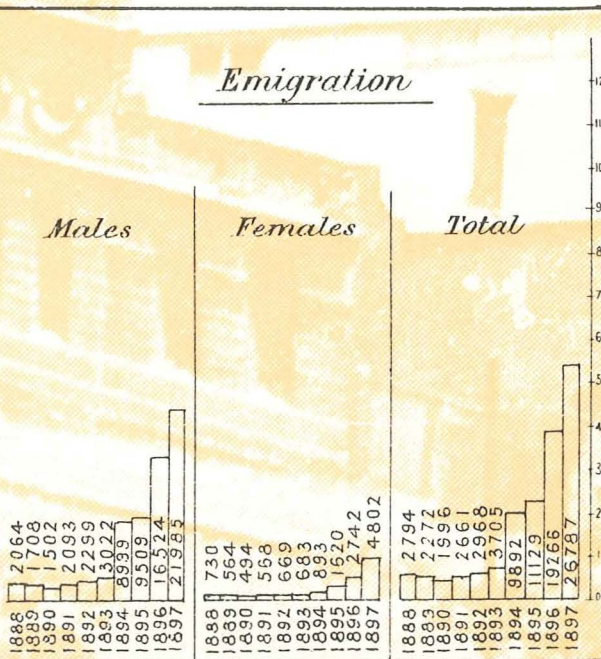


The official valuations per ounce of gold for the Colonies are as follows  
W.A. VIC. Q. N.S.W. N.Z. TAS. S.A.  
1889 £3 16s. 4d., £3 10s.; £3 12s. 6d., £3 19s. 6d.; £3 14s. 0d.; £3 10s. 3d.  
1898 £3 16s. 4d., £2 19s. 3d.; £3 13s. 1d., £3 17s. 13d.; £3 18s. 6d.; £2 19s. 6d.

## Immigration



## Emigration





WESTERN AUSTRALIAN YEAR BOOK

1989



Cover: The Bungle Bungle massif, East Kimberley region

*Photograph: Richard Woldendorp, Photo Index*

Frontispiece: The Stirling Ranges, the dominant landform  
of the Great Southern Region

*Photograph: Robert Karri-Davies, Photo Index*







# **WESTERN AUSTRALIAN YEAR BOOK**

**No. 26 — 1989**

**B. N. PINK**

**DEPUTY COMMONWEALTH STATISTICIAN  
AND GOVERNMENT STATISTICIAN**

**AUSTRALIAN BUREAU OF STATISTICS  
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## GENERAL INFORMATION

### Symbols

The following symbols mean:

n.a.	not available
n.e.c.	not elsewhere classified
n.e.i.	not elsewhere included
n.e.s.	not elsewhere specified
n.p.	not available for separate publication (but included in totals where applicable)
n.y.a.	not yet available
p	preliminary—figure or series subject to revision
r	figures or series revised since previous issue
..	not applicable
*	subject to sampling variability too high for most practical uses
—	nil or rounded to zero
—	break in continuity of series (where drawn between two consecutive figures or columns)

### Other forms of usage

**Rounding.** Where figures have been rounded, discrepancies may occur between sums of the component items and totals.

### Services available from the ABS

A comprehensive list of all statistical publications issued by the ABS is provided in the *Catalogue of Publications and Products, Australia* (1101.0), which is available free of charge from any ABS Office.

For economic reasons the ABS does not publish all of its available statistics. A wide range of statistics is available on request.

The Western Australian Office of the ABS provides a free inquiry service, which gives information about the availability of ABS products and services, as well as answers to simple statistical questions. For more complex questions and projects, an Information Consultancy is available to provide a professional level of service.

'Self help' facilities are available in the ABS reference library, which holds copies of all ABS publications and some statistical output from overseas and international organisations.

These services are all available from Information Services, Level 1, Hyatt Centre, 30 Terrace Road, East Perth, WA 6004, or from other ABS Offices. Information Services in Perth is open from 9.00 a.m. to 4.30 p.m., Mondays to Fridays and may be contacted by telephone on (09) 323 5140 or facsimile on (09) 221 2374.



## PREFACE

The *Western Australian Year Book* is a general reference work on Western Australia and includes authoritative information on almost every aspect of life in the State. Together with chapters on the social, demographic and economic structure of the State, the Year Book includes information on history, geography, climate, vegetation and fauna, and government. Each chapter contains the latest information available at the time of manuscript preparation.

Constraints of time and space mean that the Year Book can only be illustrative of the wide range of data available from the ABS in over 1,500 publications, or on microfiche, magnetic tape, floppy disk, CD-ROM, or electronically through VIATEL or AUSSTATS. The publications of the Western Australian Office are listed in the Appendix.

I express my appreciation to the many outside contributors, officers of the Bureau, and the staff of the Department of Services, State Printing Division for their work on the Year Book project.

The wide range of statistics presented in this book would not be possible without the continued cooperation of individuals, businesses, government agencies and other organisations who provide the basic information from which ABS statistics are produced. Their assistance is gratefully acknowledged.

October 1989

B. N. PINK  
Deputy Commonwealth Statistician  
and Government Statistician

# Chapter 1

## HISTORY OF WESTERN AUSTRALIA

Contributed by Laura Hodan, B.A. (Hons)

The history of the people of Western Australia began some 40,000 years ago when the ancestors of the present Aborigines are believed to have come to the western coast of Australia from South East Asia. What this history actually is has been open to much speculation, resulting in the promulgation of several theories. Archaeology, with the discovery of relics of Aboriginal cultures, has helped to replace or modify these theories with factual evidence.

There is a general consensus among anthropologists that these 'first West Australians' had a complex culture involving a religion and ritual closely related to the environment which supported them, and a simple system of management of the land and its resources—people adjusting their social and reproductive behaviour to the changing potentialities of the landscape.

These nomadic people had managed to live their lives in a delicate balance with an extremely harsh environment for thousands of years.

The history of the European people of Western Australia began much later.

European sailing ships, mainly of Dutch origin, had touched on the north-west shores of Western Australia in the 17th century. Dirk Hartog, skipper of the *Eendracht*, landed in the Shark Bay area, leaving behind him a pewter dish inscribed with the details of his visit and bearing the date 1616. Other ships, blown off their course for the East Indies by the strong westerly winds, became wrecked off the treacherous north-west coast, among them the *Batavia* in 1629 and the *Vergulde Draeck* in 1656.

Abel Tasman's visit in 1644 was no accident: he had been commissioned by the Dutch East India Company to explore the north and north-west coasts of this new land about which there were constant reports. He called this land 'New Holland'.

In 1621 a British ship, the *Trial*, was wrecked near the Montebello Islands and was probably the first British ship to reach Western Australia; but it was not until William Dampier's visit in the *Cygnets* that the attention of the British Government was

drawn to 'New Holland'. Dampier was one of a group of buccaneers who, having cause to repair their vessel, beached her in King Sound. On returning to England he wrote of his experiences and impressions of 'New Holland' in a book *New Voyage Around the World*. On the strength of this the British Government then commissioned Dampier to make a further voyage of exploration. This he did, again visiting the north-west coast in 1699.

These European navigators, all with thoughts of trade and profit in their minds, could see nothing, either in the country or its inhabitants to warrant further expenditure on continued exploration.

For the next 100 years very little interest was taken in the western coastline. However, the formal British occupation of Australia at Sydney Cove in January 1788 and the ensuing colonisation of New South Wales stimulated activity in exploring the remainder of the coastline of this new country. Such activity was not confined to the British. French navigators were also exploring and charting the 'New Holland' coastline and many names today—Baudin, Freycinet, Hamelin—bear witness to their presence.

### 1826 TO 1850—EARLY SETTLEMENT IN WESTERN AUSTRALIA

It was this interest of the French that stirred the British into action. In a move designed primarily to forestall the French who they feared planned to annex the territory for themselves, Major Edmund Lockyer was sent in command of a small military garrison from Sydney to what is now Albany. The purpose of this move was not, as yet, to formally claim the area of Western Australia for Britain but



rather to merely 'keep trespassers out'. However, when Lockyer and his party anchored in King George Sound on 25 December 1826 they did, in fact, establish the first British settlement in what is now Western Australia.

In 1827 Captain Stirling was despatched from Sydney in HMS *Success* to explore the area around the Swan River. He wrote very favourably in his report regarding its suitability for settlement. Nevertheless the British Government at first firmly rejected the idea of a settlement. Stirling had cause to return to London in 1828 and whilst there was able to arouse the interest of a syndicate of capitalists who were prepared to invest large sums of money in the new Colony. In addition to this Stirling made frequent visits to the Colonial Office with convincing evidence that there was considerable public support for a colony as well as rumours that the French still had thoughts of 'New Holland' for themselves.

British Government reluctance was finally overcome. Captain Fremantle in HMS *Challenger* was despatched forthwith and, landing at the mouth of the Swan River hoisted the British flag on the south head and formally took possession of the territory in the name of His Majesty King George IV on 2 May 1829.

The Colonial Office officially announced that a colony was to be established with Captain Stirling as Lieutenant-Governor.

The newly appointed Lieutenant-Governor, Captain James Stirling, his family and about seventy settlers arrived off Garden Island in the *Parmelia* on 1 June 1829. HMS *Sulphur*, bearing a detachment of troops, arrived some days later.

A Proclamation establishing the Colony was read on 18 June 1829. The site at the mouth of the Swan River was named Fremantle and proclaimed to be the port of the Colony. After some difficulty a site for the capital was selected some twenty kilometres upstream. The official ceremony to mark the foundation of Perth took place on 12 August 1829.

The terms relating to land grants offered by the Colonial Office to prospective settlers were remarkably favourable and aroused a great deal of initial interest and excitement in England. By the end of 1830 almost 2,000 settlers had come to Western Australia.

This land grant system took no account of any prior right of the Aboriginal population. On the whole it appears that neither the Government of the Colony nor the colonists themselves took

account of any rights of the Aboriginal people, even their right to live.

In his much publicised report Dampier describes the natives of Western Australia as primitive in the extreme, with only rudimentary knowledge of stone or wood technology and making no apparent use of the land. These words were to prejudice the minds of the English and Australians alike right into the twentieth century.

The European settlers were so blinded by the belief in the superiority of their own culture that they brought their whole life-style with them—society, religion and technology. Little wonder then that they were unable to see the existence among the Aborigines of any cultural achievement. In fact, so great were the differences between these people and themselves that it was seriously debated whether they were human or not.

Not only did these people have a culture but it was shown to be hopelessly at variance with that of the Europeans—in the practice of religion, in attitudes towards material possessions, the relative importance of the work ethic and the relationship between the people and the land. Neither group could have possibly understood the very basis for living of the other. This did not cause problems in the settlement at King George Sound where, over quite some time, the Aborigines had already had contact with transient Europeans. The garrison at King George Sound was small, each party remained independent of the other with no occasion for exploitation of the Aborigines. There was never any fierce competition for scarce resources.

A similar situation did not exist in the Swan River Colony. Initially each side was cautious, trying to avoid open conflict but, when the settlers began cultivating the soil, planting crops and driving the Aborigines off the land they considered their land it is understandable that this soon led to direct confrontation. The stories of bloodshed and revenge—the attacks on the settlers and the terrible retribution meted out to the Aborigines are not among the great achievements of the Colony.

After the treacherous killing of Yagan, a notable Aboriginal leader, in 1833 and the Battle of Pinjarra in 1834 the resistance of the coastal Aborigines was broken. It lasted much longer and was more bitter in the northern pastoral areas. In the process of breaking the resistance hundreds of Aborigines were killed; hundreds more died in the epidemics of white man's diseases to which these people had no resistance—whooping cough,

influenza, measles, smallpox etc. They still further decimated their own numbers by tribal killings. By the turn of the century there were no longer many full blood Aborigines left—merely the last vestige of a race that seemed doomed to extinction.

Trouble with the Aborigines was only one of the many problems that beset the new Swan River Colony almost causing its abandonment in the early years. Although by the end of 1830 some 2,000 settlers had arrived in the Colony the population twenty years later was only around 5,200. This compares with a population in South Australia at the same date of nearly 53,000—and the colony in South Australia was not founded until 1836.

The preparations for the settling of the new Swan River Colony had been calamitously inadequate. The surveyors were unable to keep pace with the new arrivals and the land was granted and occupied in a most haphazard fashion. Both the new land owners and the labourers they brought with them were quite unused to the physical exertion required to bring virgin land into cultivation. They didn't understand this land; they hadn't known what implements to bring with them. This was all compounded by the fact that the soil along the coast and around Perth was of poor quality and that the better land further south was covered with dense, difficult to clear hardwood forest.

Many disillusioned settlers left the Colony but in spite of all the obstacles some progress had been made by the time the first convicts arrived in 1850.

The Colony was exporting wool, timber, sandalwood, livestock, and products from a whaling industry in Cockburn Sound. In 1840 the *Shepherd* departed for London with a cargo consisting wholly of colonial produce. There were flour mills and sawmills; seagoing ships were being built at Fremantle. Exploration and settlement were being extended south to Bunbury, over the Darling Range to York and Beverley and further north into the Kimberley region. A road from Albany to Perth had been surveyed. Postal services existed between Perth and various towns and there were newspapers and a published Government Gazette. In 1841 legislation was passed providing for compulsory registration of births, deaths and marriages and the establishment of a central registry office in Perth. A General Board of Education was established in 1847 and Perth Boys' School and Perth Girls' School opened in the same year. There were social and

economic institutions such as banks, a civil court and churches.

The first official census was conducted in October 1848 with: population 4,622 (males 2,818, females 1,804); livestock numbered 141,123 sheep, 10,919 cattle, 2,287 pigs and 2,095 horses; the area under crop was more than 7,000 acres, including 3,317 acres of wheat.

Various small mining discoveries had also been made—coal in the Murray district and at Irwin River; lead in the Northampton district near Murchison River resulted in the establishment of the Geraldine Lead Mine.

In spite of these advances, Western Australia was, at this time, one of the most isolated and insignificant corners of the British Empire. Although colonies had been established in South Australia and Victoria in the 1830s the settlers in the Swan River Colony were still separated from other European settlements by many hundreds of kilometres of desert.

The local market was too small to generate economic activity on its own account and the Colony was unable to attract either capital or labour in the face of the more advanced and successful, competing colonies in eastern Australia.

### 1850 TO 1890—CONVICTISM; ITS IMPACT ON THE COLONY

Many leading colonists felt that this state of stagnation would disappear with the help of an increased labour supply and the provision of much-needed public works. The answer, they felt, lay in allowing convicts into the Colony. Originally proud of being a non-convict colony, the land-owners were grateful enough when the British Government agreed to the transportation of convicts to Western Australia. The first convicts, seventy-five in number, arrived in 1850; and between 1850 and 1868 when transportation virtually ceased some 10,000 convicts had been brought into the Colony.

The influx of convicts affected Western Australia in several important ways. It was convict labour which built the Colony's first public works—roads, bridges, jetties, wharves and buildings. Agriculture was boosted by the provision of cheap labour but perhaps more so by the increase in the size of the local market. Shipping became more regular thus, in effect, increasing the size of the export market. Convictism provided a much

needed injection of capital as the British Government had to spend money on feeding, clothing, housing and guarding the convicts. It also brought its own social problems; all the convicts were males and this created an even greater imbalance between the sexes. There was an increased number of crimes of violence and a deepening of the colonial inferiority complex, but, on the whole Western Australia was not plagued by the severity of the problems which convictism had brought to the other colonies of Australia.

Considerable development and quite rapid progress were made in Western Australia in the 1850s and 1860s. Although this slowed with the cessation of transportation of convicts in 1868 the following fifteen to twenty years were years of exploration and opening up of new areas in the Kimberley and inland, the starting of new industries and the consolidation of existing ones—sandalwood, hardwoods, a now flourishing pastoral industry and the rapid rise of a valuable export-earning pearling industry off the north west coast.

It was also a period during which social and political advances were made.

Representative government was inaugurated in 1870 with the new Legislative Council comprising twelve elected members and six nominees.

A Medical Board for the registration of medical practitioners was established. The municipalities of Perth, Fremantle, Guildford, Albany, Bunbury, Busselton, Geraldton and York were proclaimed and Road Boards established.

In 1877 the Overland Telegraph line between Perth and Eucla was completed. This establishment of communication with Adelaide and Darwin and thus London went a long way in reducing the isolation of the Colony from the outside world.

### **1890 TO 1900—TEN YEARS OF RESPONSIBLE GOVERNMENT; GOLD RUSHES**

Responsible government was granted to Western Australia in 1890 and a constitution proclaimed on 21 October of that year. The elections for members of the newly-constituted Legislative Assembly took place in November and December; the Governor nominated the first members of the newly-constituted Legislative Council and Parliament was officially opened on 30 December 1890 with John Forrest commissioned to form the first Ministry.

Forrest, a locally-born explorer-surveyor was an ambitious developer with a very good standing in the Colony. His determined policy was to develop the Colony's land and mineral resources, but before this could be done the Colony needed railways, roads, bridges, harbour facilities and other public works. To achieve this aim he planned to use funds raised by loan to the limit of the Colony's credit, a policy enthusiastically received by the new Parliament and the colonists alike.

From 1888 to 1891 there was a series of small gold rushes in the Colony leading to a significant rise in annual revenue. Also in 1891 the Colony's first Engineer-in-Chief was appointed—C.Y. O'Connor, a highly skilled engineer and a man of vision.

It was against this backdrop of responsible government, expanding annual revenue, an astute, prestigious and ambitious Premier ably served by the first Engineer-in-Chief that the rich discoveries of gold at Coolgardie in 1892 by Bayley and Ford, and at Kalgoorlie in 1893 by Hannan and O'Shea were to have such a dramatic impact.

The lure of gold brought men streaming in their thousands to Western Australia; there was a massive inflow of capital—anything relating to gold or situated in the mining areas was able to attract almost unlimited capital from London and the eastern colonies.

This huge increase in capital, production of wealth and the great surge in the population providing the much needed increase in the size of the local market meant that the gold discoveries at Coolgardie and Kalgoorlie gave tremendous impetus to the Colony.

Railways were built, harbour works were undertaken, with the dredged and newly reconstructed harbour at Fremantle opened to shipping in 1897 and Bunbury Harbour works started in the same year. In 1898 work commenced on the project for which C.Y. O'Connor is probably best remembered: a pipeline to the Goldfields by which water was pumped through a number of stations from a reservoir at Mundaring in the Darling Range. This 557-kilometre pipeline was completed in 1903 thus proving the success of a scheme which many had prophesied could only fail. By this time Forrest had left the State for Federal politics and O'Connor, dogged by vicious criticism of the scheme, took his own life in 1902 before the pipeline was completed.

Anticipating the time when the gold mania would be over and the most easily won gold largely worked out, Forrest's government took measures to enhance the development of the agricultural and pastoral sectors of the Colony to provide a more permanent and solid base for the economy.

The Homestead Acts of 1893 and 1894 were passed, encouraging new settlers to take up small parcels of land; an Agricultural Bank was formed, a Department of Agriculture succeeded the former Bureau and the first butter factory was established at Busselton. These factors, with the continued extension of railways into the agricultural areas plus the placing of tariffs on imported livestock and foodstuffs into Western Australia and the vastly expanded local market enabled the agricultural industries to prosper in spite of some bad seasons.

The gold rushes had brought men to Western Australia more liberal than the conservative local land owners. These men had ideas on trade unionism from the eastern colonies and as they became dissatisfied with the Colonial Government's mining regulations they agitated for greater political rights. By 1901 all adult men and women had been granted the right to vote at Legislative Assembly elections, there were reductions in the previously imposed food tariffs protecting the farmers and graziers, as well as other parliamentary reforms.

Although the colonial land owners still controlled the parliament it became obvious that the influx of men and new ideas from outside had irreversibly changed the character of the Colony. Now it was much more in line with the rest of Australia. It was not therefore surprising that a referendum on the issue of federation with the rest of the colonies resulted in a majority of about 70 per cent favouring federation.

Many of the more conservative, or perhaps far-sighted, old colonists remained unreconciled to the idea of being joined to areas much more economically advanced and of losing the power of self-government they had so newly received.

### 1901 TO 1929—FEDERATION; WORLD WAR I; CENTENARY

Federation took effect from 1 January 1901 but there have been times since when many Western Australians felt the State should have stayed out of the Commonwealth of Australia.

Politically, with the departure of John Forrest for the federal arena and the arrival among the gold

seekers of some very experienced trade unionists from the east there came a period of unstable Ministries. This led finally to the formation of the political party system. A Trades and Labour Congress held in 1899 decided on the formation of a Political Party which captured six seats in the Legislative Assembly at the 1901 elections. The Labour Party rapidly became a strong parliamentary force virtually compelling the other factions to join together to form a Liberal Party.

The mantle of federation did not seem to fit comfortably on the shoulders of Western Australians. The State was still very isolated from the rest of the Commonwealth in distance and perhaps in thinking. Its manufacturing industries were very severely discouraged by the now free trade existing between the States; and it never seemed to be able to get enough funds to carry out important projects.

In 1910 the Commonwealth agreed to make special grants to Western Australia for the next ten years. In 1925 the Commonwealth established a Royal Commission to enquire into the financial disabilities of Western Australia under federation, and, in 1933 the Commonwealth Grants Commission was set up to recommend action required to bring about a more equitable distribution of Commonwealth finance among the States. Western Australia's disabilities were recognised—it was given the status of 'claimant' State and received special grants right into the 1960s.

Western Australia was very much in favour of the Commonwealth Government decision to support Britain in the 1914–18 War providing more volunteers for overseas military service in proportion to population than any other State. Perhaps this was because Western Australia had a higher proportion of British migrants and single men—perhaps this was also the reason why Western Australia returned the highest 'Yes' vote in the referendum on conscription in 1916.

Following the Australia-wide political turmoil after the split in the Labour Party over the conscription vote the unions became more militant under the policies of the Federal Labour Government. At the time of the national waterfront strike in 1917 Prime Minister Hughes called for volunteers to work on the wharves. These volunteer National Workers, as they were called, were granted considerable favours for their actions. This naturally angered the union lumpers, culminating on the Fremantle wharves in 1919 in the 'Battle of the Barricades' which involved violent confrontation between about 3,000



lumpers (and their supporters) and police, resulting finally in the shooting of one unionist.

Nevertheless, although the 1914–18 War caused manpower shortages in some industries and disruption to overseas shipping, for the people who remained in the State the tempo of life was not much changed.

The period from Federation to 1929 saw many changes within the State. It was a time of continued, if often modest progress.

Wheat growing was being consciously fostered as the staple industry. Access to finance was readily available through the Agricultural Bank, railways were being extended into the wheatbelt areas. There was large scale assisted migration from United Kingdom in association with further settlement of the wheatbelt in the 1920s; and superphosphate fertiliser, the answer to the

infertility of the wheatbelt soils, was being manufactured within the State from 1910. Apart from setbacks due to droughts the wheat industry continued to expand with production reaching 36.4 million bushels in 1927 and 39.1 million bushels in 1929, both being the highest in the Commonwealth for those years.

Transport and communication were improving, the transcontinental railway between Kalgoorlie and Port Augusta in South Australia being opened in 1917. A road construction scheme with financial assistance from the Commonwealth commenced; there was a State Shipping Service; the first air mail service in Australia began in 1921 between Geraldton and Derby and the first regular air service between Perth and Adelaide started in 1929. The first radio station, 6WF commenced broadcasting in 1924.



1915 A camel train loaded with sleepers for the trans-Australia railway

*Photograph: West Australian Newspapers Ltd.*

Further education facilities were being provided: a School of Mines at Kalgoorlie in 1904; first students enrolled in the University of Western Australia, established in 1913 on a temporary site; Muresk Agricultural College opened in 1926.

Influential women's organisations active in this period helped to bring about social legislation particularly in the areas of public health and child

welfare. A Children's Hospital was opened in Perth in 1909 and the King Edward Memorial Hospital for Women in 1916, due much to the agitation of Edith Cowan who, in 1921 was to become Australia's first woman member of parliament.

And so by 1929, the State's centenary year, with over 50 per cent of the population living in the

Perth metropolitan area and Western Australia a relatively comfortable place to live in, it was with a considerable degree of satisfaction that the State was able to look back on its first 100 years of progress.

### 1929 TO 1945—WORLD DEPRESSION; WORLD WAR II

Western Australia, so very dependent on income from exports of wheat and wool was heavily hit when the world wide depression was heralded by

sharply falling wheat and wool prices. As the depression deepened farmers were forced off their land; the Government cut back its public works; all commercial activity slowed dramatically. Thousands were unemployed—some 30 per cent of trade union membership. Those employed had to accept wage cuts. Men lived in government camps while employed part-time on relief projects or searched for work in the 'back blocks'; thousands of families were dependent on the dole or charitable hand outs.



1930 Unemployed relief workers demonstration in Perth.

*Photograph: West Australian Newspapers Ltd.*

Western Australians, some ill-nourished, dismayed and helpless at this turn of events allowed their anger and discontent to find outlet in a renewed move for secession in 1933.

What did they stand to gain from being part of the Commonwealth? Secondary industry could never develop unless protected from competition in the other States; protective tariffs were imposed by the Commonwealth to protect manufacturing in the eastern States from overseas competition. In this State, so dependent on primary industries, it only served to increase farm costs to a disastrous level; and the Commonwealth Government had always starved Western Australia of funds.

No wonder then that at a referendum in 1933 over two-thirds voted to leave the Federation. However, a delegation despatched to London to

seek secession from the British Parliament found its petition rejected by this Parliament on the grounds of constitutional impossibility.

It was clear that the Commonwealth Government, which had by this time far reaching financial and economic powers, held responsibility for dealing with the depression. However, it seemed unable to bring in any course of action to combat the problem. In 1933 all States adopted the 'Premiers' Plan', at least a unified course of action. Whether the improved conditions reached by 1935 had much to do with the Plan or were the result of Australia 'importing' recovery from overseas is a moot point.

For those in regular employment even the 1930s brought a modest increase in real living standards by way of greater use of telephones, refrigerators,

motor cars and the general improvement in transport and communication and other services. It was however, the war of 1939–45 which brought regular employment for all, followed by hitherto unknown prosperity in the post-war period.

In the early years of the war, life in Western Australia more or less continued at its usual pace. There was a drought in 1940, cyclone and floods in 1941 and 1942, the Canning and Samson Brook Dams were completed and work was started on Eyre Highway, linking Norseman and Port Augusta (South Australia). Liquid fuel had been rationed and industrial activity had increased, particularly in manufactures for war purposes—engineering, clothing and food processing.

The full reality of war was brought home to Western Australians in 1942 with attacks by Japanese aircraft on Broome, Wyndham and Port Hedland and the real threat of an invasion of Australia. Discussion by the military of a 'Brisbane Line', which would have abandoned the West to invasion, only served to reinforce Western Australia's sense of isolation from the rest of the nation..

A munitions factory was established at Welshpool; registration of all civilian persons aged 16 years and over was imposed. Clothing, tea and sugar were rationed in 1942, butter in 1943 and meat in 1944. A Commonwealth daylight saving scheme was introduced with Western Australia exempted in 1943. These war related measures, the introduction of the Uniform Tax Scheme making the Commonwealth the sole taxing authority in the income tax field and the extension of federal social services did, nevertheless, all help to bind Western Australia more closely into the Commonwealth.

#### 1946 TO 1960—A STATE GROWING UP

War ended in 1945 and with the demobilisation of the fighting forces came problems of rehabilitation and an acute housing shortage. Agreements were made between the Commonwealth and the States on land settlement and housing.

A new industrial centre was established in 1946 at the former munitions factory at Welshpool and plans announced for manufacture of agricultural tractors. In 1947 the first of the assisted migrants arrived from Britain and the first of the 'displaced persons' under agreement with the International Refugee Organisation.

There was general stimulation in the mining industry with world shortages and high prices of most minerals.

The shipment to New South Wales of the first load of iron ore mined at Cockatoo Island was made in 1951.

The fishing industry expanded and the first crayfish tails were exported. An integrated wood distillation and charcoal iron industry commenced production at Wundowie. The Stirling Dam was officially opened and the Commonwealth granted \$4.3m to Western Australia towards the cost of the Comprehensive Water Supply Scheme.

Boosted by a high level of immigration all facets of the economy were expanding as fast as other scarce resources would allow. War time controls were being progressively removed with rationing of meat, clothing, petrol, tea and butter abolished by 1950.

In this post-war period the strong demand for primary products was a major contributing factor to the prosperity. Wool prices reached their, until then, highest ever level. Wheat production increased to 50 million bushels in 1950–51, the highest since 1930–31 due to both an increase in area sown and in average yield. The gross value of this harvest was \$33m, five times higher than in 1945–46.

The highest population increase since 1896, the peak gold rush period, occurred in 1950 with migration at 19,295 and natural increase 9,170.

The increased manpower for civilian production, the progressive removal of war time controls and the substantial recirculation of purchasing power previously withheld (deferred pay, allowances etc.) which released the pent-up demand contributed to the economic recovery in Western Australia after the strains imposed by transition from war to peace.

The inherent cause of economic prosperity or otherwise in Western Australia had always been the state of the primary sector and this time was no exception. The booming conditions of the early 1950s, caused largely by high export returns for wheat and wool, ended with falls in these export prices and a consequent sharp decline in farm incomes in 1954–55.

This fundamental weakness in the economic structure of the State had long been recognised

and attempts had been made after the war to seek some diversification. As a result, in 1952 negotiations were completed for the establishment at Kwinana of oil refining, steel rolling and cement manufacturing projects with provisions for port facilities in Cockburn Sound and rail links with the metropolitan system. The oil refinery and steel rolling mill began operating in 1955 and 1956 respectively. By the late 1960s, improved rail and sea transport facilities and the State Government's favourable terms had attracted many more industrial concerns to the Cockburn Sound area. Western Australia had gone a long way towards overcoming the industrial backwardness that had inhibited it for so long.

There was also considerable interest in developing the northern part of the State in the post war period. Air transportation of beef carcasses from Glenroy Station to Wyndham for shipment overseas began in 1949. In 1963, after expenditure of millions of dollars by State and Commonwealth Governments under Western Australian Grant (Beef, Cattle, Roads) Acts the first consignment of frozen beef carcasses were sent by road from Glenroy Station to the coast, thus replacing the air-freight system which had operated for almost fifteen years. Under another Commonwealth Act, finance was made available to Western Australia for the development of the State north of 20°S latitude. A large proportion of these moneys was to be spent in connection with damming the Ord River and associated irrigation works.

### **1960 TO 1989—THE MINERAL BOOM; A STATE COMES OF AGE**

Oil was found at Exmouth Gulf in 1953 but proved uncommercial and it was not until the late 1960s that oil and natural gas in commercial quantities were discovered, firstly at Barrow Island in 1966.

Repeatedly the Commonwealth had rejected applications by the Western Australian Government for a licence to export iron ore; finally, in 1960 the embargo on iron ore exports was lifted. This stimulated exploration which resulted in the location of massive deposits of iron ore in the Pilbara. With large British, American and Japanese firms ready to invest in the north to mine the ore, development was rapid.

The mineral boom involved not only iron ore but also the mining of bauxite in the Darling Scarp, nickel at Kambalda and production of ilmenite from mineral beach sands. By 1965 Western Australia had become a major world supplier of mineral exports.

The State Governments of these years have been given credit for much of this achievement. They had fought hard for the establishment of the first industries at Kwinana. The Commonwealth had been persuaded to provide large sums of money for development of the north, the standard rail link with the eastern States and expanding roles in areas such as housing, hospitals etc. They had been able to attract to the State the vast quantities of private capital needed to finance the development of its mineral resources.

Perth itself was changing—its skyline was becoming higher, the Narrows Bridge was completed in 1959 and the beginnings of a freeway system to provide for an ever increasing volume of heavy traffic. In the years of the mineral boom of the 1960s Western Australia became 'affluent' and was able to throw off its status of 'claimant' State and even defied Canberra on many issues—not however, going as far as secession.

Some of the heat had gone out of the mineral boom by the early 1970s but, by then foreign capital inflow into the State had been enormous—not only to develop the mineral resources but also to invest in new farming lands and city real estate. The Perth skyline continued to change, becoming higher and higher, its suburbs sprawling further north and south serviced by extending freeways.

Development of the State's resources continues; diamonds are mined in the Kimberleys; there have been ups and downs in the gold mining industry; proposals for more mineral sands mining and plans for further industrial development. The shift has been away from the more traditional agricultural industries toward the mining sector. Along with this has been a rapid growth in the areas providing the services required by this now highly sophisticated society.

At June 1988 the estimated population of Perth was 1,118,000, more than double what it was in 1965; but what a vastly different population! With a very high proportion of migrant-born inhabitants it is a culturally diversified and highly cosmopolitan population in the 1980s.

As the trade of Australia and, in particular Western Australia, becomes more and more closely tied to Pacific countries Perth's situation midway between Singapore and Sydney becomes highly strategic. Perth has a new international airport with over forty international flights per week. There is a highly developed communication system—the world is as close as the nearest telephone or telex machine. The State of Western



Australia can no longer be considered as isolated in any sense of the word.

For the first 130 years of its existence, originally as the struggling Swan River Colony, later as an underprivileged State of the Commonwealth, Western Australia had sought to overcome three major economic disabilities. Its extreme isolation from the other States and the rest of the world, its small population and hence a small local market in which to sell its production, and, partly linked to this its heavy reliance on overseas markets particularly for wool and wheat. In the last few decades these forces have proved to be no longer paramount. Western Australia has 'come of age' economically—but not without cost.

### 1989 TO ... —WHERE TO NOW?

This process of continued growth and development has created serious problems—the problems of pollution of the sea, the land, the rivers and the atmosphere by factories as well as the ubiquitous motor vehicle; and the general degradation of the land by what can now be seen as agricultural malpractices—over clearing, overstocking and the use of massive amounts of artificial fertilisers to name a few. The obvious extent and the rate of increase of this degradation and pollution is attracting the attention of Governments and public alike.

The practices carried out with impunity in colonial days with no obvious deleterious effect on the

environment at the time can be destructive when carried out over a long period on an ever increasing scale.

The original inhabitants of Western Australia lived for thousands of years in a state of delicate balance with an extremely harsh environment. Perhaps the decade of the 1990s will see the present inhabitants of Western Australia begin a process of re-learning and re-creating whereby it will be possible to reach and maintain a delicate balance between continued economic progress and a healthy physical and social environment.

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## Chapter 2

### PHYSICAL FEATURES AND GEOLOGY

#### The Geological and Geomorphological Framework of Western Australia

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Interest in the geology of Western Australia was spurred with the beginning of the mining industry in 1850 and has continued to the present. By 1986, when mining products were valued at over \$5,400 million for the year, the entire State had been mapped on a scale of 1:250,000 by the Geological Survey of Western Australia. This remarkable organisational achievement has provided a position to view the geological evolution of the western third of the continent in a global context. Furthermore, some 75 years after the pioneering work of J.T. Jutson, we now have the framework to develop the link between solid geology and *geomorphology*, and between geological evolution and *morphotectonics*.

The morphotectonic and geomorphological emphasis of this article differs from the more economic approach of previous Year Books. Readers requiring an introduction to the economic geology and mineral statistics of Western Australia can enter the literature through Collins and Baxter (1984), Ho and Groves (1987) and Jaques et al. (1986). Significant information is found in the issues of Australian Petroleum Exploration Association Journal (APEAJ) and the bulletins and other publications of the Geological Survey of Western Australia. The most comprehensive outline of the geology of the State is to be found in Memoir 2 of the Geological Survey, which is shortly to be succeeded by Memoir 3.

The geology and geomorphology is considered at two levels: (i) the scale of the continent; and (ii) the scale of individual geomorphological regions. Because large parts of Western Australia have undergone relatively uninterrupted subaerial weathering for so long, many aspects of their geomorphology are closely related to the solid geology. But, in addition, the depositional geomorphological sequences which, in Western Australia, were essentially controlled by global and regional climatic changes during the Cenozoic,

also need to be considered. These sequences include the extensive areas of desert dunes, such as in the great Sandy Desert, widespread river deposition and floodplain formation, such as along the Gascoyne and Fitzroy rivers, and Quaternary coastal deposits which dominate the geomorphology of the Swan Coastal Plain.

#### THE MAJOR GEOLOGICAL AND GEOMORPHOLOGICAL REGIONS OF WESTERN AUSTRALIA

The major geological and geomorphological regions of Western Australia are shown in Diagrams 2.1 and 2.2 and described in Tables 2.2 and 2.3. The geomorphology is essentially shown as 'landform regions', that commonly show some correspondence to the geological divisions. The general correspondence between geomorphology and solid geology is emphasised by the older elements of the geology of Western Australia, which are the main geographical components of the broad-scale geomorphology of the region. In this approach there is a danger of oversimplification, but it forms a convenient basis from which to discuss the geomorphology and geology of Western Australia.

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For the general reader, a glossary of geological terms is provided at the end of the chapter, and a geological time-scale is given in Table 2.1. Words or phrases included in the glossary are italicised when first mentioned in the text.

TABLE 2.1 – GEOLOGICAL TIME SCALE

<i>Era</i>	<i>Period</i>	<i>Epoch</i>	<i>Duration (years)</i>	<i>Years before present</i>	
Cenozoic	Quaternary	Holocene (Recent)	10,000	10,000	
		Pleistocene	1.5–1.8 million	1.5–1.8 m	
	Neogene	Pliocene	3–5 million	5–7 m	
		Miocene	19 million	26 m	
		Oligocene	11–12 million	64–65 m	
	Palaeogene	Eocene	16 million		
		Paleocene	10 million		
	Mesozoic	Cretaceous	Senonian	Maastrichtian Campanian Santonian Coniacian	35 million
				Turonian Cenomanian	100 m
			Early	Albian Aptian Barremian Neocomian	36 million
Jurassic		54–59 million		136 m	
Triassic		33 million	190–195 m		
Palaeozoic		Permian	55 million	225 m	
		Carboniferous	65 million	280 m	
		Devonian	50 million	345 m	
		Silurian	35–45 million	395 m	
		Ordovician	60–70 million	430–440 m	
	Cambrian	70 million	500 m		
	Precambrian Eras	Adelaidean	230–530 million	570 m	
		Undifferentiated	250–550 million	800–1,100 m	
Proterozoic	Carpentarian	450 million	1,350 m		
	Early	700 million	1,800 m		
	Archaean		2,100 million	2,500 m	
				4,600 m	

**TABLE 2.2 — GENERAL MORPHOTECTONIC – GEOLOGICAL DIVISIONS OF WESTERN AUSTRALIA**  
(To be used in conjunction with diagram 2.1)

<i>Area</i>	<i>Division</i>	<i>Subdivision</i>	<i>Diagram reference</i>
Western Shield	Yilgarn Block	Eastern Goldfields Province	1
		Southern Cross Province	2
		Murchison Province	3
		Western Gneiss Terrain	4
		Proterozoic rocks on or adjoining the Yilgarn Block	4 A–H
	Pilbara Block	Not subdivided	5
	Archaean inliers between the Yilgarn and Pilbara Blocks	Not subdivided	6
	Main areas of Proterozoic metamorphic and igneous rocks	Albany–Fraser Province	7
		Leeuwin Block	8
		Northampton Block	9
		Gascoyne Province	10
		Paterson Province	11
	Main areas of Proterozoic sedimentary rocks	Hamersley Basin	12
		Ashburton Trough	13
		Bangemall Basin	14A
		Nabberu Basin	14B
Remaining Precambrian areas	Kimberley region	Kimberley Basin	15
		Halls Creek Province	16
	Musgrave Block	Not subdivided	17
	Areas between region and the Kimberley Musgrave Block	Areas of Proterozoic metamorphic and igneous rocks	18 A–D
		Proterozoic basins	19 A–C
Phanerozoic areas	Sedimentary basins indicated on Diagram 2.1		



**DIAGRAM 2.1**

Modified National Oceanic and Atmospheric Administration (NOAA) satellite image showing the general morphotectonic-geological divisions of Western Australia. The numbers refer to Table 2.2 where the subdivisions are named (modified from Geological Survey of Western Australia, Memoir 2). NOAA image courtesy of Remote Sensing Application Centre, Department of Land Administration.

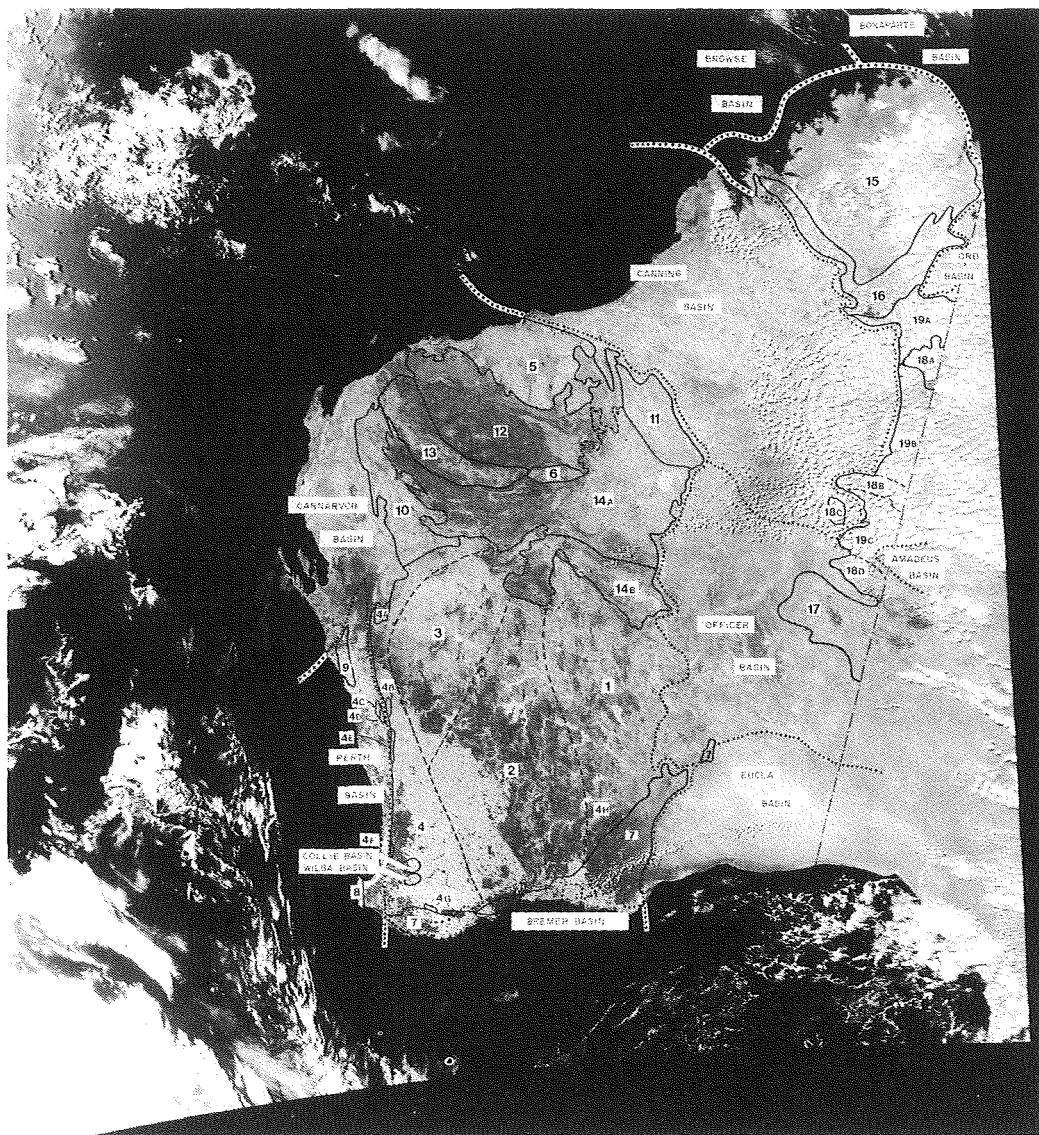


TABLE 2.3 – THE MAJOR GEOMORPHOLOGICAL DIVISIONS OF WESTERN AUSTRALIA

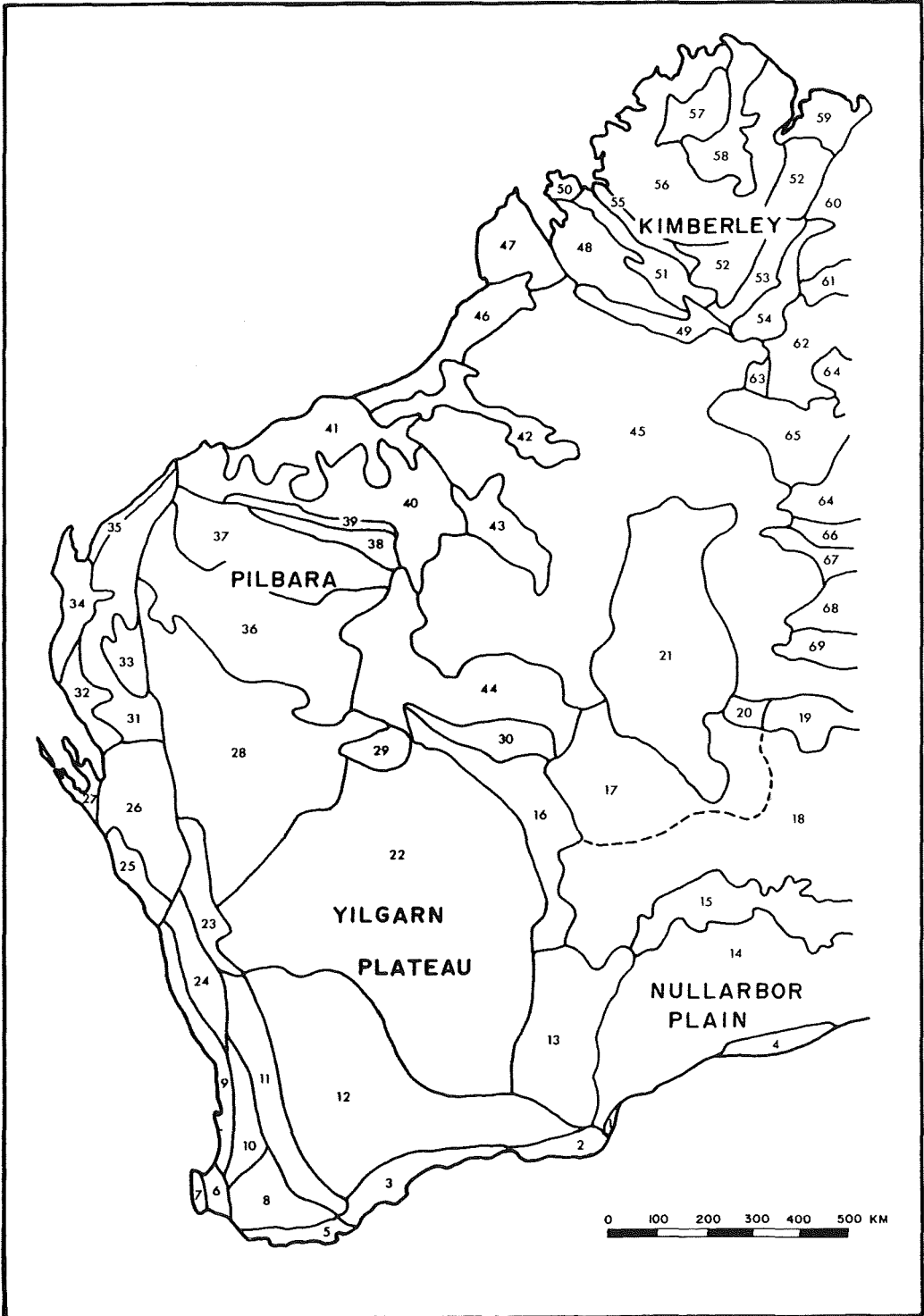
Reference	Division and Description	Reference	Division and Description
1	Israelite Plain— Narrow coastal plain with extensive dunes	19	Musgrave Ranges— Granitic ranges and rounded high hills
2	Esperance Hills— Low granite hills and plains extending as headlands and inlets	20	Warburton Ranges— Ranges and hills of basic volcanic rocks and granite
3	Stirling and Mt. Barren Hills— Hills and low ranges of granite and metamorphic rocks with intervening plains and moderately incised southerly valleys	21	Gibson Desert Plains— Sandy or stony lateritic plains
4	Roe Plain— Coastal plain with extensive dunes	22	Yilgarn Plateau— Sandplains and laterite breakaways; granitic and alluvial plains; ridges of metamorphic rocks and granitic hills and rises; calcretes, large salt lakes and dunes along valleys
5	Albany Headlands and Inlets— Granitic headlands and inlets with lagoons	23	Woodramung Hills— Low rounded ridges of folded metamorphics
6	Donnybrook Lowland— Lowland on down-faulted weak sedimentary rocks	24	Dandaragan Tablelands— Dissected plateaus and hills of sedimentary rocks, with minor laterite cappings and dry valleys; extensive sand cover in lower parts
7	Leeuwin Peninsula— Narrow granitic horst ridge with extensive cover of calcareous dune sands	25	Greenough Hills— Dissected plateaus and hills of sandstone and shale, with extensive sand cover in lower parts
8	Collie-Kalgan Slopes— Gently sloping dissected edge of plateau on granite and gneiss with laterite cappings	26	Yaringa Sandplain— Sandplain with minor dunes
9	Swan Plain— Dune ridges, mainly of limestone, and inner alluvial plain	27	Shark Bay Peninsulas— Peninsulas and islands formed by indurated limestone dunes
10	Darling Range— High plateau rim with steep western fall; remnant laterite cappings and deeply incised valleys of oceanward drainage	28	Murchison Plateau— Mainly granitic plains with out-going drainage, broken by ridges of metamorphic rocks
11	Northam Plateau— Flat-floored valleys of moderately incised oceanward drainage; older laterite remnants with breakaways on divides in east; shallow younger laterites on valley sides in west	29	Glengarry Hills— Sandstone plateau sloping north to low hills of basic volcanic rocks
12	Narrogin-Ongerup Plateau— Sandplains and laterite cappings with breakaways on divides; stripped granitic plains on valley sides; small salt lakes and bordering dunes along shallow valley floors	30	Carnegie Hills— Sandstone tablelands, stony limestone plains, salt lakes and adjacent dunes
13	Coonana-Ragged Plateau— Sandplain and stripped gneissic plains with low hills of granite and metamorphic rocks; calcretes and scattered small salt lakes along shallow valleys	31	Carnarvon Dunefield— South-north longitudinal dunes
14	Bunda Plateau— Covered karst plain of flat-lying limestone with closed depressions and caves; continuous cliff margin on south coast	32	Carnarvon Plain— Alluvial plain
15	Carlisle Plain— Sandstone plain with shallow closed depressions	33	Kennedy Range— Dissected sandstone plateau with partial lateritic cappings, covered by longitudinal dunes
16	Leemans Sand Plain— Sand plain with small salt lakes	34	North West Cape Ridges— Ranges and peninsula formed by folded sedimentary rocks and limestone dunes
17	Great Victoria Desert Dune Field— Northwest Dunes and Hills – west-east longitudinal dunes broken by low tablelands and ridges	35	Onslow Plain— Alluvial, deltaic and littoral plains; minor islands
18	Great Victoria Desert Dune Field— Main Dunefield – west-east longitudinal dunes	36	Augustus Ranges— Parallel ranges and dissected plateaus with intervening sandy lowlands
		37	Hamersley Plateaus— Dissected bold plateaus and ranges in flat lying or moderately folded sedimentary rocks
		38	Fortescue Valley— Mainly alluvial lowland

TABLE 2.3 – THE MAJOR GEOMORPHOLOGICAL DIVISIONS OF WESTERN AUSTRALIA

<i>Reference</i>	<i>Division and Description</i>	<i>Reference</i>	<i>Division and Description</i>
39	Chichester Range— Narrow range of dipping quartzite and sandstone	54	Halls Creek Ridges— Ranges and rounded hills on granite and metamorphic rocks
40	Nullagine Hills— Dissected flat-topped hills of granites and metamorphic rocks with partial lateritic cappings; narrow estuarine plain and islands	55	Richenda Foothills— Rounded hills and ridges and lowlands on a belt of granite and folded metamorphic rocks with minor basalt
41	De Grey Lowlands— Floodplains and deltaic plains; granitic and limestone lowlands; scattered ranges of metamorphic rocks in north	56	Kimberley Plateau— Sandstone plateaus with tabular high summits; ria coast and islands to north–west
42	Anketell Hills— Low mesas, buttes and stony rises of lateritized sandstone and shale among east–west longitudinal dunes and sandy plains	57	Couchman Uplands— Undulating to hilly lower plateaus, mainly on basalt
43	Rudall Tablelands— Dissected low sandstone tablelands	58	Drysdale Lowlands— Undulating to hilly lowlands, mainly on basalt
44	Stanley Hills and Dunes— Isolated sandstone ridges among west–east longitudinal dunes and sandplain	59	Bonaparte–Diemen Lowlands— Dissected lateritic lowlands and minor islands; part alluvial, part estuarine coastal plains
45	Great Sandy Desert Dunefield— East–west longitudinal dunes and minor salt lakes	60	Ord–Victoria Plateaus— Dissected plateaus, mainly basaltic but partly of sandstone and with local lateritic cappings
46	Eighty Mile Plain— Coastal dunes and estuarine plain	61	Birrundudu Plain— Low basaltic plain with clay soils; indeterminate drainage with large claypans
47	Dampier Tablelands— Low sandstone tablelands, partially lateritized and with extensive sandplain cover	62	Tanami Sandplain and Ranges— Sandplain with scattered low ranges and tablelands and occasional granitic hills
48	Fitzroy Plains— Floodplains and broad estuarine plains	63	Sturt Creek Floodout— Floodout with distributary channels and claypans
49	Fitzroy Ranges— Scattered sandstone tablelands and ranges; extensive sandplain and east–west longitudinal dunes	64	Wiso Sandplain— Sandplain with minor longitudinal dunes in South; floodplains and floodouts on margins; stony rises in North
50	Yampi Peninsula— Parallel ridges of quartzite and sandstone and narrow valleys of basalt; extending as a ria coast and islands	65	Stansmore Dunefield and Ranges— East–west longitudinal dunes locally broken by narrow sandstone ranges
51	Napier Limestone Ranges— Limestone tableland and intricately dissected bevelled ridges; rocky karst surfaces with box valleys	66	Redvers Dunefield— East–west longitudinal dunes
52	Leopold–Durack Ranges— Prominent ranges of dipping quartzites rimming the main plateau	67	Macdonald Sandplain— Mainly sandplain with dune–fringed salt lakes
53	Springvale Foothills— Granite hills and minor undulating plains	68	Amadeus Lowland— Dunefields and sandplains with scattered sandstone ranges; salt lakes and calcrete plains along lowland axis
		69	Rawlinson–Petermann Ranges— Dissected sandstone ranges with prominent escarpments

**DIAGRAM 2.2**

The major geomorphological divisions of Western Australia. The numbers correspond to those given in Table 2.3 (after Jennings, J.N. and Mabbutt, J.A., 1986: *in* Jeans, D.N., (ed), *Australia – A Geography Volume One. The Natural Environment*).



## MORPHOTECTONIC TERRAINS AND GEOMORPHOLOGY

### The Precambrian framework

The geomorphological contrast of Western Australia with other continental masses is based upon the lack of Phanerozoic *orogeny*, and particularly Late Phanerozoic orogeny. In fact, large parts of Western Australia have been relatively stable for over 1,000 million years. However, little remains of the original landscapes, and the regions have been so reduced in their relief as to lose much of their erosional potential.

The antiquity of the landscape of Western Australia is exemplified by the Yilgarn Block, which with the Pilbara and Kimberley blocks formed the geological framework of Western Australia, and controlled much of the long-term geological and broad-scale geomorphological evolution of the State. The Yilgarn Block is one of the largest areas of Archaean crust in the world. The bulk of the block—the Murchison, Southern Cross and Eastern Goldfield divisions—is a *granite*–greenstone terrain, in which arcuate belts of *metamorphosed* sedimentary and volcanic rocks (greenstone belts) lie between large areas of granitoid. High-grade *gneiss* terrains bound the western margin of the block. The gneiss terrains represent metamorphosed, and partly *migmatised*, *metasedimentary* sequences. Dates from detrital zircons have yielded ages of up to 4,200 million years, and represent the oldest mineral ages reported for terrestrial rocks. For the rest of the Yilgarn Block a large number of dates have been obtained. *Komatiite* lava flows in the eastern part of the block have been dated at 3,200 million years ago and *felsic volcanics* at around 3,000 million years ago. Recent rubidium–strontium dating for the Murchison gave ages of about 2,500 million years for a granite intruded by *porphyritic–biotite adamellite*.

The geomorphology of the Yilgarn Block is essentially one of an erosional plain, in which lithological differences and major *tectonic* lineaments are accentuated in their erosional expression. Not surprisingly, the resistant banded iron formations often form prominent ridges. Similarly, large granite domes are prominent features in the western areas of the Yilgarn Block. Even the larger *dykes* (e.g. the Jimberlana Dyke, of the Norseman region) have a clear topographic expression. Other regional-scale lithological differences are also well marked topographically, for example, the paired metamorphic belts of the

Perth–Northam area, which are related to the Northam Plateau.

The western margin of the Yilgarn Block is demarcated by the Darling Fault, which has existed since the Late Proterozoic or Early Palaeozoic. It probably originated as a *transcurrent* fault, but later functioned as a normal fault with a maximum throw of about 15,000 metres. In the Donnybrook area, the Donnybrook Sandstone and Maxicar Beds abut against the Darling Scarp and extend into valleys incised into the scarp. These sediments are of Neocomian age, and are believed to have been deposited at about the time of the last major movement along the Darling Scarp. As a morphotectonic structure, bounding a continental margin, the Darling Scarp (Diagram 2.3) forms one of the ‘Great Escarpments’ of the world.

Unlike the Yilgarn Block, the Kimberley Block is largely covered by the later Proterozoic sediments and volcanic rocks which form the Kimberley Basin, and consequently little is known of its geology. It is known however, that the block has remained stable for 2,100 million years. The geomorphology of the Kimberleys is dominated by a series of plateaus on which major structural lineaments have strongly controlled drainage net evolution. Surficial depositional elements are generally suppressed, but important Cenozoic *alluvial* sequences are found, some of which contain diamonds.

The Pilbara Block consists of large granitoid *batholiths*, some 3,000 to 3,500 million years old, associated with older greenstone belts and younger granites and adamellites, dated at around 2,800 million years ago. The southern part of the Pilbara Block is overlain by the Fortescue Group of the Hamersley Basin (see below) which is dated at 2,700 million years ago, suggesting that major stabilisation had by then taken place. The geomorphology of the block is characterised by erosional plains, in which lithological variations are clearly expressed. The corestone plains and granite domes reflect the large batholiths.

The Proterozoic saw the development of a number of block–marginal *mobile belts* and the formation of *sedimentary basins* which led to the deposition of an intracratonic platform cover. The main stratigraphic divisions of the Hamersley Basin, which is the oldest, are:

1. The basal Fortescue Group (mentioned above), which consists largely of volcanics—flood *basalts*, *andesites* and *tuffs*—and subordinate sedimentary clastics;



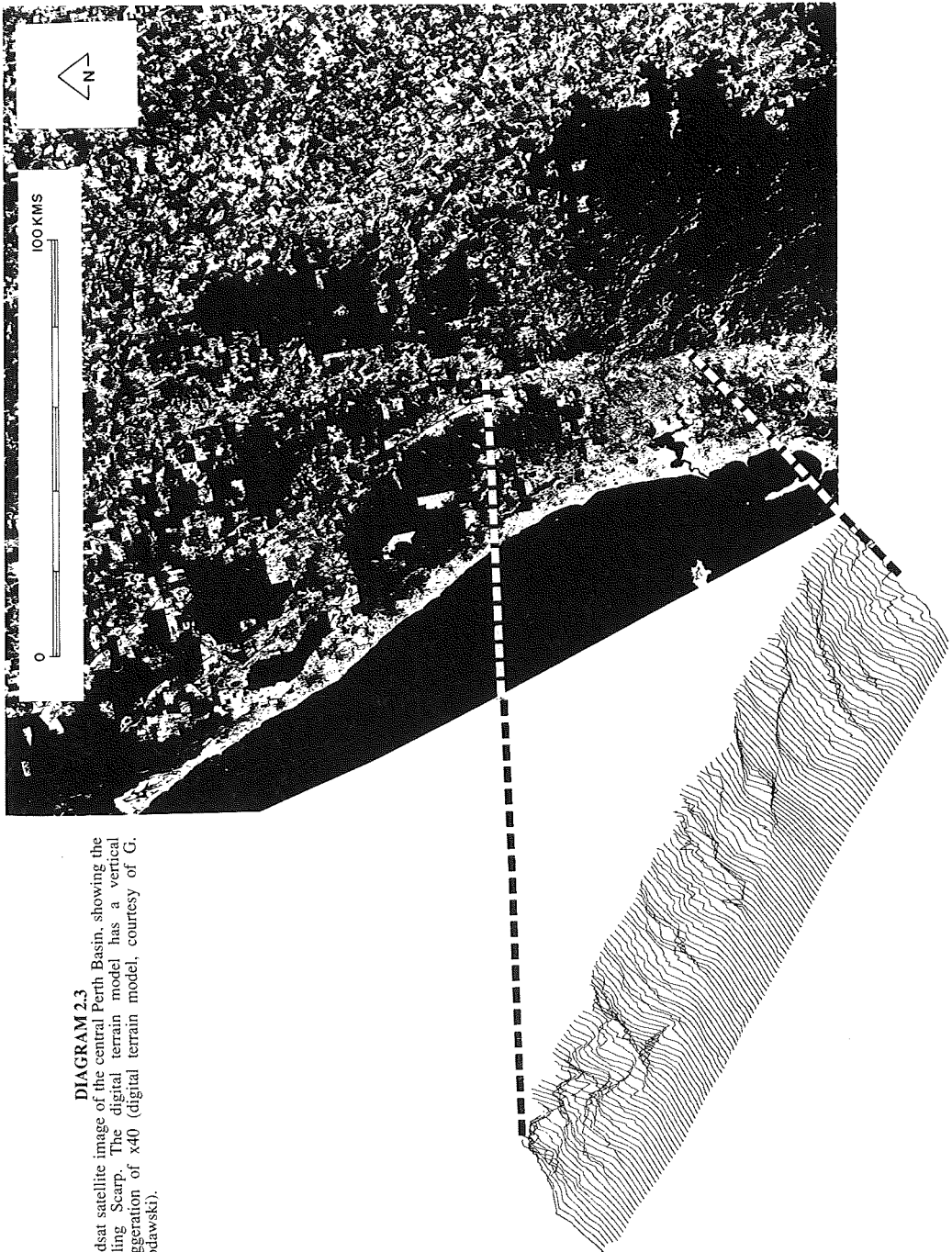
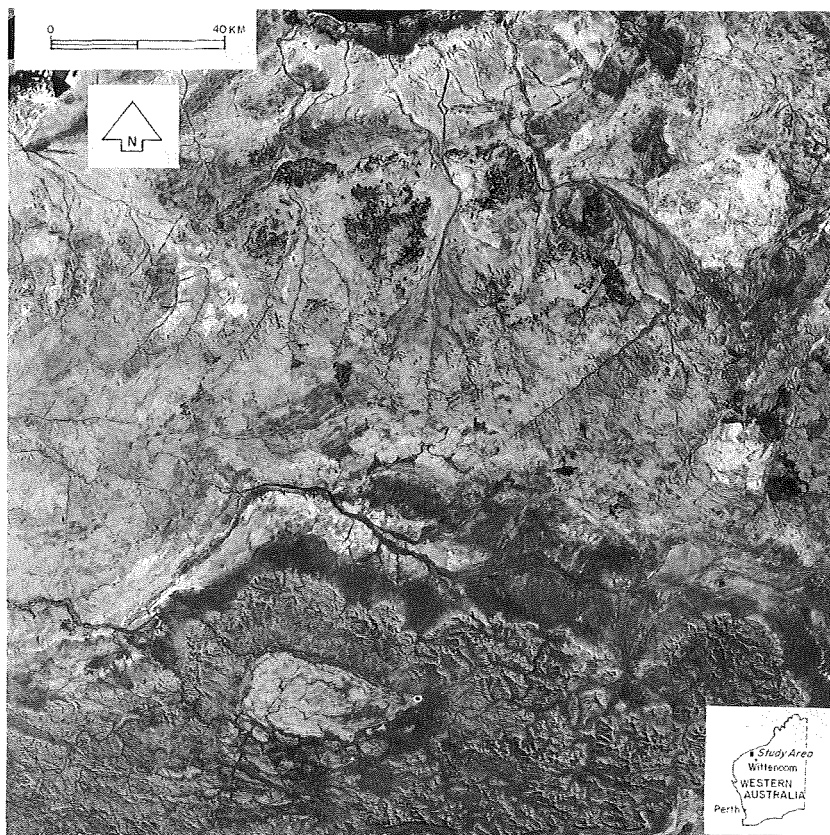


DIAGRAM 2.4

Landsat satellite image showing the contrast in the geomorphological expression of the Pilbara Block (the northern part of the scene) and the Hamersley Basin (the southern part of the scene).



2. The Hamersley Group which contains the classic banded iron formation, shales and dolomites, extensive dolerite *sills* and large volumes of acid volcanics;

3. The Turee Creek Group, the upper part of which is dominated by a series of sedimentary clastics, including *diamictites*, carbonates and subordinate dolerites and volcanics.

The deposition of the basin infill straddles the Archaean/Proterozoic boundary (2,500 million years ago). The Hamersley Basin itself was probably *cratonised* by around 2,000 million years ago.

The geomorphological continuity of the Hamersley Basin is interrupted by the Fortescue Valley (a possible *graben*), in which alluvial deposition has taken place. Large alluvial fans debouch out of the bounding escarpments into the valley. To the north

of the Fortescue River, the Chichester Range is the geomorphological expression of the Fortescue Group. To the south, the Hamersley Group forms a strongly defined, dissected plateau, on which structural and lithological controls have developed a distinctive terrain (Diagram 2.4) associated with some large landslides (Diagram 2.5).

The Gascoyne Province and Ashburton Trough are the two elements of a complex orogenic zone or mobile belt—the Capricorn Orogen—joining the Pilbara Craton to the Yilgarn Block. In the northern part, the orogen consists of folded geosynclinal sediments of the Ashburton Trough. The major structural elements are indicated by the ridge arrangement of the erosional geomorphology. The Ashburton Trough grades into the Gascoyne Province with increasing metamorphic grade and associated *plutonic* rocks. Overall, the formation of the Capricorn Orogen involved geosynclinal sedimentation, metamorphism,

basement reworking and granitoid emplacement. The oldest dates obtained for the Gascoyne Province have been 2,000 to 2,400 million years ago. A younger set of granites have been dated at 1,600 million years ago; the orogen probably did not finally stabilise until about 1,000 million years ago.

The Nabberu Basin consists of a thick sequence of sedimentary rocks—essentially underformed clastics, iron-formation and carbonate sediments—associated with minor igneous rocks. The sequences are Proterozoic, and dates of 1,600 to 2,000 million years ago have been obtained. In the western part of the basin there was some deformation 1,700 to 1,800 million years ago,

associated with the remobilisation of, and intrusions in the Gascoyne Province. The Nabberu Basin may have been an aulcogen—a continental rift which failed to develop fully—related to the *tectonics* of the Gascoyne Province.

The Bangemall Basin is a large intracratonic sedimentary basin dated at 1,100 million years ago. The succession consists of graben deposits overlain by marine *transgressive-regressive* units and stable platform deposits. The western part of the basin was influenced by tectonic activity associated with the Gascoyne Province. *Mafic* and felsic volcanic activity is evident throughout the basin, but is most pronounced in the west.

#### DIAGRAM 2.5

Large planar rock slides in the Hamersley Basin. The westernmost slide has a volume of just under 1 million cubic metres, and during failure attained sufficient momentum to override an opposing ridge.

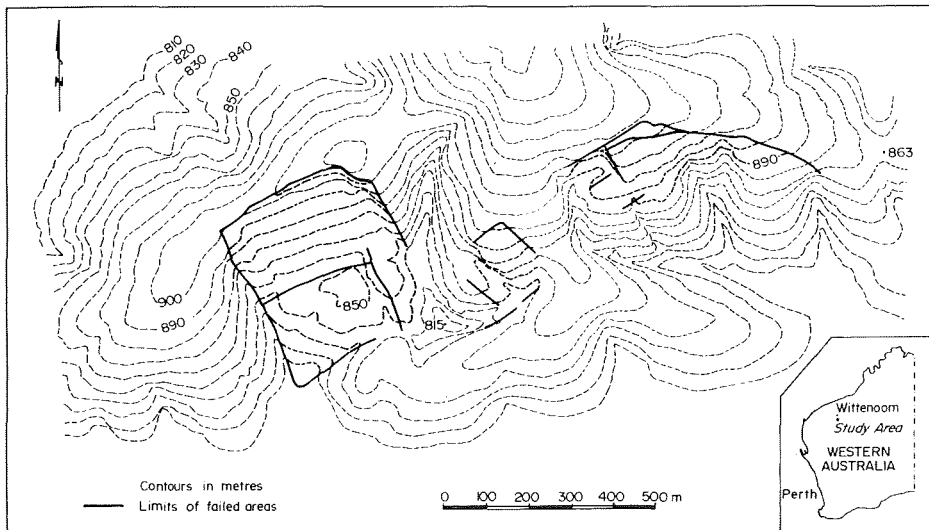
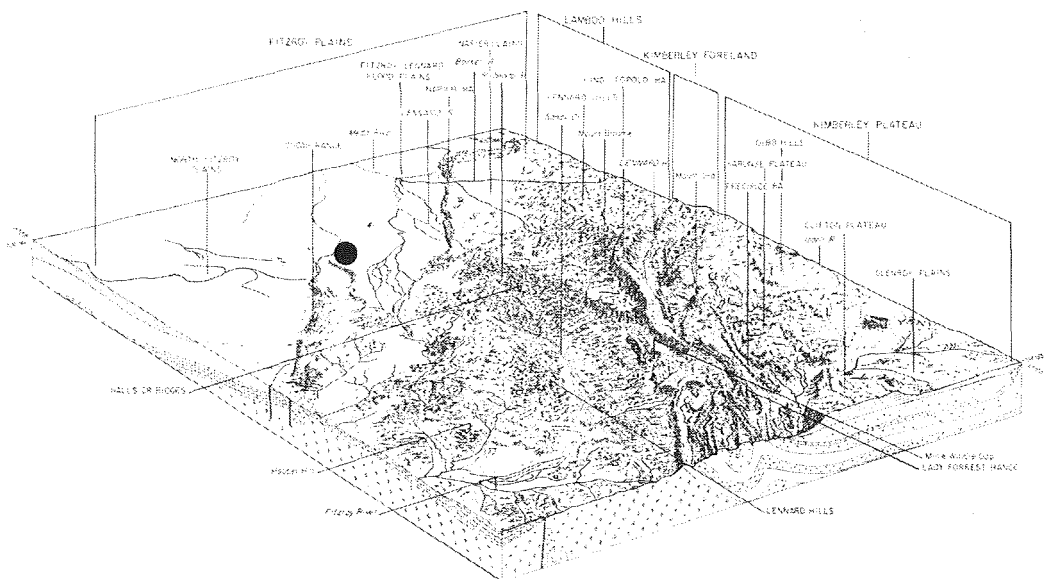
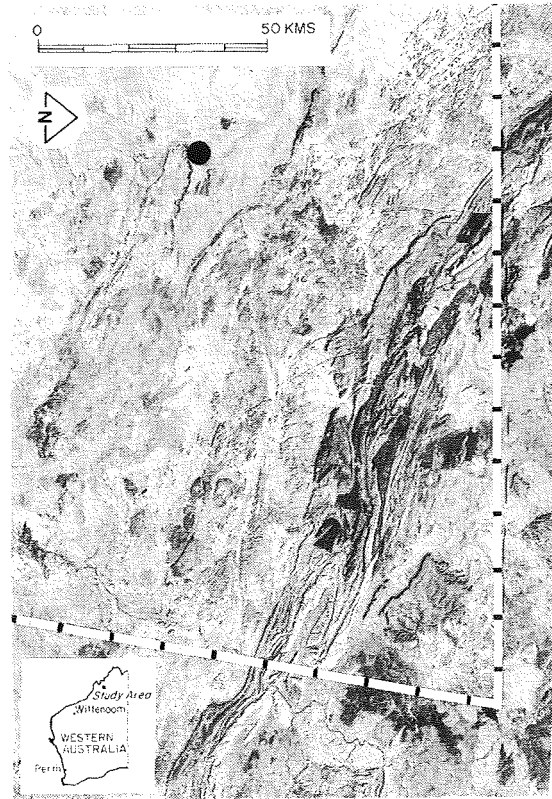


DIAGRAM 2.6

Landsat satellite image of the Lennard River area. The northwest-southeast trending ridges are Proterozoic sedimentary and associated igneous formations, which constitute part of the King Leopold Mobile Zone, which is part of the Halls Creek Province. The Devonian reef complexes which form the Napier and Oscar ranges, are also shown. The area enclosed by the broken line approximates to the area in the block diagram (from Derrick, G.M. and Playford, P.E. 1973: Lennard River, Western Australia. Geological Survey of Western Australia 1:250 000 Geological Series Explanatory Notes). The 'dots' fix corresponding locations.



In both the Nabberu and Bangemall sedimentary basins, the geomorphology is closely controlled by the geology. Sand dune development is widespread. The major *playa* systems of Lakes Gregory, Nabberu, Teague, Carnegie and Wells are important depocentres in the regions; and especially Lake Carnegie, where large amounts of clastic sediments are at present being supplied to the *playa*. Some of these clastics result from the extensive stripping of the Permian sediments of the area which reveals older landsurfaces.

The Albany–Fraser Province is a mobile belt which delimits the southern part of the Yilgarn Block. It has been dated as being 1,200 to 2,100 million years old. Along the western margin of the Yilgarn Block the basement is generally concealed by a thick sequence of Phanerozoic sediments, and is only exposed in the Naturaliste and Northampton Blocks. Dates of 1,700 to 2,000 million years ago have been obtained for the Northampton Block and the Proterozoic basement under the Perth Basin. A granulite metamorphic event dated at 644 million years ago has been recognised in the Naturaliste Block. Little is known about the age and detailed geology of the Paterson Province, which is a Proterozoic mobile belt delimiting the eastern margins of the Pilbara Block.

The Kimberley Block and bounding Halls Creek and King Leopold mobile zones of north-western Australia are part of the wider North Australian Craton. These mobile belts have a very pronounced geomorphological expression (Diagram 2.6). The Halls Creek Mobile Zone is an Early Proterozoic geosynclinal sequence of sediments dated 2,100 million years ago, which have undergone high-grade metamorphism and are associated with dolerites, *ultrabasics* and *syntectonic* granites. This phase of tectonism spanned the interval 1,900 to 1,800 million years ago, after which the belt was cratonised. The King Leopold Mobile Belt is generally thought to correspond in both age and origin to the Halls Creek Mobile Zone. However, there is also evidence of intense folding in the King Leopold Mobile Zone around 600 million years ago.

By the end of the Precambrian the morphotectonic framework, which was to control much of the future geological evolution of Western Australia, was essentially in place (Diagram 2.7). In this framework the Yilgarn and Pilbara blocks and the associated mobile belts and sedimentary basins, are now combined and constitute the Western Australian Shield. The Shield was to remain the dominant morphotectonic element of the geology of Western Australia, and from at least the end of

the Precambrian, large parts of this region were to remain as relatively stable landsurfaces.

### Palaeozoic history

Present understanding of the Early Palaeozoic morphotectonic development of Western Australia is incomplete. However, it is clear that at that time Australia was part of the Gondwana supercontinent, and that during the Early Cambrian, Gondwana generally experienced continental drift and seafloor spreading. In the region which was to become the north-west margin of Australia, plates diverged, releasing extensive *tholeiitic* flood basalts. During the Cambrian, marine deposition took place in the Bonaparte Gulf and Ord basins. By Ordovician times the sea covered large parts of the Canning, Amadeus and Bonaparte Gulf basin. Marine incursions probably also affected the Browse, Ord and Officer basins but only in the Silurian did marine deposition extend as far south as the Carnarvon and northern Perth Basins. The southward migration of marine deposition with time may reflect the progressive southward opening of a divergent margin, with the development of failed arms off it.

During the Middle and Late Devonian, marine conditions prevailed over much of the Canning, Carnarvon, Bonaparte Gulf and Ord basins and extensive coral reef complexes formed. In the northern Canning Basin the present Napier and Oscar ranges developed as fringing, barrier and atoll reef complexes during the Late Devonian. Today these form limestone ranges, which still reflect much of their original geomorphological expression and clearly show the original reef facies. *Karst* forms are well developed in some of the more massive limestone.

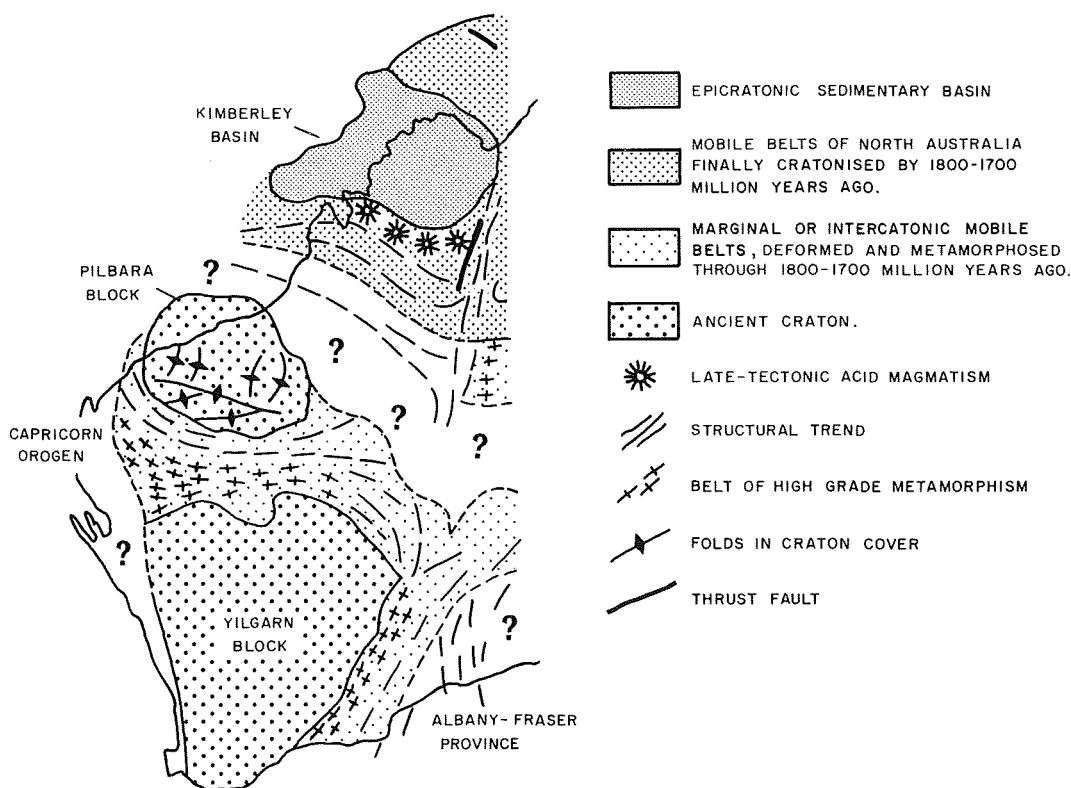
During the Early Permian, regions which were to contain the northern and western margins of Western Australia subsided, and extensive deposition occurred in the sedimentary basins. Widespread glaciation throughout much of Western Australia at this time is well documented. Glacial sediments are widely found in a stratigraphic context in the sedimentary basins, from Collie in the south to the Bonaparte Gulf in the north, but outliers of glacial deposits are also known on the Precambrian Shield, which indicate that the Early Permian ice sheet covered much of present-day Western Australia. An ice-cap covering an area of as much as 2.5 million square kilometres is possible but this is not to suggest that it was continuous. For the geomorphological development of Western Australia, Permian widespread glaciation was important. It provided a

fresh start for surface denudational processes—just as the Cenozoic ice age has removed much of the weathered *mantle* that had previously covered the Canadian Shield. Similarly *isostatic* adjustments had important geomorphological repercussions. It is not, however, at all certain that any large glacial erosional forms remain in the present landscape of Western Australia.

The marine sediment sequences of the Permian were deposited in broad basins, but at the end of the Permian the depositional basins began to assume a more linear form. This change in style of the environment of deposition was associated with faulting and the development of rift valleys, so that deposition was now along axes which were to parallel the present continental margin.

DIAGRAM 2.7

The geological framework of Western Australia during the Middle Proterozoic (adapted from Clark, I.F. and Cook, B.J., 1983: Perspectives of the Earth, Australian Academy of Science).



### Mesozoic: rifting and the development of the continental margins.

Along the present western margin, the Triassic saw the development of graben structures, which controlled deposition. Sedimentation began with a marine transgression, which was short lived near its southern limit but lasted longer further north. Grabens were active particularly in the Late Triassic, and accumulated over 3 kilometres of terrigenous clastic sediments in the Perth Basin, and over 4 kilometres on the central south-western part of the Exmouth Plateau.

During the Jurassic, sedimentation continued essentially uninterrupted along the western margins, but graben development was less active than in the Triassic. During the Early Jurassic, coal measures were deposited in the Perth Basin, and in the Middle Jurassic a marine transgression extended as far south as the northern part of the Perth Basin. That was when Gondwana began to break up, with a mid ocean spreading ridge entering the north-west coast of Australia. From the Late Jurassic on, most sedimentation off north-western Australia occurred in a marine environment. The Perth Basin underwent renewed



graben development in the Late Jurassic, and this was the forerunner of a later episode of rifting.

During the Cretaceous the coastal margins of Western Australia began to take on much of their present form. The strong Late Jurassic graben faulting had significantly diminished by the beginning of the Neocomian. In the Early Cretaceous, tensional tectonics between Australia and Antarctica led to the formation of a large downwarp which was to become the Eucla Basin. Along the western margin, the area between the Naturaliste Plateau and the Exmouth Plateau was probably still linked to Greater India. But during the mid-Neocomian, a mid-ocean ridge developed between Australia and Greater India, accompanied by widespread uplift. At the same time India moved away from Australia and the separation has continued to the present day (Diagram 2.8). From the time of the breakup (127 million years ago) until the Early Tertiary (53 million years ago), Australia and India were separated by mid-ocean ridge spreading systems and were thus on separate *lithospheric* plates.

During the Aptian to Albian a marine transgression affected large parts of Western Australia (Diagram 2.9). Sediments of this age are widespread in the Canning, Perth, Carnarvon, Officer and Eucla basins. An interval of uplift and erosion followed in the Perth Basin. In the southern part of the Perth Basin basalts then erupted and covered extensive parts of the landscape. The development of basalt flows was linked to thermal controls on rift development in the Perth Basin at the time, as was activity along the Darling Fault.

The Late Cretaceous was again marked by a marine transgression, but the conditions controlling deposition along the western margin were quite different from those of the Early Cretaceous. Sediments deposited in the Late Cretaceous are dominated by biogenic carbonates, with only a minor influx of terrestrial clastics and generally low sedimentation rates, features which characterise the sedimentation regime of much of the western margin up to the present and reflect the negligible supply of detrital sediments from the low-relief hinterland.

**DIAGRAM 2.8**

Greater India and Australia at 108 million years ago (Ma). The stippled pattern between the two continents indicates the magnetic signatures. The northwest-southeast trending structure is the Argo Abyssal Plain, in which earlier sea floor spreading had taken place. The inset shows Gondwana before rifting (adapted from Veevers, J.J., (ed) 1984: *Phanerozoic earth history of Australia*.).

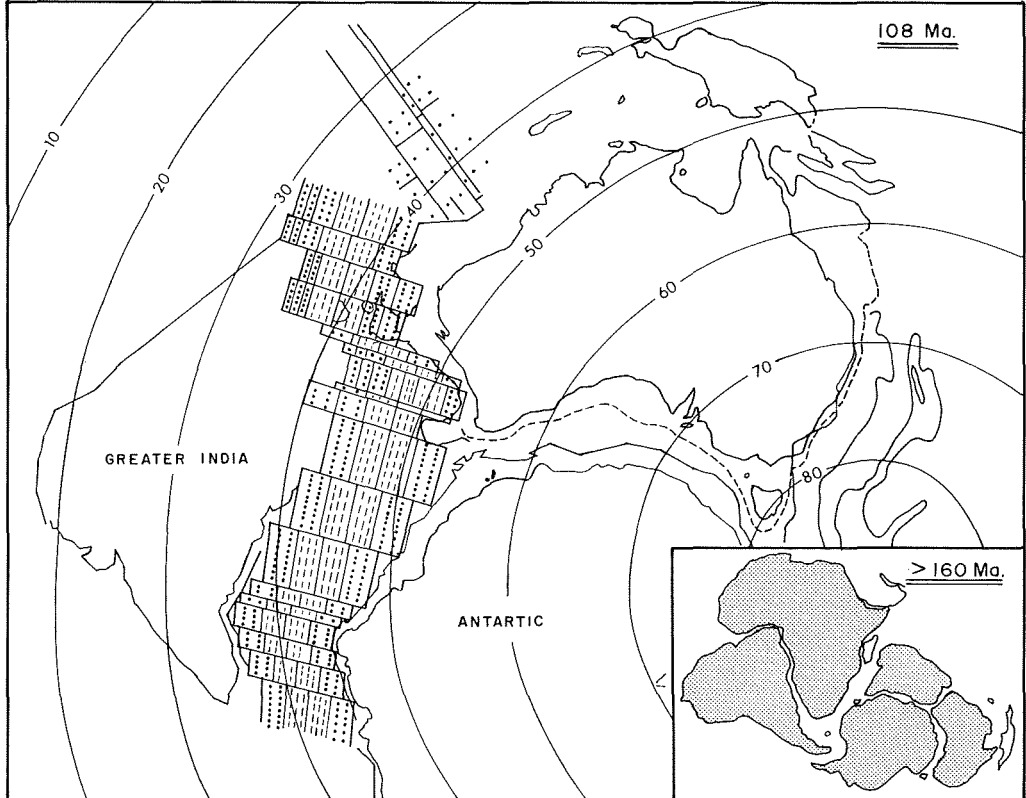
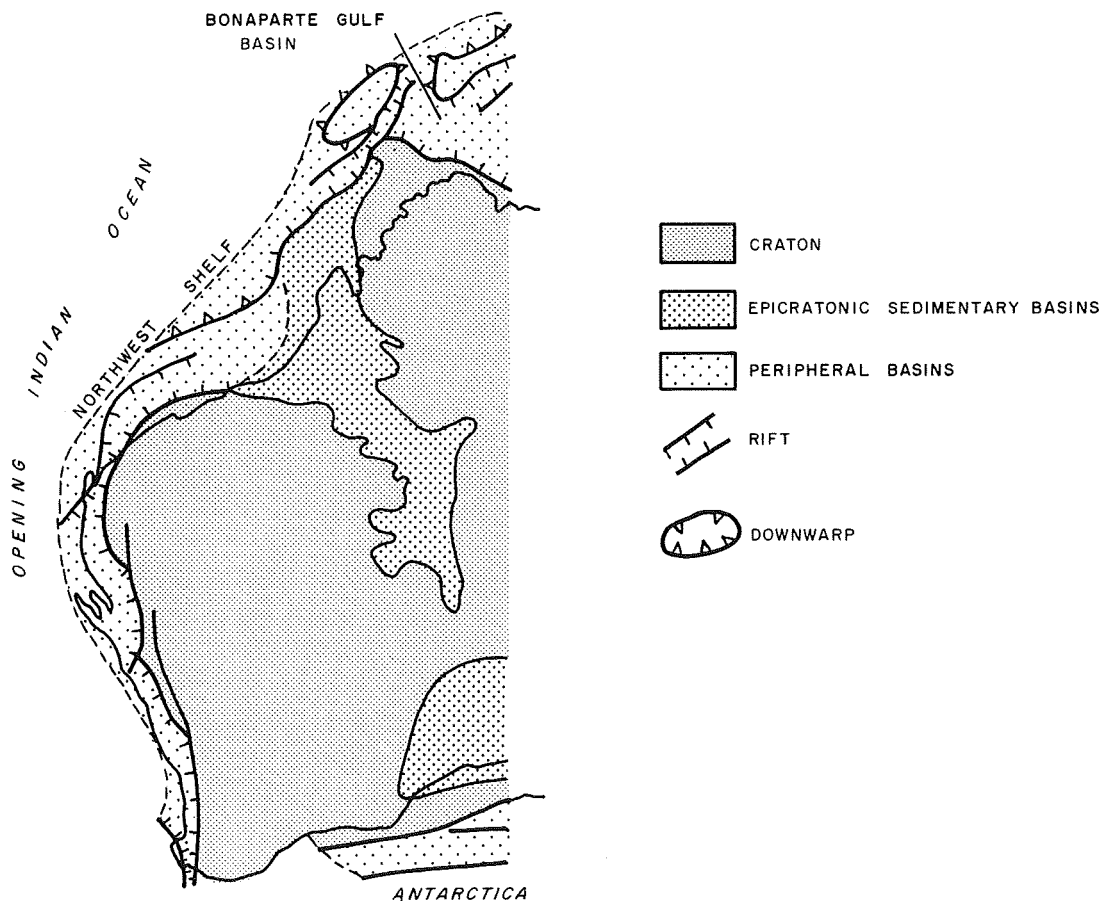


DIAGRAM 2.9

The geological/morphotectonic setting of Western Australia during the Early Cretaceous (adapted from Clark, I.F. and Cook, B.J., 1983: Perspectives of the Earth, Australian Academy of Science).



During the Late Cretaceous, the southern margin of Australia was controlled by a series of graben structures parallel to the coast. However, these were less pronounced along the southern margins of Western Australia, and here Late Cretaceous sedimentation was largely restricted to the Eucla Basin.

The relationship of deposits of Cretaceous age to the present geomorphology indicates that major elements in the landscape may be older than 100 million years. From the distribution of Late Cretaceous sediments it is clear that some of the present valleys, which cut through the scarps of the Darling and Dunsborough faults, were already in existence at that time. There is similar evidence that the lower Murchison River valley may have

existed in the Cretaceous. Evidence of the upstream extension of Triassic sediments along the Greenough River valley suggests that some of the drainage in the southern Carnarvon Basin/northern Perth Basin may have existed in the Triassic. Large playa systems with complex depositional and marginal deflation features are widespread in Western Australia. They are frequently related to a network of palaeochannels which were probably active during the Late Cretaceous. From the combined evidence it is clear that major elements of the geomorphology of Western Australia are much older than generally accepted for other parts of the world. In fact, it seems that some elements of the geomorphology of the present landscape may have survived the breakup of the Gondwana supercontinent.

### **Cenozoic: the development of the present landsurface**

The morphotectonic framework of Western Australia was in place by the beginning of the Tertiary, but nevertheless, marine transgressions during the Paleocene, Eocene and Miocene significantly modified large areas of the western and southern margins of Western Australia (Diagram 2.10).

The Eocene saw marine transgressions extending into the western and southern coasts of Western Australia. In the middle Eocene, shallow seas penetrated into the Eucla Basin, and during the Late Eocene extended north of Norseman. The Bremer Basin, with its characteristic siltstone, *lignite* and *spongolite*, is a product of the Late Eocene transgression. These sediments were deposited over an irregular landsurface of Precambrian rocks, like that now found in the Esperance area. Marine platforms, which formed during the height of the Late Eocene marine transgression, are still evident along some Precambrian uplands, which rise above the Tertiary sediments.

The Miocene saw extensive carbonate deposition in both the Eucla and Carnarvon basins. Today Miocene limestones dominate the surface geology of the Eucla Basin, and provide the setting for one of the classic karst regions of the world.

Although the morphotectonic framework of Western Australia was established by the Early Tertiary, the details of the geomorphology of the landsurface were still quite different from those of today. This is evidenced by the existence of an extensive paleochannel network which is thought to have been still active at that time (Diagram 2.10); and climate generally was quite different from that of today. The occurrence of the mangrove palm, *Nipa*, in the Eocene Kings Park Formation suggests that sea surface temperatures may have been as warm as 20° to 25°C, significantly warmer than today. Pollen in Late Eocene sediments show that over southern Western Australia the vegetation resembled tropical to sub-tropical rainforest. Similar conditions prevailed over southern Western Australia throughout much of the Oligocene. Early Miocene precipitation was probably high, but more arid conditions set in during the Middle Miocene. By the Late Miocene the arid climates that today prevail over much of Western Australia, had been established, and Australia had essentially reached its present geographical position (Diagram 2.11).

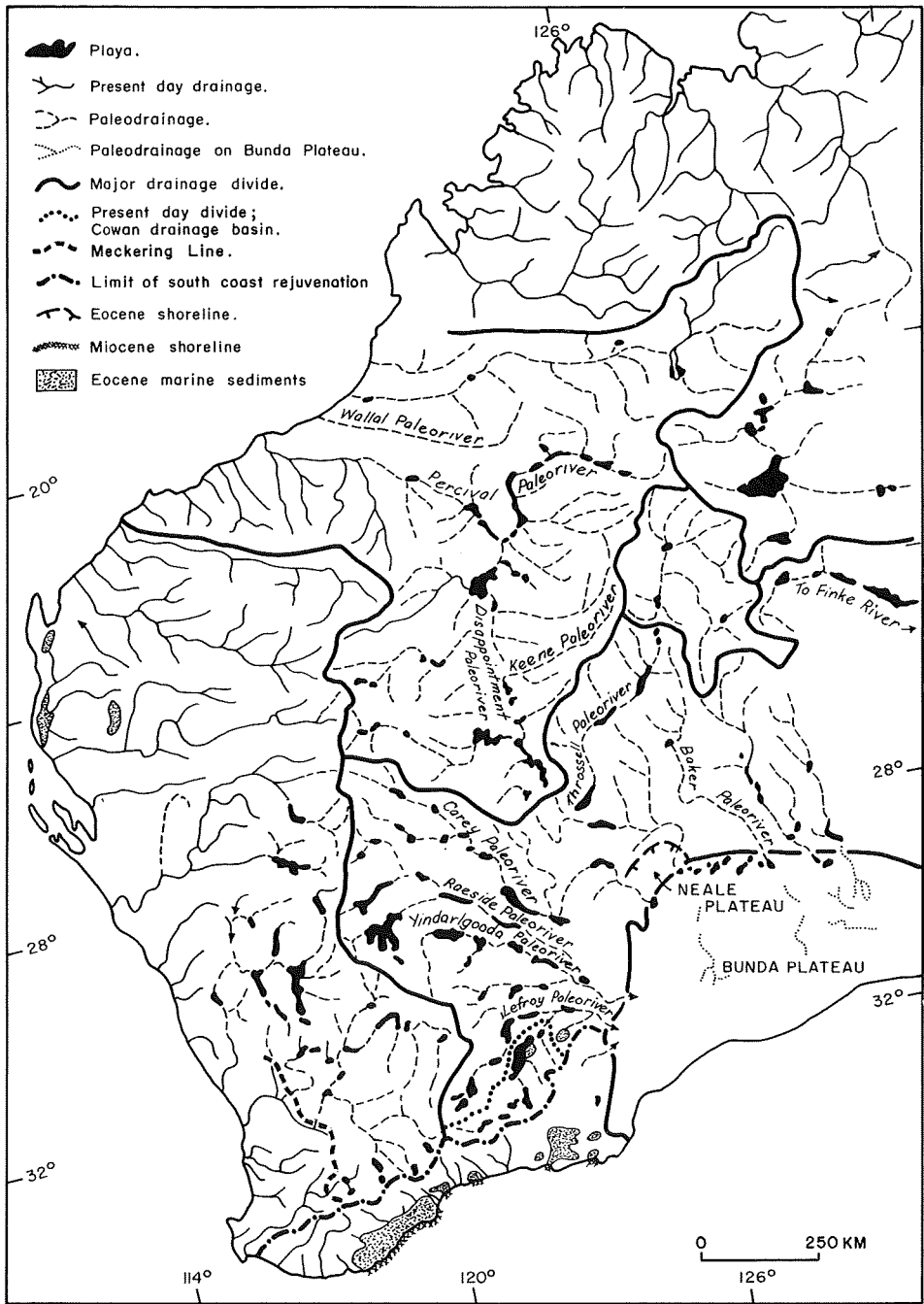
The wet climates of the Early and Middle Tertiary were conducive to deep weathering; and this is likely to have taken place during the Eocene, but certainly by the Oligocene and Early–Middle Miocene. Deep weathering resulted in a weathered *regolith* and extensive *laterite* formation. The landsurface of much of Western Australia bears a strong imprint of the deep weathering event of the Tertiary, and its control on subsequent geomorphological development is well manifested in etchplain development.

It was traditionally thought that, in terms of tectonics, Western Australia had been essentially stable during much of the Cenozoic. But with the recognition of the South West Seismic Zone, the Jarradale Axis and Ravensthorpe Ramp (Diagram 2.10) and other features, this view has been modified. The most striking geomorphological expression of Cenozoic tectonic activity is in the Exmouth Gulf—Cape Range area. Here, three ranges—the Cape Range, Rough Range and Giralia Range—correspond to *anticlinal* axes initiated during post–Middle Miocene times by reverse movement on underlying normal faults. The Cape Range is the dominant of the three, reaching a height of some 300 metres. The range has been deeply dissected during uplift, which has continued to the present. This is witnessed by warped and uplifted Quaternary reef complexes which now form a staircase along the western flank of the range. On the Yilgarn Block, fault scarps a metre or so high and tens of kilometres long have formed within historic times. Such fault scarps are rapidly eroded and are only incomplete indicators of past seismic activity.

The Late Cenozoic left a significant geomorphological imprint on the landscape as a result of the climatic changes which occurred during this time. The importance of deep weathering for an understanding of the geomorphology is fundamental, but equally striking is the geomorphological expression of the arid climates which first set in during the Late Tertiary. Repeated extensions of the arid zone occurred during the Pleistocene, and resulted in the development of desert dune sequences, which are now stabilised and are found well outside their climatic range (Diagram 2.12). Although no convincing dates are available for these events, it is generally thought that arid zone advances were coincident with global glacial maxima, and that the last massive extension of the arid zone took place at about 18,000 years before present.

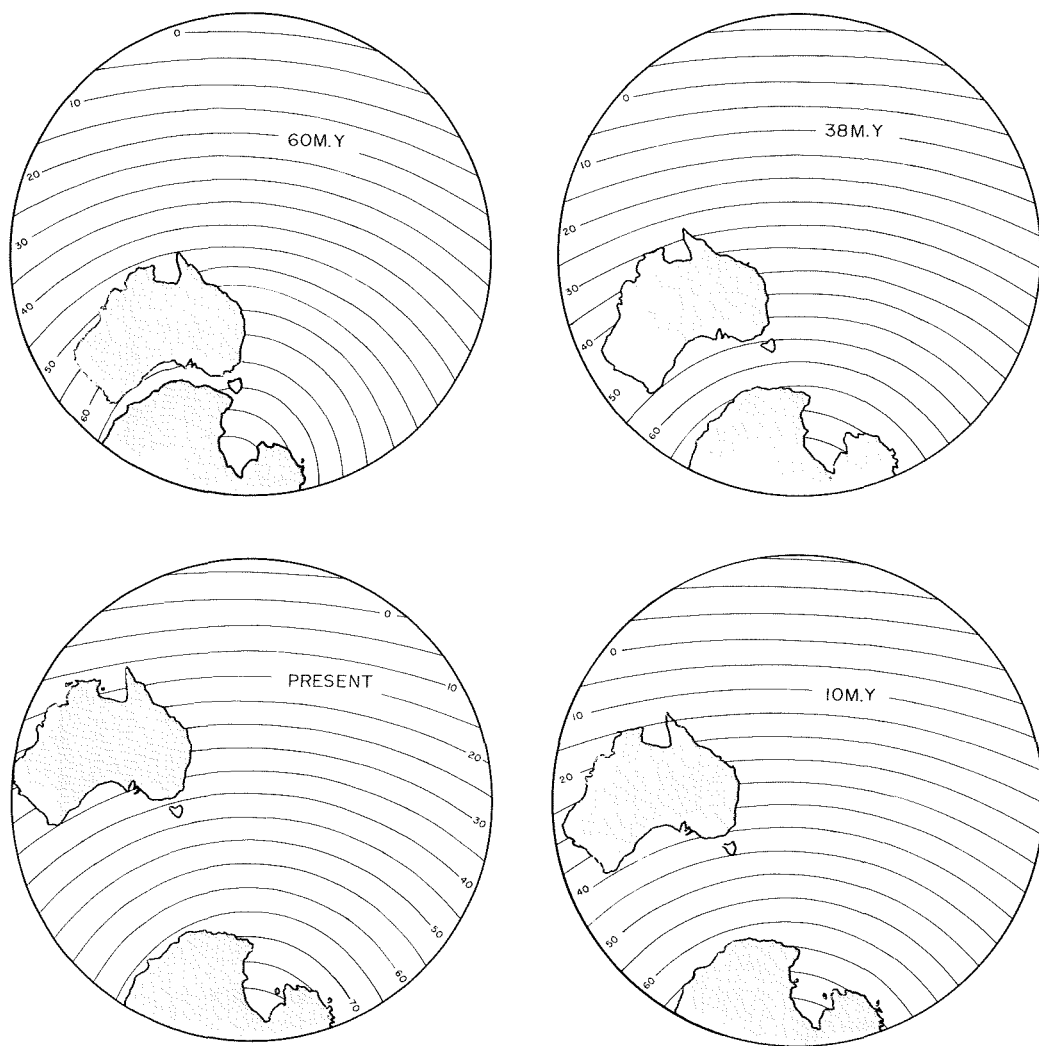
DIAGRAM 2.10

Major palaeochannels and Tertiary marine sediments and shorelines. The Meckering Line separates the poorly defined streams of the inland region from the more incised coastward draining rivers. The limit of rejuvenation along the south coast is related to the Ravensthorpe Ramp (from van de Graaff, W.J.E., Crowe, R.W.A., Bunting, J.A. and Jackson, M.J., 1977: Zeitschrift für Geomorphologie, 21).



**DIAGRAM 2.11**

The position of Australia during the Cenozoic (after Crook, K.A.W., 1981: *in* *Ecological Biogeography of Australia*. A. Keast (ed)).



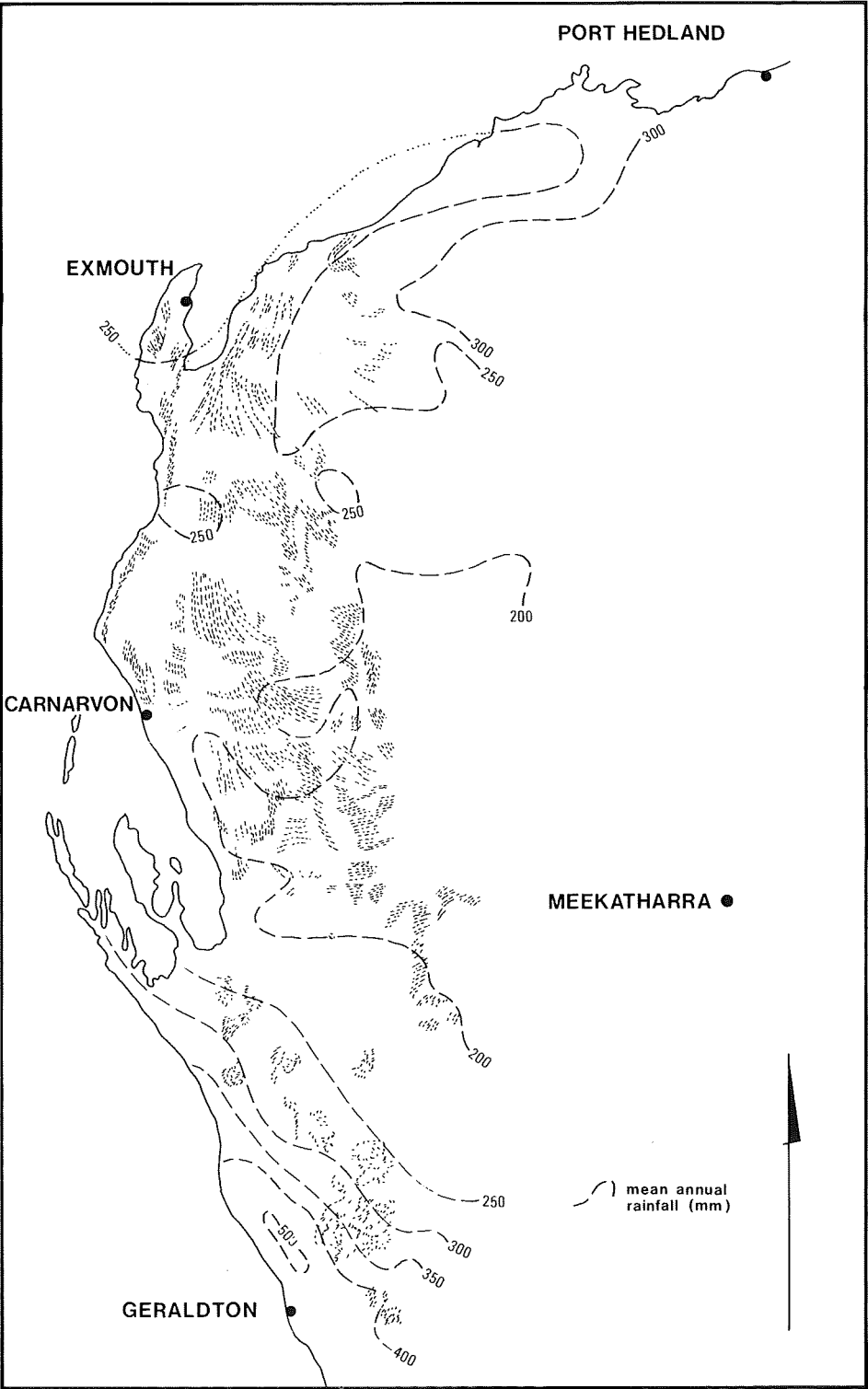
Quaternary changes in climate caused variations in the hydrology and sediment supply characteristics of streams. These changes controlled alluvial deposition and resulted in formation of alluvial fills and terrace complexes along the major rivers of Western Australia. The Gascoyne, Fitzroy and, on a smaller scale the Swan River, all possess well-developed terrace forms flanking their present courses (Diagram 2.13). In the Geraldton area, extensive alluvial deposition, linked to changes in sediment yield processes, took place during the early part of the Late Quaternary. It is now known, from radiocarbon dates, that

significant parts of the Swan and Helena river terrace fills were deposited since around 40,000 years before present. In the Carnarvon Basin, the large wedge of sediments associated with the avulsion of the lower Gascoyne River was deposited over the last 120,000 years.

During the Late Cenozoic global ice volume changes significantly altered sea level. Thus, during the last interglacial-glacial-interglacial cycle, from about 130,000 years ago to present, sea level along the Western Australian coast ranged from +8 metres 120,000 years ago to -50 metres at

DIAGRAM 2.12

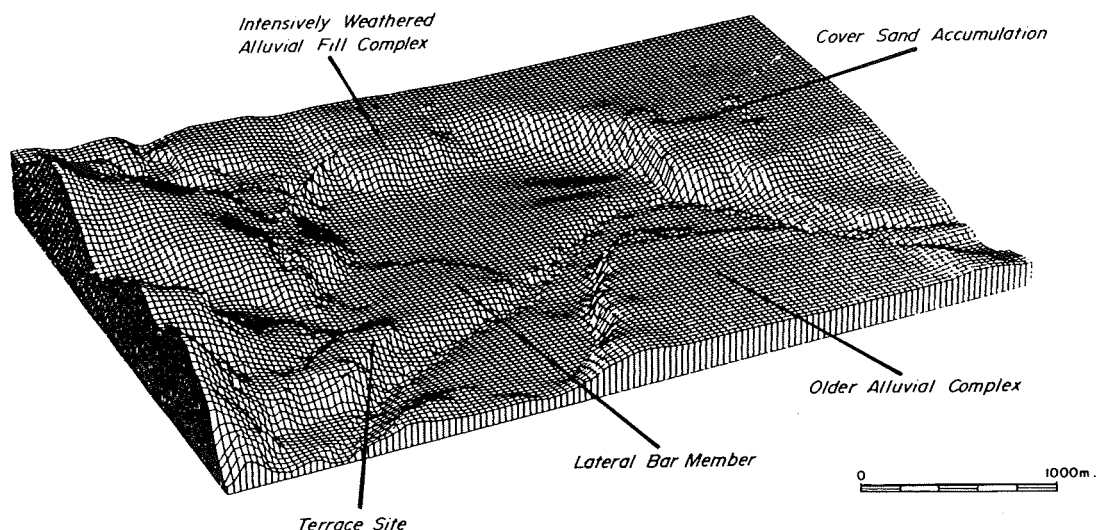
The present occurrence of Late Pleistocene (?) desert dunes in the central coastal areas of Western Australia.





**DIAGRAM 2.13**

The terraces and associated deposits of the Swan River immediately downstream of the Darling Scarp (vertical exaggeration approximately x5). The digital terrain model is a view from the north-east.



18,000 years ago, and reached its present level (or slightly above) by 6,500 years ago. These changes in sea level have influenced geomorphological evolution along many coastal areas in Western Australia.

During the Late Tertiary or Early Pleistocene, shoreline complexes, now at heights of 90 to 115 metres (Eneabba and Ridge Hill Shelf)—and 20 to 80 metres (Yoganup Formation), were deposited in the Perth Basin. They were the initial sequences of a series of coastal barriers which formed in the Perth Basin throughout the Quaternary.

In the course of the Late Cenozoic there was a significant change in the nature of coastal sediments in the Perth Basin. The older barrier sequences are essentially siliciclastic deposits, whereas the younger Pleistocene barriers are carbonate rich. The Tamala Limestone sequences which dominate much of the coastal plain of the Perth Basin, and which in the Carnarvon Basin have led to the development of the distinctive Shark Bay region, are a Middle to Late Quaternary phenomenon.

Significant geomorphological modifications have taken place over many parts of Western Australia in the last 150 years, linked to European land use

practices; consequently rates of sediment yield may well be an order of magnitude higher than earlier in the Late Cenozoic. Widespread erosion is evident in many catchments and high rates of sediment supply are changing the hydraulic and sediment regimes of streams. Wind erosion is equally widespread, and in the most severely affected catchments, such as the Gascoyne, the loss of the vegetation cover has resulted in the local mobilisation of former desert dunes, giving rise to fears of desertification.

## GLOSSARY

**Adamellite:** Granitic rock in which 10 to 15 per cent of the felsic constituents are quartz, and in which the ratio of alkali feldspar to total feldspar is between 35 and 65 per cent.

**Alluvium:** Unconsolidated sedimentary material transported by a river and deposited on flood plains, estuaries and deltas.

**Andesite:** Very fine crystalline extrusive rock of volcanic origin composed largely of plagioclase feldspar with smaller amounts of dark-coloured mineral (hornblende, biotite or pyroxene)—the extrusive equivalent of diorite.

**Anticline:** An arch-shaped fold in which the younger strata remain at the top of the succession.

**Aphanitic:** Referring to the texture of an igneous rock in which the crystalline components are not distinguishable by the unaided eye.

**Basalt:** An *aphanitic* crystalline rock of volcanic origin, composed largely of plagioclase feldspar and dark minerals such as pyroxene and olivine – the extrusive equivalent of gabbro.

**Batholith:** A large intrusive mass of igneous rock, typically granite, outcropping over at least 100 square kilometres and extending to an unknown depth. Batholiths are particularly characteristic of orogenic belts in subduction zones.

**Biotite:** A black, brown or dark green ferromagnesian mica, abundant and widely distributed in igneous and metamorphic rocks.

**Craton:** The large, relatively immobile (stable) portion of continents, consisting of shields and platforms, which has remained unaffected by orogenic activity for commonly several periods of time.

**Diamictite:** A coarse sedimentary rock that is not sorted, or is poorly sorted, and contains particles of many sizes.

**Dyke:** A tabular intrusion of igneous rock, normally of intermediate grain size, that cuts discordantly through the surrounding rock.

**Felsic:** An acronym derived from feldspar and silica, and used to describe light-coloured silicate minerals such as quartz, feldspar and feldspathoids.

**Gneiss:** A coarse grained crystalline rock formed during high-grade regional metamorphism of igneous or sedimentary rocks, characterised by a banded appearance and linear orientation of minerals.

**Graben:** A block of the Earth's crust, generally with a length much greater than its width, that has dropped relative to the blocks on either side.

**Granite:** A coarse grained acid igneous rock, consisting mainly of quartz, alkali feldspar and mica, with various accessory minerals. It occurs in intrusive bodies from crystallised magma, or the 'granitisation' (metasomatic transformation) of pre-existing rocks.

**Isostasy:** A condition of equilibrium in the Earth's crust. Assuming that the lighter continental masses float on a denser medium, changes in crustal

elevation must be compensated in some way at depth.

**Karst:** A topography formed over limestone, dolomite or gypsum and characterised by sinkholes, caves and underground drainage.

**Komatiite:** Lavas with a high magnesium content, thought to be unique to the Early Precambrian.

**Laterite:** Weathered material composed principally of the oxides of iron, aluminium, titanium, and manganese; laterite ranges from soft, earthy, porous soil to hard, dense rock.

**Lignite:** Coal of relatively recent origin, intermediate between peat and bituminous coal; often contains patterns from the wood from which it formed. Also known as brown coal.

**Lithosphere:** The outer, rigid shell of the solid Earth, overlying the less rigid athenosphere. The lithosphere comprises the crust (both oceanic and continental) and that part of the mantle (the lithospheric mantle) above the athenosphere to which the crust is mechanically coupled. The total thickness of the lithosphere varies between about 50 and 100 kilometres below the Earth's surface.

**Mafic:** A general term describing ferromagnesian minerals.

**Mantle:** The section of the Earth's interior between the crust and the outer core, bounded at the top by the Mohorovicic discontinuity and at the base by the Gutenberg discontinuity.

**Metamorphic rock:** A rock formed from pre-existing solid rocks by mineralogical, structural and chemical changes, through the action of heat or pressure or both.

**Metasediment:** A sediment or sedimentary rock which shows evidence of metamorphism.

**Migmatite:** A very high-grade metamorphic rock in which extremes of temperature and pressure have induced partial melting so that the rock has taken on some of the characteristics of igneous texture.

**Mobile belt:** A long, relatively narrow region where crustal mobility by magmatism, metamorphism and tectonic activity has led to widespread deformation.

**Morphotectonics:** Refers to the relationship between geomorphology and tectonics irrespective of scale.

**Orogeny:** An episode of tectonic activity (folding, faulting, thrusting) and mountain-building usually related to a destructive plate margin.

**Plate tectonics:** The interaction of the large rigid sections into which the Earth's lithosphere is divided. There are eight major plates and numerous smaller ones.

**Playa:** A low, essentially flat, part of a basin or other undrained area in an arid region.

**Plutonic rock:** Igneous rock which has formed from magma which has crystallised as an intrusion at depth in the crust and is coarsely crystalline.

**Porphyry:** An igneous rock in which phenocrysts (large conspicuous crystals) are enclosed in a very fine-grained to aphanitic matrix.

**Regolith:** The layer or blanket of unconsolidated rocky debris of any thickness that overlies bedrock and forms the surface of the land.

**Regression:** Retreat of the sea from land areas, and the consequent evidence of such withdrawal.

**Sedimentary basin:** An area of continued subsidence of the crust that accumulates sediment over a prolonged period.

**Shield:** A major structural unit of the Earth's crust, consisting predominantly of Precambrian metamorphic and igneous rocks which have remained unaffected by later orogenies.

**Sill:** A tabular igneous intrusion that is oriented parallel to the planar structure of surrounding rock.

**Spongolite:** A rock or sediment composed chiefly of the remains of sponges.

**Syntectonic:** Refers to a geologic process or event occurring during tectonic activity.

**Tectonics:** A branch of geology dealing with the broad architecture of the outer part of the Earth, that is, the regional assembling of structural or deformational features, a study of their mutual relations, origin and historical evolution.

**Tholeiite:** A variety of basalts composed principally of plagioclase, pyroxene, and iron oxide minerals as phenocrysts in a glassy ground mass.

**Transcurrent fault:** A strike-slip fault characterised by a steeply inclined surface.

**Transgressive deposit:** Sediment deposited during transgression (landward extension) of the sea.

**Tuff:** Consolidated volcanic ash, composed largely of fragments produced directly by volcanic eruption; much of the volcanic material represents finely comminuted crystals and rocks.

**Ultrabasic:** Of igneous rock, having a low silica content, as opposed to the higher silica contents of acidic, basic, and intermediate rocks.

**Volcanics:** Igneous rocks that solidified after reaching, or nearing, the Earth's surface.

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## Chapter 3

# CLIMATE AND METEOROLOGY

*(Contributed by the Western Australian Regional Office of the Bureau of Meteorology)*

Western Australia is the largest State in the Commonwealth, extending from latitude 13°30' S to 35°08' S, and from longitude 113°09' E to 129° E. It stretches about 2,400 kilometres in a north-south direction and about 1,600 kilometres west-east. A little more than one-third of the State lies within the tropics, while the remainder extends southward to the temperate zone.

Because of its large size and its latitudinal position, Western Australia has entirely different climates in its northern and southern parts, while in the central regions there is a gradual change from the tropical climate of the north to the typical Mediterranean climate of the south.

Most of the State is a plateau between 300 and 600 metres above mean sea-level and there are no outstanding mountain ranges. Where the edge of the plateau forms the Darling Range along the southern part of the west coast, it exerts a marked influence on the rainfall, causing a rapid increase from the coastal plain to the higher land. Elsewhere the effect of topography is less marked and its main influence is seen in the general decrease of rainfall with increasing distance from the coast.

### PRESSURE SYSTEMS

Weather during the year is controlled largely by the movement of the anticyclonic belt (high pressure systems with anti-clockwise winds) which lies in an east-west direction across the continent for about six months of the year.

In winter this system moves northward, bringing clear skies with fine sunny days and easterly winds to the tropics. With this northward movement, westerly winds on the southern side of the anticyclones extend over the southern part of the State, bringing with them cool cloudy weather and rain. In mid-winter the northern fringe of the 'Roaring forties' extends to Western Australia and there are frequent westerly gales in the south coastal belt.

These westerly winds are maintained by a series of depressions (low pressure systems with

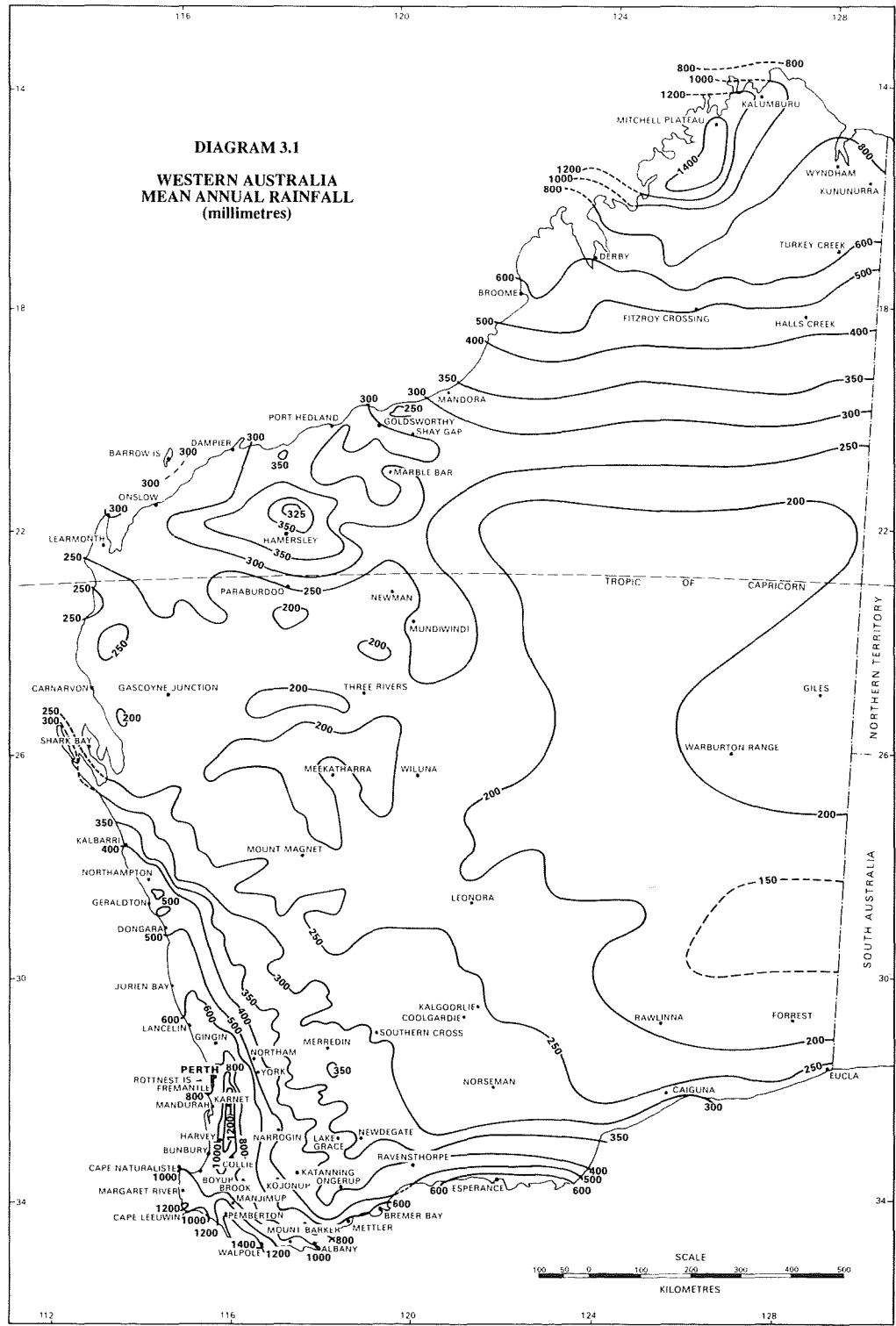
clockwise winds), which move eastward well south of the Western Australian coast, and others which originate in the Indian Ocean and move south-eastward past Cape Leeuwin. The extent to which westerlies affect the State depends largely on the intensity and the position of these depressions.

Towards the end of winter the anticyclonic belt moves southward, and the westerlies are confined more to the lower south-west and the south coastal districts. By summer the anticyclonic belt has moved so far south that its axis is off the south coast and easterly winds prevail over most of the State.

During this summer period the midday sun is at a high elevation in the tropics and the continual heating leads to the development of a monsoonal depression over this region. Wind circulation round this system causes easterlies on its southern or inland side, but in the coastal districts north-east from Onslow, and in parts of the Kimberley, westerlies prevail. Winds in both the north and the south of the State are then in the opposite direction to those prevailing during the winter.

Nearing summer's end the anticyclonic belt moves northward again. The monsoonal depression over the tropics dissipates and westerlies again gradually extend northward to the southern part of the State.

During the northern 'Wet' season (from about December to March), occasional cyclones, known locally as 'willy willys', bring strong winds and rain to the tropics. They originate generally in the Timor Sea or off the north-west coast and often move first in a south-westerly direction parallel to the coast and later in a south-easterly direction.





They frequently move inland between Broome and Onslow but occasionally travel further westward before curving to the south-east and moving inland over the west coast. Others fade out at sea without ever crossing the coast. Those that move inland usually start to dissipate soon after crossing the coast, but occasionally they move right across the State, passing into the Southern Ocean and moving off towards Tasmania.

These storms are often extremely violent and have on occasions almost completely wrecked towns on the north-west coast, while a cyclone which struck a pearling fleet off the Eighty Mile Beach in 1887 caused the loss of twenty-two vessels and 140 lives.

However, despite the damage which they cause, the storms are of great benefit to the pastoral regions on account of the heavy and widespread rain which generally accompanies them. The heaviest fall ever recorded in one day in Western Australia, 747 millimetres, was received at Whim Creek from a cyclone in 1898.

## RAINFALL

The moist rain-bearing winds in this State are in general from a westerly direction. The easterlies, having come from the dry inland parts of Australia, usually bring fine weather and clear skies.

Because of this the highest rainfall occurs in the winter months in the south of the State, and in the summer months in the north. In between these areas there is a gradual change from one rainfall regime to the other.

Proceeding northward from the winter rainfall area of the south-west of the State, the wet period occurs earlier during the year. Across a belt Carnarvon-Menzies-Eucla, there is a more rapid change, and this belt divides the winter rainfall area from that which receives most of its rain in the first six months of the year. Further north, the change is more gradual but continuous and in the Kimberley most of the year's rainfall is received in the summer months which, in the southern parts of the State, are the driest of the year.

TABLE 3.1 - RAINFALL AT REPRESENTATIVE CLIMATOLOGICAL STATIONS  
(Stations are arranged from north to south in three groups: Coastal, Wheat Belt and Other Inland)

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
COASTAL													
Wyndham (New site) (a)—													
Rainfall (mm)— Average	166	193	153	23	10	2	7	—	8	18	54	101	735
Highest	329	369	428	119	98	23	84	—	78	75	174	226	1,101
Lowest	47	51	—	—	—	—	—	—	—	—	2	15	63
Highest one day	89	77	140	74	48	23	49	—	78	38	84	87	140
Wet days— Average number	15	14	11	3	1	—	—	—	1	3	6	9	63
Broome—													
Rainfall (mm)— Average	175	162	92	25	30	19	5	2	2	2	9	41	564
Highest	825	427	439	226	176	208	72	23	24	28	50	279	1,228
Lowest	5	8	—	—	—	—	—	—	—	—	—	—	139
Highest one day	351	151	204	107	119	127	55	12	13	15	37	210	351
Wet days— Average number	11	11	7	3	3	2	1	1	1	1	1	5	47
Port Hedland M.O. (b)—													
Rainfall (mm)— Average	58	94	46	23	28	18	10	4	1	1	4	17	304
Highest	454	360	251	352	170	125	81	35	9	8	67	219	627
Lowest	—	—	—	—	—	—	—	—	—	—	—	—	45
Highest one day	387	329	152	111	156	53	46	25	3	7	59	169	387
Wet days— Average number	5	7	4	2	3	3	2	1	1	1	1	2	32
Onslow—													
Rainfall (mm)— Average	27	46	49	19	45	43	18	10	1	1	2	4	266
Highest	261	539	415	279	259	227	222	107	25	27	56	61	998
Lowest	—	—	—	—	—	—	—	—	—	—	—	—	15
Highest one day	192	356	283	157	124	111	76	62	17	21	30	38	356
Wet days— Average number	2	3	3	2	3	4	2	2	—	—	—	—	21
Carnarvon M.O. (b)—													
Rainfall (mm)— Average	13	21	15	12	39	49	44	18	6	7	5	1	230
Highest	157	149	93	89	195	161	180	51	22	53	81	4	557
Lowest	—	—	—	—	—	1	—	1	—	—	—	—	75
Highest one day	66	78	77	76	95	96	82	35	17	25	81	4	96
Wet days— Average number	2	3	2	3	5	7	7	5	3	3	1	1	42

**TABLE 3.1 – RAINFALL AT REPRESENTATIVE CLIMATOLOGICAL STATIONS** (*continued*)  
 (Stations are arranged from north to south in three groups: Coastal, Wheat Belt and Other Inland)

Reporting station and characteristic		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
COASTAL (continued)														
Geraldton—														
Rainfall (mm)—	Average	6	14	15	26	71	112	95	67	30	20	10	5	471
	Highest	53	131	89	100	282	286	243	131	81	109	47	59	843
	Lowest	—	—	—	—	—	25	24	11	—	—	—	—	220
	Highest one day	36	69	88	48	62	109	72	59	39	71	24	51	109
Wet days—	Average number	2	2	3	6	10	14	15	13	9	7	4	2	87
Perth (Bureau of Meteorology)—														
Rainfall (mm)—	Average	8	12	19	45	123	184	173	136	80	54	21	14	869
	Highest	115	166	145	149	308	476	425	318	199	200	73	81	1,339
	Lowest	—	—	—	—	14	55	62	12	9	1	—	—	509
	Highest one day	55	87	77	67	76	99	76	74	52	55	39	47	99
Wet days—	Average number	3	3	4	8	14	17	18	17	14	11	6	4	119
Bunbury—														
Rainfall (mm)—	Average	11	12	22	46	128	183	171	124	80	54	26	14	871
	Highest	157	103	91	175	288	412	417	302	201	195	84	80	1,365
	Lowest	—	—	—	—	10	36	49	21	—	5	—	—	484
	Highest one day	115	86	66	61	79	82	95	62	58	39	38	27	115
Wet days—	Average number	2	2	4	7	14	18	20	17	14	11	6	4	119
Albany M.O. (b)—														
Rainfall (mm)—	Average	23	23	28	65	96	99	124	106	82	79	48	25	798
	Highest	123	62	85	127	260	224	204	174	133	172	117	97	966
	Lowest	3	4	6	21	47	45	55	52	43	37	6	5	628
	Highest one day	80	36	52	52	40	38	43	44	44	53	29	42	80
Wet days—	Average number	8	8	11	14	18	19	21	21	18	15	13	10	176
Esperance—														
Rainfall (mm)—	Average	14	27	25	48	77	80	98	88	55	50	39	17	618
	Highest	35	80	82	155	186	129	193	145	119	117	87	85	868
	Lowest	2	—	1	6	18	33	23	39	16	16	21	1	468
	Highest one day	25	70	31	34	51	34	45	31	28	77	42	24	77
Wet days—	Average number	5	6	6	10	12	14	15	15	13	11	8	6	121
Ecula—														
Rainfall (mm)—	Average	14	19	21	25	31	29	24	26	21	19	17	14	260
	Highest	95	182	127	205	104	155	83	82	85	74	114	116	433
	Lowest	—	—	—	—	—	2	—	2	—	1	—	—	112
	Highest one day	54	115	51	41	75	36	26	38	40	33	42	65	115
Wet days—	Average number	3	4	6	7	10	10	10	9	8	6	5	4	82
WHEAT BELT														
Carnamah—														
Rainfall (mm)—	Average	11	15	21	23	51	82	70	54	28	18	11	9	393
	Highest	103	103	180	121	170	231	188	192	83	73	91	57	783
	Lowest	—	—	—	—	2	13	11	12	1	—	—	—	204
	Highest one day	97	78	153	89	74	61	43	79	33	40	71	50	153
Wet days—	Average number	2	2	3	5	9	13	14	11	8	5	3	2	75
Wongan Hills—														
Rainfall (mm)—	Average	11	16	20	23	53	75	70	52	28	19	11	9	389
	Highest	78	111	166	81	188	220	174	131	97	66	60	59	675
	Lowest	—	—	—	—	1	17	8	8	2	—	—	—	161
	Highest one day	69	80	81	62	64	70	41	34	37	36	39	57	81
Wet days—	Average number	2	2	3	5	8	12	13	12	8	6	3	2	76
Kellerberrin—														
Rainfall (mm)—	Average	10	15	22	22	43	58	53	41	26	19	12	13	334
	Highest	87	127	152	110	119	163	123	100	76	77	86	67	661
	Lowest	—	—	—	—	—	15	11	3	2	1	—	—	172
	Highest one day	52	108	103	58	41	53	38	40	24	37	45	57	108
Wet days—	Average number	2	2	3	5	8	12	13	11	8	6	3	2	75
Southern Cross—														
Rainfall (mm)—	Average	14	20	21	21	34	41	38	30	19	16	15	12	281
	Highest	113	137	169	128	119	183	107	88	106	79	75	72	577
	Lowest	—	—	—	—	—	5	6	1	—	—	—	—	118
	Highest one day	63	84	61	44	55	43	36	40	25	55	51	40	84
Wet days—	Average number	3	3	3	5	8	10	11	9	6	5	3	2	68

**TABLE 3.1 – RAINFALL AT REPRESENTATIVE CLIMATOLOGICAL STATIONS (continued)**  
 (Stations are arranged from north to south in three groups: Coastal, Wheat Belt and Other Inland)

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
WHEAT BELT (continued)													
Northam—													
Rainfall (mm)— Average	8	13	19	24	57	84	85	62	36	25	12	9	434
Highest	80	190	189	88	148	233	221	170	129	100	70	66	711
Lowest	—	—	—	—	1	10	20	3	3	—	—	—	194
Highest one day	45	116	126	75	65	67	54	33	31	58	32	50	126
Wet days— Average number	2	2	3	5	10	15	16	14	10	7	4	2	90
Wandering—													
Rainfall (mm)— Average	10	15	20	35	79	118	115	94	61	43	19	14	623
Highest	156	244	122	121	195	368	324	270	192	130	65	106	1,051
Lowest	—	—	—	—	11	25	34	14	8	1	—	—	297
Highest one day	115	138	104	51	61	85	69	53	40	43	48	64	138
Wet days— Average number	3	3	4	7	13	17	17	16	13	11	6	4	114
Narrogin—													
Rainfall (mm)— Average	10	17	21	30	65	92	89	69	47	34	18	13	505
Highest	155	237	128	121	167	300	243	185	121	128	79	95	741
Lowest	—	—	—	—	10	25	25	16	7	2	—	—	269
Highest one day	91	115	114	63	68	71	81	42	36	49	38	58	115
Wet days— Average number	2	3	4	6	11	15	15	14	11	9	5	3	98
Katanning—													
Rainfall (mm)— Average	13	17	22	31	61	79	76	63	46	37	21	16	482
Highest	217	225	134	162	148	214	174	173	123	115	98	74	782
Lowest	—	—	—	—	7	21	22	13	4	5	—	—	273
Highest one day	116	126	70	106	59	70	38	44	37	50	55	55	126
Wet days— Average number	3	4	5	7	13	17	18	16	13	10	6	4	116
OTHER INLAND													
Halls Creek M.O. (b)—													
Rainfall (mm)— Average	149	124	71	22	14	5	7	3	5	16	32	69	517
Highest	501	484	381	162	105	87	71	49	85	92	175	208	922
Lowest	14	3	2	—	—	—	—	—	—	—	1	4	250
Highest one day	202	124	100	88	62	36	48	42	37	61	97	120	202
Wet days— Average number	13	12	8	3	2	1	1	1	1	3	6	10	62
Marble Bar—													
Rainfall (mm)— Average	76	79	56	21	23	23	12	6	1	4	10	36	347
Highest	310	337	389	241	187	165	134	46	24	116	71	243	798
Lowest	—	—	—	—	—	—	—	—	—	—	—	—	12
Highest one day	152	121	305	125	91	105	63	32	24	84	61	150	305
Wet days— Average number	7	7	5	2	2	2	2	1	—	1	2	4	35
Meekatharra M.O. (b)—													
Rainfall (mm)— Average	26	31	23	13	25	35	22	11	6	6	13	9	220
Highest	129	142	166	65	96	187	166	56	41	62	113	32	441
Lowest	—	—	—	—	—	1	—	—	—	—	—	—	66
Highest one day	103	57	58	37	37	61	62	23	17	25	82	24	103
Wet days— Average number	4	4	4	4	5	6	6	4	2	2	2	3	46
Laverton—													
Rainfall (mm)— Average	22	25	30	22	25	25	16	14	9	7	15	15	221
Highest	142	144	122	205	124	126	66	85	67	50	152	135	452
Lowest	—	—	—	—	—	—	—	—	—	—	—	—	66
Highest one day	75	87	67	54	52	40	33	41	44	49	91	71	91
Wet days— Average number	3	3	4	3	5	5	4	4	2	2	3	3	41
Kalgoorlie M.O. (b)—													
Rainfall (mm)— Average	22	28	20	19	27	32	26	20	15	16	18	14	257
Highest	186	308	143	99	110	186	83	65	98	84	115	60	488
Lowest	—	—	—	—	—	2	2	3	1	—	—	—	108
Highest one day	154	178	70	50	45	57	28	40	44	77	77	27	178
Wet days— Average number	3	4	4	5	7	8	9	7	5	4	4	3	63
Rawlinna—													
Rainfall (mm)— Average	13	17	20	17	18	19	14	16	13	13	13	15	188
Highest	210	123	85	114	81	131	59	155	85	64	81	117	497
Lowest	—	—	—	—	—	—	—	—	—	—	—	—	77
Highest one day	100	73	48	58	31	38	25	66	72	31	65	49	100
Wet days— Average number	2	3	3	3	5	5	5	5	4	3	3	3	44

**TABLE 3.1 – RAINFALL AT REPRESENTATIVE CLIMATOLOGICAL STATIONS (continued)**  
(Stations are arranged from north to south in three groups: Coastal, Wheat Belt and Other Inland)

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
OTHER INLAND (continued)													
Collie—													
Rainfall (mm)— Average	16	15	24	50	128	186	186	142	99	68	32	16	958
Highest	243	178	105	183	270	474	440	414	249	213	106	81	1,467
Lowest	—	—	—	0	15	56	52	31	15	2	1	—	598
Highest one day	74	106	84	63	62	91	69	73	58	49	48	32	106
Wet days— Average number	3	3	5	9	17	20	22	20	17	14	8	5	143
Manjimup—													
Rainfall (mm)— Average	20	20	31	64	136	176	180	149	108	79	47	25	1,035
Highest	92	117	138	194	269	332	320	323	257	165	122	78	1,761
Lowest	—	—	1	8	26	80	43	49	24	9	3	—	650
Highest one day	79	44	89	77	79	83	50	54	59	53	49	32	89
Wet days— Average number	5	6	7	11	17	20	22	20	17	14	10	7	156
Pemberton—													
Rainfall (mm)— Average	21	20	38	81	155	199	219	165	118	92	62	35	1,205
Highest	80	86	128	213	337	365	391	388	214	189	160	92	1,712
Lowest	1	1	5	6	36	116	130	50	45	13	6	3	802
Highest one day	60	30	77	81	77	59	91	61	45	44	45	42	91
Wet days— Average number	6	6	8	12	18	20	22	21	18	16	12	9	168
Mount Barker—													
Rainfall (mm)— Average	23	24	36	56	86	98	107	92	81	72	43	29	746
Highest	182	179	129	234	243	209	261	173	157	160	155	87	1,095
Lowest	1	1	4	4	16	43	22	33	18	16	3	1	431
Highest one day	105	72	56	139	71	68	72	48	45	54	64	44	139
Wet days— Average number	7	7	10	13	17	19	21	20	18	16	11	9	168

(a) Commencing with Year Book No. 21—1983 figures relate to reporting station on a new site. (b) Meteorological Office.

**Table 3.2— ANNUAL RAINFALL AT REPRESENTATIVE STATIONS**  
(millimetres)

Station	1983	1984	1985	1986	1987	1988	Long term average (a)
Albany M.O. (b)	612	773	820	740	667	956	808
Broome M.O. (b)	497	503	395	339	528	482	583
Bunbury	710	817	(c)	665	529	843	871
Camamah	418	442	231	388	274	388	395
Camarvon M.O. (b)	208	352	202	210	103	108	231
Collie	1,040	812	753	638	620	1,066	973
Esperance M.O. (b)	468	643	561	651	572	552	623
Eucla	390	287	240	312	204	361	261
Geraldton M.O. (b)	419	512	392	558	460	466	470
Giles M.O. (b)	426	208	84	2,002	260	242	263
Halls Creek M.O. (b)	731	679	283	457	699	508	518
Kalgoorlie M.O. (b)	240	293	210	280	306	272	253
Katanning	569	467	409	397	330	517	486
Kellerberrin	386	374	261	337	272	333	334
Leonora	225	329	223	233	261	244	222
Manjimup	966	1,029	913	791	715	1,131	1,044
Marble Bar	338	412	238	266	330	620	345
Meekatharra M.O. (b)	218	329	170	303	289	186	213
Mount Barker	611	697	601	618	535	830	751
Narrogin	662	462	435	387	453	534	508
Newman	240	316	270	177	302	326	321
Northam	615	357	322	445	391	404	436
Onslow	126	(c)	67	432	180	180	267
Pemberton	1,039	1,284	1,040	997	869	1,388	1,220
Perth (Bureau of Meteorology)	820	827	691	930	768	912	870
Port Hedland M.O. (b)	289	253	102	167	153	533	315
Southern Cross	287	304	346	331	274	382	281
Wandering	697	511	489	507	472	598	631
Wongan Hills	471	412	356	401	377	477	389
Wyndham	661	723	462	683	872	663	775

(a) Number of years of record used to calculate the long-term average varies from station to station. (b) Meteorological Office. (c) Records incomplete.

[illegible]

Reporting station and characteristic

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
COASTAL (continued)													
Port Hedland—													
Mean max., °C	36.2	36.1	36.7	35.0	30.3	27.4	26.8	28.9	32.1	34.3	36.1	36.7	33.0
Mean min., °C	25.4	25.3	24.3	21.1	17.0	13.8	12.0	12.9	15.2	17.9	21.1	23.8	18.9
Highest max., °C	47.5	47.1	44.5	42.4	37.2	34.4	33.8	36.8	40.9	43.7	47.4	47.9	47.9
Lowest min., °C	18.1	16.3	15.8	12.2	7.0	4.7	3.2	3.7	8.4	11.1	12.4	16.6	3.2
No. of days 30.0°C and over	30	28	30	28	17	5	3	10	22	26	28	31	259
No. of days 40.0°C and over	5	4	5	1	—	—	—	—	—	2	5	6	27
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Roebourne—													
Mean max., °C	38.5	37.8	37.4	35.1	30.1	26.8	26.4	28.7	32.3	35.1	37.8	38.9	33.6
Mean min., °C	26.1	26.1	25.2	22.0	18.2	15.0	13.4	14.4	16.7	19.4	22.6	24.9	20.2
Highest max., °C	47.8	47.6	45.7	43.4	37.8	34.3	33.3	37.9	41.6	45.0	47.4	47.6	47.8
Lowest min., °C	18.6	12.8	17.2	14.1	8.2	4.4	4.4	1.8	7.8	11.1	9.4	11.7	1.8
No. of days 30.0°C and over	30	27	30	30	19	5	3	10	24	28	30	31	268
No. of days 40.0°C and over	12	9	8	1	—	—	—	—	—	4	10	13	57
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Onslow—													
Mean max., °C	35.9	35.8	35.5	33.3	28.8	25.4	24.8	26.5	29.2	31.6	34.0	35.4	31.3
Mean min., °C	23.5	24.0	23.0	20.0	15.8	12.8	11.2	12.1	13.9	16.3	19.0	21.4	17.6
Highest max., °C	47.7	48.3	46.4	43.8	38.3	32.7	32.3	35.3	38.3	44.7	46.1	47.5	48.3
Lowest min., °C	15.8	15.1	14.7	10.0	5.6	2.9	3.1	4.6	5.5	7.4	10.0	9.4	2.9
No. of days 30.0°C and over	30	27	28	27	11	1	—	3	13	23	26	29	218
No. of days 40.0°C and over	6	5	4	—	—	—	—	—	—	1	3	6	25
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Camarvon—													
Mean max., °C	31.3	32.4	31.2	28.7	25.8	23.2	22.0	22.7	24.3	25.8	27.1	29.0	26.7
Mean min., °C	22.4	23.3	22.0	19.0	14.8	12.4	11.1	11.6	13.9	16.3	18.5	20.4	17.2
Highest max., °C	47.7	46.9	45.3	41.1	36.2	31.8	30.7	31.6	38.4	42.4	43.4	45.4	47.7
Lowest min., °C	15.9	17.1	13.4	9.5	6.1	3.6	2.4	3.5	5.9	8.8	10.7	12.6	2.4
No. of days 30.0°C and over	15	17	15	8	3	—	—	—	2	4	4	8	77
No. of days 40.0°C and over	2	2	1	—	—	—	—	—	—	—	—	1	6
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Geraldton—													
Mean max., °C	31.7	32.4	30.8	27.3	23.7	20.7	19.4	20.0	22.0	24.3	26.9	29.3	25.7
Mean min., °C	18.4	19.1	17.8	15.3	12.6	10.9	9.3	8.9	9.2	10.9	13.7	16.2	13.5
Highest max., °C	47.7	47.3	44.3	39.4	36.6	29.2	35.5	31.6	36.8	40.7	42.2	46.7	47.7
Lowest min., °C	10.2	10.0	8.9	6.9	2.1	0.5	1.1	1.3	1.8	2.4	3.8	7.7	0.5
No. of days 30.0°C and over	15	17	15	7	1	—	—	—	1	3	7	11	76
No. of days 40.0°C and over	3	2	1	—	—	—	—	—	—	—	—	1	8
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Perth—													
Mean max., °C	29.6	30.0	28.0	24.5	24.6	18.2	17.4	18.0	19.5	21.4	24.6	27.4	23.2
Mean min., °C	17.8	18.0	16.7	14.2	11.6	10.1	9.0	9.2	10.2	11.6	14.0	16.2	13.1
Highest max., °C	44.7	44.6	41.7	37.6	32.4	28.1	26.3	27.8	32.7	37.3	40.3	42.3	44.7
Lowest min., °C	9.2	8.7	7.7	4.1	1.3	1.6	1.2	1.9	2.6	4.2	5.6	8.6	1.2
No. of days 30.0°C and over	15	15	10	3	—	—	—	—	—	1	4	9	55
No. of days 40.0°C and over	1	—	—	—	—	—	—	—	—	—	—	—	2
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Bunbury—													
Mean max., °C	27.6	27.8	25.9	22.9	19.8	17.6	16.8	17.1	18.1	19.9	22.9	25.5	21.8
Mean min., °C	15.1	15.4	14.3	12.2	10.4	9.2	8.4	8.4	9.2	10.3	12.2	13.9	11.4
Highest max., °C	41.2	40.1	38.3	33.9	28.7	25.1	23.2	24.2	28.8	33.6	37.7	38.6	41.2
Lowest min., °C	5.6	5.2	4.1	2.6	0.1	0.3	−2.2	0.6	−1.1	0.6	4.0	3.6	−2.2
No. of days 30.0°C and over	9	9	4	—	—	—	—	—	—	—	1	5	30
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Albany—													
Mean max., °C	25.3	25.1	24.2	21.5	18.6	16.6	15.8	16.0	17.3	18.9	20.8	23.5	20.2
Mean min., °C	13.5	14.3	13.1	11.5	9.7	8.1	7.5	7.4	7.8	9.0	10.6	12.3	10.2
Highest max., °C	45.6	41.6	40.5	38.8	32.6	24.8	22.5	24.1	27.8	33.1	38.1	41.0	45.6
Lowest min., °C	5.6	5.1	4.5	3.3	1.9	—	−0.2	1.4	0.7	1.8	2.9	3.6	−0.2
No. of days 30.0°C and over	4	4	4	1	—	—	—	—	—	—	1	3	16
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	—	—	—	1
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—

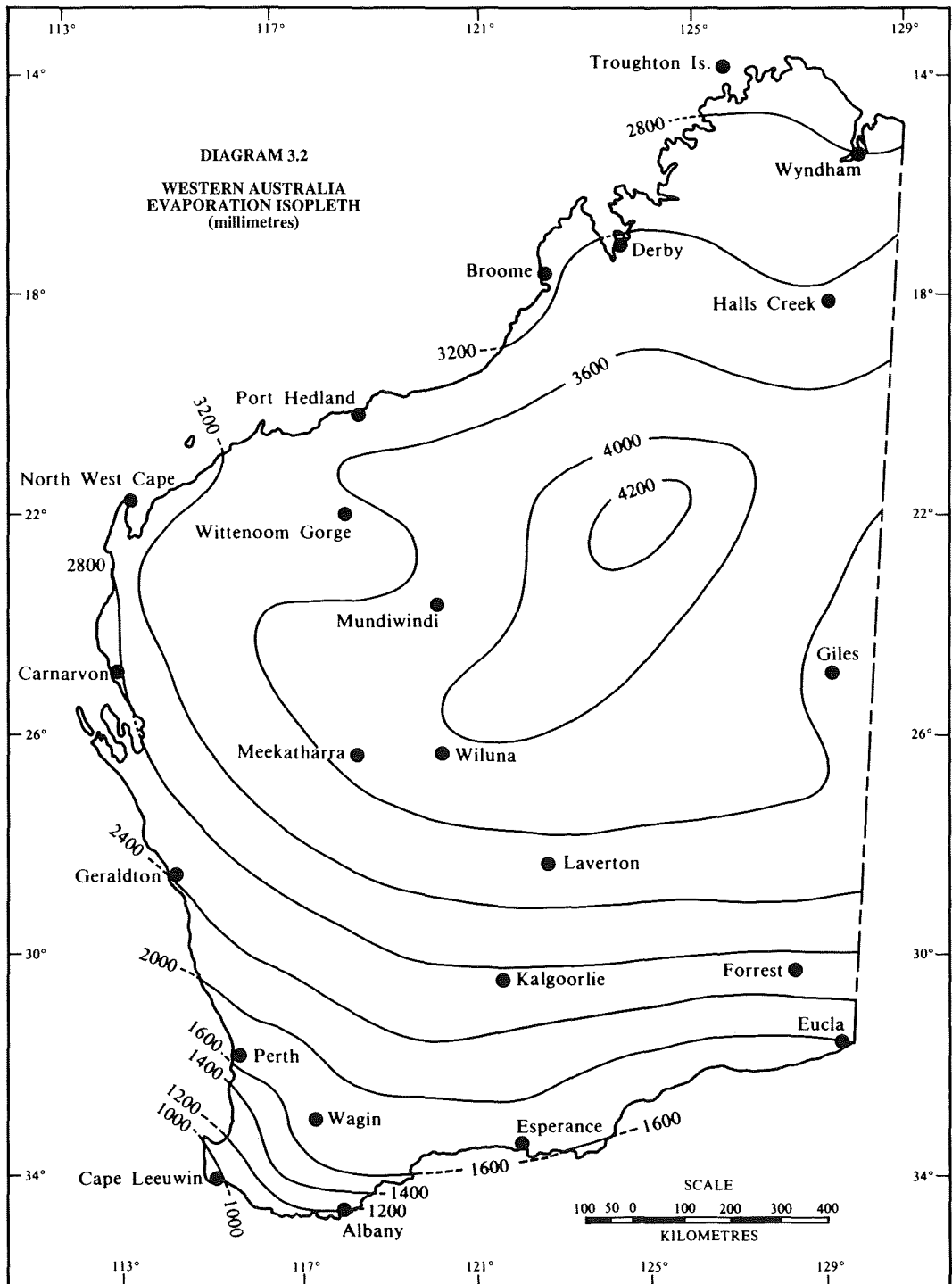
**TABLE 3.3 – TEMPERATURE AT REPRESENTATIVE CLIMATOLOGICAL STATIONS (continued)**  
 (Stations are arranged from north to south in three groups: Coastal, Wheat Belt and Other Inland)

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
COASTAL (continued)													
Esperance Post Office—													
Mean max., °C	26.2	26.4	25.2	23.1	20.2	17.9	17.1	17.7	19.2	21.1	22.9	24.8	21.4
Mean min., °C	15.5	16.0	14.9	13.1	10.3	8.9	8.2	8.5	9.4	10.6	12.7	14.4	11.7
Highest max., °C	44.4	44.3	42.5	40.1	34.5	26.3	27.6	29.4	34.4	40.1	42.1	44.4	47.2
Lowest min., °C	8.3	8.0	7.5	5.7	2.9	2.2	2.36	2.5	2.7	3.6	5.8	7.2	-0.6
No. of days 30.0°C and over	6	4	5	3	—	—	—	—	—	2	3	3	28
No. of days 40.0°C and over	2	—	—	—	—	—	—	—	—	—	1	—	3
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	1
Eucla—													
Mean max., °C	25.5	25.3	24.9	23.3	20.9	18.7	17.8	18.9	20.9	22.6	23.4	24.4	21.8
Mean min., °C	16.5	16.8	15.9	13.4	10.4	8.1	7.0	7.4	9.0	11.1	13.3	15.0	11.9
Highest max., °C	50.7	48.9	44.4	41.4	35.8	33.3	32.1	34.9	40.0	43.1	46.7	49.3	50.7
Lowest min., °C	3.5	6.6	4.6	2.0	—	-2.2	-2.2	-1.6	-0.6	-0.3	2.8	3.3	-2.2
No. of days 30.0°C and over	6	5	5	4	1	—	—	—	2	6	6	6	43
No. of days 40.0°C and over	2	1	1	1	—	—	—	—	—	—	—	1	6
No. of days 2.0°C and under	—	—	—	—	—	—	—	1	—	—	—	—	2
WHEAT BELT													
Camamah—													
Mean max., °C	35.9	35.5	32.7	27.3	22.3	18.9	17.7	19.0	22.1	25.7	29.8	33.4	26.7
Mean min., °C	18.3	18.9	17.0	13.7	10.5	8.6	7.2	7.1	8.1	10.2	13.0	15.8	12.1
Highest max., °C	48.1	45.7	43.9	40.0	34.4	27.8	27.8	29.4	35.1	40.0	43.1	44.3	48.1
Lowest min., °C	5.1	6.9	6.7	1.7	1.1	—	0.6	0.7	1.0	1.1	2.3	6.7	—
No. of days 30.0°C and over	28	25	21	8	1	—	—	—	—	6	15	26	132
No. of days 40.0°C and over	5	7	2	—	—	—	—	—	—	—	1	4	18
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	1
Wongan Hills—													
Mean max., °C	34.4	33.9	30.6	25.9	21.1	17.9	16.9	17.6	20.4	24.8	28.7	32.4	25.2
Mean min., °C	17.9	18.2	16.2	13.1	9.6	7.6	6.5	6.5	7.5	10.1	12.9	15.7	11.4
Highest max., °C	47.4	44.5	43.5	39.2	34.7	26.0	25.4	27.2	35.2	39.4	41.8	44.2	47.4
Lowest min., °C	8.8	9.6	5.6	2.8	-0.6	0.5	-0.9	-0.5	0.2	0.6	4.3	5.3	-0.9
No. of days 30.0°C and over	25	22	16	6	—	—	—	—	—	5	11	22	108
No. of days 40.0°C and over	4	4	—	—	—	—	—	—	—	—	—	2	10
No. of days 2.0°C and under	—	—	—	—	—	1	1	3	—	—	—	—	6
Kellerberrin—													
Mean max., °C	33.9	33.2	30.2	25.5	20.5	17.3	16.2	17.6	20.8	24.4	28.9	31.9	25.1
Mean min., °C	16.8	16.7	15.1	11.7	8.4	7.0	5.7	5.6	6.6	8.8	12.3	14.9	10.8
Highest max., °C	46.5	46.7	44.4	39.2	35.6	26.9	24.9	28.3	36.5	39.4	43.1	45.0	46.7
Lowest min., °C	7.2	6.1	4.0	1.1	-2.2	-2.2	-2.0	-1.3	-1.0	0.3	1.7	5.4	-3.3
No. of days 30.0°C and over	25	21	15	5	—	—	—	—	—	5	12	20	102
No. of days 40.0°C and over	4	2	—	—	—	—	—	—	—	—	—	1	7
No. of days 2.0°C and under	—	—	—	—	1	2	3	5	2	—	—	—	13
Southern Cross—													
Mean max., °C	34.6	33.7	30.7	25.7	20.5	17.1	16.3	18.0	21.9	25.4	29.7	33.2	25.7
Mean min., °C	17.1	17.1	15.0	11.3	7.4	5.7	4.3	4.7	6.4	9.1	12.7	15.5	10.4
Highest max., °C	46.1	47.2	44.4	39.6	33.3	27.5	26.7	30.6	34.8	39.3	43.4	45.9	47.2
Lowest min., °C	5.6	5.6	3.4	-1.1	-3.3	-4.3	-5.0	-3.9	-3.3	-1.1	1.1	3.4	-5.0
No. of days 30.0°C and over	27	23	17	6	—	—	—	—	1	7	14	24	118
No. of days 40.0°C and over	5	2	1	—	—	—	—	—	—	—	1	2	11
No. of days 2.0°C and under	—	—	—	—	2	4	8	8	4	1	—	—	26
Northam—													
Mean max., °C	34.0	33.6	30.6	25.9	20.8	17.7	16.7	17.8	20.4	23.7	28.3	32.1	25.1
Mean min., °C	17.1	17.1	15.4	12.0	8.5	6.4	5.4	5.7	7.0	9.0	12.5	15.4	10.9
Highest max., °C	46.2	46.7	43.9	39.5	35.1	27.2	25.0	28.0	34.6	39.4	44.1	45.6	46.7
Lowest min., °C	7.3	7.5	5.5	-0.6	-2.7	-3.9	-2.1	-1.1	-1.0	-0.4	2.1	5.6	-3.9
No. of days 30.0°C and over	25	22	16	6	—	—	—	—	—	4	10	22	107
No. of days 40.0°C and over	4	4	—	—	—	—	—	—	—	—	—	2	10
No. of days 2.0°C and under	—	—	—	—	1	3	3	4	2	—	—	—	14
Wandering—													
Mean max., °C	31.7	31.0	28.2	23.5	18.9	16.0	15.1	16.0	18.1	21.3	25.8	29.5	22.8
Mean min., °C	13.7	13.7	12.0	8.9	6.3	5.0	4.1	4.0	4.8	6.2	9.1	11.9	8.2
Highest max., °C	45.6	44.6	41.9	37.2	33.2	25.0	23.8	26.1	30.9	36.9	39.8	42.8	45.6
Lowest min., °C	3.3	2.8	-0.6	-2.2	-5.6	-5.7	-4.4	-3.9	-3.5	-2.6	-1.7	1.0	-5.7
No. of days 30.0°C and over	20	17	11	3	—	—	—	—	—	2	7	16	76
No. of days 40.0°C and over	2	1	—	—	—	—	—	—	—	—	—	1	3
No. of days 2.0°C and under	—	—	—	1	6	7	9	11	9	5	1	—	48



**TABLE 3.3 – TEMPERATURE AT REPRESENTATIVE CLIMATOLOGICAL STATIONS (continued)**  
(Stations are arranged from north to south in three groups: Coastal, Wheat Belt and Other Inland)

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
<b>WHEAT BELT (continued)</b>													
Narrogin—													
Mean max., °C	30.8	30.0	27.2	22.4	18.2	15.3	14.6	15.1	17.3	21.2	24.9	28.9	22.0
Mean min., °C	14.7	14.9	13.6	10.9	8.1	7.0	5.8	5.6	6.2	8.1	10.7	12.9	9.5
Highest max., °C	43.7	42.8	40.9	36.1	32.2	26.2	22.2	24.9	36.4	37.8	42.1	43.2	43.7
Lowest min., °C	4.3	3.9	3.3	—	-1.4	-2.7	-2.7	-2.7	-3.0	-1.7	—	1.8	-3.0
No. of days 30.0°C and over	16	14	8	2	—	—	—	—	—	1	5	14	57
No. of days 40.0°C and over	1	1	—	—	—	—	—	—	—	—	—	—	2
No. of days 2.0°C and under	—	—	—	—	1	2	4	5	3	—	—	—	17
Katanning—													
Mean max., °C	30.3	29.4	26.7	22.6	18.3	15.4	14.4	15.4	17.7	20.6	25.0	28.4	22.1
Mean min., °C	13.6	13.7	12.5	10.2	7.9	6.5	5.4	5.5	6.4	7.6	10.0	12.1	9.2
Highest max., °C	43.8	44.6	41.7	36.1	32.3	24.1	22.2	23.8	30.6	37.8	41.1	43.3	44.6
Lowest min., °C	5.0	3.3	1.7	0.6	-1.1	-2.1	-3.9	-2.2	-1.2	-0.6	1.7	2.7	-3.9
No. of days 30.0°C and over	17	13	8	1	—	—	—	—	—	1	5	12	58
No. of days 40.0°C and over	1	1	—	—	—	—	—	—	—	—	—	—	2
No. of days 2.0°C and under	—	—	—	—	1	2	3	4	2	—	—	—	13
<b>OTHER INLAND</b>													
Halls Creek—													
Mean max., °C	36.8	35.8	35.6	33.8	29.8	27.3	27.0	29.9	33.6	36.9	38.4	38.2	33.8
Mean min., °C	24.1	23.6	22.6	20.2	16.6	13.5	12.2	14.7	18.5	22.4	24.3	24.7	19.9
Highest max., °C	44.3	43.8	42.2	39.9	37.2	35.0	34.0	37.8	40.2	43.8	45.0	44.9	44.9
Lowest min., °C	15.6	12.2	11.0	7.2	2.4	0.2	-1.1	0.4	3.0	8.9	11.7	12.1	-1.1
No. of days 30.0°C and over	30	27	30	28	17	6	6	16	27	30	30	30	279
No. of days 40.0°C and over	6	4	2	—	—	—	—	—	—	3	8	9	31
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Marble Bar—													
Mean max., °C	41.0	40.0	39.1	36.0	30.6	27.0	26.7	29.5	33.8	37.4	40.5	41.6	35.3
Mean min., °C	26.1	25.6	24.7	21.2	16.4	12.9	11.6	13.2	16.6	20.1	23.6	25.4	19.8
Highest max., °C	49.2	48.3	46.7	45.0	39.4	35.6	35.0	37.2	42.6	45.6	47.2	48.3	49.2
Lowest min., °C	18.9	13.9	15.3	11.1	5.6	1.1	2.2	3.9	5.6	10.0	14.4	17.2	1.1
No. of days 30.0°C and over	30	27	31	28	18	6	4	13	26	30	30	30	273
No. of days 40.0°C and over	19	14	12	2	—	—	—	—	—	8	16	23	94
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
Meekatharra—													
Mean max., °C	38.1	36.6	34.6	29.1	23.3	19.4	18.6	21.0	25.3	29.1	33.1	36.3	28.6
Mean min., °C	24.2	23.7	21.5	16.9	11.7	8.7	7.3	8.3	11.5	14.8	18.5	22.0	15.8
Highest max., °C	44.8	44.3	43.7	38.8	34.3	28.3	28.8	32.6	37.7	40.2	42.3	45.0	45.0
Lowest min., °C	12.2	12.3	10.3	5.8	1.7	-3.1	-0.2	—	3.5	5.2	5.2	11.1	-3.1
No. of days 30.0°C and over	30	26	27	13	2	—	—	—	4	14	23	29	169
No. of days 40.0°C and over	10	6	2	—	—	—	—	—	—	—	1	4	22
No. of days 2.0°C and under	—	—	—	—	—	—	1	—	—	—	—	—	1
Laverton—													
Mean max., °C	36.3	34.3	32.0	27.8	22.6	19.1	17.7	19.9	24.2	28.7	32.3	34.2	27.4
Mean min., °C	21.0	19.9	18.1	14.7	9.9	7.7	5.4	6.2	9.4	13.7	16.8	19.1	13.5
Highest max., °C	46.1	46.1	44.4	40.0	35.0	30.2	30.1	33.9	36.8	40.6	43.9	45.6	46.1
Lowest min., °C	7.2	7.5	6.1	2.8	-0.9	-2.8	-4.2	-2.8	-1.1	2.2	4.4	10.0	-4.2
No. of days 30.0°C and over	28	23	20	12	2	—	—	—	4	13	21	25	147
No. of days 40.0°C and over	8	4	2	—	—	—	—	—	—	—	2	3	18
No. of days 2.0°C and under	—	—	—	—	1	2	6	4	—	—	—	—	12
Kalgoorlie—													
Mean max., °C	33.6	31.9	29.6	25.1	20.4	17.5	16.5	18.3	22.0	25.5	28.9	32.1	25.3
Mean min., °C	18.2	17.7	15.9	12.4	8.3	6.2	4.8	5.4	7.8	10.8	13.9	16.6	11.5
Highest max., °C	46.4	46.1	44.5	39.2	33.3	27.6	28.1	30.6	36.8	40.7	41.7	45.0	46.4
Lowest min., °C	8.4	8.6	5.3	1.7	-1.8	-3.0	-3.4	-2.4	-0.6	-1.0	3.4	5.5	-3.4
No. of days 30.0°C and over	24	18	14	5	—	—	—	—	1	6	12	21	100
No. of days 40.0°C and over	3	2	1	—	—	—	—	—	—	—	—	2	8
No. of days 2.0°C and under	—	—	—	—	1	4	8	6	1	—	—	—	20
Rawlinna—													
Mean max., °C	32.9	31.7	29.6	25.5	21.7	18.6	17.9	19.8	23.4	26.3	29.6	31.7	25.7
Mean min., °C	15.3	15.1	14.3	11.3	8.1	5.9	4.4	5.1	7.4	9.8	12.2	14.2	10.3
Highest max., °C	47.9	46.4	44.7	40.0	35.0	31.3	29.7	33.9	39.3	41.7	45.6	45.7	47.9
Lowest min., °C	5.6	5.0	6.1	1.7	—	-2.7	-2.3	-3.2	-0.6	0.7	0.8	5.1	-3.2
No. of days 30.0°C and over	23	17	14	7	1	—	—	—	3	9	14	19	106
No. of days 40.0°C and over	5	3	2	—	—	—	—	—	—	—	1	3	13
No. of days 2.0°C and under	—	—	—	—	1	3	7	4	1	—	—	—	16



**TABLE 3.3 – TEMPERATURE AT REPRESENTATIVE CLIMATOLOGICAL STATIONS (continued)**  
(Stations are arranged from north to south in three groups: Coastal, Wheat Belt and Other Inland)

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
OTHER INLAND (continued)													
Collie—													
Mean max., °C	31.1	30.6	27.7	22.4	19.1	16.5	15.6	16.3	18.0	21.3	24.8	28.9	22.7
Mean min., °C	14.2	14.1	12.3	9.5	7.1	6.2	4.7	4.7	6.1	7.8	10.2	12.6	9.1
Highest max., °C	44.4	43.4	40.8	36.7	30.4	24.4	22.8	26.1	30.3	36.3	38.8	41.7	44.4
Lowest min., °C	3.2	1.8	0.2	-1.3	-2.2	-4.0	-3.9	-3.2	-2.2	-0.6	0.3	1.7	-4.0
No. of days 30.0°C and over	19	15	10	2	—	—	—	—	—	1	5	13	63
No. of days 40.0°C and over	1	—	—	—	—	—	—	—	—	—	—	—	2
No. of days 2.0°C and under	—	—	—	1	3	5	6	8	4	1	—	—	28
Manjimup—													
Mean max., °C	27.0	26.9	24.5	20.7	17.2	15.1	14.2	14.8	16.4	18.6	21.6	24.6	19.9
Mean min., °C	13.0	13.2	12.3	10.4	8.6	7.3	6.3	6.3	7.0	8.2	10.0	11.5	9.2
Highest max., °C	41.7	41.2	38.9	33.6	29.2	22.9	21.7	24.7	28.1	33.3	37.4	38.8	41.7
Lowest min., °C	5.6	4.4	3.3	1.6	-0.6	0.2	-2.8	-1.1	-0.6	0.6	1.7	4.4	-2.8
No. of days 30.0°C and over	10	10	5	—	—	—	—	—	—	—	1	7	33
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of days 2.0°C and under	—	—	—	—	—	1	—	1	—	—	—	—	2
Pemberton—													
Mean max., °C	26.0	26.1	24.1	20.6	17.6	15.6	14.7	15.1	16.5	18.6	21.1	20.9	23.6
Mean min., °C	13.0	13.5	12.5	10.7	9.1	8.1	7.1	6.8	7.3	8.4	10.1	11.8	9.7
Highest max., °C	41.7	40.1	38.9	33.9	28.3	23.2	22.0	25.6	28.3	30.6	37.0	38.5	41.7
Lowest min., °C	4.4	4.4	3.9	2.7	—	-0.4	-1.4	-1.1	-0.3	0.6	2.1	3.9	-1.4
No. of days 30.0°C and over	8	8	4	1	—	—	—	—	—	1	1	5	29
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of days 2.0°C and under	—	—	—	—	—	—	1	1	1	—	—	—	3
Mount Baker—													
Mean max., °C	26.2	25.9	24.0	21.0	17.6	15.2	14.2	15.0	16.8	18.7	21.8	24.9	24.3
Mean min., °C	12.6	12.8	12.1	10.4	8.4	6.9	5.8	5.9	6.8	7.9	9.7	12.0	11.3
Highest max., °C	43.9	43.2	40.6	37.2	32.2	23.3	22.2	24.4	28.9	35.6	39.3	40.0	43.9
Lowest min., °C	4.4	5.3	5.1	2.8	1.0	—	-0.6	0.5	0	1.7	3.5	5.0	-1.3
No. of days 30.0°C and over	10	8	5	1	—	—	—	—	—	—	2	6	32
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	—	—	—	1
No. of days 2.0°C and under	—	—	—	—	—	—	1	1	—	—	—	—	2

## THUNDERSTORMS

Thunderstorms are frequent in the Kimberley during the 'Wet' season but are practically unknown in the 'Dry'.

In most of the State south from the tropics thunderstorms are most frequent in the summer months but in the south-west they are more uniformly distributed and in many places in coastal districts they are most frequent in winter.

The winter storms are often accompanied by hail which, however, is usually not heavy enough to cause damage. Hail accompanying summer storms can be much heavier, and occasionally damages ripening crops in the wheat belt. Both winter and summer thunderstorms may be accompanied by severe squalls, but these are infrequent.

## EVAPORATION

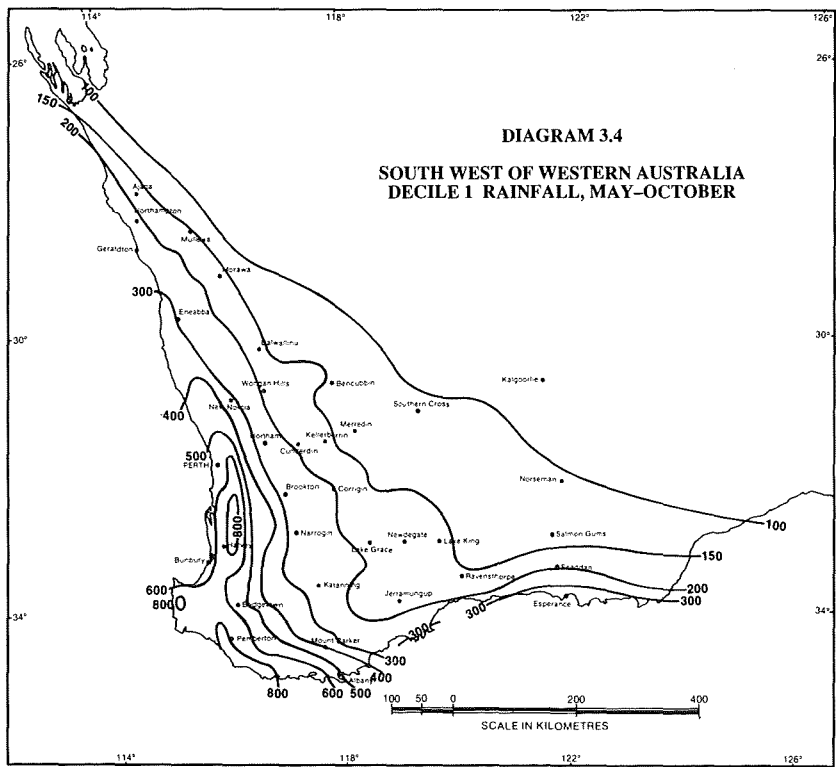
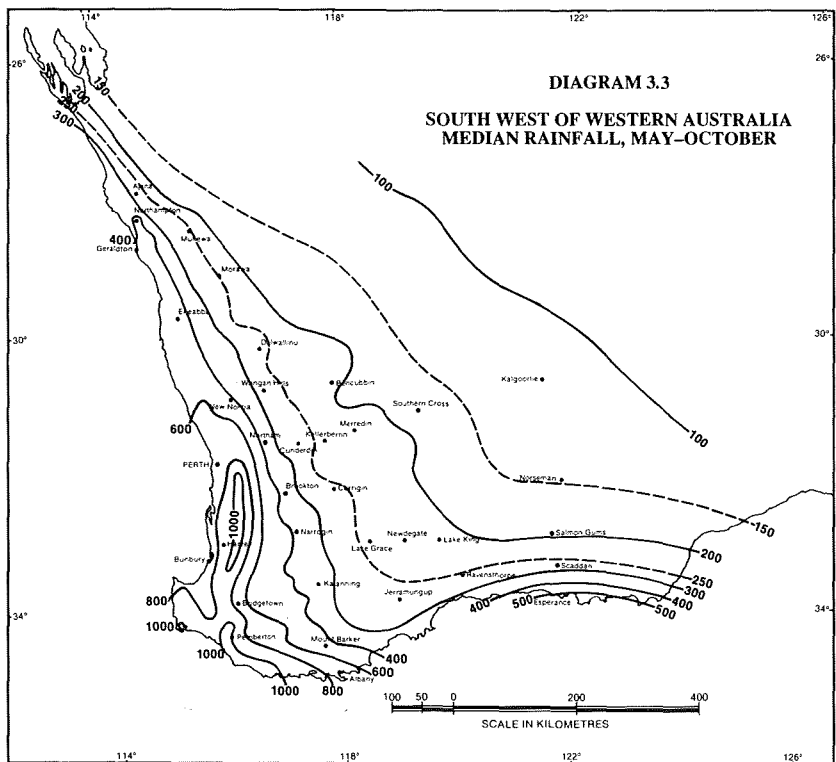
Except for the lower south-west, evaporation from a free water surface exceeds the annual rainfall, and in a large proportion of the State it is more than ten times greater than the rainfall.

It is least in the winter months, amounting in July to less than fifty millimetres in the far south-west, and to about 225 millimetres in the northern tropics. In January, when evaporation is highest, it totals about 200 millimetres on the far south coast and reaches 500 millimetres in the East Gascoyne and North-Eastern Meteorological Districts. Further north, evaporation is reduced by the moister air over the tropics at this time of the year.

Diagram 3.2 shows the average annual annual evaporation using the Class A pan evaporimeter with bird guard.

## GROWING SEASON RAINFALL

Crop production in the agricultural districts of the south-west of the State is dependent on the winter rains. The bulk of the useful rainfall for this purpose occurs in the six-month period between May and October. Diagram 3.3 shows the median (50 percentile) value of the rainfall in this period and the decile 1 (10 percentile) rainfall, (i.e. the rainfall total which on average is not exceeded in one year in ten) is shown in Diagram 3.4.



METROPOLITAN CLIMATE

Perth has more sunshine and a greater number of clear days during the year than any other State capital city. It also has the wettest winter, the driest summer, and is the windiest of the capital cities. The highest temperature on record for Perth is 44.7°C (12 January 1978) and the lowest 1.2°C (7 July 1916).

SNOW

Snow has been known to fall as far north as Wongan Hills, but it is only in the southern districts that it occasionally lies on the ground. It is seen on top of the Stirling Ranges for a short time nearly every winter, but elsewhere is very infrequent and of negligible importance.

TABLE 3.4 – CLIMATOLOGICAL DATA – PERTH BUREAU OF METEOROLOGY

Month	Wind				Temperature				Relative humidity (Saturation = 100%)		Cloud (proportion of sky covered)— Mean of readings at 9 a.m. 3 p.m. and 9 p.m.	Evapor- ation Mean daily amount	
	Prevailing direction		Speed								Sun- shine Mean daily amount		
	9 a.m.	3 p.m.	Aver- age	High- est	Highest in sun	Lowest terrestrial	Mean	At 3 p.m.					
Number of years of obser- vations	30 (a)		30 (a) 63		63	81	30 (a)		30 (a)	30 (a)	13 (b)		
			km/h	km/h	°c	date	°c	date	%	%	hours	%	mm
Jan.	E	SSW	17.5	89	80.7	22/1914	4.2	20/1925	53	43	10.8	29	9.3
Feb.	ENE	SSW	17.2	113	78.7	4/1934	4.3	1/1913	52	43	10.2	31	8.9
Mar.	E	SSW	16.2	113	75.0	19/1918	2.6	(c)	57	46	9.1	35	7.1
Apr.	ENE	SSW	13.7	130	69.4	8/1916	-0.7	26/1960	60	48	7.3	42	4.4
May	NE	WSW	13.5	119	63.3	4/1925	-3.9	31/1964	68	58	6.1	54	3.0
June	N	NW	13.5	128	57.5	9/1914	-3.4	27/1946	72	63	5.0	59	2.3
July	NNE	W	14.2	137	56.2	13/1915	-3.8	30/1920	73	63	5.4	56	2.4
Aug.	N	WNW	15.1	156	62.8	29/1921	-3.0	18/1966	71	60	6.4	56	2.8
Sept.	ENE	SSW	15.1	113	67.5	29/1916	-2.7	(d)	64	57	7.4	4.9	4.0
Oct.	SE	SW	16.1	104	71.8	19/1954	-1.2	16/1931	64	54	8.9	48	5.7
Nov.	E	SW	17.2	102	75.0	30/1925	-1.1	1/1968	57	47	9.9	39	7.1
Dec.	E	SSW	17.7	102	76.0	11/1927	3.3	29/1957	54	46	10.7	32	8.7
Year—													
Average	E	SSW	15.6	..	..	..	..	..	62	52	8.1	44	..
Extremes	..	..	..	156	80.7	22/1/14	-3.9	31/5/64	..	..	..	..	..

(a) Standard 30 year's normal (1911–1940). (b) Class A Pan 1967–1979. Correction of + 7% applied for bird screen. (c) Recorded on 8 March 1903 and 16 March 1967. (d) Recorded on 8 September 1952 and 6 September 1956.

## Chapter 4

### FLORA AND FAUNA

#### The Vegetation of Western Australia<sup>(1)</sup>

Contributed by T.E.H. Aplin and P.G. Wilson  
(Western Australian Herbarium, Department of Agriculture)

The flora of Western Australia consists of about 8,000 species of flowering plants (angiosperms), 15 cycads and conifers (gymnosperms) and 50 ferns. The families of flowering plants that characterise the flora are also widespread throughout Australia, e.g. Myrtaceae, Proteaceae and Leguminosae. The Stylidiaceae, Goodeniaceae and Epacridaceae, which are poorly represented outside Australia, are well developed in Western Australia. Large groups of plants that are almost wholly endemic in this State are the *Chloanthaceae*, *Prostantheroideae* (Lamiaceae), *Persoonieae* and *Banksieae* (Proteaceae) and *Epacrideae* (Epacridaceae). At the generic level there are forty-seven monotypic genera, most of which are endemic in the South-West Province, while at the species level 2,472, or 68 per cent of species in the South-West are endemic, although it has been suggested that the degree of endemism may approach 75–80%.

Climatically, Western Australia shows a marked variation from a predominantly summer rainfall pattern in the north to a characteristically Mediterranean-type winter rainfall pattern in the south. Between these two rainfall systems is a large region whose climate is characterised by the extreme variability of the rainfall both annually and seasonally.<sup>(2)</sup> The vegetation of Western Australia is determined by these varying climatic patterns, although local changes in geology, soils, topography and drainage may affect the structure and/or the floristic composition of plant communities. The delineation of the present day vegetation also reflects the past tectonic and climatic history of the Australian continent.

It is generally accepted that in the Palaeozoic era the Australian continent was united with the continents of Africa, Antarctica, India and South

America in a once common land-mass known as Gondwana. During this period these continents had a common flora as exemplified by the *Glossopteris* elements. In the late Neocomian period (Early Cretaceous), rifting between India (with Africa and South America) and Australia (with Antarctica) was initiated. In Eocene times (Early to Mid-Tertiary), sea-floor spreading between Australia and Antarctica commenced and for the first time the southern coasts were warmed by the entering Indian Ocean. The early Tertiary flora of the South-West Province contained several sub-tropical rainforest and mangrove genera in abundance. The Australian continental block was isolated at about the time the pan-Australian flora began to develop, and the northward drift of the continent which brought the Australian block into contact with the Asian block in the middle Miocene period (Late Tertiary) allowed the entry of a different flora, the 'Indo-Malayan' flora.

The degree of endemism and diversification in the south-western flora, which had its origin in pre-Miocene times, was brought about largely by the isolation caused by the late Eocene and Miocene seas which inundated the Nullarbor Shelf. Another factor that contributed to the diversification of the flora was the lateritisation that occurred in the Tertiary period, with the subsequent dissection of the lateritic landscape causing fragmentation of a once continuous flora.

#### FORMATIONS AND ALLIANCES

The classification of vegetation involves the groupings of similar structural units and the grouping or classification of the floristic components present in all strata of plant communities that form part of the vegetation.

<sup>1</sup> See Appendix for reference to additional information in earlier issues of the Year Book.

<sup>2</sup> See Chapter 3,—Climate and Meteorology.

TABLE 4.1 – PLANT COMMUNITIES—MAJOR STRUCTURAL FORMATION

Life-form and height of tallest stratum	Projective foliage cover of tallest stratum, as per cent	Description
Trees over 30 m	70–100 30–70 10–30 under 10	High closed forest High open forest High woodland High open woodland
Trees 10–30 m	70–100 30–70 10–30 under 10	Closed forest Open forest Woodland Open woodland
Trees under 10 m	70–100 30–70 10–30 under 10	Low closed forest Low open forest Low woodland Low open woodland
Shrubs over 2 m	70–100 30–70 10–30 under 10	Closed scrub Open scrub High shrubland High open shrubland
Shrubs 1–2 m	70–100 30–70 10–30 under 10	Closed heath Open heath Shrubland Open shrubland
Shrubs under 1 m	70–100 30–70 10–30 under 10	Low closed heath Low open heath Low shrubland Low open shrubland
Herbs	70–100  30–70 10–30	Closed herbland, closed tussock grassland, closed sedgeland, etc. Herbland, tussock grassland, sedgeland, etc. Open herbland, open tussock grassland, open sedgeland, etc.
Hummock grasses	10–30 under 10	Hummock grassland Open hummock grassland

## BOTANICAL PROVINCES AND DISTRICTS

The vegetation of Western Australia has been subdivided into three Botanical Provinces. The areas that these provinces occupy are determined largely by climatic pattern. Within each province are smaller regions, known as Botanical Districts, in which the structure and floristics of the vegetation are determined partly by climate and partly by geology and soils. The boundaries of these provinces and districts are shown in Diagram 4.1.

### The Northern Province

The Northern Province, or Tropical Zone, is characterised by a dry monsoonal climate. The rainfall received in the summer months ranges

from less than 500mm to over 1,250mm per annum. The annual mean maximum temperature is over 30°C. The evaporation rate ranges from 2,000–2,500mm per annum.

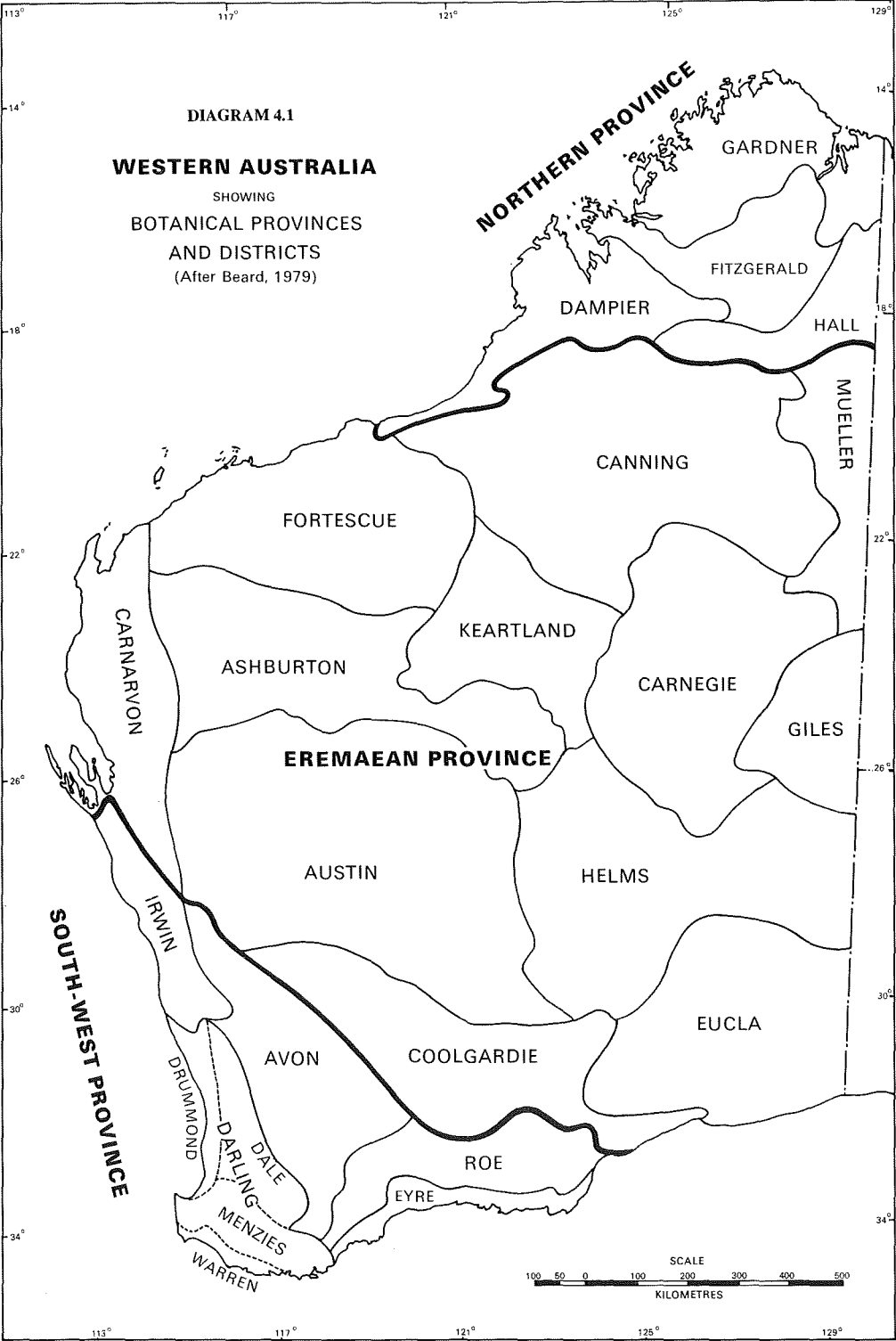
The vegetation formation consists of grassy *Eucalyptus* open forests and woodlands. The major components are 'Australian' elements, with 'Indo-Malayan' elements as minor components. The latter are usually found in special habitats such as streamlines or scarps. Some important 'Indo-Malayan' genera are *Ficus* (Moraceae), *Barringtonia* (Lecythidaceae) and *Terminalia* (Combretaceae).

**The Gardner Botanical District.** The Gardner botanical district, commonly referred to as the Kimberley Plateau, consists of a series of sandstone, shale, quartzite and volcanic rocks. The topography varies from alluvial flats through rolling to hill landscape to very rugged dissected plateau. Saline mud flats are present along estuaries.

On the volcanic rocks and shales, on gently undulating to hilly topography, the woodland and open woodland formations consist mainly of *E. tectifera*–*E. grandifolia* alliance. *E. tectifera* sub-alliance is restricted to the volcanic soils while *E. grandifolia* sub-alliance is developed on the shales and sandstones. *E. latifolia* and *E. papuana* alliances characterise the flats and levee soils.

On the sandstone and quartzite rocks, ranges and hogbacks, the woodland, open woodland and low open woodland formations are mainly made up of *E. tetradonta*–*E. miniata* alliance. In this alliance, *E. tetradonta* sub-alliance is found mainly in the northern high-rainfall region while *E. phoenicea*–*E. ferruginea* (Scarlet Gum–Rusty Bloodwood) sub-alliance is its southern lower-rainfall counterpart.

Other alliances and associations found in the Gardner botanical district are *Terminalia* spp.–*Dichanthium* spp. woodland and grassland communities, on soils of heavy texture; *E. brevifolia*, *E. argillacea* and *Melaleuca viridiflora* associations on podsols, over shales and sandstones; fringing communities of *E. camaldulensis* and *Terminalia* spp.–*Ficus* spp.–*Melaleuca* spp.; and mangrove communities on the estuarine mud flats. Closed mixed forests of 'Indo-Malayan' elements such as *Calophyllum*, *Ficus*, *Carallia*, *Barringtonia*, *Nauclea*, *Randia* and *Myristica* and *Melaleuca leucadendron* (Cadjaput) fringe gullies, while semi-deciduous





vine thickets with lianes such as *Aristolochia*, *Capparis*, *Cansjera*, *Adenia* and *Canavalia* occur in small pockets.

**The Hall Botanical District.** In the Hall botanical district, the low open woodlands of *E. pruinosa* association are the low-rainfall counterparts of *E. tectifera* woodlands and occur on soils derived from basic rocks. *E. brevifolia* association is generally seen on skeletal soils on acid rocks, and also on many other soils. Low open woodlands of *Terminalia* spp. alliance occur on cracking clay soils formed on volcanics and limestone. Tussock grasslands with *Astrebula*, *Dichanthium*, *Chrysopogon* and *Panicum* occur on high-level plains of Tertiary alluvia. The rugged hilly country of the Halls Creek ridges carries *E. brevifolia* and *E. pruinosa* low open woodland associations over *Triodia intermedia*. The gently undulating plains with calcareous soils carry arid short grass communities of *Enneapogon* (Bottle Washers), *Aristida* and *Sporobolus*.

**The Fitzgerald Botanical District.** The Fitzgerald botanical district consists essentially of mountain ranges, plateaus and steep-sided valleys. The ranges and plateaus are made up of quartzite and shale-sandstone with lateritic remnants, lightly covered with a thin soil mantle. The vegetation comprises mainly low open woodland of *E. brevifolia*, *E. dichromophloia* and *E. phoenicea-E. ferruginea* communities, with a patchy shrub layer and *Plectrachne pungens* as the main ground component.

**The Dampier Botanical District.** The Dampier botanical district is a region in which a great thickness of gently folded sedimentary rock, of Palaeozoic and Mesozoic age, overlies a Precambrian basement of crystalline rock. The basement outcrops along the north and east of the basin.

The up-land regions consist of low hills and stony plains with granite domes, gneiss, hills, schist ridges and gently sloping sandy plateaus. The vegetation formations consist of low open woodland formations of Eucalyptus species with a hummock grassland ground layer. The main alliance of *E. brevifolia* is represented by a number of associations. One noteworthy association is *Grevillea pyramidalis*. The hummock grassland layer consists of the genera *Triodia* and *Plectrachne* is almost pure stands of species. A short grass ground storey with *Enneapogon* and *Aristida* may be seen on the interfluvies and hill-foot slopes to the south-east. The drainage floors

usually carry low open woodland formations of *E. dichromophloia* and *E. tectifera* alliances. The grass layer includes the genera *Chrysopogon*, *Sehima*, *Sorghum* and *Dichanthium*.

The Dampier botanical district contains extensive areas of sandy plains which lack surface drainage. The dominant layer in the vegetation is composed of *Acacia*, the more important species being *A. tumida*, *A. eriopoda*, *A. pachycarpa*, *A. holosericea* and *A. monticola*. *E. dichromophloia* and *E. zygophylla* make up the tallest stratum of the low woodland formation containing these *Acacia* species. Other tree genera include *Gyrocarpus*, *Atalaya*, *Hakea*, *Grevillea*, *Lysiphyllum*, *Persoonia* and *Erythrophloeum*, with the occasional *Adansonia*. In the high rainfall area, a woodland formation of *E. miniata* alliance is present. This alliance also has a strong layer of *Acacia* shrubs. In this district *E. tetradonta* is not associated with *E. miniata* as it is in the Gardner botanical district.

### The Eremaean Province

The Eremaean Province, which lies between the predominantly summer and predominantly winter rainfall patterns of the north and the south-west, respectively, is intermediate in character. The rainfall, which over most of the province is less than 400 mm per annum, is received either from extensions of summer rainfall southward or from northern extensions of the southern winter systems. The vegetation of the province varies from woodland, high shrubland, low shrubland to hummock grassland. Eleven botanical districts have been broadly recognised, seven of them in the desert area.

**The Fortescue Botanical District.** The Fortescue botanical district, usually placed in the Northern Province, consists of the Pilbara block. The vegetation of the narrow coastal strip carries grasslands of *Eragrostis* and *Eriachne* and low open shrublands of *Acacia translucens-A. inaequilatera* alliance. *Acacia pyrifolia* high open shrubland alliance is present on granite and basalt soils. High shrubland and low woodland *A. aneura* alliance is found along the major valleys and southern flanks of the Hamersley Range. On the Proterozoic rocks of the Hamersley Range the characteristic vegetation is a low open woodland formation, with *E. leucophloia* alliance. Hummock grassland ground layer found on stony soils consists mainly of *Triodia wiseana* and *T. basedowii*. Low woodland formations of *E.*

*dichromophloia*–*E. setosa*, with *Triodia basedowii* as ground cover, occur on the sand plains.

#### **The Ashburton and Austin Botanical Districts.**

The Ashburton and the Austin botanical districts are separated by rainfall patterns. The former, with its rainfall more likely to occur in summer, and the latter, with its rainfall more likely to occur in winter, both carry extensive low woodland and high shrubland formations of *A. aneura* alliance but, whereas the northern alliance is associated more with grass genera such as *Aristida*, *Eragrostis*, *Eriachne*, *Panicum*, *Brachiaria*, *Triodia* and *Setaria*, the southern alliance is associated more with genera such as *Danthonia*, *Eremophila*, *Maireana*, *Helipterum*, *Cephalopterum*, *Velleia*, *Swainsona* and other herbaceous annuals. *A. aneura* alliance consists of a number of sub-alliances and associations. *Maireana pyramidata* is associated with *A. aneura* on saline alluvial plains. Other woody genera that are prominent in the *A. aneura* alliance are *Hakea*, *Grevillea*, *Atriplex*, *Frankenia*, *Plagianthus*, *Alectryon* and *Brachychiton*.

#### **The Carnarvon Botanical District.**

The Carnarvon botanical district, a sedimentary basin in which the exposed surface rocks range from Permian to Recent in age, is mostly low-lying. The vegetation on the northern plains consists of *Acacia xiphophylla* high open shrubland with *Triodia basedowii* as ground cover. On the sand plains the vegetation is predominantly *Acacia pyrifolia* open shrubland, with scattered *Owenia reticulata*, and with *Triodia pungens* and *Plectrachne schinzii* as ground cover. On Cape Range *E. dichromophloia* low open woodland, with *Triodia pungens* and *T. wiseana*, is to be seen. *Acacia* species such as *A. coriacea*, *A. ramulosa*, *A. sclerosperma*, *A. xiphophylla*, *A. tetragonophylla*, *A. grasbyi* and *A. ligulata* form high open shrubland or low open woodland communities with shrub species of other genera over a wide area of this botanical district. On alluvial flats the low shrub understorey layer consists of species of *Maireana* and *Atriplex*. *Halosarcia* low open shrubland occupies the wetter sites. On Kennedy Range a mixed open shrubland with *Triodia basedowii* and *T. pungens* as ground cover is present.

The Canning, Mueller, Kearland, Carnegie, Giles and Helms botanical districts make up the desert region of Western Australia.

#### **The Canning and Mueller Botanical Districts.**

The Canning and Mueller districts contain extensive areas of high shrubland with several species of *Acacia* dominating. On the sandy plains the dominant species is *A. pachycarpa* with *Triodia pungens* as ground cover. Scattered trees of *Eucalyptus* sp. (Desert Bloodwood) are present on the dunes. *Owenia reticulata* (Desert Walnut) is the principal low tree species in the north-western sector. *E. pachyphylla* and *E. odontocarpa* are prominent in the north-eastern sector, while woodlands of *Allocasuarina decaisneana* are also of local importance there, in the interdunes.

#### **The Keartland Botanical District.**

The Keartland district has a noticeable abundance of *Thryptomene maisonneuvei* and other Myrtaceae in the high shrubland formation. The Desert Bloodwood is present on the dunes, together with *Plectrachne schinzii*. *A. aneura* is of local importance, on small hills and mesas, with *Triodia pungens*. Hills of igneous rocks are covered with *Plectrachne melvillei*.

#### **The Carnegie Botanical District.**

The Carnegie district carries extensive areas of *A. aneura*, with *Danthonia* and seasonal ephemerals. On the rises of the lateritic plains hummock grasslands of *Triodia basedowii* and high shrublands with *E. kingsmillii* merge in with the *A. aneura* which tend to thin out. Desert Bloodwood, *Allo-casuarina decaisneana*, and *E. coolabah* become more local in distribution, while *Plectrachne schinzii* is increasingly replaced by *Thryptomene maisonneuvei* southwards.

#### **The Giles Botanical District.**

The Giles district consists of ranges with sandhill country between them, somewhat similar to the Carnegie district. *Allocasuarina decaisneana* groves are very common in sandhill country between the ranges. *Triodia basedowii* and *Plectrachne schinzii* provide ground cover. On the ranges the high shrubland is made up predominantly of *Acacia* spp. including *A. aneura*, with *Eremophila*, *Hakea*, *Grevillea* and *Eucalyptus* as co-dominants in some areas. *Callitris columellaris* is locally dominant. *Triodia basedowii* and *Plectrachne melvillei* form the hummock grassland ground layer.

#### **The Helms Botanical District.**

The Helms district contains extensive areas of *A. aneura* alliance. A high shrubland formation characterised by *E. youngiana* alliance is also well developed. Associated with the shrubland community are other tall shrubs such as *Hakea*,

*Acacia*, *Melaleuca*, *Grevillea* and other *Eucalyptus* species. Patches of open woodland of *E. gongylocarpa* are restricted apparently to areas where the sand is deeper. The hummock grass associated with *E. youngiana* and *E. gongylocarpa* is *Triodia basedowii*.

**The Eucla Botanical District.** The Eucla botanical district, commonly referred to as the Nullarbor Plain, is dominated by a low shrubland formation of *Maireana sedifolia*. *Atriplex*, *Stipa* and seasonal ephemerals are well represented. Towards the margin a low open woodland of *Acacia sowdenii* alliance, with a shrubland understorey of *Maireana* and *Atriplex*, becomes more and more evident. To the north this is replaced by a low woodland made up of *Acacia aneura*, *Casuarina cristata* and *Myoporum platycarpum*. Along the coastal strip low woodlands of *E. socialis*, *E. gracilis* and *A. sowdenii* alliances are to be seen on the ridges and flats, respectively. *E. transcontinentalis*-*E. flocktoniae* woodland alliance, found in the extreme south-western portion, forms a continuum with a similar formation in the Coolgardie botanical district.

**The Coolgardie Botanical District.** The Coolgardie botanical district marks the transition from the South-West Province to the Eremaean Province, from the Eucalyptus zone to the Acacia zone. In this district a high degree of variability occurs within Eucalyptus and Acacia. It is thought that this variability may have been due to climatic oscillations known to have occurred since the Pleistocene period, thus making many of the 'species' of recent origin. The vegetation is a mosaic of woodland and shrubland formations. Woodland formations include *E. salmonophloia*, *E. transcontinentalis*-*E. flocktoniae*, *E. torquata*-*E. lesouefii*, *E. dundasii*-*E. longicornis*, *E. brockwayi* and *Acacia aneura* alliances. Shrubland formations include *Grevillea eriostachya*-*G. didymobotrya*-*G. excelsior*, *Eucalyptus foecunda*, *E. eremophila* and other mallee or shrub eucalypts, *Acacia* spp.-*Casuarina* spp.-*Melaleuca* spp. and *Acacia aneura* alliances.

### The South-West Province

The South-West Province, which receives its rainfall in winter and has a warm to cool temperate climate, has a high degree of endemism in its flora. The degree of endemism is most powerfully expressed in the cusps of its triangular-crescentic area particularly in the high shrubland and heath formations found to the north of the Hill River and to the east of the Fitzgerald River. The shrubland and heath formations in the South-West Province,

apart from certain communities dominated by *Eucalyptus* and *Acacia*, are known as Kwongan. Large areas of this province have been altered greatly by man and contain a high proportion of the naturalised alien species recorded in the State.

**The Darling Botanical District.** The Darling botanical district consists of four subdistricts. The Warren subdistrict, which occupies the extreme south-western corner of Western Australia, has an annual rainfall in excess of 1,200 mm. The main vegetation formations are the high open forest, on granite soils represented by *E. diversicolor* alliance; open forest on lateritic soils represented by *E. marginata*-*E. calophylla* alliance; low forest and scrub of *Agonis flexuosa* on extensive coastal dunes; also on sand dunes, heaths, with *Jacksonia horrida*-*Acacia decipiens*; and sedgeland of *Evandra aristata*-*Anarthria* spp. in waterlogged areas.

The Menzies subdistrict marks the transition from the Warren subdistrict to the Dale subdistrict.

In the Drummond subdistrict the narrow strip of Recent or Pleistocene sand dunes carry scrub or low forests of *Agonis flexuosa* alliance at the southern edge, with *Acacia rostellifera*. *A. cyclops*-*A. cochlearis* alliance and sand dune complex over most of its length. Inland and parallel to the coastal dune system is a narrow belt of coastal limestone hills, the natural habitat of *E. gomphocephala* woodland alliance. The greater part of the Perth basin is mantled with aeolian sands. The northern sector carries a low forest formation of *Banksia menziesii*-*B. attenuata*-*Allocasuarina fraseriana*-*E. todtiana* alliance, with a heath understorey, and smaller areas of *B. prionotes* alliance; the southern part is dominated by a *E. marginata*-*E. calophylla* open forest or woodland alliance, with a heath understorey, and smaller areas of *Banksia* low forest. Poorly drained swampy areas carry *Casuarina obesa* low forest alliance. Swamp and fen formations are made up of complex communities of sedgeland. Watercourses in the district are fringed by a *E. rudis*-*Melaleuca* spp. alliance.

The Dale subdistrict occupies the laterite capped plateau dissected by young streams to form steep-sided valleys. An open forest formation of *E. marginata*-*E. calophylla* alliance characterises the lateritic erosional and deep depositional surfaces, with *E. wandoo* alliance restricted to the heavier pediment soils.

**The Irwin Botanical District.** The Irwin botanical district, for the most part, overlies sedimentary

rocks from Silurian to Quaternary age, with smaller areas of Precambrian metamorphics. At the northern extremity, the Irwin district consists of red and yellow sands underlain by Mesozoic sediments. High shrubland formations are made up of mixed high shrubland with a heath understorey, with mainly Proteaceous and Myrtaceous elements, *Acacia* spp.—*Allocasuarina acutivalvis* and *Melaleuca* spp. and *Hakea* spp. scrub alliances. Low woodlands of *Banksia menziesii*—*B. attenuata*, *B. ashbyi*—*B. sceptrum*, *B. prionotes* and *Actino-strobus arenarius* occur on deep sands. Heath and low heath formations of Proteaceae, Myrtaceae, and Leguminosae occur in areas where the sand is shallow or where a lateritic crust is present.

The vegetation of the coastal dune system is an extension of the Darling district. The limestone hills in the Irwin district carry low woodlands of *E. erythrocorys*. Poorly drained areas and small lakes carry or are fringed by *Casuarina obesa* and *E. rudis*—*Melaleuca* spp. alliances.

The central to southern portions of the Irwin district are characterised by the so-called 'sand plains'. These carry low woodlands of *Banksia menziesii*—*B. attenuata*—*E. todiana* and *B. prionotes* alliances particularly on the deeper sands. *E. lane-poelei* (Salmonbark Wandoo) and *E. accedens* (Powderbark Wandoo) are of local significance, on heavy clay soils. In areas of deep dissection, the valleys carry woodlands of *E. wandoo* and *E. calophylla* alliances. Heath and low heath formations cover most of the elevated regions. Proteaceae, Myrtaceae and Leguminosae are dominant components, while on laterite hills *Xanthorrhoea reflexa* and *Dryandra* spp. become very conspicuous. High shrubland communities with *Grevillea eriostachya*—*G. didymobotrya*—*G. eriostachya*, *Lambertia multiflora* (Native Honeysuckle) and *Actinostrobus arenarius* alliances are also significant in the sandplain region.

**The Avon Botanical District.** The Avon botanical district, which covers most of the so-called wheat belt, is now for the most part cleared of native vegetation for farming.

On the eastern edge of the Darling district, on the low hilly to hilly terrain, with hard acidic yellow mottled soils, the pediments of early erosional cycles, the woodland formation consists of *E. wandoo* alliance. *E. marginata*—*E. calophylla* alliance occurs on soils which tend more to ironstone gravels with a sandy matrix. *E. wandoo* alliance is associated with *E. accedens*, and with *E. astringens* which commonly occur on lateritic

breakaways. In the southern portion *E. gardneri* (Blue Mallet) and *E. falcata* (Silver Mallet) are more commonly seen on the breakaways, while *E. cornuta* woodland alliance replaces the *E. wandoo* woodland alliance. *E. wandoo* woodland has a very open low shrub layer.

On the hard neutral red soils of the river valley systems, which represent further erosional cycles, the woodland formation is represented by the *E. loxophleba* alliance, with *Acacia acuminata* as its main associate. *A. acuminata* tends to merge with the *E. wandoo* alliance, particularly as the soils become sandy or gritty. In the southern portion *E. occidentalis* alliance replaces the *E. loxophleba* alliance. *E. occidentalis* woodlands occur also on the clay soils of swamps or seasonal shallow lakes.

Extensive areas of *E. salmonophloia* woodland alliance are found in the hard alkaline yellow soils further to the east, on valley plains and terraces. *E. salmonophloia* woodland has an open mixed low shrub understorey with *Maireana* and *Atriplex* dominating in more saline soils. Other trees associated with this alliance are *E. salubris* (Gimlet), *E. longicornis* (Red Morrel) and *E. melanoxylon* (Black Morrel).

Salt lakes, remnants of once extensive river systems, carry *Casuarina obesa* and *Melaleuca* spp. low woodland alliances on the fringes with low shrubland formations of *Halosarcia* spp. alliance in the old watercourse. *E. sargentii* (Salt River Gum) and *E. kondininensis* (Kondinin Blackbutt) grow on saline soils.

**The Eyre Botanical District.** The Eyre botanical district lies at the edge of the Archaean Shield where it abuts into the Proterozoic metamorphics of the Albany—Esperance block. The latter consists largely of sediments of middle and late Eocene age, at one time mantled by a lateritic crust, which is represented in the present landscape by narrow ironstone gravel ridges and erosional scarps along the northern edge.

The Stirling and Mount Barren Ranges which rise abruptly out of an otherwise predominantly undulating landscape are composed of hard Proterozoic metasedimentary rocks. The ranges carry Kwongan of closed heath and scrub formations of mixed Myrtaceae, Proteaceae, Leguminosae and Epacridaceae alliance. Woodlands of *E. marginata*—*E. calophylla*, *E. wandoo* and *E. cornuta* occur on the lower slopes and valleys of the Stirling Range.

Over a large area of the Eyre district, the vegetation is made up of Kwongan of high

shrubland formations with shrub or mallee eucalypts dominating. *E. tetragona*, *E. redunca*–*E. uncinata*, *E. gardneri*–*E. nutans* and *E. eremophila*–*E. oleosa* alliances form a mosaic over the area, the former on the undulating upper slopes and rises nearer the coast. Patches of mixed heath and low heath of Proteaceae, Myrtaceae and Leguminosae are present. The heath vegetation merges into and forms the understorey of the high shrubland communities. To the east *E. tetragona* alliance gives way to *E. tetragona*, while on the sandy soils *Banksia speciosa*–*lambertia inermis* and *Nuytsia floribunda* become dominant.

Woodland formations of *E. occidentalis*, *E. loxophleba* and *E. salmonophloia* alliances occur along drainage lines and loamy slopes and flats. Low forests of *E. platypus*–*E. gardneri*–*E. falcata* alliance occur locally on scarp slopes.

The littoral fringe of the coastal plain is made up of a chain of granite bosses with drift sand between them *Acacia rostellifera*–*A. cyclops*–*A. cochlearis* and *Agonis flexuosa* scrub alliances are present with the sand dune and granite lithic complexes. *Banksia baxteri* and *B. attenuata*, as well as *Lambertia inermis* (Chittick), are dominant on the drift sand, inland, with *E. marginata* and *E. cornuta*, the former found to the west, the latter restricted to interdunal flats.

**The Roe Botanical District.** The Roe botanical district contains a number of plant communities found in the adjacent Eyre, Avon and Coolgardie districts. On residual sandplains there are extensive areas of mixed heath.

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## The Fauna of Western Australia

(Contributed by the Western Australian Museum)

### EXTINCT FAUNAS<sup>(3)</sup>

Earth's oldest recorded organic remains occur in Western Australia. Stromatolites discovered near Marble Bar are about 3,500 million years old. They are dome-shaped structures in which sediment has been trapped by single-celled Cyanobacteria. Stromatolites have been found throughout sediments of Precambrian age; living survivors also occur in Western Australia, the best known being in Shark Bay.

Invertebrate marine life in the Cambrian (570–500 million years ago) is revealed in rocks in the Ord River district, crowded with trilobites (*Redlichia*, *Xystridura*), brachiopods (*Wimanella*, *Billingsella*) and *Biconulites*.

The Ordovician (500–400 million years) saw a substantial thickness of marine deposition in the West Kimberley, with abundant fossil nautiloids (eg *Kyminoceras*) and other molluscs, graptolites, trilobites and brachiopods (*Spanodonta*).

The Silurian (440–395 million years) seems to have passed with little sedimentation in Western Australia. In the lower Murchison district however, sandy deltaic deposit formed around the mouth of an extensive river system. This sandstone, now incised by the gorge of the Murchison River, has preserved tracks of a range of marine animals including those of large, scorpion-like predators known as eurypterids.

Seas of the Devonian (395–345 million years) abounded in early forms of fish. Limestones of this age in the West Kimberley have yielded exquisitely preserved fossils, including primitive armoured fishes (Placoderms), a sea-living lungfish (Dipnoan), Rhipidistians, Acanthodians and other early bony fishes. Because of their fine preservation, these fossils have formed the basis of important research into early fish evolution. Extensive shallow-water Devonian limestone reefs around the south-western part of the central Kimberley Block contain abundant marine faunas, including stromatoporoids (*Amphipora*,

<sup>3</sup> Contributed by K.J. McNamara and G.W. Kendrick.

*Actinostroma*), corals, (*Hexagonaria*, *Thamnopora*), brachiopods (*Stringocephalus*, *Ladja*, *Schuchertella*), nautiloids (*Beloceras*), goniatites (*Manticoceras*, *Platyclymeria*), other molluscs, bryozoans and trilobites. The oldest known vascular plants from Western Australia occur only rarely in Devonian sediments of the East Kimberley (the lycopod *Leptophloeum*) and of the Carnarvon area (a lepidodendroid).

The Carboniferous (345–280 million years) saw deposition confined to parts of the East and West Kimberley and Carnarvon areas. The marine formations contain rich invertebrate faunas, including corals (*Syringopora*) brachiopods (*Camarotoechia*, *Cleiothyridina*, *Unispirifer*), trilobites, molluscs and bryozoans.

Permian deposits (280–225 million years) cover extensive areas in Western Australia. Principal occurrences are in the West Kimberley, Carnarvon and Irwin River districts. Marine sediments contain diverse invertebrate faunas, including crinoids (*Calceolispongia*, *Jimba-crinus*), brachiopods (*Neospirifera*, *Lino-productus*, *Aulosteges*, *Strophalosia*), goniatites (*Juresanites*), bivalves (*Deltopecten*, *Schizodus*), gastropods (*Ptychomphalina*, *Bellerophon*), corals (*Pleurophyllum*, *Euriphyllum*) and the rare trilobite *Ditomopyge*. A shark, *Helicoprion*, is known from the Carnarvon district. Permian coal measures occur in the Collie and Irwin districts and contain a flora which includes *Glossopteris*, *Gangamopteris* and *Noeggerathiopsis*.

Rocks of the Triassic (225–194 million years) are exposed only in a few small areas of the State. A marine deposit in the Erskine Range, West Kimberley, contains large amphibians (*Deltasaurus*, *Blinasaurus*), fish including a dipnoan (*Ceratodus*) and invertebrates (*Lingula*). A similar deposit in the Geraldton district has yielded remains of *Deltasaurus*, ammonites (*Ophiceras*) and other invertebrates, including molluscs and brachiopods. Terrestrial deposits in the West Kimberley contain remains of the 'Seed Fern' *Dicroidium*, the bennettitalean *Otozomites* and other plants.

Jurassic (194–135 million years) marine sediments in the Geraldton area contain a rich, well-preserved mollusc fauna, notably bivalves (*Trigonia*, *Cucullaea*, *Oxytoma*, *Astarte*), and ammonites (*Fontannesia*, *Otoites*, *Pseudotoites*), a large nautiloid, brachiopods and rare echinoids. Slightly younger marine faunas in the West Kimberley contain the bivalves *Inoceramus*, *Buchia* and *Malayomaorica*, the ammonite *Kossmatia* and belemnites.

Australian Jurassic land vegetation included elements with extensive global distributions. Plants of this period recorded from the West Kimberley, include the Bennettites *Taeniopteris*, *Otozamites* and *Ptilophyllum*, the conifers *Brachyphyllum* and *Elatocladus* and *Ginkgoites*, related to the living *Ginkgo*.

Widespread deepwater radiolarites of the Cretaceous Period (135–65 million years) in the Carnarvon hinterland contain the large ammonites *Tropaeum*, *Australiceras* and numerous belemnites. Chalk occurs sporadically from near Exmouth Gulf southwards to near Perth and contains rich faunas of bivalves (*Inoceramus*, oysters etc.), brachiopods (*Inopinatarcula*, *Magadina*), crinoids (*Mar-supites*, *Uintacrinus*) and occasional pachydiscoid ammonites. Greensands in the Gingin–Dandaragan district have yielded ichthyosaur, plesiosaur and mosasaur remains, as well as shark teeth. A Late Cretaceous deposit near Exmouth Gulf is notable for its prolific ammonite fauna which lived close to the time of extinction of this group of cephalopod molluscs. Western Australia's only known dinosaur, a theropod, *Megalosauropus broomensis*, is known only from footprints preserved in Lower Cretaceous sandstone at Broome. Land vegetation (including *Cladophlebis*, *Otozamites*) associated with this and other Lower Cretaceous deposits show affinities with archaic Jurassic forms.

The onset of the Tertiary (65–1.6 million years) brought major changes to marine faunas, with the decline and disappearance of a number of long-standing Cretaceous groups and their gradual replacement by more modern forms. Marine limestones and greensands of Paleocene (65–54 million years) age form an extensive surface outcrop in the Exmouth district and are notable for well-preserved faunas of echinoids (*Giraliaster*, *Schizaster*), brachiopods (*Tegu-lorhynchia*) and bryozoans; the nautiloids *Aturoidea*, *Deltoidea* and *Teichertia* are also represented.

Eocene (55–40 million years) marine deposits in the Carnarvon hinterland contain well-preserved faunas, notably corals and molluscs including the nautiloid *Aturia*. Plant remains include familiar modern genera, such as *Banksia*, *Casuarina* and forms related to *Araucaria*. *Banksia* cones from this area provide the earliest unequivocal record for the genus in Australia. Eocene deposits along the south coast contain a great diversity of fossil remains, both marine and non-marine. Marine groups present include many species of sponges, echinoids and molluscs, including the nautiloids

*Aturia*, *Cimomia* and *Teichertia*. Rich assemblages of fossil leaves, wood, pollen, spores and occasional fruiting bodies are known from Eocene and other early Tertiary deposits in southern Western Australia. Most of this diverse flora remains to be identified; however, the presence of tree ferns and other ferns such as *Gleichenia*, the conifers *Araucaria*, *Agathis* and *Dacrydium*, palms such as *Livistona*, the Ant-arctic Beech, *Nothofagus*, mangroves including rhizophoraceans and genera of humid-tropical affinity, such as *Ficus*, *Terminalia*, *Bombax* and *Anacolosa* indicate vegetation consistent with a humid temperate rainforest environment.

In the Miocene Epoch (23–5 million years), extensive deposits of marine limestone were laid down in the Carnarvon and Nullarbor districts. These contain rich fossil assemblages, notably molluscs and echinoids. Affinities of the northern fauna lie strongly with the tropical Indo-Pacific; those of the Nullarbor area lie mainly with south-eastern Australia. Towards the end of the period, a marked intensification of global cooling was observed, accompanied by a substantial fall in sea level and in Australia, a shift toward continental aridity.

Sea levels appear to have remained lower than at present around Western Australia during most of Pliocene time (5.0–1.6 million years). Faunal remains from this period are known from deposits on the Roe Plains of the southern Nullarbor and from the subsurface near Perth. The coastline near Perth lay close to the foot of the Darling scarp, the Swan Coastal Plain being, for a time, wholly submerged.

During Quaternary time (the last 1.6 million years) many caves formed and have preserved the fossil remains of a vertebrate fauna of much greater diversity than that recorded today. Included are species of kangaroo (*Macropus*) larger than any living kangaroo, as well as other large macropods including *Sthenurus* and *Protemnodon*; the large diprotodontid *Zygo-maturus*; the 'marsupial lion', *Thylacoleo*; a koala, *Phascolarctos*, a wombat *Vombatus*; a large echidna, *Zaglossus*; a giant flightless bird of the family Dromornithidae and a large boid snake, *Wonambi*. When these elements became extinct is unknown, but it appears to have been more than 40,000 years ago. The Thylacine (*Thylacinus*) and Tasmanian Devil (*Sarcophilus*) became totally extinct within Western Australia more recently, the Thylacine disappearing about

3,500 years ago. The Dingo appeared first in relatively recent times no more than 4,000 years ago, co-existing only for a brief period with its marsupial counterpart, the Thylacine.

## CONTEMPORARY FAUNAS

### Origins and Distributions<sup>(4)</sup>

**Terrestrial.** The origins of the Australian fauna can be explained by the breakup of the southern hemisphere supercontinent, Gondwana, in the Cretaceous and the northward drift of Australia during the Tertiary to close the 4,000 kilometre gap with South-East Asia. Consequently the contemporary fauna comprises an ancient Gondwanic element with affinities with faunas of the other southern continents, and a more recent post-Gondwanic northern continental element. Representatives of the latter have reached Australia at different times by flying or rafting across water barriers of varying width. Among the earliest to arrive were successful rafters, such as lizards and rodents and good flyers such as certain birds and bats. Others (including humans) less able to cross the barriers arrived later by 'island-hopping' via the unstable arc of islands linking South-East Asia at times when sea levels were lower and water barriers narrower. There are thought to have been two main routes of invasion to Australia as a whole: from the Malaysian Archipelago (or Philippines) via Celebes to New Guinea and Cape York Peninsula, and via the Sunda Arc to the Kimberley and Arnhemland.

The present distribution of the modern Western Australian fauna reflects not only past geological and climatic events, particularly those of the Quaternary, but also short term climatic oscillations. The broad distribution patterns of most living terrestrial animals can generally be related to today's major climatic zones which give rise to three major faunal divisions: a northern tropical fauna adapted to conditions of reliable monsoonal summer rain and dry winters characteristic of the Kimberley; a temperate fauna adapted to Mediterranean-type conditions with reliable winter rainfall and dry summers characteristic of the south-west and, between them, a fauna adapted to arid conditions with irregular and variable rainfall that prevail over the remainder of the State. These broad faunal divisions do not necessarily reflect origins and both Gondwanic and post-Gondwanic elements may be present in each. However, particularly in

<sup>4</sup> Contributed by P.F. Berry.





some of the more mobile groups, such as birds and bats, the Kimberley has stronger South-East Asian representation than the others. Additionally, a number of interesting Gondwanic relics are now confined to the south-west, e.g. certain genera of legless lizards (*Pygo-podidae*), an onychophoran (*Occiperipatoides*) and the Salamander Fish (*Lepidogalaxias*).

Elevation has little influence on broad faunal distributions as Western Australia is generally of low relief, averaging only about 400m above sea level with a maximum of 1,200m.

The distribution of some terrestrial species, particularly medium-sized marsupials, has been substantially modified by recent direct and indirect influence of European man (eg land clearing and introduction of alien animals), usually resulting in marked contraction of former distributional ranges, but a few distributions, such as that of the Crested Pigeon, have expanded. Near shore islands, cut off by rising sea levels, such as Barrow, Bernier, the Houtman Abrolhos and the Archipelago of the Recherche, are important refuges for a number of terrestrial animals that have recently disappeared from the mainland or have contracting distributions. On some islands, forms have evolved that are distinct from their mainland counterparts.

**Inland Waters.** The inland waters of Western Australia may be divided into rivers and inland drainage systems. The flow regimes of the rivers reflect the climatic zones of the State. Rivers of the northern zone flow during the summer wet season. During the winter dry season flow is dependant on groundwater and may cease altogether, leaving only pools.

The fauna is rich and diverse, examples being the freshwater crocodile *Crocodylus johnstoni*, large freshwater prawns or Cherrabun (*Macrobrachium*) and archer fishes (*Taxotidae*). Rivers of the arid zone from the De Grey to the Murchison are subject to periodic flooding usually associated with cyclones, but become reduced to isolated pools during drought. The faunal assemblages of the larger rivers are impoverished in comparison with the rich assemblages of the Kimberley and some species represent outliers of these. Flow of most permanent rivers and streams of the south-western winter rainfall zone slows down substantially in summer and some are reduced to chains of pools. Increased salinity caused by agricultural clearing, and building of dams is rapidly altering much of the riverine ecosystem in this zone. The fauna of the south-western rivers

and streams is of particular interest for its Gondwanic element, examples of which are native minnows (*Galaxiidae*), freshwater crayfish (*Parastacidae*) and a freshwater mussel (*Westralunio*).

The inland drainage systems can be divided into fresh-water 'gnamma-holes' usually in granite outcrops, claypans (including man-made dams), swamps, soaks and lakes; and saline lakes. Gnamma-holes, claypans and soaks of the arid zone are characterised by an ephemeral fauna, mainly of brachiopod crustacea. Many birds and mammals dependent of free water must move away if they dry up. Man-made dams have increased the availability of water and the abundance and distributions of certain animals in this zone have changed. Permanent lakes, swamps and soaks along the south-western coast are important refuges for water birds. The saline lakes of the inland and south-west support an interesting and highly adapted ephemeral fauna. Conspicuous when water is present are brine shrimps (*Artemia* and *Parartemia*), which at times build up to high population densities and attract large numbers of water birds, many of which breed there.

**Coastal Waters.** The coastal marine fauna of the north coast is distinct from that of the south coast although a few species do occur around the entire coastline. The northern fauna is representative of the widespread tropical Indo-West-Pacific fauna. It is the product of the continuous tropical conditions experienced on the north coast since the beginning of the Tertiary due to Australia's northward drift. The southern fauna is representative of a temperate element largely restricted to the Australian south coast. The south coast has experienced less stable environmental conditions than the north since the break-up of Gondwana, including circulation changes (development of the west wind drift) and marked temperature fluctuations owing to glaciations and changes in position of the sub-tropical convergence. Consequently, the origins of the present fauna are complex, sometimes involving renewed contact between sister species which had evolved on the west and east coasts. Some species of the northern and southern faunas overlap on the west coast, with the distribution of tropical species being extended well south by the southward flow of the Leeuwin current in winter. This overlap region of the west coast is characterised by a number of endemic species. Of these, two commercially important examples are the Western Rock Lobster *Panulirus cygnus* and the Western Jewfish *Glaukosoma hebraicum*.



Young West Australian Jewfish (*Glaucosoma hebraicum*); highly prized for its flesh, this endemic species occurs on deeper reefs between the Recherche Archipelago and Shark Bay.

Photograph: B Hutchins



The Bicolor Scalyfin (*Parma bicolor*), a damselfish endemic to rocky reefs of the southwest.

Photograph: B Hutchins

## Mammals <sup>(5)</sup>

The modern Australian mammal fauna comprises approximately equal numbers of marsupials (pouched mammals), and eutherians (true placental mammals), and two species of monotremes (egg-laying mammals).

Western Australia, with about one-third of the area of the continent, has 55 per cent of all Australian species of mammals. This fauna

comprises 166 native and 19 introduced (including the Dingo) species, including representatives of all modern families except those of the Platypus, Tasmanian Tiger, Koala and rhinolophid bats. Excluding exotics and the single monotreme, the Echidna, the terrestrial assemblage comprises 53 per cent marsupials, 21 per cent rodents and 26 per cent bats. This is a close reflection of the proportion of these broad groups on the continent as a whole.

Because of the extensive coastline encompassing both tropical and temperate areas, Western Australian waters have representatives of most of the Australian aquatic mammals, including four seal, seventeen whale and fifteen killer whale and dolphin species, as well as a particularly large population of Dugong (*Dugong dugon*) at Shark Bay.

Nineteenth century American and other whalers took Sperm Whales *Physeter macrocephalus*, Southern Right Whales *Eubalaena australis* and Humpback Whales *Megaptera novaengliae*; local bay whalers also took the latter two species, while in the 20th century Humpbacks and Sperm Whales were hunted from shore stations. Humpbacks were so seriously overfished that the industry ceased in 1963 but there has been some recovery in numbers recently. Southern Right Whales are also being seen more frequently. Sperm whaling ceased in 1978. All cetaceans now receive special protection under the *Commonwealth Whale Protection Act 1980*.

The State's mammal fauna can be grouped into broad divisions related to climatic zones mentioned on page 59. The south-western zone is particularly rich in native terrestrial mammals, with sixty-three species recorded since European settlement. Endemics comprise the Dibbler, *Parantechinus apicalis*; White-tailed Dunnart, *Sminthopsis granulipes*; Western Ringtail Possum, *Pseudocheirus occidentalis*; Honey Possum, *Tarsipes rostratus*; Broad-faced Potoroo, *Potorous platypus*; Banded Hare-wallaby, *Lagostrophus fasciatus*; Quokka, *Setonix brachyurus*; Western Brush Wallaby, *Macropus irma*; the marsupial mice, *Sminthopsis gilberti* and *S. griseoventer*; *Sminthopsis* ssp; Ashy Grey Mouse, *Pseudomys albocinerus*; and the Western Mouse, *Pseudomys occidentalis*.

The south-western zone is noticeably richer in macropodids than the other broad regions. However, many south-western species in the

<sup>5</sup> Contributed by D.J. Kitchener.



kangaroo family are now extinct there and persist only on the continental islands off the coast. Those no longer in the south-western zone are: Long-nosed Potoroo, *Potorous tridactylus*; Broad-faced Potoroo, *P. platyops* (extinct); Burrowing Bettong, *Bettongia lesueur*; Banded Hare-wallaby, *Lagostrophus fasciatus*; Rufous Hare-wallaby, *Lagorchestes hirsutus* and Crescent Nailtail Wallaby, *Onychogalea lunata* (extinct). Compared to the northern zone, the south-western zone is poor in bat species.

The northern zone of reliable summer rainfall has a relatively rich mammal assemblage of sixty-five species, particularly of the small vespertilionid and hipposiderid bats. This assemblage is more distinctive than those of the other regions, containing groups not found elsewhere in the State (hipposiderid bats; Blossom-bat, *MacroGLOSSUS*; mosaic-tailed rats, *Melomys*; tree rats *Mesembriomys*; Rabbit-eared Rat, *Conilurus*; Scaly-tailed Possum, *Wyulda* and the little Rock-wallaby, *Peradorcas*) but excluding other genera that are widely represented elsewhere (Stick-nest rats, *Leporillus*; hopping mice *Notomys*; Kultarr, *Antechinus*; ningauis, *Ningau* and long-nosed bandicoots, *Perameles*). Endemic to the Kimberley are: *Antechinus* sp. 'ningbing'; Scaly-tailed Possum, *Wyulda squamicaudata*; Warabi, *Petrogale burbidgei* and Yellow-lipped Eptesicus, *Eptesicus douglasorum*.

The south-western part of the Kimberley, incorporating Dampier Land, has a mammal fauna that is supplemented to some extent by an intrusion of arid and semi-arid zone mammals from the Great Sandy Desert. The subhumid North Kimberley has a group of species not found elsewhere in the region, including the Little Rock-wallaby, *Peradorcas concinna*; Warabi, *Petrogale burbidgei*; Northern Brown Bandicoot, *Isodon macrourus*; Common Planigale, *Planigale maculata*; Black-footed Tree Rat, *Mesembriomys gouldi*; Pygmy Long-eared Bat, *Nyctophilus walkeri* and Lesser Wart-nosed Horseshoe Bat, *Hipposideros stenotis*. However, the species richness of this area declines with rainfall gradients and major geomorphological changes across the region. The east Kimberley has a relatively depauperate mammal assemblage with few drier-country species. This reflects the combined influence of the drier climate and its geomorphological similarities to the north Kimberley.

The arid zone includes the deserts, Pilbara, North West Cape, Murchison and Gascoyne areas. Over

much of the region rain generally falls in summer, although the southern deserts and western part of the other areas receive most of their effective rain in winter. Mosaics of desert dune, sandplains and alluvial plain environments are found throughout the region.

The deserts, contrary to popular belief, are not markedly poor in species of mammals. Fifty-two species of native mammals are recorded from there. Although none is confined to the desert areas, a number are restricted to desert substrates (Hairy-footed Dunnart, *Sminthopsis hirtipes*; Lesser Hairy-footed Dunnart, *S. youngsoni*; Long-tailed Dunnart, *S. longicaudata*; Spinifex Hopping Mouse, *Notomys alexis*; Desert Bandicoot, *Perameles eremiana* and Desert Mouse, *Pseudomys desertor*). Dasyurids, particularly the species *Sminthopsis* and native rodents of the genus *Pseudomys*, are well represented (both genera by six species). However, the other rodent genera are poorly represented there.



The Wongai Ningau (*Ningau ridei*), a minute shrew-like, insectivorous marsupial of inland sandy desert areas.

Photograph: Western Australian Museum

Slightly fewer than half of the species found in the deserts have restricted arid or semi-arid distributions; many are widely distributed species including a few tropical intruders (Northern Brush-tailed Possum, *Trichosurus arnhemensis*; Northern Nailtail Wallaby, *Onychogalea unguifera* and Northern Mastiff-bat, *Chaerophon jobensis*) and those from the temperate south-western zone referred to earlier. The relative proportions of arid and wetter tropical elements in the desert mammal fauna show gradational changes as the deserts approach the south-western zone.

The mammal assemblage of the Pilbara, North West Cape, Gascoyne and parts of the Murchison areas shows greatest affinity with that of the deserts; as in the deserts, there are relatively fewer species (forty-nine) than either the northern or the south-western zones. Like the deserts these areas have relatively few macropodid and rodent species while dasyurids are well represented. Bats are well represented and the number of species (nineteen) in these areas is second only to the Kimberley—although as in the deserts there are relatively few vespertilionids. The Pilbara, because of its geomorphological similarities with the Kimberley, retains some elements of the Kimberley mammal fauna (Northern Quoll, *Dasyurus hallucatus*; Common Rock Rat, *Zyomys argurus*; Orange Hoeshoe Bat, *Rhinonicteris aurantius*); it also has the endemic species: Pilbara Ningaui, *Ningaui timealeyi* and Chapman's Pseudomys, *Pseudomys chapmani*. The Little Red Antechinus, *Dasykaluta rosamondae*, once thought to be restricted to the Pilbara is now also known from the adjacent deserts.

As in eastern Australia, the group that has suffered most since European settlement comprises the medium-sized species i.e. the Desert Bandicoot, *Perameles eremiana*; Pig-footed Bandicoot, *Chaeropus ecaudatus*; Long-nosed Potoroo, *Potorous tridactylus*; Broad-faced Potoroo, *P. platyops*; Crescent Nailtail Wallaby, *Onychogalea lunata* and stick-nest rats, *Leporillus* spp. Several of the Western Australian species that are now extinct are however small rodents, namely *Notomys longicaudatus* and *N. macrotis*. The only group of mammals that has not apparently declined is the bats. In fact bats seem to have been favoured in some areas, such as the Pilbara and Murchison, by mining activity which has created new habitats in mine shafts.

### Birds<sup>(6)</sup>

For its size Western Australia has a small avifauna. Three hundred and eighty species breed here and approximately another 120 visit the State.

As in most groups of animals and plants, the distribution of birds in Western Australia can be related to the principal climatic zones: the northern summer-rain zone, the central arid zone and the south-western winter-rain zone.

The northern zone, a region of open woodlands with grassy understorey, is the stronghold in Western Australia of such granivorous birds as the finches and pigeons. The larger streams are lined with relatively lush forests; living in them are many species of birds, especially honeyeaters, not found further south but which extend eastwards through the Northern Territory to Queensland. In north-west Kimberley, where mean annual rainfall exceeds 1,000 millimeters, semideciduous vine forests and thickets develop on basaltic soils and other favourable sites. Confined to them are the Scrub Fowl, Red-crowned and Torres Strait Pigeons, Rufous Owl and Rainbow Pitta.

The arid zone, a region of low and unreliable rainfall, occupies the greater part of the State. North of the Tropic of Capricorn little rain is received outside summer and early autumn. Here the vegetation is predominantly a hummock grassland of spinifex (*Triodia*) that supports very few species of birds. The woodlands of river gum and cajuput fringing the north-western rivers are somewhat richer in birds, including a few Kimberley species such as the Peaceful Dove, Pheasant Coucal, Blue-winged Kookaburra, Black-tailed Tree-creeper and Black-chinned Honeyeater.

With mean annual rainfall ranging from 250 millimetres at the mulga-eucalypt line to 1,500 millimetres in the karri forests of the deep south-west the winter-rainfall zone is much more diversified than the others. In the drier parts of the zone many of the birds inhabiting the mallee and eucalypt woodlands, e.g. the Mulga Parrot, Mallee Fowl, Southern Whiteface, Chestnut-tailed Thornbill and White-browed Babbler, also inhabit the adjacent mulga scrubs of the arid zone. Others, like the Southern Scrub-robin, Gilbert Whistler and White-eared Honeyeater, do not transgress the mulga-eucalypt line; nor do they penetrate the eucalypt forests of the wetter parts of the zone.

Whereas the distributions of the mallee and woodland birds are continuous with, or only narrowly separated from those of eastern Australia, the birds of the wetter forests and heaths of the south-west are widely separated. In isolation some of them have evolved into distinct subspecies, e.g. the Little Wattlebird and White-cheeked Honeyeater, or even full species, e.g.

<sup>6</sup>

Contributed by G.M. Storr.

Baudin's Cockatoo, Noisy Scrub-bird, White-breasted Robin, Elegant Fairy-wren, Western Spinebill and Red-eared Firetail. One south-western forest bird, the Red-capped Parrot, has no close relative in south-eastern Australia.

### Reptiles<sup>(7)</sup>

Four families of turtles, five families of lizards, seven families of snakes and one family of crocodiles are represented in Australia. Only one of them, the Cheluidae, was certainly here before the fragmentation of Gondwana. The gecko subfamily Diplodactylinae could be another example; it occurs in Australia, the Loyalty Islands, New Caledonia and New Zealand. The families Pygopodidae and Carettochelyidae are confined to Australia and New Guinea; in the absence of fossils their place of origin is unknown, as is that of marine families Cheloniidae and Dermochelyidae. All remaining families, plus the gecko subfamily Gekkoninae, probably arrived here from South-East Asia after Australia drifted northwards from Antarctica.

In Western Australia there are 8 genera and 13 species of turtles; 42 genera and 298 species of lizards; 30 genera and 102 species of snakes; and 1 genus and 2 species of crocodiles.

The northern summer-rain zone has more in common with the far north of the Northern Territory and north Queensland than with the rest of Western Australia. It is the only part of the State inhabited by colubrid snakes, wart snakes and crocodiles, and it is much richer than other regions in monitors, blind snakes and mud snakes. In the gecko family the dominant genera are *Gehyra* and *Oedura*; among dragon lizards, *Diporiphora* and *Gemmatophora*; among skinks, *Carlia*, *Ctenotus* and *Sphenomorphus*; and among elapid snakes, *Demansia* and *Denisonia*.

The fauna of the arid zone is strongly demarcated from that of the northern zone but forms a continuum with that of the south-western zone. In other words the mulga-eucalypt line is irrelevant in reptile distribution. Reptiles are generally much less sensitive to changes in the vegetation than to changes in the soil. Among arid-zone geckos the dominant genera are *Diplodactylus*, *Gehyra* and *Nephruirus*; among the dragons, *Ctenophorus* and

*Tympanocryptis*; among skinks, *Ctenotus* and *Lerista*; and among elapid snakes, *Vermicella*. The seas of the Pilbara share with the Kimberley the bulk of the State's sea snakes and marine turtles.

The arid zone is not so impoverished in reptiles as in birds and frogs. It owes this to the fact that lizards are essentially lovers of warm dry climates, and in particular to the great radiation of two genera of skinks (*Ctenotus* and *Lerista*) and a genus of geckos (*Diplodactylus*).

The south-western winter-rain zone is the most diversified part of the State. From the warm dry north to the cool humid south there is a gradual decline in the number of geckos, dragon lizards, monitors and blind snakes. The number of skinks and elapid snakes does not decline, but the composition of these families changes rapidly. For example, the dominant skink genera in the north are *Ctenotus* and *Lerista*; in the south, *Egernia*, *Morethia* and *Hemiergis*. Compared to other regions, the south-western zone is notable for its wealth of legless lizards; indeed no other part of Australia is as rich in these lizards as the coastal plains between Shark Bay and the Swan River.

Unlike the birds, the reptiles of the south-western zone have little in common with those of south-eastern Australia. The south-western zone is well represented by such northern and arid genera as *Diplodactylus*, *Ctenophorus*, *Tympanocryptis*, *Ctenotus*, *Lerista*, *Menetia*, *Morethia* and *Vermicella*. Genera shared with south-eastern Australia include *Phyllodactylus*, *Aprasia*, *Hemiergis*, *Leiopisma* and *Notechis*. Except in the far south these genera constitute only a minor part of the fauna, and one of them (*Leiopisma*) contains only two species, compared to twelve in south-eastern Australia and Tasmania.

### Amphibians<sup>(8)</sup>

Frogs alone occur in Australia, and they are represented over most of the continent by only two families, the 'tree frogs' (Hylidae) and 'ground frogs' (Leptodactylidae). Since its contact with the northern island arc, two other families have entered Australia, namely the Ranidae (a single species in North Queensland) and the Microhylidae (eight species in North Queensland, one of which reaches the far north of the Northern Territory).

<sup>7</sup> Contributed by G.M. Storr.

<sup>8</sup> Contributed by G.M. Storr.

The frogs of Western Australia comprise two families: the Hylidae (2 genera, 25 species) and Leptodactylidae (12 genera, 49 species). In the far north (the region of good summer rains) hylid frogs slightly predominate. In the south-west (the region of good winter rains) leptodactylid frogs are overwhelmingly predominant. The intervening arid zone is understandably inhabited by many fewer species, but here too leptodactylids greatly predominate, owing to their ability to burrow and so avoid desiccation during droughts.

### Fishes <sup>(9)</sup>

The fish fauna of Western Australia comprises approximately 1,600 species, of which the tropical northern component is by far the largest with about 65 per cent of the total. The remaining species are divided between the southern temperate marine and freshwater environments which contain about 400 and 60 species respectively. Only about 6 per cent (95) of the marine species are endemic to Western Australia, whereas nearly 50 per cent of the freshwater fishes fall into this category. It has been conservatively estimated that another 200–300 species remain to be collected off this State, mainly from deep water.

Western Australia's temperate fish fauna consists of two major components, a cool temperate fauna inhabiting the south coast and lower west coast, and a warm temperate or subtropical fauna along the west coast. The first component is generally made up of species that are shared with other areas of southern Australia, whereas the warm temperate component contains many species endemic to Western Australia. Among the coastal reef fishes for instance, over 55 species are confined to the seas of the State, most of which have the major portion of their distributions along the west coast. The temperate fauna extends up the west coast to the region of Kalbarri, thereafter the number of cool-water species decrease sharply northwards until Coral Bay where this element disappears.

The tropical fishes tend to be widespread, occurring throughout the vast Indo-West Pacific region. The northern tropical fauna is by far the largest comprising approximately 1,200 species. The majority are inhabitants of coral reefs, or their immediate vicinity, for example in adjacent sand flats or weed beds. The larger predators are the best known because of their edible qualities and the sport they provide for anglers. The most

common fishes in this category include the groopers, coral cods, and coral trout (all members of the family Serranidae), the jacks or trevallies (Carangidae), tropical snappers or sea perches (Lutjanidae, unrelated to the popular southern snapper of the family Sparidae), sweetlips (Haemulidae), emperors (Lethrinidae) and barracuda (Sphyraenidae).

Coastal estuaries and sandflats represent another major tropical habitat for at least 100 species, including the juveniles of some species which later migrate to reefs. Mulletts (Mugilidae), threadfins (Polynemidae), ponyfishes (Leiognathidae), silver biddies (Gerriidae) and herrings (Clupeidae) are common.

The freshwater fish fauna of Australia is small by world standards, consisting of about 150 species. However, this total can be approximately doubled if species which are basically marine or estuarine, but frequently enter freshwater, are added. The main reason for Australia's impoverishment is the extremely arid climate. Nearly all its freshwater fishes were derived in relatively recent times from sea-dwelling ancestors.

The Western Australian fauna can be conveniently divided into south-western (temperate) and northern (tropical) components with little intermixing of the two except in a few streams between the Murchison and Greenough Rivers. The south-western freshwater fishes are mainly confined to the coastal belt between Esperance and Perth. Ten species are known from this region. Half of these belong to the family Galaxiidae, commonly known as native minnows. The group is represented by two genera: *Galaxias* and *Galaxiella*. The Salamanderfish, *Lepido-galaxias salamandroides* was formerly believed to belong to this group, but recent studies indicate that it is in a separate family (Lepidogalaxiidae). This small (five centimetre) fish is of special interest to biologists, some of whom believe that it is a pre-Gondwanic relic showing affinities with northern hemisphere esocoid fishes. It inhabits streams and waterholes in the Pemberton area and aestivates in damp soil during drought.

The northern fauna is more diverse and comprises twelve species in the Pilbara region and about 45 species in the Kimberley Division. About half are endemic to the State. The most speciose families are the grunters (Teraponidae), catfishes (Ariidae and Plotosidae), rainbowfishes (Melano-



taeniidae), hardyheads (Atherinidae), glassfishes (Ambassidae) and gudgeons (Eleotridae).

### Echinoderms <sup>(10)</sup>

All five groups of echinoderms: feather stars (Crinoidea) star fish (Asteroidea), brittle stars (Ophiuroidea), sea urchins (Echinoidea) and sea cucumbers (Holothuriodea), are well represented. The majority are either tropical species or endemic species with tropical affinities.

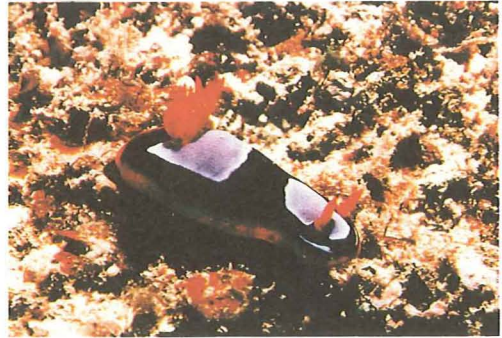
Certain edible holothurians known as *bêche-de-mer* or *trepang* occur on the shores and reefs of the north-west. Little is known of the fishing potential for *trepang*, but the resource has been traditionally fished by boats from Indonesia. The only other echinoderm of potential economic importance is the Crown-of-thorns starfish, *Acanthaster planci* which has caused extensive damage to coral reefs in the Indo-West Pacific.

### Molluscs <sup>(11)</sup>

The marine molluscs number over 2,000 species. The shallow water marine molluscs may be divided into a northern tropical Indo-West Pacific fauna, a temperate southern Australian fauna and a region of overlap, characterised by the presence of west coast endemic species. The North West Cape area is the major geographical limit for tropical molluscs, with nearly one-third of species having their southern limit in that area. Two subsidiary areas of southern limits occur on the west coast at Shark Bay and the Houtman Abrolhos. The Houtman Abrolhos is the southernmost area that can be considered to have a basically tropical fauna; 72 per cent of the molluscs are tropical forms. South of the Abrolhos the tropical species rapidly drop out; only about 3 per cent of the tropical species occur as far south as Cape Leeuwin. Most of the temperate molluscs occur along the entire south coast of Western Australia to Cape Leeuwin. About 20 per cent have their northern limit in the Cape Leeuwin - Cape Naturaliste region; only 3 per cent extend to the north coast, beyond North West Cape. Endemics comprise about 10 per cent of the west coast fauna. While some occur on the north or south coasts most endemics have at least part of their range on the west coast. Although the number of endemic species is only a small

fraction of the total molluscan fauna, some species occur in large numbers and are thus ecologically important in coastal habitats.

Commercial fisheries exist for abalone, scallops, squid and pearl oysters.



*Chromodoris westraliensis*, an endemic sea slug that occurs between Albany and North West Cape.

Photograph: C. Bryce

The freshwater mollusc fauna is impoverished, but best developed in the Kimberley. Salt lake snails, *Coxiella*, reach their greatest diversity and abundance in the south-west. Some freshwater snails are vectors for parasites.

The land snail fauna is adapted to a wide variety of climatic conditions, ranging from moist situations to the most arid. In the Kimberley the family Camaenidae is particularly diverse. *Bothriembryon* is diverse in the south and south-west.

### Corals <sup>(12)</sup>

Approximately 318 species of corals in 70 genera have been recorded for the State. Coral growth is best developed off the tropical north with patch and platform reefs on the inner Sahul and North-West Shelves and a series of atolls along the shelf edge—Ashmore, Seringapatam and Scott Reefs and the Rowley Shoals. Along the mainland coast of the Kimberley and Pilbara and adjacent islands are fringing reefs. Best developed is the Ningaloo Reef which extends 220 km southward from North

<sup>10</sup> Contributed by L. M. Marsh

<sup>11</sup> Contributed by F. E. Wells

<sup>12</sup> Contributed by L. M. Marsh



West Cape. The most southerly true coral reefs in the Indian Ocean occur at the Houtman Abrolhos off Geraldton. South of the Abrolhos the coral fauna diminishes sharply but extensive colonies of *Pocillopora damicornis* and *Montipora* grow at Rottnest Island from where 25 species have been recorded. Seven genera reach Geographe Bay and four extend to the Recherche Archipelago. The southward extension of corals along the west coast to the south coast is facilitated by the Leeuwin current which transports larvae and maintains slightly elevated water temperatures in winter.

### Crustaceans <sup>(13)</sup>

The most important commercial crustacean species is the Western Rock Lobster, *Panulirus cygnus*, a west coast endemic. On the south coast, the Southern Rock Lobster, *Jasus novaehollandiae*, supports a small fishery. On the continental slope off the North west shelf five species of deep water lobsters, *Metanephrops*, are trawled, together with several species of deep water prawns.

The Swan River Prawn or School Prawn, *Metapenaeus dalli*, is netted by amateur and professional fishermen in west coast estuaries. In northern gulfs and bays larger prawns are taken by commercial trawlers. Fishing centres are at Shark Bay, Exmouth Gulf and Nickol Bay. The main species are the Western King Prawn, *Penaeus latisulcatus*, Brown Tiger Prawn, *P. esculentus* and Banana Prawn, *P. merguensis*. Two species of shovel-nosed lobsters sometimes taken in trawls are the Moreton Bay Bug, *Thenus orientalis*, and the Balmain Bug, *Ibacus peronii*.

The Blue Swimming Crab, *Portunus pelagicus*, is plentiful in summer in the estuary of the Swan River and at Mandurah. The large edible crab, *Hypothalassia armata*, occurs in deep water between Rottnest Island and Geraldton and Australia's largest crab, *Pseudocarcinus gigas*, is occasionally caught in deep water along the south-west and south coasts. Possibly two species of large edible mud crab (*Scylla*) occur in the mangroves of the north.

Crustaceans of the inland waters fall into the ecological climate-dependent groupings mentioned on page 61. The Cherrabun (*Macrobrachium*), a large freshwater prawn, occurs in permanent pools of the Kimberley.

Ephemeral inland waters are often inhabited by shield shrimps (*Triops*, *Lepidurus*), fairy or brine shrimps *Artemia*, *Parartemia* and *Branchinella* and water fleas Cladocera. These produce resistant eggs which survive in dry sediment for years, hatch after occasional rains, grow rapidly to maturity and breed before the water dries up.

Permanent inland waters support copepods (especially *Boeckella*), water fleas (Cladocera) and shelled fairy shrimps (Conchostraca).

Several species of freshwater crayfish occur in the south-west. The Marron, *Cherax tenuimanus*, lives in permanent streams with deepwater pools; the Jilgie, *C. quinquecarinatus* in shallow permanent water, while the Koonac, *C. preissii* burrows in swamps. Three other crayfish species of *Engaewa* live in isolated seepages and swamps. The 'White Yabbie', *C. destructor* has been introduced from south-eastern Australia into many wheatbelt dams for local consumption. The shrimp *Palaemonetes australis* is abundant in fresh water and estuaries.

### Spiders, Ticks, Scorpions, Centipedes and Millipedes <sup>(14)</sup>



Unnamed blind spider from caves in Cape Range, North West Cape: one of many blind species of arthropods from the caves.

Photograph: D Mead-Hunter

The commonest, most widespread and conspicuous families of spiders are the Araneidae (orbweavers), Lycosidae (wolf spiders), Theridiidae (combfooted spiders), Sparassidae

<sup>13</sup> Contributed by P.F. Berry D.S. Jones and G.J. Morgan

<sup>14</sup> Contributed by L. E. Koch and B. Y. Main

(huntsman spiders) and certain trapdoor spiders. Males of the latter group wander away from their burrows during the mating season and often invade gardens and occasionally houses when they may be confused with the venomous funnel-web spiders (*Atrax*) of the eastern states. Pest and poisonous species include the notorious Redback Spider *Latrodectus mactans hasseltii*. There have been no fatalities from this spider since the advent of an antivenene.



*Lycosa forresti*, a brightly coloured wolf spider found in arid zone regions of Western Australia. These spiders construct burrows with a tight fitting mud lid in clay soils.

Photograph: Western Australian Museum

The commonest native tick is the Ornate Kangaroo Tick *Amblyomma triguttatum*. In addition to its normal host this tick attaches to a wide range of creatures including lizards, rabbits, horses, cattle and sheep, and occasionally humans. Other common examples of hard-bodied (ixodid) ticks are the introduced species such as the Dog Tick *Rhipicephalus sanguineus* and the Cattle Tick, *Boophilus microplus*. The best known example of the soft-bodied (argasid) family is the cosmopolitan Fowl Tick *Argas*. Fortunately, local ticks are not known to infect their hosts with dangerous viral and other diseases.

Three families and five genera of scorpions are represented in Western Australia. The large widespread *Urodacus* scorpions (twelve species) live in deep spiral burrows and sometimes enter houses or fall into swimming pools.

The medium-sized to very large centipedes, which are colourful and mostly banded, belong to the family Scolopendridae, and include the cosmopolitan, *Scolopendra morsitans*, ten native species of the genus *Cormocephalus* and five of *Ethmostigmus*. There are numerous species in other families.

About fifteen genera of millipedes have been recorded including several introduced species. They feed on plant debris and are harmless, but some emit dark, toxic secretions. Minute polyxenids travel in vast masses in some years in the Pilbara.

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## Entomology in Western Australia

### With Particular Reference to Agriculture

(Contributed by the Entomology Branch, Department of Agriculture)

The entomological field in Western Australia is so vast and the number of active workers on the subject so few that much still remains to be learned about the insects found in this State.

No attempt is made here to cover all the various orders of insects which occur in the State, mention being made only of those of economic importance. Reference is also made to beneficial insects and mites which have been introduced for the control of agricultural pests. In Western Australia, the use of natural agents in pest control is an increasingly important facet of agricultural research.

### CLASS COLLEMBOLA (Springtails)

#### Order Collembola (Springtails)

This group includes the lucerne flea, *Sminthurus viridis* (Linnaeus) which was introduced into this State from eastern Australia in about 1910 and is a very serious pasture pest. Partial control is exercised by the predatory pasture snout mite, *Bdellodes lapidaria* (Kramer), and the introduced spiny snout mite *Neomolgus capillatus* (Kramer).



## CLASS INSECTA (Insects)

### Orders Orthoptera, Mantodea, Blattodea, Phasmatodea (Grasshoppers, Locusts, Mantids, Cockroaches, etc).

The most important grasshopper form is the small plague grasshopper, *Austroicetes cruciata* (Saussure). For breeding it favours hard, bare soil and as extensive areas once utilised for wheat growing have now reverted to grazing, these uncultivated tracts periodically give rise to serious grasshopper swarms which menace the adjacent wheat lands. The Australian plague locust, *Chortoicetes terminifera* (Walker) occurs in Western Australia but rarely as a plague species.

During the past 20 years, the wingless grasshopper, *Phaulacridium vittatum* (Sjöstedt) has been causing increasing damage on pasture, lucerne, orchards, vineyards, vegetable gardens and trees.

In the Kimberley the yellow-winged locust, *Gastrimargus musicus* (Fabricius), the migratory locust, *Locusta migratoria* (Linnaeus) and the spur-throated locust, *Austracris guttulosa* (Walker) assume plague proportions.

The cockroach fauna includes a large number of native species as well as several introduced forms.

### Order Isoptera (Termites)

The so-called white ant is a serious pest in all parts of the State. Among the most important species may be cited the giant termite, *Mastotermes darwiniensis* Froggatt of the north and the widely distributed subterranean termite, *Coptotermes acinaciformis* (Froggatt). Heavy annual losses are caused by termite damage.

### Order Phthiraptera (Lice)

Indigenous species occur on birds and native mammals, and various introduced forms infest domestic poultry, horses, cattle and sheep.

### Order Thysanoptera (Thrips)

The most serious native species is the plague thrips, *Thrips imaginis* Bagnall which may swarm in apple blossoms and seriously affects the crop setting. *Thrips tabaci* Lindeman, the onion thrips, is a carrier for the plant disease spotted wilt. Severe damage to tomato plants may result from this virus.

## Order Hemiptera (Bugs, Aphids, Scale Insects)

This group contains a large number of pest species, many of them introduced. The green vegetable bug, *Nezara viridula* (Linnaeus) is now present throughout the State but is partially controlled by the introduced parasitic wasp, *Trissolcus basalis* (Wollaston). The native Rutherglen bug, *Nysius vinitor* Bergroth may at times swarm on vegetables and fruit trees. The crusader bug, *Mictis profana* (Fabricius) normally feeds on acacias and other native plants but may be troublesome to citrus. The apple dimpling bug, *Campylomma livida* Reuter is a native species which causes severe malformation of apples.

Numerous introduced aphid species occur as pests on vegetables, garden plants and fruit trees. The green peach aphid, *Myzus persicae* (Sulzer) occurs on peaches, potatoes and rape, and is a vector of virus diseases in lupins; citrus and apple trees are attacked by the black citrus aphid, *Toxoptera citricidus* (Kirkaldy) and the woolly aphid, *Eriosoma lanigerum* (Hausmann) respectively, and the cabbage aphid, *Brevicoryne brassicae* (Linnaeus) is found on cabbages, cauliflowers, rape, etc. Several introduced legume aphids, e.g. spotted alfalfa aphid, *Therioaphis trifolii* (Monell) f. *maculata*, bluegreen aphid, *Acyrthosiphon kondoi* Shinji and pea aphid, *A. pisum* (Harris) have been recorded since 1978. These are now partially controlled by introduced parasitic wasps.

Scale insects (Coccidae) are important horticultural pests. These include San José scale, *Comstockaspis perniciosus* (Comstock), which is a serious pest of apples; Red scale, *Aonidiella aurantii* (Maskell), which is found mainly on citrus; black scale, *Saissetia oleae* Bernard, which is found attacking citrus, stone fruits and garden shrubs; white wax scale, *Gascardia destructor* (Newstead), which is mainly a pest of citrus but also attacks cultivated shrubs; soft brown scale, *Coccus hesperidum* Linnaeus, which has a wide host range but is of greatest importance on citrus.

### Order Coleoptera (Beetles)

This order is represented in Western Australia by many and varied forms.

The ladybirds (Coccinellidae) have considerable economic importance and in addition to native species the State contains a number specially introduced to combat various scale insects and aphids. These include the mealybug ladybird,

*Cryptolaemus montrouzieri* Mulsant and the common spotted ladybird, *Harmonia conformis* (Boisduval). *H. conformis*, in conjunction with the parasitic wasp, *Aphelinus mali* (Haldeman), plays an important role in combatting the woolly aphid of apple trees. Leaf-eating ladybirds of the genus *Henosepilachna* attack vegetables, especially pumpkins and melons.

The cockchafers or scarabs (Scarabaeidae) are represented by a great diversity of forms. Several species known as spring beetles may swarm on flowering fruit trees and roses in early summer. The bronze-coloured *Colymbomorpha vittata* Britton is a common pest of apple trees and the saddle-backed beetle, *Phyllotocus ustulatus* Blanchard sometimes visits citrus blossoms in large numbers. The introduced African black beetle, *Heteronychus arator* (Fabricius) is a troublesome pest of lawns, turf, pastures and vegetables. A native species of *Colpochilodes* has caused spasmodic damage to cereal crops and clover pastures in the southern portions of the State.

The longicorn beetles (Cerambycidae) are a group of wood-boring insects, but healthy trees are seldom seriously affected. They are not a pest of structural timber as they do not attack seasoned material.

The leaf beetles (Chrysomelidae) may superficially resemble ladybirds. Common pest species in the north of the State are the pumpkin beetles, *Aulacophora hilaris* (Boisduval) and *A. abdominalis* (Fabricius).

The weevil group (Curculionidae) contains a number of pest species. The lesser grain borer *Rhyzopertha dominica* (Fabricius) is our principal weevil pest of stored grain but the rice weevil *Sitophilus oryzae* (Linnaeus) and the granary weevil, *S. granarius* (Linnaeus) also occurs.

Two orchard pests are the introduced apple weevil, *Otiorynchus cribricollis* Gyllenhal and Fuller's rose weevil, *Asynonychus cervinus* (Boheman). The small lucerne weevil, *Artichonotus taeniatulus* (Berg), and the whitefringed weevil, *Graphognathus leucoloma* (Boheman) attack the roots of lucerne and potato tubers. Two other introduced pest species are the sitona weevil, *Sitona discoideus* Gyllenhal, and the garden weevil, *Phlyctinus callosus* Boheman.

#### Order Diptera (Flies, Mosquitoes, etc.)

This group contains a number of species, of major economic importance.

The mosquitoes are well represented, including the brown house mosquito, *Culex quinquefasciatus* Say, the common banded mosquito, *Culex annulirostris* Skuse, the saltmarsh mosquito, *Aedes vigilax* (Skuse) and the southern saltmarsh mosquito *Aedes camtorhynchus* (Thompson). The last three are either proven or suspected vectors of Ross River Virus. A significant increase in the incidence of Epidemic Polyarthritis, caused by Ross River Virus, was recorded over the summer of 1988-89 in the Perth, Mandurah and Bunbury areas. The anophelines are represented by the widely distributed *Anopheles annulipes* Walker. *A. annulipes*, together with *Aedes alboannulatus* Macquarie, have played an important part in the spread of the rabbit virus *Myxomatosis*.

Of the introduced flies, those causing most trouble are the Australian sheep blowfly, *Lucilia cuprina* (Wiedemann), and the Mediterranean fruit fly, *Ceratitis capitata* (Wiedemann). The western goldenhaired blowfly *Calliphora albifrontalis* Malloch and the lesser brown blowfly, *Calliphora nociva* Hardy are also important in sheep strike. The buffalo fly, *Haematobia irritans exigua* de Meijere is a serious stock pest in the Kimberley.

The common house fly, *Musca domestica* Linnaeus is widespread as is also the native bush fly, *Musca vetustissima* Walker and the stable fly, *Stomoxys calcitrans* (Linnaeus).

Of the many useful flies may be mentioned the tachinids which parasitise caterpillars, grasshoppers and other pests and the bee flies (Bombyliidae) which parasitise the eggs of other insects.

#### Order Siphonaptera (Fleas)

The poultry stickfast flea, *Echidnophaga gallinacea* (Westwood) is mainly a pest of poultry and domestic animals. The oriental rat flea, *Xenopsylla cheopis* (Rothschild), the human flea, *Pulex irritans* Linnaeus and the cat and dog fleas, *Ctenocephalides felis* (Bouché) and *C. canis* (Curtis) are among the most important introduced species.

#### Order Lepidoptera (Moths, Butterflies, etc.)

The caterpillars of a group of small native moths of the family Pyralidae, commonly known as pasture webworms, *Hednota pedionama* (Meyrick), *H. crypsichroa* Lower etc. are serious pests of cereal crops (excepting oats) and grass pastures.

A family of considerable interest is the Tortricidae, in which group are included the codling moth, *Cydia pomonella* (Linnaeus) and the oriental fruit moth, *C. molesta* (Busck). Outbreaks of both insects have occurred in Western Australia but drastic eradication measures have ensured that this State remains free of these serious orchard pests.

The family Noctuidae contains several important pests, including the native budworm and the cotton bollworm, *Heliothis punctigera* Wallengren and *H. armigera* (Hübner), the cluster caterpillar, *Spodoptera litura* (Fabricius), the rough bollworm, *Earias huegeli* Rogenhofer, the brown cutworm, *Agrotis munda* Walker, the southern armyworm, *Persectania ewingii* (Westwood), the common armyworm, *Mythimna convecta* (Walker) and the northern armyworm, *Mythimna separata* (Walker). The fruit piercing moth, *Othreis materna* (Linnaeus) also belongs to this group and causes heavy losses in citrus fruit in the Kimberley and the north-west.

Other common moth pests are the cabbage moth, *Plutella xylostella* (Linnaeus), the potato moth, *Phthorimeaea operculella* (Zeller) and the apple looper, *Chloroclystis laticostata* (Walker).

Two butterflies of economic importance, both introduced, are the cabbage white butterfly, *Pieris rapae* (Linnaeus) and the orange palmdart, *Cephrenes augiades sperthias* (Felder).

#### Order Hymenoptera (Ants, Wasps, Bees)

Of the ants, (Formicidae) one of the best-known native species is the meat ant, *Iridomyrmex purpureus* (F. Smith), which often nests on gravel paths and roadsides.

Two important introduced ant pests are the Argentine ant, *Iridomyrmex humilis* (Mayr), and the Singapore ant, *Monomorium destructor* (Jerdon). The Argentine ant was once widespread in metropolitan and country areas, but has been reduced in recent years, as a result of a large-scale control campaign.

This campaign was terminated in 1988 as a result of an Environmental Protection Authority review which recommended the withdrawal of Heptachlor for use against Argentine ants.

The sawflies (Pergidae and Tenthredinidae) are represented locally by a number of native forms. The larvae of the genus *Perga*, often called spitfires, eat the foliage of eucalypts. An introduced sawfly, the pear and cherry slug, *Caliroa cerasi* (Linnaeus), is a common pest on pear and plum trees. Another introduced sawfly

known as the leafblister sawfly, *Phylacteophaga froggatti* Riek causes severe disfigurement to various eucalypts.

The smaller parasitic wasps (ichneumonids, chalcids, braconids etc), are well represented and play an important role in combating many insect pests. Some attack insect eggs while others parasitise caterpillars, aphids and scale insects.

The social wasps (Vespidae) include the common paperwasp, *Polistes humilis synoecus* Saussure and the yellow paperwasp, *P. dominulus* (Christ). Both are introduced species and can inflict painful stings.

The European wasp, *Vespula germanica* (Fabricius) was first detected in Western Australia in January 1977. Subsequent surveys and follow-up of reports from the public resulted in a further forty nests being found in the metropolitan area, Kalgoorlie and Albany. All nests of this troublesome exotic insect are destroyed by the Agriculture Protection Board (APB).

The European wasp is similar in appearance to a honey bee but has distinct bright yellow and black markings across the body.

#### REFERENCES

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## Natural Regions

(Contributed by Rex T. Prider, B.SC., PH.D., F.G.S. Emeritus Professor of Geology,  
University of Western Australia)

The physical features, geology, climate, flora and fauna of Western Australia have been outlined in this and the two preceding Chapters and the subdivision of the State into 'natural regions' may now be considered. A Natural Region is one clearly marked off from neighbouring regions by topographical, geological, climatic, or biological conditions, or by combinations of these, so that, as far as human activities are concerned, they have different economic possibilities.

Many methods for the subdivision of the State have been suggested—based on climate, soil and

ecology, physiography (geomorphology) and geology (including geological structure). These, together with Land and Statistical Divisions, have been dealt with in some detail by Gentilli in *Western Landscapes*, pp. 3–48. The scheme of 'natural regions' summarised on page 100, which was first devised by E. de C. Clarke in 1926, taking note of all these variables, has stood the test of time well, although some of its details, in view of our increase in geological knowledge of the State and utilisation of light country by minor element studies, could be revised, and a finer division into subregions made.

### CHARACTERISTICS OF THE NATURAL REGIONS OF WESTERN AUSTRALIA

The subdivision of Western Australia into Natural Regions (see Diagram 4.1) has been described by E. de C. Clarke in *J. Roy. Soc. W. Aust.*, vol. XII, 1927, pp. 117–32. A summary of the characteristics of these different Natural Regions (reprinted by courtesy of the University of Western Australia Press from Clarke, Prider and Teichert: *Elements of Geology for Western Australian Students*) is given below.

NATURAL REGION	TOPOGRAPHY	GEOLOGY	RAINFALL	WATER SUPPLY (a)	VEGETATION, ETC
ANTRIM (geographic)	Tableland	Cambrian sediments and lavas	Summer, monsoonal, 500 to 1,000 millimetres	Catchments, wells and artesian	Grassland and savannah
NORTH KIMBERLEY (geographic)	Dissected stony tableland	Younger Precambrian	Summer, monsoonal, 750 millimetres or more	Streams, springs, catchments	Luxuriant in valleys, sparse on tableland
FITZROY (chief river)	Very wide valleys and low hills	Palaeozoic (largely Permian)	Summer, monsoonal, 500 to 750 millimetres	Catchments and artesian	Grassland and savannah
CANNING (A W Canning (Surveyor and Explorer)	Sandridges and table-top hills	Palaeozoic and Mesozoic	Summer, 375 millimetres or less	Springs, pools, artesian water (undeveloped)	'Spinifex' (species of <i>Triodon</i> ) and desert shrubs
NORTH WEST (common usage)	Rugged hills. Rivers in well defined valleys	Older and Younger Precambrian. Man economic minerals	Variable, unreliable 375 millimetres or less	Wells, catchments, pools	'Spinifex' few shrubs and trees
CARNEGIE, David Carnegie (explorer)	Sand ridges and table-top hills	Palaeozoic and Mesozoic, Younger Precambrian	Variable and unreliable, probably about 125 millimetres	Catchments, wells	'Spinifex' and desert shrubs
WARBURTON (Warburton Ranges)	Hills (some over 900 metres) separated by sandy country	Older Precambrian	Variable and unreliable, perhaps about 125 millimetres, Probably better than Carnegie Region owing to high hills	Catchments, wells, some springs	'Mulga' (species of <i>Acacia</i> ) and 'Spinifex'

CHARACTERISTICS OF THE NATURAL REGIONS OF WESTERN AUSTRALIA (*continued*)

The subdivision of Western Australia into Natural Regions (see Diagram 4.1) has been described by E. de C. Clarke in *J. Roy. Soc. W. Aust.*, vol. XII, 1927, pp. 117–32. A summary of the characteristics of these different Natural Regions (reprinted by courtesy of the University of Western Australia Press from Clarke, Prider and Teichert: *Elements of Geology for Western Australian Students*) is given below.

NATURAL REGION	TOPOGRAPHY	GEOLOGY	RAINFALL	WATER SUPPLY (a)	VEGETATION, ETC
MURCHISON (common usage)	Ridge hills and break-aways. Rivers in shallow beds. Salt 'lakes'	Older Precambrian, Economic minerals especially gold and nickel	Summer or winter, unreliable, 250 millimetres or less	Wells (potable groundwater)	'Mulga'. Eucalypts scarce except along rivers
KALGOORLIE (chief town)	Less hilly than Murchison. Salt 'lakes'. No defined watercourses except salt lake system	Older Precambrian. Economic minerals especially gold and nickel	Mainly winter, unreliable, 250 millimetres or less	Catchments. Ground water too salty for use	Eucalypt forest especially Salmon Gum ( <i>E. salmonophloia</i> ), Gimlet ( <i>E. salubris</i> ) and Red Morrel ( <i>E. longicornis</i> )
WHEAT BELT (common usage)	Same as Kalgoorlie region	Older Precambrian, but few 'greenstones'	Winter, reliable 250 to 500 millimetres	Similar to Kalgoorlie Region, but ground water potable in many places; therefore wells frequent	Eucalypt forest—Salmon Gum, Gimlet and Morrel
JARRAH (chief timber)	More dissected than Wheat Belt Region, especially near Darling Scarp	Like Wheat Belt Region but there is an extensive cuirass of laterite	Winter, reliable 625 to 1,000 millimetres	Streams and springs	Forest of Jarrah ( <i>E. marginata</i> ), Wandoo ( <i>E. Wandoo</i> ), Karri ( <i>E. Diversicolor</i> ) and Marri ( <i>E. calophylla</i> )
CARNARVON (chief town)	Elevated plain with table-top hills	Palaeozoic, Mesozoic, Tertiary and later	Summer or winter, very unreliable, about 250 millimetres	Artesian in many places. Catchments, pools	Sparse scrub in north, denser in south
GREENOUGH (river)	Sandstone tableland	Mesozoic and older	Winter, 375 to 500 millimetres	Springs, wells and catchments	Scrub
PERTH (chief town)	Coastal plain	Mesozoic and later	Winter, reliable, 500 to 875 millimetres	Springs, wells, artesian	Scrub, swamp and forest
STIRLING (prominent range)	Undulating tableland with abrupt ranges	Siliceous Tertiary sediments with inliers of Older and Younger Precambrian	Winter, 375 millimetres or less	Catchments, Stream water generally too salty for use	Heath and swamp
NULLARBOR (geographic)	Tableland, no hills	Calcareous Tertiary sediments	Winter, 250 millimetres or less	Catchments, Subartesian	Poor grassland

(a) 'Wells' refers to those that draw on ground water, but are not artesian. 'Catchments' refers to water collected on the surface—naturally in gnamma holes, artificially by conserving the run-off. 'Pools' refers to pools in watercourses and includes rock holes.

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## Chapter 5

### CONSTITUTION AND GOVERNMENT

**Western Australia is one of the six federated sovereign States which, together with the Northern Territory and the Australian Capital Territory, constitute the Commonwealth of Australia. Thus, in addition to having its own Parliament and executive government, it is represented in the federal legislature. As well as government at the Federal and State levels, there is a third system, that of local government, which functions through City Councils, Town Councils and Shire Councils.**

#### OUTLINE OF CONSTITUTIONAL DEVELOPMENT

A Legislative Council was established in Western Australia shortly after its foundation as a Crown Colony and sat for the first time in February 1832. The Council was non-elective and consisted of the Governor and four senior officials. In 1839, membership was increased to nine when the Governor nominated four unofficial members. Additional appointments were made from time to time until the dissolution of the nominee Legislative Council in 1870 with the inauguration of representative government as provided for in the Australian Colonies Government Act of 1850. This Act, which enabled the establishment of representative governments in other Australian Colonies, withheld the privilege from Western Australia until such time as the Colony should be able to defray all costs of government from its own revenues, and it was not until 1870 that it was felt that Western Australia was able to satisfy this condition. The new Legislative Council, elections for which took place in October of that year, consisted of twelve elected members, three nominees and three officials. The number of members of the Council was increased in 1874 to 21, of whom 14 were elected, in 1882 to 24, of whom 16 were elected and in 1886 to 26, comprising 17 elected members, 5 nominees and 4 officials.

Following the passage by the Legislative Council of a Constitution Act in 1889 and subsequent representations made in London by delegates sent from the Colony, responsible government was granted to Western Australia by an Imperial Act assented to on 15 August 1890. Provision was made for the establishment of a Parliament of two Houses, to be known as the 'Legislative Council'

and the 'Legislative Assembly', to replace the old Council. Proclamation of responsible government was made in Perth on 21 October 1890 and election of the thirty members of the Legislative Assembly took place in November and December. The fifteen members of the Legislative Council were nominated by the Governor, as provided for in the Constitution Act, and the Parliament was officially opened on 30 December 1890. The Constitution Act of 1889, while prescribing a Council which was originally nominative, contained a provision that, after the expiration of six years or on the population of the Colony reaching 60,000, the Council should become fully elective. The required population was attained in 1893 and an amendment to the Act in that year enabled the election of twenty-one members to the Legislative Council, and at the same time increased the Legislative Assembly to thirty-three members. By an amendment of 1899, membership of the Legislative Council was raised to thirty and of the Legislative Assembly to fifty. Provision was made for the Legislative Assembly to be increased to fifty-one members by the *Constitution Acts Amendment Act (No. 2) 1965*. The increase in numbers, however, did not become effective until the State general election in 1968.

On 1 January 1901, Western Australia and five other Australian Colonies were federated under the name of the 'Commonwealth of Australia', authority for the union having been given by the Commonwealth of Australia Constitution Act which was passed by the British Parliament in 1900. By a provision of the Constitution Act the constituent parts of the Commonwealth previously designated 'Colonies' became known as 'States'. Under the Constitution, powers are divided between the Parliaments of the Commonwealth and of the States by conferring power for specific

subjects on the Commonwealth either exclusively or jointly with the States, leaving the remaining powers to the States.

Procedure in both Federal and State Parliaments is based on British practice. The legislatures consist of the Sovereign, represented by the Governor-General of Australia or the Governor of the State, and the elected members. In the field of executive government the British 'Cabinet' system has also been adopted. The members of the Cabinets must hold seats in the legislature as elected members. The Cabinet is responsible to the Parliament and continues in office only while holding the confidence of the Parliament. All Cabinet Ministers are members of the Executive Council, the supreme group of advisers to the Crown, and the Cabinet thus provides the executive government of the Commonwealth or the State. The executive Council is presided over by the Governor-General of Australia or the Governor of the State and at its meetings, which are formal and official in character, the decisions of the Cabinet are given legal form, appointments are made, resignations accepted, proclamations issued and regulations approved.

### VICE-REGAL REPRESENTATION

#### The Governor-General of Australia

Under the Commonwealth Constitution, ultimate executive power is vested in the Crown and is exercised by the Governor-General as the direct representative of the Sovereign. Appointment to the office is made by the Crown after consultation with the Prime Minister of the Commonwealth. The present Governor-General is His Excellency the Honourable Bill Hayden, A.C. who was sworn in on 16 February 1989. During the absence from Australia of the Governor-General it is usual for the senior among the State Governors to be appointed Administrator.

#### The Governor of Western Australia

The Governor of Western Australia is the personal representative of the Sovereign in the State and exercises the powers of the crown in State matters. He is the titular head of the Government and performs the official and ceremonial functions attaching to the crown. The present Governor of Western Australia, His Excellency Professor Gordon Stanley Reid, A.C. was sworn in on 2 July 1984. In the event of the Governor's absence from Western Australia the Lieutenant-Governor of the State is appointed Administrator. If there is no Lieutenant-Governor it is customary for the Chief Justice of Western Australia to be appointed

Administrator. The present Lieutenant-Governor, Sir Francis Burt, K.C.M.G., received his commission on 19 April 1977.

The last Governor of Western Australia as a Colony was Lieutenant-Colonel Sir Gerard Smith, K.C.M.G., whose term of office expired on 29 June 1900 and the first Governor of the State was Captain Sir Arthur Lawley, K.C.M.G., who was sworn in on 1 May 1901. The names and dates of assumption of office of Governors and acting Governors from the foundation of the Colony to 1980 are shown in the *Western Australian Year Book*, No. 20—1982.

### THE FEDERAL PARLIAMENT

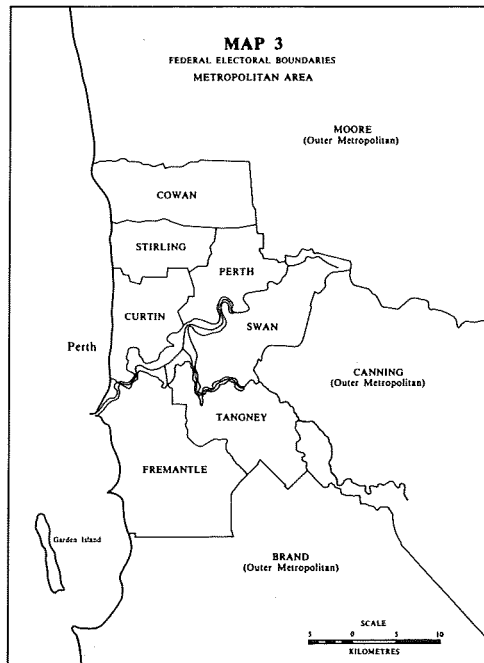
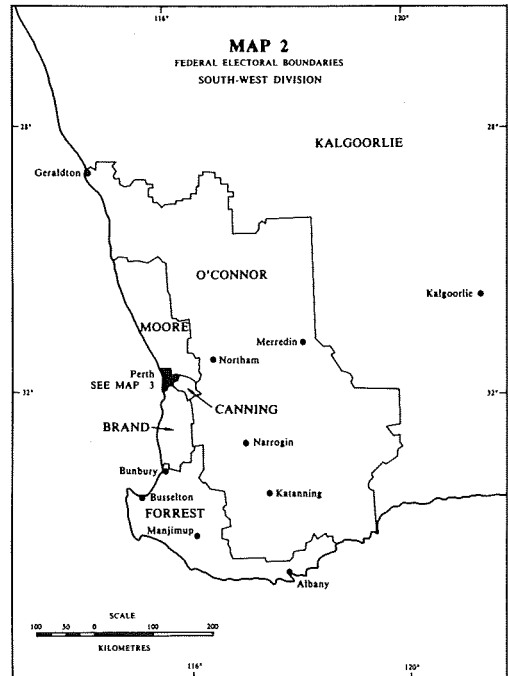
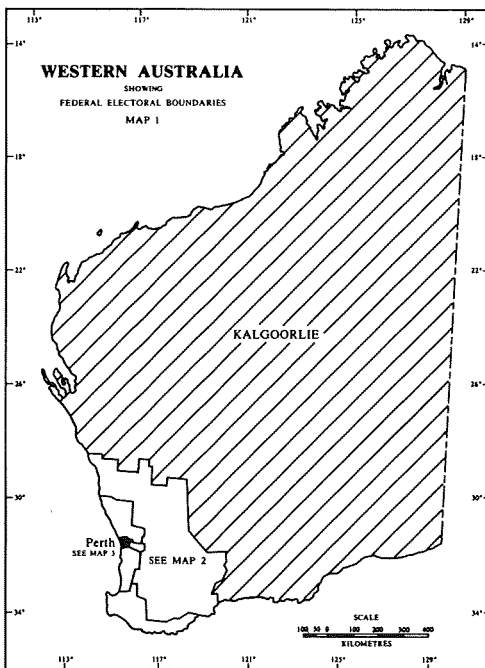
The legislative power of the Commonwealth is vested in a Federal Parliament which consists of Her Majesty the Queen (represented by the Governor-General), a Senate and a House of Representatives. Subject to the Constitution, the Federal Parliament is empowered to make laws concerning, among other things, defence, external affairs, customs and excise, trade and commerce with other countries and among the States, taxation, borrowing of money on public credit, currency and coinage, banking, insurance, navigation, fisheries, quarantine, posts and telegraphs, census and statistics, immigration, naturalisation and aliens, copyrights and trademarks, bankruptcy, marriage, divorce and matrimonial causes, social services, and conciliation and arbitration for the prevention and settlement of industrial disputes extending beyond the limits of any one State. The Constitution provides that, when a law of a State is inconsistent with the law of the Commonwealth, the Commonwealth law shall prevail and the State law shall, to the extent of the inconsistency, be invalid.

The qualifications necessary for membership of the Federal Parliament and for voting at federal elections are described in *Year Book Australia*. Under the provisions of the *Commonwealth Electoral Act 1973*, which was proclaimed operative from 21 March 1973, the age qualification for enrolment, voting and candidature for federal parliamentary elections was lowered from twenty-one years to eighteen years.

The payment of allowances to Senators and Members of the House of Representatives is provided for in the Constitution and a superannuation scheme is established under the provisions of the *Parliamentary Retiring Allowance Act 1984*.

DIAGRAM 5.1

## FEDERAL ELECTORAL BOUNDARIES, WESTERN AUSTRALIA



## The Senate

The Senate consisted originally of thirty-six members, six Senators being returned from each State. The Parliament is authorised by the Constitution to increase or decrease the number of members. The growth of the population since Federation having been such as to warrant a considerable enlargement of the Parliament, a Representation Act was passed in 1948 to provide for increased membership by raising from six to ten the number of Senators from each State. A further Representation Act was passed in 1983 increasing the number of Senators for each State from ten to twelve. The counting of votes in elections for the Senate is one of proportional representation. A summary of the procedure is given in the *Western Australian Year Book* No. 24—1986 and earlier issues..

Members are elected on the basis of adult suffrage by the people of the State which they represent. As provided by the *Commonwealth Electoral Act 1918*, enrolment as an elector is compulsory for all qualified persons except those who are Aboriginal natives of Australia. Aborigines, although entitled to enrol, are not required to do so. Voting is compulsory for all enrolled persons in terms of an amendment of 1924 which operated for the first time at elections held on 14 November 1925. The term of office of a Senator is normally six years and commences on the first day of July following his election. One-half of the members retire at the end of every third year and are eligible for re-election.

Elections for the Senate were last held on 11 July 1987. Table 5.1 shows the Western Australian membership of the Senate at 9 March 1988.

TABLE 5.1 – WESTERN AUSTRALIAN MEMBERS OF THE SENATE

Member	Political party	Year of retirement
M.E. Beahan	A.L.P.	1990
Hon. F.M. Chaney	Lib.	1993
P.F.S. Cook	A.L.P.	1993
N.A. Crichton-Browne	Lib.	1990
Hon. P.D. Durack, Q.C.	Lib.	1993
P.J. Giles	A.L.P.	1993
J.A. Jenkins	A.D.	1990
S.C. Knowles	Lib.	1993
J.P. McKiernan	A.L.P.	1990
J.H. Panizza	Lib.	1990
J. Vallentine	Ind.	1990
Hon. P.A. Walsh	A.L.P.	1993

A.L.P. = Australian Labor Party. Lib. = Liberal Party. A.D. = Australian Democrats. Ind. = Independent.

## The House of Representatives

State membership of the House of Representatives is on a population basis with the proviso that each State shall have at least five members. The Constitution provides further that the number of members of the House of Representatives shall be, as nearly as practicable, double the number of Senators. With the enlargement of the Senate from thirty-six to sixty members, the membership of the House of Representatives was increased, from the date of the 1949 elections, from seventy-four to 121, not including a member for the Australian Capital Territory, which achieved representation for the first time at this election, and a member for the Northern Territory, which had been represented since 1922.

Subsequent redistributions have increased the number of members of the House of Representatives in line with population growth. At the last election in July 1987, the following numbers of members of the House were elected: New South Wales 51; Victoria 39; Queensland 24; Western Australia 13; South Australia 13; Tasmania 5; plus the Australian Capital Territory 2 and the Northern Territory 1, making a total of 148 seats. Diagram 5.1 shows House of Representatives electorates in Western Australia.

Members of the House of Representatives are elected for the duration of the Parliament—which is limited to three years—by the people of the electorate whom they represent. As provided by the *Commonwealth Electoral Act 1918*, enrolment for electors is the same as for the Senate. Voting is on the preferential system.

TABLE 5.2 – WESTERN AUSTRALIAN MEMBERS OF THE HOUSE OF REPRESENTATIVES

Member	Political party	Electorate
W.F. Fatin	A.L.P.	Brand
G. Gear	A.L.P.	Canning
C.A. Jakobsen	A.L.P.	Cowan
A.C. Rocher	Lib.	Curtin
G.D. Prosser	Lib.	Forrest
Hon. J.S. Dawkins	A.L.P.	Fremantle
G. Campbell	A.L.P.	Kalgoorlie
C.A. Blanchard	A.L.P.	Moore
C.W. Tuckey	Lib.	O'Connor
Dr R.I. Charlesworth, AM	A.L.P.	Perth
R.F. Edwards	A.L.P.	Stirling
Hon. K.C. Beazley	A.L.P.	Swan
P.D. Shack	Lib.	Tangney

A.L.P. = Australian Labor Party. Lib. = Liberal Party of Australia.

Elections for the House of Representatives were last held on 11 July 1987. Table 5.2 shows the

Western Australian membership of the House of Representatives at 9 March 1988.

### THE STATE PARLIAMENT

The Crown, represented by the Governor, and the Parliament, comprising a Legislative Council and a Legislative Assembly, constitute the legislature of Western Australia.

Executive government is based, as in the case of the Commonwealth and other States, on the system which evolved in Great Britain in the eighteenth century and which is generally known as the 'Cabinet' system. The cabinet consists of Ministers of the crown chosen for the Ministry

from members of Parliament belonging to the political party, or coalition of parties, which is in the majority in the Legislative Assembly. The Constitution requires that at least one of the Ministers be selected from members of the Legislative Council. In Western Australia, as in the other Australian States, the office of principal Minister is designated 'Premier'.

Since 1890, when responsible government was granted to Western Australia, there have been twenty-seven separate Ministries. No organised political party existed in the Colony until the formation of a Labour party in the 1890s. A Labour Ministry assumed office in 1904.

TABLE 5.3 – MINISTRIES FROM 1890

Name of Premier	Political party		Date of assumption of office	Duration		
				Years	Months	Days
Forrest	(a)	1890	29 December	10	1	17
Throssell		1901	15 February	—	3	12
Leake			27 May	—	5	25
Morgans			21 November	—	1	2
Leake			23 December	—	6	8
James	Labour	1902	1 July	2	1	9
Daglish		1904	10 August	1	—	15
Rason	Liberal	1905	25 August	—	8	12
Moore	Liberal	1906	7 May	4	4	9
Wilson	Liberal	1910	16 September	1	—	21
Scaddan	Labour	1911	7 October	4	9	20
Wilson	Liberal	1916	27 July	—	11	1
Lefroy	Liberal	1917	28 June	1	9	20
Colebatch	Liberal	1919	17 April	—	1	—
Mitchell	Nat. and C.P. (coalition)		17 May	4	10	30
Collier	Labour	1924	16 April	6	—	8
Mitchell	Nat. and C.P. (coalition)	1930	24 April	3	—	—
Collier	Labour	1933	24 April	3	3	27
Wilcock	Labour	1936	20 August	8	11	11
Wise	Labour	1945	31 July	1	8	1
McLarty	L.C.L. and C.P. (coalition)	1947	1 April	5	10	22
Hawke	Labour	1953	23 February	6	1	10
Brand	L.C.L. and C.P. (coalition)	1959	2 April	11	11	1
Tonkin	A.L.P.	1971	3 March	3	1	5
Court	Lib. and C.P. (coalition)	1974	8 April	7	9	17
O'Connor	Lib. and C.P. (coalition)	1982	25 January	1	1	—
Burke	A.L.P.	1983	25 February	5	—	—
Dowding	A.L.P.	1988	25 February	Still in office (b)		

A.L.P. = Australian Labor Party. C.P. = Country Party. (c) L.C.L. = Liberal and Country League. (d) Nat. = Nationalist.

(a) No specific party designation. (b) At 31 May 1989. (c) The name of the Party was changed to the *National Country Party of Australia (W.A.) Inc.* on 5 May 1975. (d) The name of the Party was changed to *The Liberal Party of Australia (Western Australian Division) Incorporated* on 15 July 1968.

The Constitution Act of 1889 provided for a Ministry of five members. This number was increased by subsequent amendments to the Act to the present number of seventeen Ministers.

The right to vote at parliamentary elections was extended to women by the *Constitution Acts Amendment Act 1899* and membership of either House was provided for by the *Parliament (Qualification of Women) Act 1920*. The first woman member of any Australian Parliament was Mrs Edith Dircksey Cowan, O.B.E., who was

elected to the Legislative Assembly in March 1921 as member for West Perth. Mrs A.F.G. (later Dame Florence) Cardell-Oliver, M.L.A. for Subiaco became the first woman Cabinet Minister in Australia when she joined the McLarty Ministry in 1947.

Payment of members was introduced in 1900 by a Payment of Members Act and a superannuation fund operates under the *Parliamentary Superannuation Act 1970*.

TABLE 5.4 – THE MINISTRY AT 16 MARCH 1989

<i>Minister</i>		<i>Title of Office</i>
Peter M'Callum Dowding, LL.B	MLA	Premier; Public Sector Management; Womens Interests.
David Charles Parker, B.A., J.P.	MLA	Deputy Premier, Treasurer, Minister for Resources Development, Minister for Arts.
Joseph Max Berinson, Q.C.	MLC	Attorney General, Minister for Budget Management, Corrective Services, Leader of the Government in the Legislative Council.
Elsie Kay Hallahan, B.S.W., J.P.	MLC	Minister for Local Government; Lands; The Family; The Aged; Minister Assisting the Minister for Women's Interests; Deputy Leader of the Government in the Legislative Council.
Jeffrey Phillip Carr, B.A., J.P.	MLA	Minister for Mines; Fuel and Energy; Mid-West.
Robert John Pearce, B.A., Dip. Ed., J.P.	MLA	Minister for Transport; Environment; Parliamentary and Electoral Reform, Leader of the House in the Legislative Assembly.
Julian Fletcher Grill, LL.B, J.P.	MLA	Minister for Economic Development and Trade; Tourism, Small Business.
Keith James Wilson	MLA	Minister for Health.
Ian Frederick Taylor, B Econ.(Hons), J.P.	MLA	Minister for Police and Emergency Services; Conservation and Land Management, Waterways.
Pamela Anne Beggs, J.P.	MLA	Minister for Housing; Planning.
Gavan John Troy, B.Bus, F.A.I.M., J.P.	MLA	Minister for Labour; Employment and Training; Productivity; Minister Assisting the Minister for Education with T.A.F.E.
Ernest Francis Bridge, J.P.	MLA	Minister for Agriculture, Water Resources, North-West.
Gordon Leslie Hill, J.P.	MLA	Minister for Regional Development, Fisheries; Multicultural and Ethnic Affairs.
Graham John Edwards	MLC	Minister for Racing and Gaming; Sport and Recreation, Youth.
Yvonne Daphne Henderson B.A., Dip Ed, J.P.	MLA	Minister for Works and Services; Consumer Affairs.
Carmen Mary Lawrence B. Psych., Ph D.	MLA	Minister for Education, Aboriginal Affairs.
David Lawrence Smith, LL.B, J.P.	MLA	Minister for Community Services, Justice; South -West.
William Ian Thomas, B.A.	MLA	Parliamentary Secretary to the Cabinet.

TABLE 5.5 – ELECTORAL REGIONS AND ELECTORAL DISTRICTS

<i>Electoral Region</i>	<i>Electoral districts</i>	<i>Electoral Region</i>	<i>Electoral districts</i>
North Metropolitan	Balcatta Cottesloe Dianella Floreat Glendalough Kingsley Marrangaroo Marmion Nedlands Nollamarra Perth Scarborough Wanneroo Whitford	East Metropolitan (continued)	Maylands Morley Roleystone Swan Hills Thornlie
		South- west	Albany Bunbury Collie Mandurah Mitchell Murray Stirling Vasse Warren Wellington
South Metropolitan	Applecross Cockburn Fremantle Jandakot Melville Peel Riverton Rockingham South Perth Victoria Park	Agricultural	Avon Geraldton Greenough Merredin Moore Roe Wagin
East Metropolitan	Armadale Belmont Darling Range Helena Kenwick	Mining and Pastoral	Ashburton Eyre Kalgoorlie Kimberley Northern Rivers Pilbara

Under the provisions of the *Acts Amendment (Electoral Reform) Act 1987*, which came into operation on 30 October 1987, three Electoral Distribution Commissioners were appointed to divide the State into fifty-seven electoral districts—thirty-four comprising the Metropolitan Area (as described in the *Metropolitan Region Town Planning Scheme Act 1959*, as at 1 January 1987) and twenty-three the remainder of the State. These districts return one member each to the Legislative Assembly.

The State is also divided into six regions—three Metropolitan regions consisting of the Metropolitan electoral districts, a South-West region, an Agricultural region and a Mining and Pastoral region consisting of the electoral districts comprising the remainder of the State. The North Metropolitan Region and the South-West Region each return seven members to the Legislative

Council, and the other electoral regions return five Council members.

The division process, which included opportunities for public submissions and comment, was completed on 29 April 1988, when the final division was gazetted. This division was applied to the election held in February 1989 and will apply to the next general elections for the Legislative Assembly.

A further provision of the Act extends the terms of members of both Houses of Parliament to four years, commencing with the Thirty-third Parliament.

### The Legislative Council

At 22 May 1989 the Legislative Council consisted of thirty-four members. Under the provision of the *Act Amendment (Electoral Reform) Act 1987* all members are elected for a term of four years

TABLE 5.6 – MEMBERS OF THE LEGISLATIVE COUNCIL 22 MAY 1989

Name	Political party	Electoral region	Name	Political party	Electoral region
J.M. Berinson	A.L.P.	North Central Metropolitan	G.K. Kelly	A.L.P.	South Metropolitan
J.M. Brown	A.L.P.	South-East	P.H. Lockyer	Lib.	Lower North
T.G. Butler	A.L.P.	North-East Metropolitan	M. McAleer	Lib.	Upper West
J.N. Caldwell	N.P.A.	South	F.E. McKenzie	A.L.P.	North-East Metropolitan
G. Cash	Lib.	North Metropolitan	M. Montgomery	N.P.A.	South-West
E.J. Charlton	N.P.A.	Central	N.F. Moore	Lib.	Lower North
C. Davenport	A.L.P.	South Metropolitan	M.W. Nevil	A.L.P.	South-East
R. Davies	Lib.	North Metropolitan	M. Patterson	Lib.	South-West
G.J. Edwards	A.L.P.	North Metropolitan	P.G. Pandal	Lib.	South Central Metropolitan
G.M. Evans	Lib.	Metropolitan	S.M. Piantadosi	A.L.P.	North Central Metropolitan
P. Foss	Lib.	East Metropolitan	R. Pike	Lib.	North-Metropolitan
C.E. Griffiths	Lib.	South Central Metropolitan	T.G. Stephens	A.L.P.	North
S.J. Halden	A.L.P.	North Metropolitan	W.N. Stretch	Lib.	Lower Central
E.K. Hallahan	A.L.P.	South-East Metropolitan	R. Thomas	A.L.P.	South-West
T.R. Helm	A.L.P.	North	D. Tomlinson	Lib.	East-Metropolitan
B.J. House	Lib.	South-West	D.W. Wenn	A.L.P.	South-West
B.L. Jones	A.L.P.	Lower West	D.J. Wordsworth	Lib.	South

### SUMMARY

Australian Labor Party (A.L.P.)	16	The Liberal Party of Australia (Western Australian Division) Incorporated (Lib.)	15
National Party of Australia (N.P.A.)	3		

### The Legislative Assembly

At 31 March 1989 there were fifty-seven members of the Legislative Assembly, each member representing one of the fifty-seven electoral districts into which the State was divided

for the purpose. Under the provisions of the *Acts Amendment (Electoral Reform) Act 1987* Members of the Legislative Assembly are elected for the duration of Parliament, which is limited to four years.

TABLE 5.7 – MEMBERS OF THE LEGISLATIVE ASSEMBLY AT 16 MARCH 1989

<i>Name</i>	<i>Political party</i>	<i>Electoral district</i>	<i>Name</i>	<i>Political party</i>	<i>Electoral district</i>
R.A. Ainsworth	N.P.A.	Roe	K.R. Lewis	Lib.	Applecross
Dr.I.C. Alexander,	A.L.P.	Perth	B.J. MacKinnon	Lib.	Jandakot
Hon. M. Barnett	A.L.P.	Rockingham	W.J. McNee	Lib.	Moore
Hon. P.A. Beggs	A.L.P.	Whitfords	N.R. Marlborough,	A.L.P.	Peel
B.R. Blaikie	Lib.	Vasse	Hon. A. Mensaros	Lib.	Floreat
J.L. Bradshaw	Lib.	Wellington	K.J. Minson	Lib.	Greenough
Hon. E.F. Bridge	A.L.P.	Kimberley	R.K. Nicholls	Lib.	Murray
P.A. Buchanan.	A.L.P.	Ashburton	P.D. Omodei	Lib.	Warren
Hon. J.P. Carr	A.L.P.	Geraldton	Hon. D.C. Parker.	A.L.P.	Fremantle
N.M. Catania	A.L.P.	Balcatta	Hon. R.J. Pearce	A.L.P.	Armadale
J.G. Clarko.	Lib.	Marmion	J.B. Read	A.L.P.	Murray
R.F. Court.	Lib.	Nedlands	E.S. Ripper	A.L.P.	Belmont
H.J. Cowan	N.P.A.	Merredin	D.J. Shave	Lib.	Melville
E.J. Cunningham	A.L.P.	Marangaroo	D.L. Smith	A.L.P.	Mitchell
F.A. Donovan	A.L.P.	Morley	P.J. Smith.	A.L.P.	Bunbury
Hon. P.M. Dowding,	A.L.P.	Maylands	G.J. Strickland	Lib.	Scarborough
C.L. Edwards		Kingsley	Hon. I.F. Taylor	A.L.P.	Kalgoorlie
Dr G.I. Gallop	A.L.P.	Victoria Park	W.I. Thomas	A.L.P.	Cockburn
L. Graham	A.L.P.	Pilbara	Hon. I.D. Thompson	Lib.	Darling Range
Hon. W.L. Grayden,	Lib.	South Perth	M.W. Trenorden,	N.P.A.	Avon
Hon. J.F. Grill	A.L.P.	Eyre	Hon. G.J. Troy	A.L.P.	Swan Hills
W.R.B. Hassell.	Lib.	Cottesloe	F.C. Tubby	Lib.	Roleystone
Hon. Y.D. Henderson	A.L.P.	Thornlie	Dr H. Turnbull	N.P.A.	Collie
Hon. G.L. Hill	A.L.P.	Helena	J.P. Watkins	A.L.P.	Wanneroop
M.G. House	N.P.A.	Stirling	Dr J. Watson	A.L.P.	Kenwick
G.D. Kierath	Lib.	Riverton	L.H. Watt,	Lib.	Albany
J.C. Kobelke	A.L.P.	Nollamara	R.L. Wiese,	N.P.A.	Wagingin
Hon. C.M. Lawrence	A.L.P.	Glendalough	Hon. K.J. Wilson,	A.L.P.	Dianella
K.J. Leahy, J.P.	A.L.P.	Northern Rivers			
SUMMARY					
Australian Labor Party (A.L.P.)		31	The Liberal Party of Australia (Western		
National Party of Australia (N.P.A.)		6	Australian Division) Incorporated (Lib.)		20

## ELECTIONS

### The Federal Parliament

General elections for the Federal Parliament were held on 11 July 1987. The Australian Labor Party, led by R.J.L. Hawke, A.C., was elected to office with a majority of fourteen seats in the House of Representatives.

Australian Labor Party representation in the Senate as a result of the elections decreased from thirty-five to thirty-two.

### The State Parliament

At the conjoint election for the Legislative Council and the Legislative Assembly held on 4 February 1989, the Australian Labor Party, led by P.M'C. Dowding, LL.B., M.L.A., was elected to office with a majority in the Legislative Assembly of five seats.

## LEGISLATION DURING 1988

During the third session of the thirty-second Parliament, which lasted from 19 April to

5 January 1989, the Western Australian legislature enacted 76 Public Statutes and, in addition, dealt with forty-two Bills which were introduced but not passed.

The full text of the legislation enacted is contained in the volumes of *The Acts of the Parliament of Western Australia*.

## GOVERNMENT ADMINISTRATION

### State Government

The Public Service of Western Australia operates under the provisions of the *Public Service Act 1978* and consists of a number of Departments established in accordance with the Act. The establishment, abolition or alteration of Departments is subject to the approval of the Governor.

Other parts of the State Public Service normally referred to as Statutory Authorities or Instrumentalities, function under separate Acts although they largely follow the conditions prescribed in the Public Service Act.



**TABLE 5.8 – WESTERN AUSTRALIAN GOVERNMENT DEPARTMENTS**  
(*Public Service Act 1978*)

<i>Department</i>	<i>Address</i>	<i>Department</i>	<i>Address</i>
Aboriginal Affairs Planning Authority	17 Emerald Terrace West Perth 6005	Local Government Department	32 St George's Terrace. Perth 6000
Department of Agriculture	Baron-Hay Court South Perth 6151	Department of Marine and Harbours	1 Essex Street Fremantle 6160
Department for the Arts	Perth Cultural Centre Stirling Street Perth 6000	Department of Mines	100 Plain Street East Perth 6004
Audit Department	815 Hay Street Perth 6000	Department of Occupational Health, Safety and Welfare	600 Murray Street West Perth 6005
Authority for Intellectually Handicapped Persons	53 Ord Street West Perth 6005	Police Service	2 Adelaide Terrace. East Perth 6004
Building Management Authority of Western Australia	2 Havelock Street West Perth 6005	Department of the Premier and Cabinet	197 St George's Terrace. Perth 6000
Department for Community Services	189 Royal Street East Perth 6000	Public Service Commission	111 St George's Terrace. Perth 6000
Department of Computing and Information Technology	32 St Georges's Terrace Perth 6000	Office of Racing and Gaming	3 Plain Street East Perth 6004
Department of Conservation and Land Management	50 Hayman Road Como 6152	Department of Regional Development and the North West	132 St George's Terrace, Perth 6000
Ministry of Consumer Affairs	600 Murray Street Perth 6000	Department of Resources Development	170 St George's Terrace. Perth 6000
Corporate Affairs Department	565 Hay Street Perth 6000	Department of Services	3 Havelock Street West Perth 6005
Department of Corrective Services	441 Murray Street Perth 6000	Department for Sport and Recreation	100 Plain Street East Perth 6004
Crown Law Department	109 St George's Terrace. Perth 6000	State Government Insurance Commission	170 St George's Terrace Perth 6000
Education Department	151 Royal Street East Perth 6004	State Planning Commission	22 St George's Terrace. Perth 6000
Department of Employment and Training	18-20 Howard Street Perth 6000	State Taxation Department	20 Barrack Street Perth 6000
Environmental Protection Authority	1 Mount Street Perth 6000	Technology and Industry Development Authority	170 St George's Terrace. Perth 6000
Department of Fisheries	108 Adelaide Terrace. Perth 6000	Department of Transport	68 St George's Terrace. Perth 6000
Government Employees Superannuation Board	10 Kings Park Road Perth 6000	Treasury Department of Western Australia	197 St George's Terrace. Perth 6000
Health Department of Western Australia	189 Royal Street East Perth 6004	Water Authority of Western Australia	629 Newcastle Street Leederville 6007
Homeswest	99 Plain Street East Perth 6004	Worker's Compensation and Rehabilitation Commission	15 Rheola Street West Perth 6005
Department of Land Administration	Cathedral Avenue Perth 6000	Western Australian Electoral Commission	480 Hay Street Perth 6000
Department of Executive Personnel	111 St George's Terrace. Perth 6000		

### Australian Government

A comprehensive guide to the organisation and functions of the Australian Government is given in the *Commonwealth Government Directory*, including an outline of the activities of each Department of State together with similar information concerning Boards, Committees, Councils, Commissions and other Instrumentalities. A list of Australian Government Departments, the principal matters dealt with by each Department, and details of the statutes administered by the relevant Federal Minister are

published from time to time in the *Commonwealth of Australia Gazette*.

### THE JUDICATURE

The two major factors in the development of the Australian legal system have been its British origin and the Commonwealth Constitution of 1900. This Statute, an Act of the Imperial Parliament in London, limited the legislative power of State parliaments in some respects and created a federal legislature. Since 1942, however, the Imperial Parliament can legislate for Australia

only at Australia's request. The sources of Australian law of today are, therefore, found in Commonwealth and State legislation, in some Imperial legislation, and in the common law. Independence of the judiciary is an essential part of the Australian legal system.

Particulars of these and other Western Australian courts, and Commonwealth courts appear in Chapters 9 and 21.

**TABLE 5.9 – THE JUDICIARY**  
**At January 1989**

<i>Office</i>	<i>Name</i>
<b>SUPREME COURT OF WESTERN AUSTRALIA</b>	
Chief Justice	The Honourable D.K. Malcolm,
Senior Puisne Judge	The Honourable A.R.A. Wallace
Puisne Judges	The Honourable P.F. Brinsden The Honourable C.H. Smith The Honourable G.A. Kennedy The Honourable W.P. Pidgeon The Honourable B.W. Rowland The Honourable E.M. Franklyn The Honourable P.L. Seaman The Honourable R.D. Nicholson The Honourable T.A. Walsh
Master	Mr G.T. Staples Mr K. White Mr M.S. Ng
<b>THE DISTRICT COURT OF WESTERN AUSTRALIA</b>	
Chief Judge	His Honour Judge D.C. Heenan
Judges	His Honour Judge I.R. Gunning His Honour Judge B.T. O'Dea His Honour Judge F.J. Whelan His Honour Judge K.J. Hammond His Honour Judge G.T. Sadleir His Honour Judge N.H.S. Clarke His Honour Judge A. Kennedy His Honour Judge P.J. Healy His Honour Judge H. Jackson His Honour Judge R. Keall His Honour Judge R. Viol His Honour Judge J. Barlow His Honour Judge P.J. Williams His Honour Judge D.D. Charters
<b>THE FAMILY COURT OF WESTERN AUSTRALIA</b>	
Chairman of Judges	The Honourable A.J. Barblett
Judges	His Honour Judge I.W.P. McCall His Honour Judge D.F. Connor His Honour Judge G.E.S. Ferrier His Honour Judge D.R. Anderson

### **STATE REPRESENTATION OVERSEAS AND IN OTHER STATES**

Western Australia has been represented in the United Kingdom by an Agent General since 1892, the first appointment to the post being that of Sir Malcolm Fraser. An Office is maintained at Western Australia House, 115 Strand, London, W.C.2. Its functions include the representation of all Government Departments which have business

in Britain and Europe, the purchase of government stores and equipment, the attraction of migrants, the encouragement of overseas private investment in Western Australia, and the provision of various types of assistance to visitors from Western Australia. In addition, the Office acts as agent for the State Treasury and as a receiving agency for The Rural and Industries Bank of Western Australia. Western Australia's European Public Relations Office and its tourist officer for the United Kingdom and Europe also operate from Western Australia House. The Agent General for Western Australia, Mr R. Davies, is the personal representative in Britain of the State Premier.

The State is also represented in Japan, an Office being maintained by the Western Australian Government at Sankaido Building, 9–13 Akasaka, 1-CHOME, Minato-Ku 107, Tokyo.

The Western Australian Tourism Commission has travel centres in the Eastern States and overseas. Those offices are located at:

108 King William Street, Adelaide;

35 Elizabeth Street, Melbourne;

92 Pitt Street, Sydney;

307 Queen Street, Brisbane;

Western Australia House, 115 Strand, London W.C. 2, United Kingdom;

Unit 03–03, Thong Sia Building 30 Bideford Rd, Singapore;

15th Floor, Quay Towers, 29 Customs Street West, Auckland, New Zealand;

2121 Avenue of the Stars, Suite 1210, Century City, Los Angeles, U.S.A.;

8th Floor, Sankaido Building, 9–13 Akasaka, 1-CHOME, Minato-Ku 107, Tokyo, Japan;

615 Swire House, 11 Chater Rd, Hong Kong Central, Hong Kong;

6th Floor, UBN Tower Letterbox 51, 10 Jalan P Ramlee 50250, Kuala Lumpur, Malaysia.

Whilst primarily concerned with promoting and facilitating travel to Western Australia, travel centre managers also provide liaison on behalf of Government Departments which have business in these cities.

There are thirty countries represented in Western Australia by a consular agent, vice-consul, consul, consul-general, or trade representative.

TABLE 5.10 – OVERSEAS REPRESENTATION IN  
WESTERN AUSTRALIA

<i>Country</i>	<i>Address of representative</i>	<i>Country</i>	<i>Address of representative</i>
Austria	T.A. Holmes, Honorary Consul, 95 St George's Terrace, Perth, 6000.	Nepal	H.L. Roberts, Honorary Consul-General 195 Adelaide Terrace, Perth, 6000.
Belgium	L. Bace, Honorary Consul, 16 St George's Terrace Perth 6000	Netherlands	T.C. Dercksen, Honorary Consul, 83 Mill Point Rd., South Perth, 6151.
Canada	J. Lyall, Hon. Consul 19/44 St George's Terrace Perth 6000	New Zealand	D. Robertson, Consul, 16 St George's Terrace, Perth, 6000.
Denmark	P.S. Rasmussen, Honorary Consul, 19 Phillimore St., Fremantle, 6160.	Norway	P.G. Lynn, Honorary Consul, 11 Cliff St., Fremantle, 6160.
Finland	R.C. Mattiske, Honorary Consul, 47 Allerton Way, Booragoon, 6154.	Pakistan	I.M. Parkes, Honorary Consul, 7 Kitchener Way, Victoria Park, 6100.
France	J. Kerr, Honorary Consul, 2nd Floor, 442 Murray Street, Perth, 6000.	Philippines	B.V. Richards, Honorary Consul, 16 Cavella Court, Willetton 6155
Germany, Federal Republic of	A.E. Blankensee, Honorary Consul, 16 St George's Terrace, Perth, 6000.	Portugal	J.M. Do Rosario E Silva, Honorary Consul 242 Soult Terrace, Fremantle 6160
Greece	A. Callidopoulos, Consul, 16 St George's Terrace, Perth, 6000.	Seychelles	G.F. Robert, Honorary Consul, 271 Canning Rd., Lesmurdie, 6076
Honduras	E. de Tapero de Newmann, Honorary Consul, 44 Troy Terrace., Daglish, 6008.	Spain	A. Quintela, Honorary Consul, 140 St George's Terrace, Perth, 6000.
Indonesia	R.C.H. Manser, Honorary Consul, 4 Judd St., South Perth, 6151.	Sweden	H. Morgan, Honorary Consul, 849-851 Wellington St., Perth, 6000.
Ireland	G.M. Nolan, Honorary Consul-General, 10 Lilika Rd, City Beach, 6015.	Switzerland	R. Abplanalp, Honorary Consul, 5 Marie Way, Kalamunda, 6076.
Italy	V Schioppa, Consul, 31 Labouchere Rd., South Perth, 6151.	Thailand	Brigadier W.D. Jamieson, Honorary Consul-General, 135 Victoria Avenue, Dalkeith, 6009.
Japan	N Yabata, O.B.E., Consul-General, 221 St George's Terrace, Perth, 6000.	United Kingdom	L. Boyes, Consul-General, 95 St George's Terrace, Perth, 6000.
Malaysia	A.B. Junnus, Consul, 195 Adelaide Terrace, Perth, 6000.	United States of America	W.H. Itoh, Consul-General, 16 St George's Terrace, Perth 6000
Malta	Dr. A.V. Scibberras M.D., Honorary Consul, Bassendean Medical Centre, 1 Old Perth Rd., Bassendean, 6000.	Yugoslavia	D Tomisic, Consul, 24 Colin St., West Perth, 6005.

## THE LOCAL GOVERNMENT SYSTEM

The function of local government in Western Australia is performed by a number of Councils (or, in special circumstances, by Commissioners appointed by the Governor) exercising powers conferred by the Parliament of the State. Each of the Councils consists of members elected by a local community and is responsible for the provision of many of the services necessary for the organisation and welfare of the community which it represents.

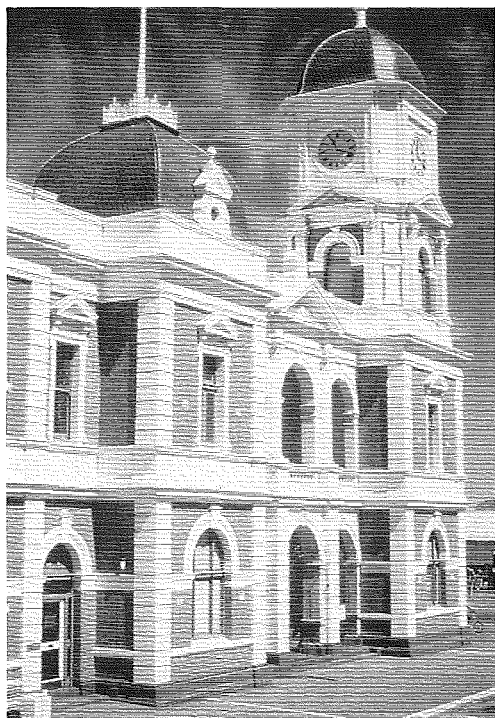
## Local government districts

On presentation of a petition signed by a prescribed minimum number of electors, the Governor may, by Order, constitute any part of the State as a Town; constitute as a new Shire any part of an existing Shire; divide a Shire into two or more Shires; sever a portion of a district and annex the portion to an adjoining district, or constitute the portion as a new Town or Shire; divide a district into wards; or abolish a district and dissolve the local governing authority. In

some cases the electors of a district have the right to demand that a poll be held on the question of boundary changes.

On the petition of the local authority concerned, the Governor may by Order declare to be a City any district which satisfies certain specified requirements. These requirements are that during the three years immediately preceeding the declaration, it shall have maintained a population of not less than 30,000 persons if situated in the metropolitan area as declared for the purposes of the Act, or not less than 20,000 persons if situated outside that area; and have maintained a gross revenue of \$200,000 for each of the three years. In addition the district must be clearly distinguishable as a centre of population having a distinct civic centre with adequate halls and cultural facilities, and must have sufficient residential, commercial, and industrial centres to justify its declaration as a separate city.

On 1 February 1989 the Town of Kalgoorlie and the Shire of Boulder were amalgamated into the City of Kalgoorlie/Boulder. There are now eighteen cities, eleven towns and 109 shires in Western Australia.



The Town Hall, Boulder

*Photograph: Western Australian Tourism Commission*



Kalgoorlie

*Photograph: Western Australian Tourism Commission*

The *Local Government Act 1960* establishes a Local Government Boundaries Commission of three members. The Minister may refer to the Commission any question concerning the constitution or alteration of the constitution of local government districts. Every case where authorities are unable to agree on a matter of amalgamation or severance of territory must be referred to the Commission.

The boundaries of local government districts as they existed at 30 June 1988 are delineated on the maps of the State inside the back cover and the names and designations as at that date are given in the lists at the end of this Chapter.

### **Constitution and electoral provisions**

The provisions of the Local Government Act relating to the composition of a Council require that the minimum number of members be five with no limit set for the maximum number.

Provision is made for local government elections to be held on the first Saturday in May of each year but in specified circumstances the Governor may, by proclamation, appoint a Saturday in May, later than the first Saturday, to be the election date. Voting is not compulsory. Membership of a Council is elective in all cases, the qualified electors being adult Australian citizens, resident in the district and enrolled for the Legislative Assembly, or who own or occupy rateable land in the district. The preferential system of voting is used and representation is generally on the basis of

wards into which the district may be divided. Each elector is entitled to one vote. Subject to disqualification on certain specified grounds, all electors, other than corporation nominees, are eligible for election to the Council of the district whether as Mayor, President or councillor.

The term of office of a Mayor or a President is three years if elected by the electors of the district, or one year if elected by the Council. Councillors are elected for a term of three years, as near as practicable to one-third of their number retiring each year. On the expiration of their term of office all members, including the Mayor and the President, are eligible for re-election if not subject to any of the disqualifications contained in the Act.

### Functions of Local Authorities

The functions and powers of local authorities are extremely diverse in character. They are prescribed in detail in the Local Government Act and some of the more important of them are referred to in later Chapters of the Western Australian Year Book. For example, reference to local government activity in the fields of road construction and maintenance will be found in Chapter 23; the provision of parks, gardens and recreation grounds in Chapter 11; libraries in Chapter 11; public transport facilities in Chapter 19; water supplies in Chapter 12; and town planning and building control in Chapter 18. Among the many other powers of local authorities are those relating to hospitals and nursing services, kindergartens, hostels for school children, community centres, dental clinics, infant and maternal health centres, day nurseries, control of dogs, jetties, swimming pools, sanitation and disposal of refuse, fire prevention, eradication of noxious weeds and vermin, aerodromes, abattoirs, quarries, pounds and cemeteries. Under the provisions of the Health Act local authorities are responsible for certain aspects of health administration.

### Financial Provisions

Local government authorities have four major sources of finance. They are moneys received from rates, loans, government grants and personal income tax entitlements. Financial powers of local authorities, although derived mainly from the Local Government Act, are also provided by other Statutes, including the Health Act, the Fire Brigades Act, the Cemeteries Act, and the Library Board of Western Australia Act.

**Rates.** The general rate for a local government district in any year is determined by dividing the sum required to make up the difference between anticipated expenditure and estimated revenue from sources other than rates for that year by the total value of rateable property in the district. However, a Council may impose a rate which would yield less than the amount required to balance its budget, subject to approval by the Minister. In assessing the value of rateable property, every local authority must adopt valuations made by the Valuer-General under the provisions of the *Valuation of Land Act 1979*. The *Land Valuation Tribunals Act 1978* provides for the constitution of Land Valuation Tribunals, to which appeals may be made on matters concerning valuations of property.

Valuations may be on the basis of either 'unimproved value' or 'gross rental value'. The unimproved value generally represents the price which the rated land might be expected to realise if sold on the open market and, as the term implies, excludes any improvements. The gross rental value is an estimate of the gross rental value of the property including improvements. Generally, City Councils and Town Councils are required to assess the general rate on the basis of gross rental value, and Shire Councils on unimproved value. Councils may charge a penalty on unpaid rates or offer a discount for early payment. The prescribed maximum percentage for penalty or discount is 10 per cent.

**Loans.** Local authorities are authorised to raise loans for works and undertakings and for the liquidation of existing loan debts. A Council may, with the written consent of the Minister, obtain advances from a bank for a budget deficiency, for the installation of sewerage connections and septic tanks, and for other work approved by the Governor.

Certain of the works and undertakings for which loan moneys may be used are specified in the Local Government Act. They include the construction of streets, roads and bridges, sewers, drains and water works; the erection or purchase of electric lighting plant, gas works and stone quarries; the provision of hostels for school children, libraries and other recreational facilities; the construction of civic and other buildings; and the purchase of land, materials and equipment. Where a particular work or undertaking is not specified in the Act the Governor may approve of it as a project for which money may be borrowed.

**Government grants.** Government grants constitute an important source of revenue for local

government authorities. These are mainly specific purpose payments for road works, further details of which are provided in Chapter 23.

**Personal income tax entitlements.** The *Local Government (Personal Income Tax Sharing) Act 1976* requires each State to allocate not less than 30 per cent of the funds among local government authorities on a population basis, but account may also be taken of the area of the authority, population density or any other matter agreed upon between the Commonwealth and the State. The remaining funds are to be allocated having regard to the special needs and disabilities of local authorities.

**General.** The financial transactions of local government authorities are subject to annual audit either by an auditor (or auditors) appointed by the Council or by the Auditor-General or persons appointed by him. To qualify for the office of auditor, a person must be a member of a specified institute or society of accountants and be registered as an auditor under the Companies Act. Appointment is for a term not exceeding two years, at the end of which time the holder of the office is eligible for reappointment.

The financial year for all Councils ends on 30 June.

Details of the revenue and expenditure of local authorities during the three year period ending with the financial year 1986-87 are given in the section *Local Government Finance* in Chapter 23.

A more comprehensive description of the local government system is contained in Chapter 5 of the *Western Australian Year Book*, No. 24—1986.

## STATISTICAL DIVISIONS

The local government districts are used as the basis of presentation of data derived not only from the population census but also from many of the regular statistical collections. Information presented in this way is valuable when considering activities in particular local government areas but is often more detailed than is required for a broader geographical assessment. For this reason, the local government districts are combined into statistical divisions which provide significant areas for the publication of statistics in a convenient summary form.

**STATISTICAL DIVISIONS (a)**  
**with component Statistical Local Areas: at 30 June 1988**

<i>PERTH</i>	<i>SOUTH-WEST (continued)</i>	<i>UPPER GREAT SOUTHERN (continued)</i>	<i>CENTRAL</i>
<b>CENTRAL METROPOLITAN</b>	<b>PRESTON</b>	<b>LAKES</b>	<b>GASCOYNE</b>
Claremont (T)	Bunbury (C)	Corrigin (S)	Camarvon (S)
Cottesloe (T)	Capel (S)	Kondinin (S)	Exmouth (S)
Mosman Park (T)	Collie (S)	Kulin (S)	Shark Bay (S)
Nedlands (C)	Dardanup (S)	Lake Grace (S)	Upper Gascoyne (S)
Peppermint Grove (S)	Donnybrook-		
Perth (C) - Inner	Balingup (S)		
Perth (C) - North	Harvey (S)		
Perth (C) - Outer		<b>MIDLANDS</b>	
Perth (C) - South		<b>MOORE</b>	<b>CARNEGIE</b>
Perth (C) -	<b>VASSE</b>	Chittering (S)	Cue (S)
Wembley-Coastal	Augusta-Margaret	Dandaragan (S)	Meekatharra (S)
	River (S)	Gingin (S)	Mount Magnet (S)
	Busselton (S)	Moora (S)	Murchison (S)
		Victoria Plains (S)	Sandstone (S)
<b>EAST METROPOLITAN</b>	<b>BLACKWOOD</b>	<b>AVON</b>	Wiluna (S)
Bassendean (T)	Boyup Brook (S)	Beverley (S)	Yalgoo (S)
Bayswater (C)	Bridgetown-	Cunderdin (S)	
Kalamunda (S)	Greenbushes (S)	Dalwallinu (S)	<b>GREENOUGH RIVER</b>
Mundaring (S)	Manjimup (S)	Dowerin (S)	Carnamah (S)
Swan (S)	Nannup (S)	Goomalling (S)	Chapman Valley (S)
		Koorda (S)	Coorow (S)
<b>NORTH METROPOLITAN</b>	<b>LOWER GREAT SOUTHERN</b>	Northam (T)	Geraldton (C)
Stirling (C) - Central	<b>PALLINUP</b>	Northam (S)	Greenough (S)
Stirling (C) - West	Broomehill (S)	Quairading (S)	Irwin (S)
Stirling (C) -	Gnowangerup (S)	Tammin (S)	Mingenew (S)
South-Eastern	Jerramungup (S)	Toodyay (S)	Morawa (S)
Wanneroo (C)	Katanning (S)	Wongan-Ballidu (S)	Mullewa (S)
	Kent (S)	Wyalkatchem (S)	Northampton (S)
<b>SOUTH-WEST METROPOLITAN</b>	Kojonup (S)	York (S)	Perenjori (S)
Cockburn (C)	Tambellup (S)	<b>CAMPION</b>	Three Springs (S)
East Fremantle (T)	Woodanilling (S)	Bruce Rock (S)	
Fremantle (C) -		Kellerberrin (S)	<b>PILBARA</b>
Inner	<b>KING</b>	Merredin (S)	<b>DE GREY</b>
Fremantle (C) -	Albany (T)	Mount Marshall (S)	East Pilbara (S)
Remainder	Albany (S)	Mukinbudin (S)	Port Hedland (S)
Kwinana (T)	Cranbrook (S)	Narembeen (S)	
Melville (C)	Denmark (S)	Nungarin (S)	<b>FORTESCUE</b>
Rockingham (S)	Plantagenet (S)	Trayning (S)	Roebourne (S)
		Westonia (S)	Ashburton (S)
<b>SOUTH-EAST METROPOLITAN</b>	<b>UPPER GREAT SOUTHERN</b>	Yilgarn (S)	
Armadale (C)	<b>HOTHAM</b>	<b>SOUTH-EASTERN</b>	<b>KIMBERLEY</b>
Belmont (C)	Boddington (S)	<b>LEFROY</b>	<b>ORD</b>
Canning (C)	Brookton (S)	Boulder (S)	Halls Creek (S)
Gosnells (C)	Cuballing (S)	Coolgardie (S)	Wyndham-East
Serpentine-	Dumbleyung (S)	Kalgoorlie (T)	Kimberley (S)
Jarrahdale (S)	Narrogin (T)	Laverton (S)	
South Perth (C)	Narrogin (S)	Leonora (S)	
	Pingelly (S)	Menzies (S)	<b>FITZROY</b>
<b>SOUTH-WEST</b>	Wagin (S)	<b>JOHNSTON</b>	Broome (S)
<b>DALE</b>	Wandering (S)	Dundas (S)	Derby-West
Mandurah (C)	West Arthur (S)	Esperance (S)	Kimberley (S)
Waroona (S)	Wickepin (S)	Ravensthorpe (S)	
Murray (S)	Williams (S)		

Statistical divisions are indicated thus: *SOUTH-WEST*; sub-divisions thus: *BLACKWOOD*; statistical local areas thus: Manjimup (S). Cities are marked (C), Towns (T) and Shires (S).

## LOCAL GOVERNMENT AREAS AT 30 JUNE 1988

Local government area (a)	Statistical division in which situated	Local government area (a)	Statistical division in which situated
Albany (T)	Lower Great Southern	Lake Grace	Upper Great Southern
Albany	Lower Great Southern	Laverton	South-Eastern
Armadale (C)	Perth	Leonora	South-Eastern
Ashburton	Pilbara	Mandurah(T)	South-West
Augusta-Margaret River	South-West	Manjimup	South-West
Bassendean (T)	Perth	Meekatharra	Central
Bayswater (C)	Perth	Melville (C)	Perth
Belmont (C)	Perth	Menzies	South-Eastern
Beverley	Midlands	Merredin	Midlands
Boddington	Upper Great Southern	Mingenew	Central
Boulder		Moora	Midlands
Boypup Brook	South-West	Morawa	Central
Bridgetown-Greenbushes	South-West	Mosman Park (T)	Perth
Brookton	Upper Great Southern	Mount Magnet	Central
Broome	Kimberley	Mount Marshall	Midlands
Broomehill	Lower Great Southern	Mukinbudin	Midlands
Bruce Rock	Midlands	Mullewa	Central
Bunbury (C)	South-West	Mundaring	Perth
Busselton	South-West	Murchison	Central
Canning (C)	Perth	Murray	South-West
Capel	South-West	Nannup	South-West
Carnamah	Central	Narembeen	Midlands
Carnarvon	Central	Narrogin (T)	Upper Great Southern
Chapman Valley	Central	Narrogin	Upper Great Southern
Chittering	Midlands	Nedlands (C)	Perth
Claremont (T)	Perth	Northam (T)	Midlands
Cockburn (C)	Perth	Northam	Midlands
Collie	South-West	Northampton	Central
Coolgardie	South-Eastern	Nungarin	Midlands
Coorow	Central	Peppermint Grove	Perth
Corrigin	Upper Great Southern	Perenjori	Central
Cottesloe (T)	Perth	Perth (C)	Perth
Cranbrook	Lower Great Southern	Pingelly	Upper Great Southern
Cuballing	Upper Great Southern	Plantagenet	Lower Great Southern
Cue	Central	Port Hedland(S)	Pilbara
Cunderdin	Midlands	Quairading	Midlands
Dalwallinu	Midlands	Ravensthorpe	South-Eastern
Dandaragan	Midlands	Rockingham(C)	Perth
Dardanup	South-West	Roebourne	Pilbara
Denmark	Lower Great Southern	Sandstone	Central
Derby-West Kimberley	Kimberley	Serpentine-Jarrahdale	Perth
Donnybrook-Balingup	South-West	Shark Bay	Central
Dowerin	Midlands	South Perth (C)	Perth
Dumbleyung	Upper Great Southern	Stirling (C)	Perth
Dundas	South-Eastern	Subiaco (C)	Perth
East Fremantle (T)	Perth	Swan	Perth
East Pilbara	Pilbara	Tambellup	Lower Great Southern
Esperance	South-Eastern	Tammin	Midlands
Exmouth	Central	Three Springs	Central
Fremantle (C)	Perth	Toodyay	Midlands
Geraldton (C)	Central	Trayning	Midlands
Gingin	Midlands	Upper Gascoyne	Central
Gnowangerup	Lower Great Southern	Victoria Plains	Midlands
Goomalling	Midlands	Wagin	Upper Great Southern
Gosnells (C)	Perth	Wandering	Upper Great Southern
Greenough	Central	Wanneroo (C)	Perth
Halls Creek	Kimberley	Waroona	South-West
Harvey	South-West	West Arthur	Upper Great Southern
Irwin	Central	Westonia	Midlands
Jerramungup	Lower Great Southern	Wickepin	Upper Great Southern
Kalamunda	Perth	Williams	Upper Great Southern
Kalgoorlie(T)	South-Eastern	Wiluna	Central
Katanning	Lower Great Southern	Wongan-Ballidu	Midlands
Kellerberrin	Midlands	Woodanilling	Lower Great Southern
Kent	Lower Great Southern	Wyalkatchem	Midlands
Kojonup	Lower Great Southern	Wyndham-East Kimberley	Kimberley
Kondinin	Upper Great Southern	Yalgoo	Central
Koorda	Midlands	Yilgarn	Midlands
Kulin	Upper Great Southern	York	Midlands
Kwinana (T)	Perth		

(a) Shire, unless marked (C) indicating City, or (T) indicating Town.



# Chapter 6

## POPULATION AND VITAL STATISTICS

### Population

The State of Western Australia, although comprising almost one-third of the total area of Australia, contains only about one-eleventh of the population.

At the end of 1829, the year of establishment of the Colony, there were 1,000 non-Aboriginal persons in Western Australia. Estimates of the number of Aborigines in the State at colonisation vary. In the *Western Australian Year Book*, No. 24—1984, Chapter 1, it is noted that ‘There has, therefore, been some consensus that the population prior to European settlement was in the 50,000 to 60,000 bracket.’ Progress in the early years was slow, and in 1849 the population was still less than 5,000. Transportation of convicts, begun in the following year, resulted in some acceleration, but it was not until the discovery of gold in the Kimberley in 1885 and the rich finds at Coolgardie in 1892 and at Kalgoorlie in 1893 that any marked increase took place. This development was so rapid that, in the last decade of the century, the non-Aboriginal population was almost quadrupled, from 48,500 at the end of 1890 to 180,000 in 1900, representing an average annual rate of increase of 14.01 per cent. The rate of growth in those years has never been approached in the present century, but the average annual rate of increase of Western Australia’s population from the Census of 1901 to June 1987, 2.46 per cent, has been higher than that of any other State and of Australia as a whole (1.71 per cent).

TABLE 6.1 – POPULATION OF WESTERN AUSTRALIA AND AUSTRALIA (a)

Year ended 30 June	Western Australia (Persons)	Australia (Persons)	Proportion of Australia (per cent)	Western Australia	
				Masculinity Ratio (b)	Annual average growth rate (per cent)
1971 (c)	1,053,834	13,067,265	8.06	104.83	6.30
1976 (c)	1,178,342	14,033,083	8.40	103.73	2.03
1981 (c)	1,300,056	14,923,260	8.71	102.25	2.44
1985	1,418,564	15,788,312	8.98	101.81	1.96
1986 (c)	1,459,019	16,018,350	9.11	101.83	2.85
1987	1,500,507	16,263,319	9.23	101.94	2.84

(a) Estimated resident population. (b) Number of males per 100 females. (c) Census date.

In the decade from 30 June 1977 to 30 June 1987 the State’s annual rate of increase has been 2.22 per cent compared with a national figure of 1.37 per cent.

#### ESTIMATES OF POPULATION

The conceptual basis for population estimation in Australia changed in June 1981. Estimates since this date, together with revisions back to June 1971, have been made on the basis of the State of usual residence of persons. Census date estimates

are derived by adjusting census count, place of usual residence data for under enumeration and adding residents who are temporarily overseas on census night.

For dates other than those of the periodic censuses of population, estimates are based on records of births and deaths and movements of population interstate and overseas. Estimates of the population of Australia and of each of the States and Territories are prepared by the Australian Statistician at 31 March, 30 June, 30 Sept–

ember and 31 December in each year. Because the available records of interstate movement are incomplete, these intercensal estimates as they apply to States and Territories are approximate and are revised when the results of the next census become known.

Further information on estimated resident population is contained in the publication *Population Estimates: An outline of the New Conceptual Basis of ABS Population Estimates* (Catalogue No. 3216.0) issued by the Australian Statistician, Canberra.

### MEAN POPULATION

It is often useful to relate a given characteristic to population in order to express it in *per capita* terms or as 'per head of population.' Mean population is used for this purpose. The formula to calculate mean population is:

$$1/12 (a + 4b + 2c + 4d + e)$$

where *a* represents the population at the beginning of the year and *b*, *c*, *d* and *e* the populations at the end of the first, second, third and fourth quarters respectively.

DIAGRAM 6.1  
ESTIMATED RESIDENT POPULATION  
AGE LAST BIRTHDAY, BY SEX, 30 JUNE 1987

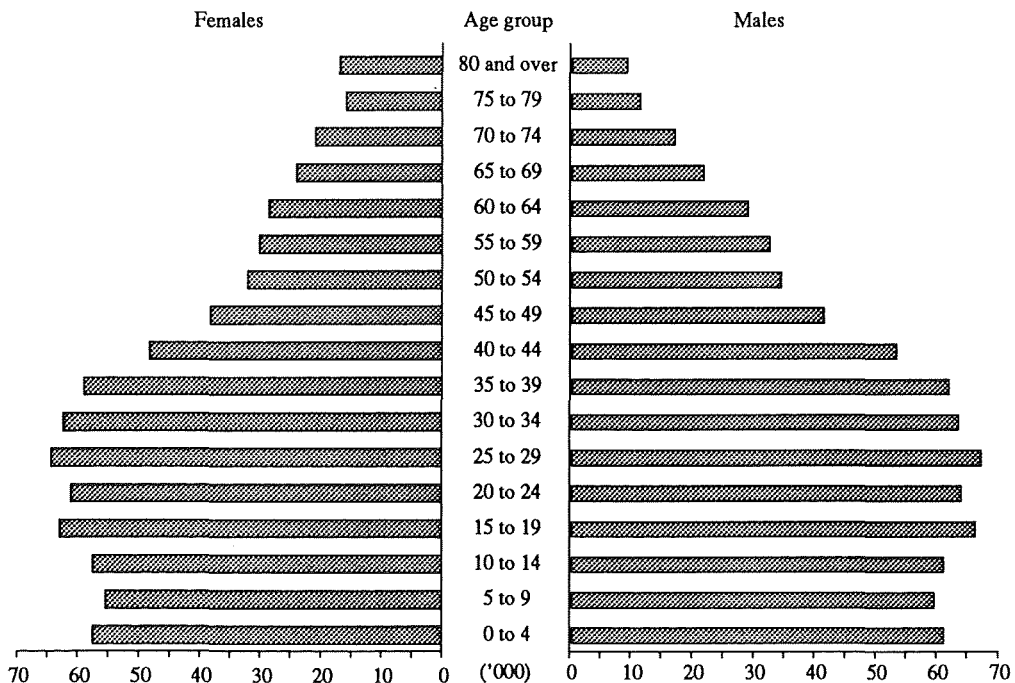


TABLE 6.2 – ESTIMATED RESIDENT POPULATION  
(\*000)

Year	Population at end of year			Increase during year			Mean population		
				Natural increase	Estimated net migration	Estimated total increase			
	Males	Females	Persons	(a)	(b)	(c)	Males	Females	Persons
YEAR ENDED 30 JUNE									
1981	657.2	642.8	1,300.1	12.9	17.0	31.0	649.2	634.8	1,284.0
1986	636.1	722.9	1,459.0	14.3	22.5	30.5	725.2	712.3	1,437.5
1987	757.5	743.0	1,500.5	14.7	26.8	41.5	746.7	733.0	1,479.8
YEAR ENDED 31 DECEMBER									
1981	666.7	652.2	1,319.0	13.9	21.1	36.7	657.9	643.3	1,301.2
1986r	746.6	732.9	1,479.5	14.9	25.6	40.5	735.9	722.7	1,458.5
1987p	767.5	752.4	1,519.9	14.5	26.0	40.4	757.2	742.9	1,500.1

(a) Excess of births registered over deaths registered by State of usual residence. (b) Interstate and overseas. (c) Differences between the sum of natural increase and net migration, and total increase are due to distribution of the intercensal discrepancy.

### POPULATION IN STATISTICAL LOCAL AREAS

Table 6.3 shows the estimated resident population in Statistical Local Areas. The names and designations are as they existed at 30 June 1987. The Cities of Fremantle, Perth and Stirling are comprised of a number of Statistical Local Areas. Statistical Local Areas are marked (C) for City, (T) for Town or (S) for Shire.

TABLE 6.3 – ESTIMATED RESIDENT POPULATION IN  
STATISTICAL LOCAL AREAS  
(persons)

Statistical Local Area	At 30 June	
	1986(a)	1987p
Albany (S)	8,579	8,750
Albany (T)	14,651	14,755
Armada (C)	43,754	45,200
Augusta-Margaret River (S)	5,033	5,251
Bassendean (T)	13,555	13,673
Bayswater (C)	43,901	44,666
Belmont (C)	29,482	29,540
Beverley (S)	1,502	1,485
Boddington (S)	911	1,059
Boulder (S)	13,225	13,707
Boyup Brook (S)	1,859	1,850
Bridgetown-Greenbushes (S)	3,536	3,601
Brookton (S)	1,093	1,060
Broome (S)	6,253	6,505
Broomehill (S)	608	593
Bruce Rock (S)	1,298	1,306
Bunbury (C)	24,731	25,370
Busselton (S)	11,933	13,376
Canning (C)	64,406	66,576
Capel (S)	3,983	4,177
Camamah (S)	1,418	1,433
Camarvon (S)	7,439	7,590
Chapman Valley (S)	771	773
Chittering (S)	1,409	1,485
Claremont (T)	8,560	8,652
Cockburn (C)	41,916	44,692
Collie (S)	9,674	9,715
Coolgardie (S)	5,190	5,157
Coorow (S)	1,393	1,431
Corrigin (S)	1,450	1,440

TABLE 6.3 – ESTIMATED RESIDENT POPULATION IN  
STATISTICAL LOCAL AREAS (continued)  
(persons)

Statistical Local Area	At 30 June	
	1986(a)	1987p
Cottesloe (T)	7,266	7,273
Cranbrook (S)	1,265	1,256
Cuballing (S)	636	644
Cue (S)	544	579
Cunderdin (S)	1,484	1,462
Dalwallinu (S)	1,779	1,801
Dandaragan (S)	2,128	2,281
Dardanup (S)	4,442	4,522
Denmark (S)	2,757	2,887
Derby-West Kimberley (S)	6,846	7,138
Donnybrook-Balingup (S)	3,763	3,827
Dowerin (S)	961	961
Dumbleyung (S)	1,021	1,004
Dundas (S)	2,275	2,305
East Fremantle (T)	6,026	6,098
East Pilbara (S)	9,553	9,902
Esperance (S)	9,906	9,937
Exmouth (S)	2,398	2,505
Fremantle (C) (b)	23,540	23,750
Inner	683	691
Remainder	22,857	23,059
Geraldton (T)	19,923	20,222
Gingin (S)	2,589	2,756
Gnowangerup (S)	2,197	2,180
Goomalling (S)	1,206	1,194
Gosnells (C)	63,805	66,399
Greenough (S)	5,798	5,985
Halls Creek (S)	2,855	2,918
Harvey (S)	10,332	10,595
Irwin (S)	1,805	1,878
Jerramungup (S)	1,356	1,345
Kalamunda (S)	43,517	45,410
Kalgoorlie (T)	10,973	11,152
Katanning (S)	4,884	4,852
Kellerberrin (S)	1,436	1,420
Kent (S)	981	977
Kojonup (S)	2,479	2,439
Kondinin (S)	1,180	1,155
Koorda (S)	690	685
Kulin (S)	1,162	1,176
Kwinana (T)	14,838	15,193
Lake Grace (S)	2,151	2,114
Laverton (S)	1,358	1,409
Leonora (S)	2,265	2,259
Mandurah (S)	19,196	20,375

**TABLE 6.3 – ESTIMATED RESIDENT POPULATION IN STATISTICAL LOCAL AREAS (continued)**  
(persons)

Statistical Local Area	At 30 June	
	1986(a)	1987p
Manjimup (S)	9,582	9,618
Meekatharra (S)	1,416	1,654
Melville (C)	72,271	76,066
Menzies (S)	300	335
Merredin (S)	4,177	4,159
Mingenew (S)	693	702
Moora (S)	2,828	2,812
Morawa (S)	1,165	1,165
Mosman Park (T)	7,434	7,467
Mount Magnet (S)	1,167	1,262
Mount Marshall (S)	877	869
Mukinbudin (S)	855	828
Mullewa (S)	1,455	1,425
Mundaring (S)	26,069	27,102
Murchison (S)	132	144
Murray (S)	6,980	7,084
Nannup (S)	1,132	1,157
Narembeen (S)	1,180	1,188
Narrogin (S)	680	668
Narrogin (T)	5,043	5,062
Nedlands (C)	19,857	19,947
Northam (S)	2,451	2,517
Northam (T)	6,887	6,917
Northampton (S)	3,034	3,084
Nungarin (S)	313	318
Peppermint Grove (S)	1,587	1,612
Perenjori (S)	823	807
Perth (C) (b)	81,491	81,880
Inner	922	929
North	21,383	21,474
Outer	14,532	14,582
South	24,543	24,708
Wembley-Coastal	20,111	20,187
Pingelly (S)	1,371	1,369
Plantagenet (S)	4,201	4,161
Port Hedland (S)	13,426	13,623
Quairading (S)	1,243	1,257
Ravensthorpe (S)	1,409	1,400
Rockingham (S)	32,845	34,271
Roebourne (S)	16,572	17,741
Sandstone (S)	127	151
Serpentine-Jarrahdale (S)	6,523	6,891
Shark Bay (S)	1,081	1,097
South Perth (C)	34,307	34,439
Stirling (C) (b)	174,902	177,665
Central	98,767	100,753
West	54,855	55,463
South-Eastern	21,280	21,449

**TABLE 6.3 – ESTIMATED RESIDENT POPULATION IN STATISTICAL LOCAL AREAS (continued)**  
(persons)

Statistical Local Area	At 30 June	
	1986(a)	1987p
Subiaco (C)	15,424	15,544
Swan (S)	39,150	41,252
Tambellup (S)	849	827
Tammin (S)	550	552
Three Springs (S)	1,022	1,005
Toodyay (S)	1,831	1,945
Trayning (S)	565	555
Upper Gascoyne (S)	244	256
Victoria Plains (S)	1,243	1,225
Wagin (S)	2,206	2,159
Wandering (S)	402	397
Wanneroo (C)	133,924	142,191
Waroona (S)	2,585	2,584
West Arthur (S)	1,118	1,089
West Pilbara (S)	8,800	8,658
Westonia (S)	484	500
Wickepin (S)	951	928
Williams (S)	1,146	1,131
Wiluna (S)	1,801	1,832
Wongan-Ballidu (S)	1,922	1,909
Woodanilling (S)	435	433
Wyalkatchem (S)	786	766
Wyndham-East Kimberley (S)	6,049	6,180
Yalgoo (S)	270	285
Yilgarn (S)	2,039	2,069
York (S)	2,258	2,302
<b>Total</b>	<b>1,459,019</b>	<b>1,500,507</b>

(a) Census date. (b) Cities of Fremantle, Perth and Stirling are comprised of a number of Statistical Local Areas.

## CHARACTERISTICS OF THE POPULATION

**Age.** Table 6.4 shows the numbers and proportions of the population of Western Australia in selected age groups at 30 June 1981, 1986 and 1987. The age groups have been chosen as representing, in a general sense, such sectors as the pre-school population, children of school age, minors, the economically active population and those beyond normal working age.

**TABLE 6.4 – POPULATION IN SELECTED AGE GROUPS (a) AT 30 JUNE**  
(persons)

Age last birthday (years)	Number in each age group			Per cent of total		
	1981 (b)	1986 (b)	1987	1981 (b)	1986 (b)	1987
Under 6	126,105	139,386	142,966	9.70	9.55	9.53
6 – 12	166,126	159,596	161,721	12.78	10.94	10.78
13 – 15	234,663	238,139	237,676	18.05	16.32	15.84
Under 18	430,211	427,954	433,772	33.09	29.33	28.91
Under 21	500,662	499,402	507,795	38.51	34.23	33.84
15 – 44	621,087	713,068	738,172	47.77	48.87	49.19
15 – 64	848,697	974,768	1,007,103	65.28	66.81	67.12
65 and over	113,143	134,014	139,578	8.70	9.19	9.30
All ages	1,300,056	1,459,019	1,500,507	100.00	100.00	100.00

(a) Estimated resident population. (b) Census date.

**Religion and Birthplace.** The religion and birthplace of the population as recorded at the censuses of 1976, 1981 and 1986 are shown in Tables 6.5 and 6.6. The *Census and Statistics Act 1905* provides that there shall be no penalty for failure to answer the question on religion, and a statement to this effect is contained in the census schedule.

**TABLE 6.5 – RELIGION OF THE POPULATION (a)**  
(<sup>'000 persons</sup>)

Religion	Census 30 June		
	1976	1981	1986
Christian—			
Anglican	360.3	375.8	371.3
Baptist	14.4	15.9	16.9
Catholic	283.2	316.3	347.7
Churches of Christ	12.6	14.2	14.4
Methodist	77.0	51.2	(b)
Presbyterian	42.6	32.0	31.6
Uniting	(b)	(b)	82.9
Other	85.0	131.6	113.3
<b>Total Christian</b>	<b>875.2</b>	<b>937.1</b>	<b>978.0</b>
Non-Christian—			
Buddhist	(c)	(c)	7.2
Hebrew	2.9	3.2	3.9
Muslim	1.9	3.6	5.5
Other	3.3	4.9	6.4
<b>Total Non-Christian</b>	<b>8.1</b>	<b>11.6</b>	<b>23.0</b>
Non-classifiable	5.5	8.0	6.0
No religious denomination	119.5	172.1	235.3
Not stated	136.6	144.8	164.3
<b>Total</b>	<b>1,144.9</b>	<b>1,273.6</b>	<b>1,406.9</b>

(a) Figures as counted. (b) The Uniting Church in Australia, which was formed in June 1977 by the union of all the Methodist Churches and most of the Congregational and Presbyterian Churches, replaced the Methodist Church as a major category in the 1986 census. (c) Included in Other, Non-Christian.

**TABLE 6.6 – BIRTHPLACE OF THE POPULATION (a)**  
(<sup>'000 persons</sup>)

Birthplace	Census, 30 June		
	1976	1981	1986
Australia	832.4	911.0	997.8
Europe—			
United Kingdom and Eire	176.6	186.1	194.0
Italy	29.3	29.2	27.8
Netherlands	10.6	11.3	11.6
Yugoslavia	10.4	11.0	11.2
Germany	7.4	8.1	9.5
Poland	4.4	5.0	6.5
Greece	4.5	4.3	4.0
Other	15.3	15.8	17.3
<b>Total Europe</b>	<b>258.6</b>	<b>270.9</b>	<b>281.8</b>
Asia—			
India	9.9	10.1	10.6
Malaysia	4.0	5.4	8.7
Vietnam	—	2.8	5.9
Burma	4.0	4.4	4.5
Singapore	2.5	3.4	4.7
Other	8.9	11.4	16.0
<b>Total Asia</b>	<b>29.3</b>	<b>37.6</b>	<b>50.5</b>

**TABLE 6.6 – BIRTHPLACE OF THE POPULATION (a)**  
*continued*  
(<sup>'000 persons</sup>)

Birthplace	Census, 30 June		
	1976	1981	1986
Oceania—			
New Zealand	8.9	18.5	25.2
Other	1.1	1.6	3.4
<b>Total Oceania</b>	<b>9.9</b>	<b>20.0</b>	<b>28.6</b>
Africa—			
Republic of South Africa	2.3	4.2	6.3
Other	5.2	7.2	9.1
<b>Total Africa</b>	<b>7.6</b>	<b>11.4</b>	<b>15.4</b>
America—			
United States of America	3.6	4.1	5.1
Other	3.4	4.4	5.1
<b>Total America</b>	<b>7.1</b>	<b>8.5</b>	<b>10.1</b>
<b>Total (b)</b>	<b>1,144.9</b>	<b>1,273.6</b>	<b>1,406.9</b>

(a) Figures as counted. (b) Includes those born at sea and not stated.

### Aborigines and Torres Strait Islanders

The 1986 Census of Population and Housing counted 37,789 Aborigines and Torres Strait Islanders in Western Australia compared to 31,351 in 1981. The 1986 figure represented 2.7 per cent of all persons counted in the State.

Table 6.7 shows the age distribution of Aborigines and Torres Strait Islanders at 30 June 1976, 1981 and 1986. At 30 June 1986 nearly 63 per cent were less than 25 years of age and 3.5 per cent were 65 years of age or older. Equivalent figures for the total State population were 41.2 per cent and 9.3 per cent respectively. There were relatively less Aborigines and Torres Strait Islanders in each age group above 20–24 years than for the total State population.

**TABLE 6.7 – AGE DISTRIBUTION: ABORIGINES AND TORRES STRAIT ISLANDERS**  
(persons)

Age last birthday (years)	Census, 30 June		
	1976	1981	1986
0 – 4	3,890	4,108	5,349
5 – 9	4,146	4,580	4,702
10 – 14	3,823	4,616	4,866
15 – 19	3,006	3,827	4,712
20 – 24	2,298	3,089	4,098
25 – 29	1,836	2,367	3,182
30 – 34	1,347	1,772	2,472
35 – 39	1,157	1,421	1,933
40 – 44	1,029	1,259	1,499
45 – 49	885	1,099	1,193
50 – 54	657	910	1,025
55 – 59	501	575	800
60 – 64	457	590	615
65 – 69	479	478	523
70 and over	612	666	818
<b>Total</b>	<b>26,126</b>	<b>31,351</b>	<b>37,789</b>

Most Aborigines and Torres Strait Islanders, 22,605 or 60 per cent of the total in Western Australia, were located in urban centres at 30 June 1986. The principal urban and remote community population centres in which Aborigines and Torres Strait Islanders were counted in the 1986 Census are shown in Table 6.8.

**TABLE 6.8 – ABORIGINES AND TORRES STRAIT ISLANDERS: MAJOR POPULATION CENTRES  
CENSUS 30 JUNE 1986**

<i>Locality</i>	<i>Persons</i>
<b>URBAN CENTRES</b>	
Albany	377
Broome	1,359
Bunbury	590
Carnarvon	878
Derby	946
Fitzroy Crossing	662
Geraldton	1,290
Halls Creek	719
Kalgoorlie-Boulder	929
Kununurra	748

**TABLE 6.8 – ABORIGINES AND TORRES STRAIT ISLANDERS: MAJOR POPULATION CENTRES  
CENSUS 30 JUNE 1986 (continued)**

<i>Locality</i>	<i>Persons</i>
<b>URBAN CENTRES (continued)</b>	
Kwinana	354
Meekatharra	373
Mullewa	318
Northam	301
Perth	8,830
Port Hedland	1,407
Roebourne	597
Wyndham	539
<b>REMOTE AREA COMMUNITIES</b>	
Balgo	443
Beagle Bay	241
Billiluna/Lake Gregory	256
Central Reserves	629
Gogo	259
Jigalong	353
La Grange	410
Looma	207
One Arm Point/Lombardina	413
Turkey Creek	258
Warburton	361

## Vital Statistics

Registration of births, deaths and marriages in Western Australia is compulsory. Particulars reported to District Registrars are sent to the Registrar General at Perth, where a central registry is maintained. Local registers are kept at each district office.

Births are required to be registered within sixty days of the event, and a fetal death (stillbirth) must be registered both as a birth and a death. Deaths are required to be registered within fourteen days. Marriage certificates must be lodged for registration within fourteen days of the date of marriage.

Statistics of births, deaths and marriages are prepared from registration documents.

### BIRTHS

The proportions of each sex born in 1981 and 1987 were relatively constant, although the percentage of males born in 1986 was slightly lower than in the other two years. Total births as a percentage of Mean Resident Population from 1.68 in 1981 fell to 1.66 in 1986 and 1.56 in 1987. The proportion of births that are ex-nuptial has increased over the period shown.

Table 6.10 shows total and ex-nuptial births registered according to age of mother. The figures show an overall decrease in the proportion of both total and ex-nuptial births to mothers under the age of 25 years, and an increase in the proportion of births to mothers in the age groups from 25 to 39 years. The most significant increase has been in ex-nuptial births to mothers in the 25–29 year age group. The proportion of ex-nuptial births to mothers in the under 25 years age groups is consistently higher than the proportion of total births to mothers in the same age groups. In the 25–29, 30–34 and 35–39 year age groups the situation is reversed.

**TABLE 6.9 – BIRTHS REGISTERED (a)**

<i>Particulars</i>	<i>1981</i>	<i>1986</i>	<i>1987</i>
Births (b)—			
Males	11,342	12,448	12,044
Females	10,535	11,788	11,288
Persons	21,877	24,236	23,332
Ex-nuptial	3,300	4,481	4,623
Proportion of total persons (per cent)	15.1	18.5	19.8

(a) Figures for 1981 are based on State of registration. Figures for 1986 and 1987 relate to state of usual residence of mother. (b) Includes ex-nuptial births.

**TABLE 6.10 – BIRTHS REGISTERED (a): AGE OF MOTHER**

Age of mother (years)	1981	1986	1987
<b>TOTAL BIRTHS (b)</b>			
Under 20	1,716	1,506	1,381
20 – 24	6,653	6,105	5,435
25 – 29	8,285	9,472	9,237
30 – 34	4,106	5,377	5,467
35 – 39	946	1,599	1,585
40 – 44	165	174	211
45 and over	6	7	11
Not stated	–	6	5
<b>Total</b>	<b>21,877</b>	<b>24,236</b>	<b>23,332</b>
<b>EX–NUPTIAL BIRTHS</b>			
Under 20	1,050	1,129	1,083
20 – 24	1,189	1,598	1,587
25 – 29	629	1,020	1,167
30 – 34	298	529	555
35 – 39	105	167	201
40 – 44	26	31	22
45 and over	–	3	3
Not stated	–	4	5
<b>Total</b>	<b>3,300</b>	<b>4,481</b>	<b>4,623</b>

(a) Figures for 1981 are based on State of registration. Figures for 1986 and 1987 relate to State of usual residence of mother. (b) Includes ex–nuptial births. (c) Less than 0.05.

**Ex–nuptial Live Births.** A birth is registered as ex–nuptial if the parents are not married to each other at the time of the confinement. Ex–nuptial

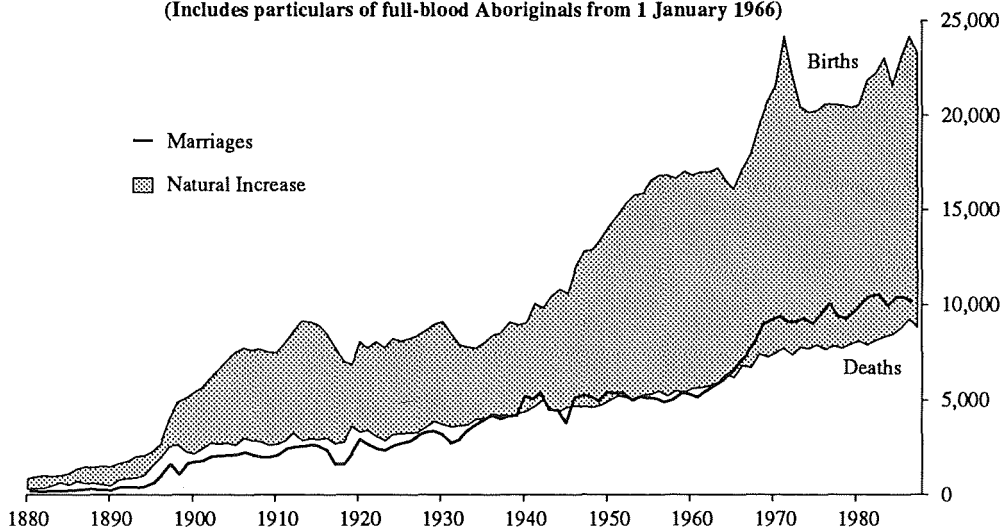
births in 1987 comprised 19.8 per cent of all live births registered.

**Legitimations.** Under the provisions of the *Marriage Act 1961* (Commonwealth) which came into operation on 1 September 1963, a child whose parents are not married to each other at the time of its birth becomes legitimised on the subsequent marriage of its parents. The legitimisation takes place whether or not there was a legal impediment to the marriage of the parents at the time of the child's birth, and whether or not the child was still living at the time of the marriage, or in the case of a child born before 1 September 1963, at that date.

**Age-specific Birth Rates.** As a measure of fertility, the crude birth rate has the advantage of simplicity in calculation. The data necessary for its computation are usually readily available from published statistics, and it is therefore useful in comparing the fertility of the populations of States and countries for which no additional data are available. However, it is of limited use since it does not take into account the important factors of age and sex composition of the population. Age-specific birth rates, which do have regard to these factors, therefore provide a better measure of fertility. Age-specific birth rates represent the number of births to women of specified ages per thousand women of those particular ages, and thus take cognisance of the variations in fertility experienced by women at the successive stages of their child-bearing life.

**DIAGRAM 6.2**

**BIRTHS, DEATHS AND MARRIAGES, 1880 to 1987**  
(Includes particulars of full-blood Aborigines from 1 January 1966)



**Gross and Net Reproduction Rates.** The gross reproduction rate is derived from fertility rates representing the number of *female* births to women of specified ages per thousand women of those particular ages. It provides a measure of the number of female children who would be born, on the average, to every woman assuming that she lives through the whole of the child-bearing period and that the basic fertility rates remain unaltered throughout.

The gross reproduction rate assumes that all females survive to the end of their child-bearing capacity. A more accurate measure, which takes into account the effect of mortality among women during this period, is the net reproduction rate. This rate represents the average number of female children who would be born to women during their lifetime if they were subject in each succeeding year of life to the fertility and mortality rates on which the calculation is based. The net reproduction rate is a measure of the number of women who, in the next generation, will replace the women of reproductive age in the current generation. It provides a useful indication of likely future population trends. A rate remaining stationary at unity indicates an ultimately static population. If a rate greater than unity is maintained, an ultimate increase of population will result, while a continuing rate less than unity will lead to an ultimate decline.

Table 6.11 provides comparative data for Western Australia and Australia on number of births, birth rates and reproductive rates for 1987. The figures show that the crude birth rate (the number of total births per thousand mean resident population) for Western Australia (15.5 per cent) is higher than for Australia as a whole (15.0 per cent). The percentage of ex-nuptial to total births in Western Australia is also higher (19.8 per cent) than the figure for Australia (18.0 per cent).

TABLE 6.11 – BIRTHS, WESTERN AUSTRALIA IN RELATION TO AUSTRALIA, 1987

Particulars	Australia	Western Australia
Number of births—		
Nuptial	18,709	200,153
Ex-nuptial	4,623	43,806
<b>Total</b>	<b>23,332</b>	<b>243,959</b>
Crude birth rate (a)	15.5	15.0
Age-specific birth rate (b)—		
15 – 19	21.8	20.6
20 – 24	88.3	85.2
25 – 29	142.6	139.9
30 – 34	87.2	90.5
35 – 39	26.6	28.8
40 – 44	4.3	4.8
45 – 49	0.3	0.3
Gross reproduction rate (c)	0.897	0.900
Net reproduction rate (d)	0.885	0.883

(a) Per 1,000 mean resident population. (b) Live births per 1,000 women in each age group. Births to mothers under 15 are included in the 15 – 19 age group, and births to mothers aged 50 and over are included in the 45 – 49 age group. (c) Sum of the female age-specific fertility rates multiplied by 5 and divided by 1,000. (d) Based on Annual Life Tables calculated by the Australian Statistician. Because of the method of calculation, these figures are subject to annual fluctuations which may not be indicative of a longer term trend.

## DEATHS

**Causes of Death.** Statistics of causes of death provide important numerical facts by which to evaluate the varying health conditions and needs of different countries. The figures in Table 6.11 and 6.12 have been compiled on the basis of the *International Statistical Classification of Diseases, Injuries and Causes of Death* (Ninth Revision, 1975), operative from 1 January 1979. The term 'cause of death', as used in these tables and elsewhere in this Chapter, means '(a) the disease or injury which initiated the train of morbid events leading directly to death, or (b) the circumstances of the accident or violence which produced the fatal injury.'

Table 6.12 – PRINCIPAL CAUSES OF DEATH, 1987 (a)

Causes of death and International number(b)	Western Australia			Australia		
	Persons	Per cent of all deaths	Rate (c)	Persons	Per cent of all deaths	Rate (c)
Infectious and parasitic diseases (000–139)	49	0.6	3.27	644	0.5	3.96
Neoplasms (140–239)—						
Malignant (140–208)—						
Digestive organs and peritoneum (150–159)	693	7.8	46.20	8,518	7.3	52.37
Trachea, bronchus and lung (162)	486	5.5	32.40	5,752	4.9	35.37
Genito-urinary organs (179–189)	336	3.8	22.40	4,350	3.7	26.75
Other	802	9.0	53.46	9,678	8.2	59.51
Benign, other and unspecified (210–239)	22	0.2	1.47	259	0.2	1.59
Endocrine, nutritional and metabolic diseases (240–279)	201	2.3	13.40	2,794	2.4	17.18
Diseases of blood and blood-forming organs (280–289)	23	0.3	1.53	468	0.4	2.88
Mental disorders (290–319)	121	1.4	8.07	1,754	1.5	10.78



Table 6.12 – PRINCIPAL CAUSES OF DEATH, 1987 (a) (continued)

Causes of death and International number(b)	Western Australia			Australia		
	Persons	Per cent of all deaths	Rate (c)	Persons	Per cent of all deaths	Rate (c)
Diseases of the nervous system and sense organs (320–389)	210	2.4	14.00	1,978	1.7	12.16
Diseases of the circulatory system (390–459)—						
Ischaemic heart disease (410–414)	2,378	26.8	158.53	32,093	27.4	197.32
Cerebrovascular disease (430–438)	856	9.6	57.06	12,568	10.7	77.27
Other	748	8.4	49.86	11,017	9.4	67.74
Diseases of the respiratory system (460–519)—						
Chronic obstructive pulmonary disease (490–496)	404	4.5	26.93	6,010	5.1	36.95
Other	199	2.2	13.27	2,481	2.1	15.25
Diseases of the digestive system (520–579)	314	3.5	20.93	4,013	3.4	24.67
Diseases of the genito-urinary system (580–629)	124	1.4	8.27	1,724	1.5	10.60
Complications of pregnancy, childbirth and the puerperium (630–676)	2	—	0.13	13	—	0.08
Diseases of the skin and subcutaneous tissue (680–709)	—	—	—	95	0.1	0.58
Diseases of the musculoskeletal system and connective tissue (710–739)	27	0.3	1.80	603	0.5	3.71
Congenital anomalies (740–759)	79	0.9	5.27	817	0.7	5.02
Certain conditions originating in the perinatal period (760–779)	78	0.9	5.20	816	0.7	5.02
Symptoms, signs and ill-defined conditions (780–799)	77	0.9	5.13	806	0.7	4.96
Accidents, poisonings and violence (800–999)—						
Motor vehicle traffic accidents (810–819)	207	2.3	13.80	2,783	2.4	17.11
Suicide and self inflicted injury (950–959)	204	2.3	13.60	2,240	1.9	13.77
Other	240	2.7	16.00	3,047	2.6	18.73
<b>All causes</b>	<b>8,880</b>	<b>100.0</b>	<b>591.98</b>	<b>117,321</b>	<b>100.0</b>	<b>721.35</b>

(a) Based on State of usual residence. Fetal deaths are excluded. (b) Classified in accordance with the *International Statistical Classification of Disease, Injuries and Causes of Death* (Ninth revision), operative from 1 January 1979. (c) Per 100,000 of mean resident population. (d) Less than 0.1.

TABLE 6.13 – INFANT DEATHS—CAUSES OF DEATH, 1987 (a)

Causes of death and International number (b)	Western Australia		Australia	
	Number	Per cent of all causes	Number	Per cent of all causes
Causes mainly of prenatal and natal origin—				
Congenital anomalies (740–759)	53	27.0	578	27.3
Immaturity (765)	22	11.2	227	10.7
Birth trauma (767)	3	1.5	29	1.4
Hypoxia and birth asphyxia (768)	8	4.1	86	4.1
Respiratory distress syndrome (769)	25	12.8	122	5.8
Other respiratory conditions (770)	6	3.1	155	7.3
Infections specific to the perinatal period (771)	1	0.5	45	2.1
Fetal and neonatal haemorrhage (772)	4	2.0	67	3.2
Other	8	4.1	89	3.7
<b>Total</b>	<b>130</b>	<b>66.3</b>	<b>1,387</b>	<b>65.5</b>
Causes mainly of postnatal origin—				
Sudden death, cause unknown (798)	54	27.6	517	24.4
Other	12	6.1	212	10.0
<b>Total</b>	<b>66</b>	<b>33.7</b>	<b>729</b>	<b>34.5</b>
<b>All causes</b>	<b>196</b>	<b>100.0</b>	<b>2,116</b>	<b>100.0</b>

(a) Based on State of usual residence. Fetal deaths are excluded. (b) Classified in accordance with the *International Statistical Classification of Disease, Injuries and Cause of Death* (Ninth revision), operative from 1 January 1979.

**Perinatal Deaths.** Since deaths within the first four weeks of life (neonatal deaths) are mainly due to conditions originating before or during birth, and the same conditions can cause fetal death (stillbirth), special tabulations are prepared

combining the two. These are termed 'perinatal deaths.' The statistical definition of perinatal deaths in Australia was amended in 1979 and now includes all fetuses and infants delivered weighing at least 500 grams or, when birthweight is

unavailable, the corresponding gestational age (22 weeks) or body length (25cm crown-heel), whether alive or dead. The rates for fetal deaths and perinatal deaths are calculated per thousand live births only. The live births figure used to calculate these rates excludes those infants known to have weighed less than 500 grams at delivery.

**6.14 - PERINATAL DEATHS—NUMBER AND RATES  
1987**

Particulars	Western Australia		Australia	
	Number	Rate	Number	Rate
Fetal deaths	143	6.1	1,432	5.9
Neonatal deaths—				
Under 1 day	59	2.5	588	2.4
1 day and under 7 days	28	1.2	329	1.3
7 days and under 28 days	18	0.8	242	1.0
Total	105	4.5	1,159	4.8
Total perinatal deaths	248	10.6	2,591	10.6

Table 6.14 provides comparative data on deaths in Western Australia for 1986. The figures show that the crude death rate (the number of deaths per thousand of mean resident population) in Western Australia (5.92) is lower than the Australian figure of 7.21. The age-specific death rates for Western Australia are lower than for Australia, with the exception of the under 1-4, and 35-39 age groups.

**6.15 - DEATHS, WESTERN AUSTRALIA IN RELATION  
TO AUSTRALIA, 1987**

Particulars	Western Australia	Australia
Number of deaths	8,880	117,321
Crude death rate (a)	5.92	7.21
Infant death rate (b)	8.40	8.67
Age-specific death rate (years) (c)—		
Under 1 year	8.24	8.75
1-4	0.46	0.42
5-9	0.16	0.20
10-14	0.18	0.22
15-19	0.63	0.74
20-24	0.81	0.99
25-29	0.86	0.90
30-34	0.71	0.90
35-39	1.23	1.17
40-44	1.49	1.66
45-49	2.62	2.82
50-54	4.15	4.83
55-59	7.55	8.23
60-64	11.55	12.82
65-69	19.53	20.44
70-74	31.53	33.38
75-79	48.43	53.25
80-84	77.13	86.26
85 and over	147.83	162.07

(a) Per 1,000 mean resident population. (b) Infant deaths per 1,000 livebirths. (c) Number of deaths per 1,000 persons in each age group. Excludes fetal deaths.

## LIFE EXPECTANCY

A life table is a life history of a hypothetical group, or cohort, of people, as it is diminished gradually by deaths. They form the basis for the *stationary population* which is the population that would result from a constant number of births each year which had been subject at each age to the life table mortality rates.

A key value in life tables is the expectation of life remaining at each age. Expectation of life in Australia, particularly at birth, improved at every age in the first half of this century. Between 1953-55 and 1970-72 there was little change in expectation of life. However, since 1970-72 there have been significant improvements, particularly in expectation of life at birth which has increased between 1970-72 and 1986 from 68.1 years to 73.0 for males and from 74.8 years to 79.5 for females.

**TABLE 6.16 - COMPLETE EXPECTATION OF LIFE AT  
SELECTED AGES (a): AUSTRALIA  
(years)**

Age	Expectation of life (b)		
	1981	1986	1987
Birth—			
Males	72.07	72.87	73.03
Females	79.27	79.18	74.46
1 year—			
Males	71.80	72.61	72.75
Females	78.88	78.79	79.05
20 years—			
Males	53.44	54.24	54.35
Females	60.27	60.18	60.40
40 years—			
Males	34.66	35.50	35.60
Females	40.76	40.77	40.97
60 years—			
Males	17.72	18.20	18.27
Females	22.51	22.60	22.76

(a) Based on annual life tables calculated by the Australian Statistician. These figures are based on estimated resident population. (b) The average number of additional years a person of given age and sex might expect to live if the age-specific death rates of the given period continued throughout their lifetime.

## MARRIAGES

### Religious and Civil Marriages.

Marriages may be celebrated either by ministers of religion registered for the purpose with the Registrar of Ministers of Religion in each State or Territory, by the Registrar-General, the Deputy Registrar-General or other State officers appointed under the Registration of Births, Deaths and Marriages Act (State), or, since 1973, by other persons authorised by the Commonwealth Attorney-General.

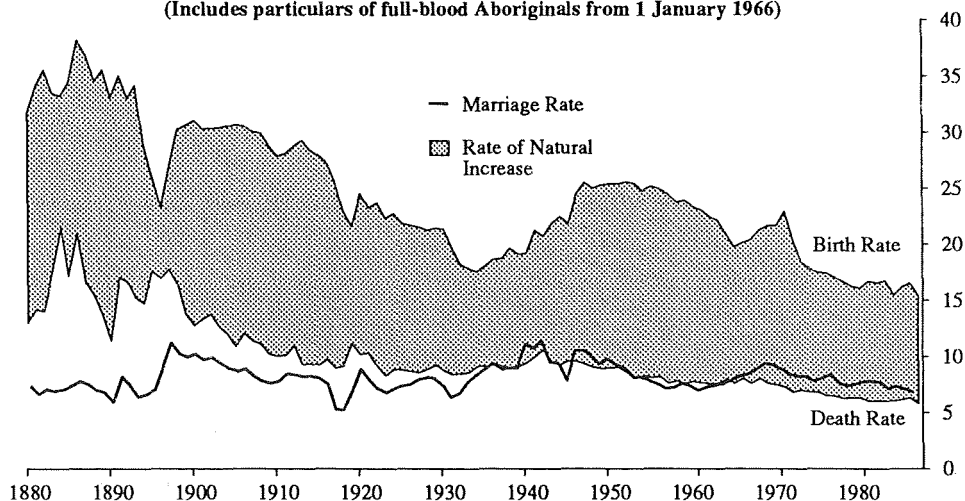
TABLE 6.17 – RELIGIOUS AND CIVIL MARRIAGES, 1987

Category of authorised celebrant	Western Australia		Australia	
	Number	Per cent of total marriages	Number	Per cent of total marriages
<b>Ministers of religion—</b>				
Registered ministers of recognised religious denominations (a)—				
Anglican Church of Australia	1,160	11.4	15,685	13.7
Assemblies of God in Australia	51	0.5	781	0.7
Baptist Union of Australia	137	1.3	1,896	1.7
Christian Bretheren	19	0.2	240	0.2
Church of Jesus Christ of Latter Day Saints	27	0.2	275	0.2
Church of the Four Square Gospel in Australia	39	0.4	65	0.1
Churches of Christ in Australia	184	1.8	1,250	1.1
Jehovah's Witnesses	11	0.1	428	0.4
Lutheran Church of Australia Incorporated	32	0.3	1,228	1.1
New Church in Australia	67	0.7	69	0.1
Orthodox Churches (b)	77	0.8	2,637	2.3
Potter's House Christian Fellowship	22	0.2	36	—
Presbyterian Church of Australia	55	0.5	2,183	1.9
Roman Catholic Church	1,842	18.1	23,829	20.9
Salvation Army	81	0.8	745	0.7
Seventh-day Adventist Church	41	0.4	377	0.3
Uniting Church of Australia	805	7.9	12,558	11.0
Other	196	1.9	2,616	2.3
<b>Total</b>	<b>4,841</b>	<b>47.7</b>	<b>66,898</b>	<b>58.6</b>
Other ministers of religion	99	1.0	1,247	1.1
<b>Total</b>	<b>4,940</b>	<b>48.7</b>	<b>68,145</b>	<b>59.7</b>
<b>Civil officers—</b>				
Registrar-General, etc	863	8.5	11,163	9.8
Other persons	4,347	42.8	34,805	30.5
<b>Total</b>	<b>5,210</b>	<b>51.3</b>	<b>45,968</b>	<b>40.3</b>
<b>TOTAL MARRIAGES</b>	<b>10,150</b>	<b>100.0</b>	<b>114,113</b>	<b>100.00</b>

(a) Under authority of the Marriage Act. (b) Includes denominations grouped under this heading in the proclamation made under the Marriage Act.

DIAGRAM 6.3

**RATES OF BIRTH, DEATH AND MARRIAGE,  
Per Thousand of Mean Population, 1880 to 1987**  
(Includes particulars of full-blood Aborigines from 1 January 1966)



**TABLE 6.18 – AVERAGE AGES OF BRIDEGROOMS AND BRIDES (years)**

<i>Marital Status</i>	<i>1981</i>	<i>1986</i>	<i>1987</i>
Bridegrooms—			
Never married	24.97	26.12	26.54
Widowed	58.53	59.04	57.38
Divorced	37.92	39.47	39.57
<b>All bridegrooms</b>	<b>28.47</b>	<b>29.87</b>	<b>30.32</b>
Brides—			
Never married	22.38	23.80	24.16
Widowed	51.28	51.86	50.31
Divorced	34.27	35.36	35.67
<b>All brides</b>	<b>25.55</b>	<b>27.03</b>	<b>27.45</b>

**DIVORCES**

The *Family Law Act 1975* (Commonwealth), which came into operation on 5 January 1976, repealed the *Matrimonial Causes Act* and made

new provisions relating to divorce. It also established the Family Court of Australia.

In Western Australia, jurisdiction relating to the *Family Law Act 1975* (Commonwealth) is vested in the Family Court of Western Australia constituted by the *Family Court Act 1975* (State).

The Family Law Act provides that an application by a party to a marriage for a decree of dissolution of the marriage shall be based on the ground that the marriage has broken down irretrievably. A decree of dissolution is made if, and only if, the Court is satisfied that the parties separated and thereafter lived separately and apart for a period of not less than twelve months immediately preceding the date of the filing of the application for dissolution of marriage, provided that the Court is satisfied that there is no reasonable likelihood of cohabitation being resumed.

**TABLE 6.19 – DISSOLUTIONS OF MARRIAGE, 1987**

<i>Duration (years)</i>	<i>Marriages dissolved</i>			
	<i>Western Australia</i>		<i>Australia</i>	
	<i>Number</i>	<i>Per cent of total dissolutions</i>	<i>Number</i>	<i>Per cent of total dissolutions</i>
Under 5	812	20.1	8,963	22.6
5 – 9	1,064	26.3	10,598	26.7
10 – 14	734	18.2	6,857	17.3
15 – 19	599	14.8	5,688	14.3
20 – 24	432	10.7	3,659	9.2
25 – 29	211	5.2	2,039	5.1
30 and over	190	4.7	1,914	4.8
Not stated	2	—	7	—
<b>Total</b>	<b>4,044</b>	<b>100.0</b>	<b>39,725</b>	<b>100.0</b>

The Family Court of Western Australia also exercises jurisdiction in matters concerning the adoption of children, and the guardianship, custody or maintenance of children.

Almost one half of marriage dissolutions occurred when the duration of the marriage was 9 years or less. Dissolutions were highest in marriages with a duration of between 5 and 9 years.

**REFERENCES****ABS publications**

*Census 86—Catalogue of 1986 Census Tables (2175.0)*

*Estimated Resident Population by Age and Sex in Statistical Local Areas, Western Australia (3203.5)*

*Births, Australia (3301.0)*

*Deaths, Australia (3302.0)*

*Causes of Death, Australia (3303.0)*

*Perinatal Deaths, Australia (3304.0)*

*Marriages, Australia (3306.0)*

*Divorces, Australia (3307.0)*

## Chapter 7

### SOCIAL WELFARE

The Commonwealth and State Governments and a large number of voluntary agencies provide social welfare services for the population. The Commonwealth Government is concerned largely with providing fixed monetary pensions and benefits and repatriation services. It also provides, either directly or through State and local government authorities and voluntary agencies, for a wide range of welfare services for people with special needs. During 1987–88, \$22,599 million were expended in Australia on social security and welfare by the Commonwealth, which is 28.9 per cent of the total Government outlay. State agencies operate in the field of child welfare and distribute emergency relief in circumstances where Commonwealth Government assistance is not available. The voluntary agencies, many of which receive government aid, provide a wide range of services in various fields of social welfare. At the end of February 1989 there were 498 licensed charitable organisations in Western Australia.

#### INCOME SUPPORT THROUGH THE DEPARTMENT OF SOCIAL SECURITY

The introduction of a pension for aged persons in 1909 began Australia's national provision of social security payments. Since then a number of other regular income payments have been introduced to meet specific cases of perceived need for people incapacitated for work, for spouses of age or invalid pensioners and for sole supporting parents. In addition, disability and service pensions have been provided through the Department of Veteran's Affairs for returned servicemen and women and their dependants.

**TABLE 7.1 — MAXIMUM WEEKLY RATES OF  
BENEFIT PAYABLE THROUGH THE DEPARTMENT  
OF SOCIAL SECURITY: JANUARY 1989**

<i>Benefit</i>	<i>\$</i>
Age and Invalid pensions; Sheltered Employment Allowance; and Rehabilitation Allowance —	
Standard (single) rate	124.25
Married rate (each person)	103.55
Mobility Allowance	11.00
Wife's/Carer's pensions	103.55
Widow's Pension/Supporting Parent's Benefit	124.25
Unemployment, Sickness and Special benefits; and Job Search Allowance —	
Single without dependants—	
16–17 years	53.55
18–20 years	97.70
21 years & over	116.00
Single with dependants	124.25
Married (combined)	207.10

**TABLE 7.1 — MAXIMUM WEEKLY RATES OF  
BENEFIT PAYABLE THROUGH THE DEPARTMENT  
OF SOCIAL SECURITY: JANUARY 1989 (continued)**

<i>Benefit</i>	<i>\$</i>
Family Allowance (a) —	
Children in families —	
First	9.80
Second	13.95
Third, fourth	16.70
Fifth	19.55
Children in institutions (each child)	16.70
Multiple Births Payment—	
Triplets	64.30
Quadruplets (or more)	85.75
Child Disability Allowance (each child) (a)	48.00
Double Orphan's Pension (each child) (a)	25.75
Family Allowance Supplement/additional payment for children (each child) —	
Under 13 years	24.00
13–15 years	31.00
Student 16–24 years (if eligible)	17.00
Mother's/Guardian's Allowance	12.00
Rent Assistance —	
With children	15.00
Without children	10.00
Incentive Allowance	15.00
Remote Area Allowance	7.00
Funeral Benefit (maximum payment) —	
For non-pensioner paying for funeral	20.00
For pensioner paying for funeral	40.00

(a) Fortnightly rate.

The Department of Social Security administers income support legislation for the aged, the disabled, the sick, widows and sole parents, the unemployed and families with children. The conditions relating to payment of the pensions and benefits described in this section are intended only

as a general guide and more detailed information about the eligibility criteria and current rates of benefit should be obtained from the Department of Social Security.

In 1987-88 Western Australians were paid more than \$1,500 million in the form of pensions and benefits through the Department of Social Security.

**TABLE 7.2 — MAIN BENEFITS PAID UNDER THE SOCIAL SECURITY ACT: 1987-88**

<i>Pension/benefit type</i>	<i>Number of beneficiaries</i>	<i>Expenditure (\$m)</i>
Age Pension (a)	105,926	537.7
Unemployment Benefit	(b)46,091	298.6
Invalid Pension (a)	37,529	205.4
Family Allowance	(c)187,810	129.8
Supporting Parent's Benefit	19,128	162.0
Other (d)	..	127.3
<b>Total</b>	<b>..</b>	<b>1460.8</b>

(a) Includes wife/carer. (b) Average number on benefit at end of each week during year. (c) Number of families. (d) Includes widows', orphans' pensions; sickness, special, funeral benefits; child disability, rehabilitation, sheltered employment allowances and family income supplement.

### Age pension

Women aged 60 and over and men aged 65 and over are eligible for the age pension subject to income and assets conditions and residential qualifications.

**TABLE 7.3 — AGE PENSIONS: 30 JUNE 1988**

	<i>Number of pensioners</i>
Male	31,289
Female	72,454
Wife/spouse carer	2,183
<b>Persons</b>	<b>105,926</b>

### Invalid Pension

**TABLE 7.4 — INVALID PENSIONS: 30 JUNE 1988**

	<i>Number of pensioners</i>
Male	20,981
Female	7,541
Wife/spouse carer	9,007
<b>Persons</b>	<b>37,529</b>

An invalid pension is payable to persons over 16 years of age who are permanently incapacitated for work to the extent of at least 85 per cent and at least 50 per cent of that permanent incapacity is caused by a permanent physical or mental

impairment; or are permanently blind. At 30 June 1988, 37,529 persons were receiving this pension, an increase of 736 on the number at June 1987.

### Sheltered employment allowance

A sheltered employment allowance is payable to disabled people who are employed in approved sheltered workshops and are otherwise qualified to receive an invalid pension or would become so qualified if they ceased to be provided with sheltered employment.

**TABLE 7.5 — SHELTERED EMPLOYMENT ALLOWANCES: 30 JUNE 1988**

	<i>Unit</i>	
Workshops paying allowances	No.	9
Sheltered employment allowances	"	793
Wife pensioners	"	74
Amount paid during the year	(\$'000)	5,546

### Rehabilitation allowance

Persons undertaking a rehabilitation program with the Commonwealth Rehabilitation Service and otherwise eligible for a social security pension or benefit can receive a non-taxable rehabilitation allowance equivalent to the invalid pension, subject to the same income and assets tests conditions. The allowance is paid during treatment or training and for up to six months thereafter.

### Mobility allowance

Severely disabled people aged 16 years to age pension age who are gainfully employed or undertaking vocational training and who, because of their disabilities, cannot use public transport without substantial assistance may be eligible for an allowance of \$11 a week. At 30 June 1988, 799 persons were in receipt of this allowance with \$508,000 being paid during 1987-88.

### Wife's pension

The wife of an aged or invalid pensioner or of a sheltered employment allowee may be paid a pension if she does not qualify for a pension in her own right.

### Carer's pension

A carer's pension may be paid to a person who provides a 'severely handicapped' age or invalid pensioner or rehabilitation allowee with substantial personal care and attention or constant supervision in the home where they both live. Persons already in receipt of a social security payment or service

pension are not eligible to receive a carer's pension.

### Widow's pension

The widow's pension was introduced in 1942 to provide a regular income for women who had lost the support of their partner.

There are three classes of widow pensioners: Class A— a widow with at least one qualifying dependent child; Class B— a widow who does not have a qualifying dependent child and who, at July 1987 was at least fifty years of age or was not less than forty-five years of age when her Class A pension ceased because she no longer had a qualifying dependent child in her care; and Class C— a widow under fifty years of age without dependent children who is in necessitous circumstances at the time of her husband's or de facto husband's death or within twenty-six weeks thereafter.

**TABLE 7.6 — WIDOWS' PENSIONS: 30 JUNE 1988**

	<i>Unit</i>	
Class A pensioners	No.	4,697
Class B pensioners	"	7,191
Class C pensioners	"	10
<b>Total</b>	"	<b>11,898</b>
Amount paid during year (a)	(\$'000)	81,116

(a) Includes allowances and rent assistance.

### Supporting parent's benefit

Sole parents who have the custody, care and control of a qualifying dependent child can be eligible for a supporting parent's benefit. The age of the youngest qualifying child was reduced as a result of legislative change effective from 1 September 1987 from twenty-four to sixteen years.

**TABLE 7.7 — SUPPORTING PARENTS' BENEFITS: 30 JUNE 1988**

	<i>Number of beneficiaries</i>
Males	1,067
Females	18,061
<b>Persons</b>	<b>19,128</b>

From March 1989 Class A widow's pension and supporting parent's benefit have been combined. The new payment is called 'Sole Parent's Pension' and the Class C widow's pension has been renamed 'Widowed Person's Allowance'.

Eligibility will be extended to widowed husbands and de facto husbands and the requirement that they be in 'necessitous circumstances' will be removed.

### Unemployment benefit

To be eligible for unemployment benefit a person must:

have been unemployed for the period covered by the benefit;

be capable of undertaking and willing to undertake suitable paid work;

be taking reasonable steps to obtain work;

not be unemployed due to being, or having been, engaged in industrial action;

not be unemployed due to industrial action by members of a trade union of which the person is a member; and

be registered for work with the Commonwealth Employment Service.

### Job search allowance

From 1 January 1988 unemployment benefit for sixteen to seventeen year olds was replaced by a job search allowance which may be dependent on a parental income test. This was designed to encourage this group to take up training and employment opportunities rather than become dependent on long term unemployment benefits and to remove any financial incentive to leave school early.

**TABLE 7.8 — UNEMPLOYMENT BENEFITS AND JOB SEARCH ALLOWANCES: 1987-88**

	<i>Unit</i>	
Number admitted to benefit during year	No.	92,289
Average number on benefit at end of each week	"	46,091
Number on benefit at end of year	"	43,061
Amount paid (a) during year	(\$'000)	298,669

(a) Comprises payment for beneficiaries, additional benefit for children, mother's/guardian's allowance and remote area allowance.

### Sickness benefit

A sickness benefit is paid to people who have been temporarily incapacitated for work because of sickness or accident and who have suffered a loss of income as a result of the incapacity or who, but for the incapacity, would qualify for the unemployment benefit.

TABLE 7.9 — SICKNESS BENEFITS: 1987-88

	<i>Unit</i>	
Number admitted to benefit during year	No.	10,397
Average number on benefit at end of each week	"	5,038
Number on benefit at end of year	"	5,366
Amount paid (a) during year	(\$'000)	36,593

(a) Comprises payment for beneficiaries, additional benefit for children, mother's/guardian's allowance, rent assistance and remote area allowance.

### Special benefit

A special benefit may be paid to a person ineligible for a pension or for an unemployment or sickness benefit, if he is unable to earn a sufficient livelihood for himself and his dependants, and is suffering hardship.

TABLE 7.10 — SPECIAL BENEFITS: 1987-88

	<i>Unit</i>	
Number admitted to benefit during year	No.	18,101
Average number on benefit at end of each week	"	2,118
Number on benefit at end of year	"	2,418
Amount paid (a) during year	(\$'000)	14,193

(a) Comprises payment for beneficiaries, additional benefit for children, mother's/guardian's allowance, and remote area allowance.

### Family allowance

TABLE 7.11 — FAMILY ALLOWANCES:  
30 JUNE 1988

	<i>Unit</i>	
Endowed families—		
Number of claims in force	No.	187,810
Number of endowed children	"	367,107
Average number of endowed children per claim	"	1.95
Approved establishments—		
Number of endowed child inmates	"	756
Amount paid during year	(\$'000)	129,783

The family allowance is paid to a person caring for children under sixteen years or full-time students aged 16-17 years who are wholly or substantially dependent on that person. The entitlement for students aged 16-17 years is income tested. In some cases family allowance may be paid for full-time students aged 18-24 years. Family allowance is not paid for students receiving Tertiary Education Assistance or other related Commonwealth education allowances. Payment is usually made to the mother. The claimant must be an Australian citizen or have been granted

permanent entry. Under certain conditions, family allowance may be paid to Australians who are temporarily absent overseas. Approved charitable, religious or government establishments are paid family allowances for children in their care.

### Multiple births payment

From November 1985 discretionary act of grace payments to parents of quadruplets were replaced with a non-means tested, non-taxable payment. The payment was also extended to parents of triplets. Payments are made in addition to family allowances until the children reach six years of age.

### Child disability allowance

The child disability allowance is payable to parents or guardians of a physically or mentally handicapped child under sixteen years who is cared for at home and is in need of constant care and attention. The allowance continues to be payable for a dependent full-time student aged 16-24 years except where the student is in receipt of certain other social security payments. An allowance of \$48 per fortnight is payable free of income test.

At 30 June 1988 there were 3,420 recipients of the allowance in respect of 3,593 handicapped children. The amount paid was \$3.4 million.

### Double orphan's pension

A guardian or an institution may be paid a double orphan's pension for a child under 16, or a dependent full-time student aged 16 - 24 years inclusive, whose parents are dead. The pension is also payable if one parent is dead and:

the whereabouts of the other parent are not known to the claimant;

the other parent has been convicted of an offence and sentenced to imprisonment for at least ten years and is serving that sentence;

the other parent is an inmate of a mental hospital and will require care and treatment in that or a similar hospital for an indefinite period.

A double orphan's pension may also be paid for a refugee child whose parents are both outside Australia or if their whereabouts are unknown.

There were 259 double orphan pensions in force at 30 June 1988. A total amount of \$193,000 was paid in pensions during 1987-88.



### **Family allowance supplement**

This payment is an income tested non-taxable supplement for families not in receipt of other Commonwealth support.

At 30 June 1988, there were 14,033 families receiving \$22.3 million in family income supplement in respect of 34,912 children.

### **Additional payments for beneficiaries**

**Additional payment for children.** Additional pension is paid to Social Security beneficiaries for dependent children. Additional pensions is not payable for children in receipt of an education scheme payment or pension, benefit or allowance in their own right.

**Mother's/Guardian's allowance.** An additional payment of up to \$12 a week is payable to a supporting parent beneficiary and to a pensioner who is single or married, but unable to live with their spouse because of the spouse's illness or infirmity.

**Rent assistance/incentive allowance.** Rent assistance is a tax-free allowance which may be paid to beneficiaries who pay rent, lodging, board and lodging or a site rent for a boat, caravan or other accommodation which the person occupies as their home.

All recipients of sheltered employment allowance and invalid pensioners undertaking training receive, in lieu of rent assistance, a non-taxable incentive allowance of \$15 a week free from any rent or income test.

**Remote area allowance.** An allowance of \$7 a week is payable to beneficiaries living in specified remote areas. At 30 June 1988, 4,656 persons were in receipt of this allowance.

**Special temporary allowance.** For up to 12 weeks after the death of one of a married pensioner couple, the surviving pensioner is paid the equivalent of the two pensions that would have been paid if the spouse had not died.

**Funeral benefit.** A benefit of up to \$20 is payable to a person liable for the funeral costs of an eligible age or invalid pensioner or recipient of sheltered employment, rehabilitation or tuberculosis allowance. Up to \$40 is payable to eligible pensioners or beneficiaries who are liable for the funeral costs of a spouse, a child or another eligible pensioner.

There were 2,756 grants of funeral benefit during 1987-88, totalling \$80,000.

### **Fringe benefits**

The majority of beneficiaries are entitled to a range of non-cash fringe benefits upon presentation of a concession card.

The Department issues four types of health cards; pensioner health benefits card; health benefits card; health care card; and pharmaceutical benefits concession card. These cards are issued depending on the income and assets of the claimant and the type of social security payment being received. The cards may entitle the holder to a wide range of concessions including health, transport, household and recreation concessions.

The concessions are provided by Government and semi-Government authorities and private organisations.

### **Payment of benefits outside Australia**

Age, invalid and widows' pensions and supporting parents' benefits continue in force for recipients who left Australia on or after 8 May 1973 or whose pension or benefit is subject to the provisions of either of the reciprocal agreements with New Zealand or the United Kingdom. In certain cases of hardship, the pension or benefit may continue for people who left before 8 May 1973.

## **INCOME SUPPORT THROUGH THE DEPARTMENT OF VETERANS AFFAIRS**

The Department provides income support to compensate veterans and their dependants for the premature ageing and loss of earning power which could result from the intangible effects of qualifying (theatre of war) service and to allow veterans and their dependants to enjoy a living standard which is at least equal to that provided by other Government income support programs and, whenever practicable, consistent with veterans' special standing in the community.

### **Service pension**

The Department of Veterans' Affairs provides service pensions to male veterans aged 60 years and over and female veterans aged 55 and over. At June 1988, 36,798 service pensions were being paid, 21,403 to veterans and 15,395 to wives and widows of veterans. During 1987-88, \$179.7 million was expended on service pensions.

TABLE 7.12 — SERVICE PENSIONS: 30 JUNE 1988

<i>War service</i>	<i>Number of pensions</i>
1914–18 war	276
1939–45 war	28,168
Korea and Malaya	538
British Commonwealth	6,483
Allied Forces	726
Special Overseas Service	261
Mariners	346
<b>Total</b>	<b>36,798</b>

### Disability pension

The Department of Veterans' Affairs provides a disability pension to veterans as compensation for incapacity accepted as war service related. At 30 June 1988, 31,362 disability pensions were being paid to 14,353 incapacitated veterans, 11,189 dependants of incapacitated veterans and 5,820 dependants of deceased veterans. During 1987–88, \$42.1 million was expended in disability pensions.

TABLE 7.13 — DISABILITY PENSIONS: 30 JUNE 1988

<i>War service</i>	<i>Number of pensions</i>
1914–18 war	1,022
1939–45 war	24,876
Korea/Malaya/F.E.S.R. (a)	802
Special Overseas Service	2,079
Peacetime Forces	2,569
Seamen's War Pension	14
<b>Total</b>	<b>31,362</b>

(a) Denotes Far East Strategic Reserve.

### Allowances

TABLE 7.14 — MAXIMUM WEEKLY RATES OF BENEFIT PAYABLE THROUGH THE DEPARTMENT OF VETERANS AFFAIRS: JANUARY 1989

	\$
Disability Pension—	
Special rate (TPI) (a)	231.50
Intermediate rate	159.40
General rate (100%)	87.25
War and Defence Widows' Pension	136.25
Service Pension—	
Single person	124.25
Married couple	207.10
Orphan's Pension—	
High rate	44.40
Low rate	22.20
Attendant's Allowance—	
High rate	72.60
Low rate	36.30
Clothing Allowance—	
High rate	3.10
Low rate	1.45

TABLE 7.14 — MAXIMUM WEEKLY RATES OF BENEFIT PAYABLE THROUGH THE DEPARTMENT OF VETERANS AFFAIRS: JANUARY 1989—continued

	\$
Extreme Disablement Adjustment Allowance	130.88
Recreational Transport Allowance—	
High rate	19.30
Low rate	9.65
Vehicle Assistance Scheme (annual rate)	780.00
Veterans' Children Education Scheme—	
Tertiary students—	
Maximum	97.70
Minimum	53.55
Secondary students—	
Maximum	97.70
Minimum	10.00
Allowances paid to service pensioners—	
Guardian's Allowance	12.00
Additional pension for each child—	
Under 13 years	24.00
13–15 years	31.00
Student 16–24 (if eligible)	17.00
Remote Area Allowance—	
Single person	7.00
Married couple	12.00
Children	3.50

(a) Totally and permanently incapacitated.

Several allowances are provided to supplement and service disability pensions. These allowances vary according to the severity of disablement and the special needs of the pensioner. They include attendant's allowance, loss of earnings allowance, recreation transport allowance and domestic allowance. An education allowance is paid for children of special rate pensioners and children of veterans who died as a result of service.

### War widow's pension

War widow's pensions are granted automatically to the widows of veterans receiving the special rate pension, or equivalent at the time of death. Other claims for the war widow's pension require determination that the veteran's death was war caused. During 1987–88, a total of \$38.5 million was paid in widow's pensions and allowances in Western Australia.

### DEPARTMENT OF COMMUNITY SERVICES AND HEALTH

The Department of Community Services and Health administers programs which provide or subsidise services providing universal access to primary health care, illness prevention and promotion of better health, as well as services for the aged, children, people with disabilities and people who need accommodation. Reference to the activities of the Department primarily relating to Health are to be found in Chapter 8.

### Home and Community Care Program

The Home and Community Care Program is a cost-shared program between the Commonwealth and State Governments which aims to develop an integrated range of home and community care services for frail or at risk aged persons, and younger disabled persons and their carers, thereby avoiding premature or inappropriate institutionalisation. An important principle of the program is consultation with service providers and users on the gaps in existing services and priorities for developing new types of services. A wide range of services related to the various aspects of home and community care can be funded under the program.

Expenditure during 1986-87 on this program by the Commonwealth and State Governments amounted to \$24.8 million. Of this, the Commonwealth contributed \$14.3 million and the Western Australian Government \$10.5 million.

### Housing and related assistance programs

A range of programs has been developed to assist households in the owner-occupied, public housing and private rental housing sectors. The Commonwealth Government provides funds for public housing, supported accommodation services; crisis accommodation; mortgage and rent relief, home purchase loans and home purchase assistance to individuals and families. The bulk of the Commonwealth financial assistance for housing is provided through the First Home Owners Scheme and the Commonwealth - State Housing Agreement.

**First Home Owners Scheme.** This scheme provides financial assistance to low and moderate income earners. Assistance may be paid either as series of monthly payments over five years, or as an initial lump sum payment with smaller monthly payments over five years. The scheme provides eligible first home buyers with a tax free benefit of up to \$5,000.

During 1987-88, 7,495 claims were approved and expenditure on new and continuing subsidies totalled \$32.97 million. In 1988-89 the Department will provide \$26 million for this scheme which will help on estimated 4,800 households buy their first homes and provide continuing monthly subsidies to a further 29,000 home buyers.

**Commonwealth - State Housing Agreement Assistance.** Public rental housing and home purchase assistance is provided for people in need. Untied grants are provided to the State

Government which has flexibility in managing housing programs within the guidelines set out in the Agreement. Assistance is available irrespective of age, sex, marital status, race, religion, disability or lifestyle; however, priority is on the basis of need.

**TABLE 7.15 — COMMONWEALTH - STATE HOUSING AGREEMENT: EXPENDITURE 1987-88 AND APPROPRIATION 1988-89 (\$'000)**

	<i>Expenditure 1987-88</i>	<i>Appropriation 1988-89</i>
Untied	49,561	48,502
Rental assistance for pensioners	3,051	3,268
Rental assistance for Aborigines	10,264	12,121
Mortgage and rent relief	2,299	2,471
Crisis Accommodation Program	1,420	1,824
Local Government and Community Housing Program	1,095	1,494
<b>Total</b>	<b>67,690</b>	<b>69,689</b>

**Supported Accommodation Assistance Program.** This program provides for a cost-shared arrangement between the Commonwealth and State Governments to assist organisations in providing a range of supported accommodation and related services to people who are homeless as a result of crisis. The program is directed at persons needing assistance to move towards independent living, wherever possible and appropriate; and tries to improve their status, dignity and self-esteem.

**TABLE 7.16 — SUPPORTED ACCOMMODATION ASSISTANCE PROGRAM: EXPENDITURE 1987-88 AND ESTIMATED EXPENDITURE 1988-89 (\$'000)**

	<i>Expenditure 1987-88</i>		<i>Estimated Expenditure 1988-89</i>	
	<i>Common- wealth</i>	<i>State</i>	<i>Common- wealth</i>	<i>State</i>
Recurrent base funds	4,689	2,987	5,375	3,560
Growth funds	413	404	413	457
Allowance for indexation	264	169	243	161
<b>Total</b>	<b>5,366</b>	<b>3,560</b>	<b>6,031</b>	<b>4,178</b>

### Programs for families with children

The Commonwealth provides funds for services to families with children through the Children's Services Program. Grants are made directly to State Government or local government authorities and non profit community organisations to provide child care services. The State Government also

contributes towards the capital and recurrent costs of the program.

The program aims to ensure that parents and children have access to quality, affordable child care services which meet their needs.

**TABLE 7.17 — CHILD CARE SERVICES FUNDED:  
1987-88**

	<i>Services provided</i>	<i>Expenditure</i>	
		<i>Recurrent</i>	<i>Capital (Direct)</i>
	No.	\$'000	\$'000
Long day care	95	8,850.1	490.2
Occasional care	31	310.4	248.8
Family day care	16	3,132.0	7.0
Outside school care	92	637.4	38.8
Aboriginal and isolated care	41	535.5	92.4
Disabled special services	15	293.5	.3
Migrant special services	5	209.1	—
Supplementary workers	29	385.9	16.3
Family support	19	261.8	—
Program support	17	483.4	—
<b>Total</b>	<b>360</b>	<b>15,099.3</b>	<b>893.8</b>

### Programs for people with disabilities

As well as funding services and programs for people with disabilities, the Commonwealth provides direct rehabilitation services, hearing aids and other audiological services. Other community support services for people with disabilities are funded under the Home and Community Care Program.

**Disability Services Program.** Under this program, non-profit community based organisations and State Government and local government authorities can be funded to provide a range of services for people with disabilities, providing these services meet their ongoing support needs.

**TABLE 7.18 — DISABILITY SERVICES PROGRAM:  
EXPENDITURE 1987-88 AND ESTIMATED  
EXPENDITURE 1988-89  
(\$'000)**

	<i>Expenditure</i>	<i>Estimated expenditure</i>
	1987-88	1988-89
Ongoing program (salaries and rental)	14,104.6	14,258.0
Demonstration projects	527.0	327.0
Equipment/maintenance	21.9	182.0
One-off assistance	—	91.0
Handicapped Childrens Benefit	130.0	130.0
Training Fee/Incentive Bonus	23.0	23.0
Attendant care	320.0	320.0
New services recurrent	} 946.4 {	267.0
New services capital and establishment		333.0
Transition		854.0
<b>Total</b>	<b>16,124.9</b>	<b>16,785.0</b>

**Rehabilitation services.** The Department provides rehabilitation services directly through the Commonwealth Rehabilitation Service. The services are available to working age people who have a disability from birth, or as a result of illness or accident. The program aims to help people obtain or retain employment, live as independently as possible and adjust to their disabilities. Clients have access to occupational therapy, counselling and social work services which are provided by Departmental staff and through private and community organisation such as technical and further education colleges and local health services. The Department also provides a range of financial assistance to people participating in rehabilitation programs. Rehabilitation services are free to people receiving a Social Security pension or benefit. The Department also pays for community or other services used during a rehabilitation program. For those not receiving a pension or benefit and in particular those with a compensation or damages claim, costs will be recovered by the Department through a direct charge on the insurance company or employer. Regional rehabilitation units have been established throughout the metropolitan area and in Bunbury in the south-west of the State and Geraldton to the north of Perth. During 1987-88 the rehabilitation services outlayed \$2,407,876 in salaries and \$1,753,240 in other expenditure; \$1,123,875 was received making the net cost of the services \$3,037,241.

**National Acoustic Laboratory.** The Department provides audiological services, including free hearing aids to eligible people through the National Acoustic Laboratory. Services provided include hearing assessment, selecting and fitting hearing aids, maintaining aids, aftercare and free batteries for aids. Services are provided through hearing centres in the metropolitan area and major country centres are visited on a regular basis.

**Attendant Care Scheme.** This scheme enables younger people with disabilities who would otherwise live in nursing homes to receive up to 28 hours a week of assistance with personal care in their own homes. The Department provides funds to specially selected organisations to employ and train attendants for individual participants. The scheme has a limited number of places.

### Residential Programs for aged people

Under the Residential Care Program, the Commonwealth funds a range of organisations to provide care in nursing homes and hostels for frail aged people. The main aims of the program are to ensure that the aged receive services best suited to

their needs, facilities are developed where they are needed, care is of high quality, and facilities are designed and services provided to allow the maximum level of independence. Nursing homes and hostels are only two of the care options available to aged people. Home and Community Care services are also funded for the frail aged or disabled who wish to live at home.

**Capital grants for nursing homes and hostels.** Capital funding is provided to approved organisations to build or buy existing nursing homes and hostels for frail aged people. In some cases funds are also available to help upgrade existing accommodation. An important consideration in funding is that services are located in areas where they are needed most and that they provide frail aged people with as home-like and comfortable a life as possible.

**Recurrent funding for nursing homes and hostels.** The Commonwealth also provides financial support to help nursing homes to meet the costs of providing care. The operational costs of nursing homes are split into two components; one covering nursing and personal care services and staff and the other, known as the infrastructures component, covering all other costs such as food, laundry and domestic staff. During 1987-88 nursing homes received \$27.65 per resident per day towards infrastructure costs.

Organisations managing hostels may receive hostel care, personal care, and respite care subsidies. The hostel care subsidy helps organisations employ staff, the personal care subsidy the provision of a higher level of care to residents and the respite care subsidy is paid to help meet the cost of providing short term hostel accommodation and care.

**Assessment Program.** High priority is given to ensuring that aged people receive the types and levels of services most suited to their needs and funding is provided to develop assessment services that will assist aged people to choose suitable available services.

**Domiciliary nursing care benefit.** The Department provides a payment of \$42 per fortnight to assist people caring for the chronically ill at home. This benefit is neither means tested nor regarded as income for taxation purposes. To receive the benefit a person must be caring for and living with someone who is eligible for admission to an approved nursing home, receiving adequate nursing care on a 24 hour basis, chronically ill and at least 16 years old.

**Special Services Program.** Dementia grants help organisations provide special hostel care in separate facilities for people suffering from dementia. Grants are provided for special services and activities, minor capital items and staff development programs.

Funds may also be provided for additional services which prolong the relative independence of aged people in residential care. It also helps develop the provision of services for special groups such as people from non-English speaking backgrounds, Aborigines and people with disabilities who have aged.

### DEPARTMENT FOR COMMUNITY SERVICES, WESTERN AUSTRALIA

The functions of the Department for Community Services, are defined in the *Community Services Act 1972*. The Acts administered by the Director-General of the Department for Community Services, subject to direction of the Minister, are the Community Services Act, the Child Welfare Act, the Welfare and Assistance Act and the Adoption of Children Act.

TABLE 7.19 — DEPARTMENTAL EXPENDITURE  
1987-88

<i>Nature of expenditure</i>	<i>\$'000</i>
Salaries, wages and allowances	42,786
Administrative support	4,157
Professional and technical support	1,605
Family, children and aged services	6,938
Youth services	3,301
Community and public affairs	829
Financial and material assistance	7,131
Regional services	4,651
Non-government agency support	19,276
<i>Total expenditure</i>	<i>90,674</i>
<i>Total revenue</i>	<i>9,750</i>
<b>Net expenditure</b>	<b>80,923</b>

#### State financial assistance

The Department for Community Services, administers the grant of financial assistance to families and individuals in need. The Department is able to provide financial assistance in a wide range of circumstances to persons who have a basic and pressing material need which they are unable to provide for from their own resources or through a more appropriate welfare agency. As well as emergency financial assistance, certain concessions are available to persons in necessitous circumstances.

**TABLE 7.20 — SUPPLEMENTARY ASSISTANCE PROVIDED BY THE DEPARTMENT FOR COMMUNITY SERVICES: 1987-88**

Category	No. of issues	Value (\$'000)
Emergency financial assistance —		
Food and medication	59,165	3,272
Optical	5,684	288
Energy and water arrears	4,695	315
Furniture removal	2,507	282
Stranded travel	1,724	78
Clothing	1,296	75
Essential household equipment	1,226	123
Lost or stolen money	1,060	69
New employment bridging	893	13
Temporary child placement	898	—
Temporary accommodation	818	24
Prison release payments	784	63
Housing arrears	548	37
Special needs health payment	547	101
Family re-establishment support	480	200
Current Department of Social Security cheque delay	379	18
Personal disaster	194	23
Unemployment and sickness benefits bridging	179	9
Blankets	135	20
Miscellaneous	2,354	92
<b>Total emergency assistance</b>	<b>85,566</b>	<b>5,100</b>
Concessional support —		
High school clothing	12,227	1,228
Homeswest ingoing fees	1,623	86
<b>Total concessional support</b>	<b>13,850</b>	<b>1,314</b>
<b>Total</b>	<b>99,416</b>	<b>6,414</b>

### Child welfare

The Department for Community Services is responsible for the care of wards and children placed under control and supervision or released on probation by the Children's Courts. A child is defined as 'any boy or girl under the age of eighteen years'. Both Departmental and private sector facilities provide emergency, short and long term accommodation to children who are in need of care or who may be awaiting a decision of a Children's Court. The Department has authority to decide which centre or facility or what form of treatment is appropriate to the needs of a child committed by a Children's Court to the care of the Department. The Department has a statutory responsibility for issuing licences to all people who have care of children under the age of six years who are not near relatives, and who are providing care on a day-to-day basis. Another function of the Department is the arranging of adoptions.

**Maintenance of children.** The Department for Community Services makes payments to foster parents and establishments having children in their care.

**TABLE 7.21 — STATE GOVERNMENT MAINTENANCE OF CHILDREN PAYMENTS MAXIMUM WEEKLY RATES \$**

Subsidy or allowance	December 1988	
	Fostered	Group Home
Subsidy—		
Wards of the State—		
Primary school age	48.50	52.75
High school age	55.50	59.00
Children not wards of the State—		
Departmentally arranged placement—		
Primary school age	48.50	52.75
High school age	55.50	59.00
Privately arranged placement—		
Near relative	13.80	13.80
Non relative	41.75	41.75
Pre-adoptive	48.50	48.50
Additional allowances—		
Pocket money—		
Wards of the State—		
Primary school age	2.00	2.00
High school — years 8-10	5.00	5.00
— years 11-12	6.50	6.50
Working (awaiting benefits)	10.00	10.00
Children not wards of the State—		
Emergency bed fees—		
Ward only	5.00	—

One dollar per week for each child maintained is paid to the establishments by the State Lotteries Commission. Where an establishment refuses assistance from the Commission on religious or moral grounds the State Government may grant an equivalent allowance to the establishment for each ward maintained. All establishments and foster parents having the care of children receive family allowances from the Commonwealth Government. At 30 June 1988, there were 453 State Wards in foster care (284 non-Aboriginal and 169 Aboriginal) and the Department was subsidising a further 535 non-ward children (205 non-Aboriginal and 330 Aboriginal) in foster care.

**Supervision of children.** A child committed to the care of the Department for Community Services becomes a ward of the Department. Many wards remain living at home with their families, but may be placed in a Departmental centre or facility, boarded out with a relative or other approved person, or placed in suitable employment. Where a child is placed under the control of the Department, the child's parents retain guardianship but the child may be treated as a ward. The Director-General of the Department has authority to place wards of working age in employment or apprenticeship.

**Child care services.** Any person who provides day-to-day care of children under the age of six years must be approved and licensed by the Department for Community Services. Licensed

services are required to provide satisfactory standards for premises, equipment, staffing and the general conduct of such services. Child care services include day care centres both privately owned and government funded, occasional care, family day care, neighbourhood and community houses. Child care centres provide group care on a full-time, part-time or occasional basis. Family day care is a supervised and coordinated system of child care which is conducted by approved and licensed caregivers in their own homes. Community and neighbourhood houses provide day care, occasional care, family support and community outreach programs to their communities. The Department for Community Services provides a support service to all child care services ensuring the maintenance of satisfactory standards. It provides information to parents using services, persons in the industry, providers and management committees. It also assists community groups to identify child care needs and facilitates in the establishment of new services.

The information in Table 7.22 is from a census of all child care services registered with the Department for Community Services.

**TABLE 7.22 — NUMBER OF CHILDREN ATTENDING CHILD CARE SERVICES DURING CENSUS WEEK JANUARY 1989**

Type of service	Number
Day care	5,156
Occasional care	783
Family day care	3,037
<b>Total</b>	<b>8,976</b>

**Establishments.** The State Government provides substitute care facilities primarily through the Department for Community Services in the form of group homes and hostels, with the latter being mainly provided for education purposes. The Department provides funding to subsidise establishments for children which are operated by the private sector. Most of these are conducted by religious organisations. The private sector primarily provides residential based care with some emphasis on the provision of foster care. At 30 June 1988, 225 beds were being provided by seven different agencies. The Department provides four centres in Western Australia for children who are the subject of remand, assessment and sentencing orders. Children in this category may also be accommodated through community support hostels. At 30 June 1988, there were six hostels operating.

**Adoption of children.** Children placed for adoption in Western Australia come under the guardianship of the Director-General of the Department for Community Services. A person wishing to adopt a child (other than a close relative) should apply directly to the Department. Each applicant must be assessed by the Department for suitability, and an order for the legalisation of an adoption must be obtained from a Judge of the Family Court of Western Australia. Persons wishing to adopt a related child should consult a solicitor. During 1987-88, forty-six locally born children were placed with adopting parents, compared with fifty-three in 1986-87 and thirty-four in 1985-86. The waiting time for adoption of a locally born young baby is between two and three years, with very few older children being placed. Thirty-four children from overseas were placed for adoption in Western Australia during 1987-88.

**Employment of children.** The *Child Welfare Act 1947* provides the conditions under which children may engage in street trading. Male children under twelve and female children under school leaving age are not permitted to engage in street trading.

#### **AUTHORITY FOR INTELLECTUALLY HANDICAPPED PERSONS**

The Board of the Authority consists of a Chairperson and five Board members who are appointed by and responsible to the Minister for Health. At June, 1988 there were 1,663 staff employed by the Authority.

The Authority has overall responsibility for establishing policy and advising government on issues impacting on the lives of people who have an intellectual handicap. It is also responsible for maintaining standards and coordinating the provision of services for people within Western Australia with an intellectual handicap. This role includes both the licensing and funding of service providers. The Mission Statement adopted by the Authority is: To advance the rights, responsibilities, dignity, development and community participation of people with an intellectual handicap.

In June, 1988 just over 4,500 Western Australians were registered as being eligible to receive service through the Authority. A person who learns and develops at a significantly slower rate than others the same age, has more than ordinary difficulty in coping with everyday life, and has shown these problems during childhood, is eligible for registration with the Authority.

People with an intellectual handicap are actively encouraged to use the same services which are available to the general public, however, the Authority funds necessary additional services through both the government and non-government sectors.



Irrabeena Speech pathologist working with a young client

*Photograph:* Authority for the Intellectually Handicapped Persons

Irrabeena is the name of the direct-service providing arm of the Authority. A wide range of services are available to people of all ages, however, they are most frequently used by the very young and the very old. The direct services include twenty-four hostels and twenty-five group homes accommodating 694 and 149 persons respectively.

The Authority actively encourages the participation of consumers and their families in the decision making process of the Authority through consultation.

Services are available on a regional basis and cover all areas of life including personal development programs and support for people who are living in the community, accommodation on both a short and extended stay basis as required, education and personal development opportunities in liaison with pre-schools, schools, Technical and Further Education and other educational organisations, a wide range of recreational opportunities and sheltered and supported employment opportunities. Specialist health services such as medical, dentistry, podiatry, audiology and dietetics are also available.

In addition to the provision of these services there are community education programs to increase community awareness and acceptance of people who have an intellectual handicap, so that they can fully participate in the everyday life of their community.

## THE JESUS PEOPLE

The Jesus People are known and respected throughout Australia for their work among homeless, drug effected and unemployed youth.

The movement started in Perth seventeen years ago with Jeffrey Hopp, the Chairman, assisting homeless and drug effected teenagers on a voluntary basis. He went on to raise funds to establish hostels and drop-in centres; for like any city, Perth has it's homeless youth, street kids and unwanted children.

Many of today's young people are not able to handle such pressures as drugs, alcohol, their peers,

unemployment and family communication breakdown. They find themselves in difficult circumstances needing the support of organisations such as the Jesus People. Young persons from a wide range of socio-economic backgrounds approach the Jesus People for help. In fact, considerable time is spent assisting families with teenage problems from some of Perth's better suburbs. During 1988, 1,164 homeless and destitute young people sought refuge at a Jesus People centre.

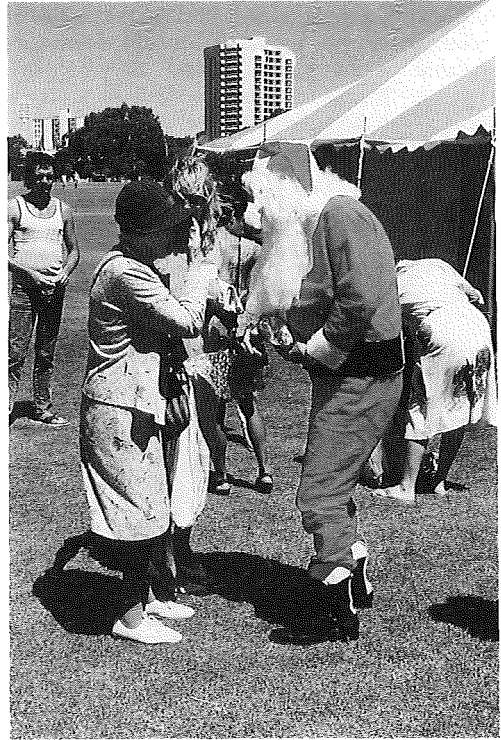
The Jesus People play an important role in drug abuse prevention and education by providing



accurate, easily understood information. They have a full-time drug education and prevention officer who is responsible for conducting seminars in schools. Students are presented with the issues facing them in an open and honest forum on topics ranging from peer pressure to self esteem and motivation. Talks are also delivered at public meetings conducted by the Jaycees, Lions, women's service groups and parents and citizens associations. During 1988, 184 school seminars and 180 public meetings were attended.

Support and rehabilitation was provided for 263 drug addicts through the drug and alcohol program, 622 food hampers were distributed to young people and families in need and over 23,000 meals provided in hostels to residents and non-residents. Additional services to the community included help with employment training, legal aid, emergency loans and family counselling.

It is the goal of Jesus People every Christmas to make sure that no person goes without. Each year the Jesus People erect a marquee in Wellington square, Perth and supply a free four-course Christmas dinner to those in need. The lonely, homeless, single parent families and pensioners are all welcome. In 1988 over 700 persons were attended to by 60 volunteers. Most of the food and gifts had been donated by Perth business houses and caring people in the community.



Christmas 1988. The Jesus People help to bring the Christmas celebration to the less fortunate people of Perth

*Photograph: The Jesus People*

## Chapter 8

### HEALTH

The Commonwealth Government and State Government health authorities, together with Boards of Health under local government administration, cooperate in maintaining health services and in the prevention and control of infectious diseases in Western Australia. The Commonwealth provides untied identifiable health grants within general revenue grants to the States and the Northern Territory as a contribution towards the cost of health programs.

Under the Medicare program, all States and Territories are compensated by Medicare grants, outside the identified health grants and tax sharing arrangements, for revenue losses and additional medical costs directly attributable to the provision of free public hospital accommodation and treatment.

#### COMMONWEALTH GOVERNMENT HEALTH BENEFITS AND ASSISTANCE

##### Medicare

The universal hospital and medical benefits scheme known as Medicare was introduced by the Commonwealth Government on 1 February 1984.

Medicare benefits are available to all persons ordinarily resident in Australia with the exception of members of foreign diplomatic missions and their dependants. Visitors to Australia are responsible for the full cost of their own medical and hospital treatment. Medical services in Australia are generally delivered by either private medical practitioners on a fee-for-service basis, or medical practitioners employed in hospitals.

TABLE 8.1 - MEDICARE: 1987-88

	<i>Unit</i>	
Persons enrolled	'000	1,556
Services processed —		
General practitioner attendances	"	5,866
Specialist attendances	"	832
Pathology	"	2,351
Other	"	1,632
<b>Total</b>	"	<b>10,682</b>
Services processed (average number per enrolled person)		
Males		5.2
Females		8.5
Persons		6.9
Benefits processed	\$'000	241,843

##### Hospital Care

Basic public hospital services are provided free of charge. Through Medicare grants to the States the cost of out-patient treatment and in-patient accommodation and care in a shared ward by a doctor employed by a hospital are covered. The scheme does not cover the cost of private accommodation in a public hospital for treatment by a doctor of the patient's choice, or charges for private hospital accommodation. It is possible however for persons to take out insurance with private health funds to cover these situations.

##### Pharmaceutical Benefits Scheme

A Pharmaceutical Benefits scheme provides assistance towards the cost of a comprehensive range of drugs and medicines supplied by an approved chemist upon presentation of a prescription from the patient's medical or dental practitioner, or by an approved hospital to patients receiving treatment at the hospital.

No individual or family needs to pay for more than twenty-five prescriptions in any calendar year. Once this limit is reached, all prescriptions for the remainder of that year are issued free of charge.

#### THE HEALTH DEPARTMENT OF WESTERN AUSTRALIA

The Health Department of Western Australia coordinates and manages health care functions and services throughout the State. The Department administers a wide range of legislation incorporating matters of individual and community health protection, treatment and regulation.

A pathology service maintained by the Department provides diagnostic medical laboratory services to government non-teaching hospitals, charitable institutions and general practitioners who elect to

use it. It also shares with the Department of Medicine of the University of Western Australia much of the diagnostic medical laboratory of the Queen Elizabeth II Medical Centre.

The Health Promotion Services of the Department, through central and regional offices, provide training and resource material for health education activities throughout the State.

The Western Australian Government subsidises the cost of dental care for pensioners and persons on low incomes who are treated at the Perth Dental Hospital and at its clinics in the metropolitan area and some major country centres.

The Patients' Assisted Travel Scheme provides financial assistance to people living outside the Perth metropolitan area who have to travel to obtain specialist medical attention. In certain circumstances, the scheme also provides allowances towards the cost of overnight accommodation where the patient is unable to return home in the same day.

A Health Advisory Network provides health care consumers and providers with a channel of communication through which the Minister for Health can be advised of health care needs. The Network's functions and responsibilities include planning and developing health care service objectives for input to Departmental planning and government policy; acting as an information exchange for ideas and proposals about health care; and providing effective feedback, from both consumers and providers, about health services.

Community Health Services

In addition to measures provided for immunisation against infectious diseases, the Community Nursing and Community Health Branches of the Health Department of Western Australia assist in maintaining the general health and well-being of children in the State.

TABLE 8.2 - CHILD HEALTH CENTRES: 1986-87

	<i>Number</i>
Child health centres	235
Attendances at centres —	
Individual infants (0 - 5 years old)	77,669
Total attendances	519,093
Visits to newborn infants	33,777

Child Health Centres are established throughout the State to support, advise, and counsel parents in relation to the care of infants and children under

school age. A health surveillance program is available to monitor the growth and development of children, and screening services are provided to detect hearing, visual, language and other physical or behavioural disorders.

School health services are provided by community nurses, with back-up from the Child Health medical officers. Services are available to all children attending schools and pre-schools throughout the State. The staff of the service includes nurses, doctors, physiotherapists, speech therapists, audiologists, occupational therapists and social workers.

Services provided include health promotion, education and screening; assessment, management programs, referral, follow-up, nursing assessment for school injuries, medical therapy and nursing care for handicapped students; counselling and liaison.

Some nurses are based in high schools and visit primary schools on a regular basis. Nursing assessment is provided and care arranged for students who have accidents or become ill at school. Children attending education support schools in the metropolitan area are cared for by health teams of nurses, physiotherapists, speech therapists and doctors. Health teams consisting of a doctor, nurses, social worker and therapists are based in Perth district offices and larger country towns. In more remote areas, local health services and visiting specialists provide school health services.

Health appraisals are carried out during pre-primary and the first year of primary education. In addition, procedures for detecting vision and hearing impairment, scoliosis or other conditions are conducted at age appropriate intervals.

Community health nurses provide health services to disadvantaged and low socio-economic groups within the community. These nurses provide a high standard of preventive and therapeutic health care to the children and adults of Aboriginal communities, particularly in the remote areas of the State. Other minority groups, such as refugees, are helped through collaboration with the Child Health and School Health Services, and with hospitals throughout Western Australia.

Dental Health

A General Dental Service operates through a number of departmental dental clinics in strategic towns, with the itinerant Dental Service bringing

dental care to communities which are remote from such clinics. Total combined attendances during 1987-88 were 10,639. A subsidised dental scheme also enables people in areas with no government dental clinic to receive care from a local private practitioner through an income tested subsidy.

The Department's School Dental Service offers dental treatment and oral preventative services to all pre-primary and primary school children throughout the State and is introducing it to high schools. Just under a quarter of a million school examinations were conducted during 1987-88, with 90.8 per cent of eligible children enrolled in the scheme.

A Dental Health Education Unit provides advisory and support services for all people involved in dental care, as well as answering requests from high school teachers and the general public.

### Mental Health Services

The Health Department of Western Australia, through its Psychiatric Services, administers hospitals for the treatment of mental illness, community mental health centres, child and adolescent clinics, day care facilities, training centres, hostels, sheltered workshops and domiciliary services for psychiatric patients.

## OTHER HEALTH SERVICES

### Royal Flying Doctor Service of Australia

The Royal Flying Doctor Service of Australia is a non-profit organisation financed by grants from the Commonwealth and State Governments and by private donations. The principal function of the Service is to provide aerial medical services for all persons in Western Australia irrespective of their location and economic situation.

**TABLE 8.3 - ROYAL FLYING DOCTOR SERVICE OF AUSTRALIA - OPERATIONS OF WESTERN AUSTRALIAN SECTION: 1987-88**

	<i>Unit</i>	
Expenditure (operational)	\$'000	6,746
Medical flights	Number	6,842
Nautical miles flown	"	1,296,707
Patients transported	"	3,836
Patients attended	"	14,735
Radio and telephone consultations	"	430

The radio network of the Royal Flying Doctor Service is regularly used in the work of Schools of the Air conducted by the Ministry of Education, and also for the transmission and receipt of telegrams and radio telephone calls. In addition, it may be used, as the need arises, in connection with flood relief, in searching for lost parties and during cyclones or other emergencies.



One of the latest acquisitions for the Royal Flying Doctor Service fleet.

Photograph: Royal Flying Doctor Service

### The St John Ambulance Association

The St John Ambulance Association is responsible for the road ambulance service and for teaching first aid throughout Western Australia. The Association also cooperates closely with the Royal Flying Doctor Service in transporting patients by air throughout the State.

The Association is a non-profit organisation. The main sources of finance are charges on users of the service, members, contributions to the Ambulance Benefit Fund, donations by individuals and grants from the State Government and the Lotteries Commission.

The Medic Alert Foundation serviced by the Association in Western Australia provides bracelets or necklets to persons who have a medical condition which may affect their treatment in the event of accident or collapse. Under such circumstances these persons may be unable to communicate effectively but the information on the bracelet would enable emergency medical personnel to assess the patient's needs. If necessary further detail could be obtained from the Association computer records.

During 1987-88 approximately 1,700 bracelets and necklets were issued bringing the total issued in Western Australia to 37,100.

**TABLE 8.4 - THE ST JOHN AMBULANCE ASSOCIATION  
WESTERN AUSTRALIA: 1987-88**

	<i>Number</i>
Ambulance service—	
Patients transported	78,300
Kilometres travelled	2,512,099
First aid classes—	
Certificates issued	22,072

### COMMUNICABLE DISEASES

The *Quarantine Act 1908* provides for the quarantine of humans, animals and plants. The Commonwealth Department of Health administers the Act in matters relating to humans whilst aspects relating to animals and plants are the responsibility of the Department of Primary Industries and Energy. The *Health Act 1911* provides for the compulsory notification of infectious diseases and for the application of preventive measures.

**TABLE 8.5 - PRINCIPAL INFECTIOUS DISEASES NOTIFIED (a): 1987-88**

<i>Disease</i>	<i>Notifications</i>
Acquired immune deficiency syndrome (AIDS)	8
Acquired immune deficiency syndrome (AIDS) — related complex	71
Ancylostomiasis	13
Bacillary dysentery (shigellosis)	111
Campylobacter infection	316
Giardiasis	262
Hepatitis A (infectious)	214
Hepatitis B (serum)	473
Leptospirosis	8
Malaria	30
Measles	21
Meningococcal infection (includes epidemic cerebrospinal meningitis)	20
Pertussis (whooping cough)	31
Puerperal fever	25
Ross river virus infection	20
Salmonella infection	365
Scarlet fever	8
Trachoma	166
Tuberculosis (all forms)	117
Venereal Disease—	
Gonorrhoea	960
Granuloma inguinale	60
Syphilis	267
Venereal warts	504

(a) Excludes diseases where the incidence was less than eight cases

### HOSPITALS

#### Commonwealth Government Hospitals

The Repatriation General Hospital, Hollywood provides free treatment for recipients of pensions payable under the Repatriation Act (according to the scope of their eligibility), and in some cases, for their dependants. Free treatment is also available for some other categories of former members of the Defence Forces and certain dependants.

**TABLE 8.6 - REPATRIATION GENERAL HOSPITAL  
INPATIENT TREATMENT: 1987-88**

	<i>Number</i>
Patients treated	10,415
Occupied bed days	95,664
Average stay of patients discharged (days)	9.4
Community occupied bed days (per cent of total)	20.1

Where spare capacity exists, the hospital takes patients from the general community and has reciprocal arrangements with Sir Charles Gairdner Hospital.

#### State Government Hospitals

Major government and government-assisted hospitals are situated in the Perth metropolitan and in regional centres throughout the State.

In addition to the hospitals included in Table 8.7 there are twenty-three Government nursing homes located in the Perth Metropolitan area and the country regional centres.

**TABLE 8.7 – STATE GOVERNMENT ACUTE HOSPITALS (a): 1987–99**

	<i>Unit</i>	
Expenditure—		
Capital funds	\$'000	64,610
Hospital Fund—		
Establishment	"	
and domestic (b)	"	45,299
Salaries and wages	"	466,011
Other	"	149,481
<b>Total expenditure</b>	"	<b>660,791</b>
Hospitals (c)	Number	87
Beds (d)	"	6,120
Staff (c)—		
Medical	"	1,134
Nursing	"	7,174
Medical support	"	1,795
Other	"	7,027
<b>Total staff</b>	"	<b>17,130</b>
In-patients—		
Treated	"	252,687
In-patient days	"	1,478,863

(a) Includes particulars of the Perth Dental Hospital (b) Maintenance of equipment, furnishings and minor repairs. (c) At 30 June. (d) It is estimated that 75 per cent of available beds are staffed.

### Private Hospitals and Nursing Homes

In addition to the government hospitals there are a number of private general and maternity hospitals, which are registered and inspected by the Health Department of Western Australia. The principal private hospitals are those established by religious bodies in the metropolitan area and the main country towns.

At 30 June 1988 there were 115 private hospitals and nursing homes in Western Australia with a total bed capacity of 6,726 at that date.

**TABLE 8.8 – PRIVATE HOSPITALS:(a): 1987–88**

	<i>Number</i>
Religious and charitable	7
Profit making	12
Other	1
<b>Total</b>	<b>20</b>
Beds (b)	1,954

(a) Registered by the Health Department of Western Australia. Excludes nursing homes. (b) Number of approved beds at 30 June.

### Mental Health Institutions

The Mental Health Act provides for the admission of patients to hospitals approved for the purpose, either on referral by a medical practitioner or by order of a Justice of the Peace supported by the referral of a medical practitioner. Special provisions exist for the detention for observation or treatment of persons admitted by order of a court or from a prison. The Act also provides for voluntary admissions. A person not less than eighteen years of age may be granted admission on his own request. Younger persons may be admitted on the application of a parent or guardian.

**TABLE 8.9 – PSYCHIATRIC SERVICES: 1986–87**

	<i>Unit</i>	
Expenditure—		
Salaries and wages	\$'000	46,078
Other	"	9,409
<b>Total</b>	"	<b>55,487</b>
Beds (a) (b)	Number	829
Separations (a)(c)	"	2,605

(a) At 30 June. (b) Approved beds. (c) Includes deaths.

## Chapter 9

### LAW, ORDER AND PUBLIC SAFETY

The law in force in Western Australia is contained in The Statutes of Western Australia, comprising legislation passed by the Western Australian Parliament and certain Imperial Acts which have been adopted, and in the Commonwealth Acts in so far as they apply to Western Australia. Under the Constitution of the Commonwealth of Australia, 'when a law of a State is inconsistent with a law of the Commonwealth, the latter shall prevail, and the former shall, to the extent of the inconsistency, be invalid.'

#### CROWN LAW DEPARTMENT

The Crown Law Department is administered, subject to the control of the Attorney General, by the Under Secretary for Law. The Department is responsible for the Supreme Court Central Office, the District Court Registry, the Family Court Registry, Court Offices throughout the State (except Childrens Courts), the Crown Solicitor's Office, the Public Trust Office, the Registrar General's Office and the Law Reform Commission. The Department, in addition to administering the Acts which come under the portfolio of the Attorney General, conducts Crown legal business and, when required, acts for and advises State Government Departments and instrumentalities.

#### LAW COURTS

In Chapter 21, reference is made to the Federal Court of Australia, the Australian Conciliation and Arbitration Commission, the Western Australian Industrial Appeal Court, and The Western Australian Industrial Commission.

##### High Court of Australia

The High Court of Australia is the Federal Supreme Court. The Constitution requires that there shall be a Chief Justice and not less than two other Justices of the High Court. At 31 December 1988 there were 6 other Justices. Sittings are held in the capital city of each State as occasion requires. The High Court exercises both original and appellate jurisdiction, acting as a court of appeal for Australia.

##### Supreme Court of Western Australia

The Supreme Court of Western Australia, consisted of a Chief Justice, ten other Judges and

three Masters at 31 December 1988. The jurisdiction of the Court in both civil and criminal matters is exercised by a single Judge, sitting alone or with a jury, unless it is provided that an action must be brought before a Full Court. Criminal cases are heard before a jury. Appeals are heard against judgements of the Supreme Court and the District Court as well as against decisions of the magistrates in the Courts of Petty Sessions. Appeal from a judgement of the Supreme Court of Western Australia in some cases lies to the High Court of Australia.

##### The District Court of Western Australia

At 31 December 1988 the District Court of Western Australia consisted of a Chief Judge and fourteen other Judges. The jurisdiction of the Court is exercised by a Judge sitting alone or with a jury. Criminal cases must be heard before a Judge and jury.

The Court has the same jurisdiction as the Supreme Court with respect to actions claiming damages for death or bodily injury. Otherwise, its civil jurisdiction exists broadly up to a maximum of \$80,000. Criminal jurisdiction exists in respect of indictable offences except those for which the penalty may be life imprisonment or strict security life imprisonment, such cases being under the jurisdiction of the Supreme Court.

Appeals from a District Court Judge lie, in the civil jurisdiction, to the Full Court of the Supreme Court and, in the criminal jurisdiction, to the Court of Criminal Appeal.

##### Family Court of Western Australia

The Family Court of Western Australia consisted of a Chairman of Judges and four other Judges, at

31 December 1988. The jurisdiction of the Court is exercisable by one Judge.

The Court hears petitions for divorce and has jurisdiction in the welfare and custody of children and in disputes as to maintenance and property of marriage.

Appeals in respect of federal jurisdiction matters lie to the Full Court of the Family Court of Australia and appeals in respect of non-federal jurisdiction matters lie to the Full Court of the Supreme Court of Western Australia.

**TABLE 9.1 — FAMILY COURT  
OF WESTERN AUSTRALIA**

Particulars	1985	1986	1987
Dissolution of Marriage— Number of—			
Applications filed	3,940	3,751	3,962
Decrees made	4,039	4,001	4,044

### Courts of Petty Sessions

Courts of Petty Sessions are held at centres of population throughout the State. Two or more Justices of the Peace sitting together in petty sessions may deal with cases which could be decided by a magistrate sitting alone.

### Childrens Courts

Childrens Courts deal with offenders under the age of eighteen years and certain cases of offences against children. Further reference to Childrens Courts appears in the section *Child Welfare* in Chapter 7.

### Local Courts

Local Courts are held throughout the State to determine minor civil issues. Jurisdiction is

limited in most cases to claims not exceeding \$10,000. A Small Debts Division of the Local Court provides a quick and less expensive means of recovering debts of less than \$3,000.

### Coroners Courts

Coroners Courts may be held to inquire into the circumstances of sudden, unnatural and suspected deaths or the cause and origin of fires. A coroner may charge a person with a major offence and commit that person for trial at a higher court.

### Licensing Court of Western Australia

The Licensing Court of Western Australia has exclusive jurisdiction to hear and determine all applications under the Liquor Act in respect of licences, provisional certificates and permits relating to the sale, supply and consumption of liquor. Appeal against a direction, determination or order of the Court lies to the Supreme Court, but only where the appeal involves a question of law.

### Small Claims Tribunals

Small Claims Tribunals deal with claims involving an amount less than \$2,000. A Tribunal is constituted by a referee sitting alone and may be constituted at any place in the State.

## CONVICTIONS IN COURTS

### Number of Convictions

It is important to bear in mind when considering the particulars shown in Table 9.2 that the figures relate to the *number of convictions* recorded and not to the *number of persons* convicted. Thus, where a person is convicted on more than one count each conviction so recorded has been included in the statistics.

**TABLE 9.2 — COURT STATISTICS — NUMBER OF CONVICTIONS: 1986–87**

Code (a)	Description of Offence	Supreme and District Courts	Courts of Petty Sessions	Childrens Courts	Total
100	Offences against the person	470	3,386	1,210	5,066
200	Robbery and extortion	135	2	31	168
300	Breaking and entering, fraud, and other offences involving theft	2,897	17,941	14,931	35,769
400	Property damage and environmental offences	50	2,550	1,584	4,184
500	Offences against good order	116	39,129	6,528	45,773
600	Drug offences	232	6,950	1,193	8,375
700	Motor vehicle, traffic and related offences	12	79,955	7,185	87,152
800	Other offences	—	7,491	104	7,595
900	Child welfare matters	—	—	202	202
..	<b>Total</b>	<b>3,912</b>	<b>157,404</b>	<b>32,968</b>	<b>194,284</b>

(a) Related to Draft Australian National Classification of Offences, June 1980.



Under the provisions of parking facilities legislation and municipal by-laws, fines may be imposed without court action for minor traffic offences. In 1987 the total number of infringement notices issued for these minor traffic offences was 547,578

### **THE JURY SYSTEM**

The operation of the jury system is governed by the *Juries Act 1957*. Indictable offences are tried before a Judge and twelve jurors sitting in the criminal jurisdiction of either the Supreme Court or District Court, depending on the gravity of the offence. Juries for civil cases comprise six persons.

#### **Eligibility for Jury Service**

Subject to the Juries Act, a person who is enrolled on any of the rolls of electors entitled to vote at an election of members of the Legislative Assembly of the Parliament of the State is liable to serve as a juror at trials in the jury district in which he or she is shown to live by any of those rolls of electors.

Each year a Juror's Book is prepared by the Chief Electoral Officer for each jury district within the State in respect of persons who appear to be qualified for, and not otherwise ineligible for service as jurors. Certain persons are excluded from jury service and persons may be excused on the grounds of illness, undue hardship, circumstances of sufficient weight, importance or urgency; or recent jury service.

### **LAW REFORM COMMISSION OF WESTERN AUSTRALIA**

The Law Reform Commission of Western Australia, established by the *Law Reform Commission Act 1972*, examines proposals for review of aspects of the law referred to it by the Attorney General. It may also submit to the Attorney General proposals for review. The Commission usually issues a discussion paper dealing with the issues involved in a particular proposal under consideration and invites comments from interested persons. A report is then made to the Attorney General.

### **PARLIAMENTARY COMMISSIONER FOR ADMINISTRATIVE INVESTIGATIONS**

The Parliamentary Commissioner for Administrative Investigations (commonly known as the Ombudsman) is empowered under the *Parliamentary Commission Act 1971* to investigate complaints by a person or a body of persons (whether incorporated or not) affected by

the administrative actions of government departments, specified statutory authorities, and local authorities.

The Act does not apply to Courts of Law in the State, a Judge of the Supreme Court, the Family Court or the District Court, a Commissioner of any Court, a Stipendiary Magistrate, a Coroner, the Auditor General, the Parliamentary Privileges Act, or any decision of the Cabinet or a Minister.

During the year ended 30 June 1987, of the 1,147 complaints processed, 111 were sustained. In 47 cases, complaints were discontinued because they were rectified or settled during investigation. In 498 of the complaints processed some assistance was given to the complainant by way of resolution or clarification.

### **THE LEGAL PROFESSION**

The Barristers' Board has the power to regulate and control the examination of articled clerks, and the qualification and examination of all candidates for admission as practitioners. Practitioners are also required to obtain a Practising Certificate, renewable annually, from the Board. At 30 June 1987, 1,596 Practising Certificates had been issued for the 1986-87 year.

### **LEGAL AID COMMISSION OF WESTERN AUSTRALIA**

The Legal Aid Commission provides legal assistance to eligible persons throughout Western Australia. The assistance may be made available at no expense to, or wholly or partly at the expense of, the Commission.

During the year ended 30 June 1987 some 57,400 persons sought assistance from the Commission. The duty counsel service, in conjunction with private legal practitioners, assisted some 24,957 persons whilst Legal Advice Bureau staff (duty solicitors) assisted 16,514 persons. Ongoing legal assistance was granted in 9,332 cases from 15,875 applications. Staff lawyers employed by the Commission handled 2,427 of these cases, whilst \$7.1 million were paid to private legal practitioners for cases undertaken by them.

### **WESTERN AUSTRALIA POLICE SERVICE**

The Western Australia Police Service comprises five main branches under the direction of the Commissioner of Police. The Commissioner is appointed by the Governor and is responsible to the Minister for Police.

The maintenance of public peace and good order, the protection of life and property and the prevention of crime through the apprehension and prosecution of criminals remain the foremost objectives of the Service. However, among other things, police officers are asked to be lecturers, computer operators, laboratory technicians,

resource managers, disco operators, bankers and marriage counsellors, and also provide assistance to a number of State Government organisations.

There were 3,287 officers in the Police Force at 30 June 1987 compared to 3,168 the previous year.

**TABLE 9.3 — WESTERN AUSTRALIAN POLICE SERVICE — CRIMES REPORTED AND CLEARED OFFENDERS, 1986-87**

<i>Offence</i>	<i>Number of crimes</i>		<i>Offenders apprehended</i>		
	<i>Reported</i>	<i>Cleared</i>	<i>Male</i>	<i>Female</i>	<i>Total</i>
Homicide	32	32	25	4	29
Sexual offences (excluding Aggravated Sexual Assault and Sexual Assault)	1,516	940	572	1	573
Aggravated Sexual Assault	172	117	85	1	86
Sexual Assault	76	55	22	1	23
Breaking and entering	34,841	5,961	6,233	681	6,914
Robbery	459	153	117	13	130
Serious assault	1,207	990	801	130	931
Assault police	545	539	398	83	481
Common assault	4,006	2,945	2,044	246	2,290
Stealing	55,562	12,682	8,049	3,805	11,854
Motor vehicle	13,012	2,380	1,836	210	2,046
Fraud	11,420	6,881	1,439	678	2,117
Damage	19,259	3,599	3,179	333	3,512
Arson	107	38	51	7	58
Unlawfully on curtilage/premises	3,223	1,056	1,188	127	1,315
Drug	7,524	7,524	4,694	805	5,499
Bomb hoax	281	47	33	13	46
Other indictable offences	382	285	226	36	262
<b>Total</b>	<b>153,624</b>	<b>46,224</b>	<b>30,992</b>	<b>7,174</b>	<b>38,166</b>

## PRISONS

**TABLE 9.4 — NUMBER OF PRISONERS DAILY AVERAGES, 1986-87**

<i>Institution</i>	<i>Males</i>	<i>Females</i>	<i>Total</i>
Prisons	1,519.6	86.9	1,606.5
Police gaol—			
East Perth	13.9	—	13.9
Police lock-ups	72.8	22.3	95.1
Public hospitals	4.6	0.5	5.1
<b>Total</b>	<b>1,610.9</b>	<b>109.7</b>	<b>1,720.6</b>

The Director of the Department of Corrective Services is responsible, subject to the control of the Minister, for the administration of prisons in Western Australia. Police gaols administered jointly by the Department of Corrective Services and the Police Service hold prisoners awaiting trial and some short-term prisoners. In addition, provision is made for holding some prisoners with very short sentences at police lock-ups throughout the State.

Work and educational opportunities vary from prison to prison. All prisons employ some prisoners in maintenance, cleaning and cooking tasks, whilst at the larger and better equipped institutions, workshops provide additional



The Bicycle Safety Section was introduced in December 1988 to promote safety and reduce accidents along Perth's cycle and pedestrian pathways.

*Photograph: WA Police Service*

employment and trades training including apprenticeships. Prison farms provide employment and some training in various aspects of agriculture. Full or part-time educational facilities are available at most prisons.

**TABLE 9.5 — PRISON RECEIVALS: DISTINCT PERSONS (a) BY AGE 1986-87**

Age (years)	Males	Females	Persons
Under 16	—	—	—
16-17	61	4	65
18-19	629	62	691
20-24	1,245	152	1,397
25-29	786	94	880
30-34	556	77	633
35-39	325	38	363
40-44	196	25	221
45-49	97	8	105
50 and over	126	11	137
Unknown	10	1	11
Total	4,031	472	4,503

(a) Distinct persons refers to the individuals admitted during the period. A person received more than once during the period is counted only for the first time.

## PROBATION AND PAROLE SERVICE

**TABLE 9.6 — PROBATION AND PAROLE SERVICE YEAR ENDED 30 JUNE 1987**

PROBATION	
Number of probation orders—	
Current at beginning of period	2,373
Issued during period	1,939
Terminated	
By compliance	1,472
Breach action taken	424
Current—	
For all or part of period	4,312
At end of period	2,416
Number of persons—	
Under supervision at end of period (a)	2,284
PAROLE	
Number of parole orders (b)—	
Current at beginning of period	784
Issued during the period (c)	649
Terminated as a result of—	
Successful completion	361
Cancellation	158
Current at end of period	914
Number of persons—	
Under supervision during period	1,433

(a) Includes persons subject to interstate orders and Commonwealth Crimes Act bonds. (b) Excludes those released to parole for deportation, extradition or repatriation only. (c) Includes orders for release under supervision, by the Governor in Executive Council.

Probation is an alternative to imprisonment; it consists of the conditional suspension of punishment. Parole is the conditional release of selected prisoners after the offender has served part of the sentence in a penal institution. One of the main functions of the Probation and Parole

Service is to provide pre-sentence reports to assist the Court in coming to a decision as to sentence which is, as far as possible, in the best interests of the community and the offender.

The Parole Board is empowered to release on parole a prisoner who has served a minimum term fixed by a court, or a prisoner being detained at the Governor's pleasure. Parole officers establish contact with prospective parolees during their imprisonment, prepare a case history of each prisoner for the information of the Parole Board, and supervise paroled persons during the parole period.

## PUBLIC SAFETY

### Industrial Foundation for Accident Prevention

The Industrial Foundation for Accident Prevention is a non-profit organisation and most of its funds are generated by the provision of its services, with the balance made up of member subscriptions and State Government grants. Employers and Government are represented on the Foundation's Management Committee and Advisory Council.

The Foundation provides occupational safety and health services to industry, commerce and Government Departments in Western Australia and other States with the aim of preventing occupational injuries and illness.

### The Western Australian Fire Brigades Board

The Board is responsible for taking, superintending, and enforcing all necessary steps for the prevention and extinguishing of fires and the protection of life and property from fire, and the control of all fire brigade premises and all fire brigades.

Of the 11,333 incidents attended by metropolitan and country fire stations in 1986-87, there were 3,674 false alarms, 5,043 fires causing negligible damage and 746 calls for special services including rescue, assistance with hazardous conditions and salvage operations.

Fifteen permanent brigades and two volunteer brigades, one of which is supported by permanent staff, operate in the metropolitan fire district centred on the City of Perth. Permanent brigade personnel serve with volunteer brigade personnel in five large country centres, and volunteer brigades provide town fire protection at seventy-three other centres. At 30 June 1987, the Board had 887 employees and there were 2,012 volunteer brigade officers and firemen.



In January 1989 fire destroyed one third of the total area of Kings Park in Perth before firefighters were successful in controlling the blaze.

Photograph: WA Fire Brigades Board

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### Bush Fires Board

The Bush Fires Board is constituted under the *Bush Fires Act 1954*. The principal functions of the Board are to administer the Act; to report to the Minister on methods of preventing or extinguishing bush fires; to recommend the prohibited and restricted burning times to be declared for the whole or any part of the State for any yearly period; to carry out research in connection with fire prevention and control; to conduct publicity campaigns for the purpose of improving fire prevention measures; to provide training facilities for volunteers; and to carry out such fire prevention measures as it considers necessary. The Board operates through its staff liaison officers based in country centres. These officers promote fire protection by the exercise of coordination, liaison and advisory functions.

Local authorities throughout the State handle local administration of the Bush Fires Act.

### REFERENCES

- Western Australia Police Service Annual Report 1987*
- Western Australian Department of Corrective Services Annual Report 1987*
- Western Australian Fire Brigades Board Annual Report 1987*
- Legal Aid Commission of Western Australia Annual Report 1987*
- Report of the Parliamentary Commissioner for Administrative Investigations 1987.*

## Chapter 10

# EDUCATION

In Western Australia, education at pre-primary, primary and secondary levels is provided at government schools administered and staffed by the Ministry of Education and at non-government schools, most of which are conducted by the principal religious bodies. Technical and further education (TAFE) is offered by the Office of TAFE, a sub-department of the Ministry of Education, and by three independent regional colleges. The latter also provide higher education facilities. Additionally, higher education is available through a multi-campus college of advanced education and three universities.

### PRE-PRIMARY EDUCATION

Before commencing primary school, a child may receive pre-primary education at either a Government or non-government school. A child may also attend a government staffed community pre-school or an independent pre-school. Attendance is optional at all centres. Children commence pre-primary education during the year in which they attain five years of age, although they may enrol during their fourth year where vacancies exist.

Every person conducting a pre-school centre is required to hold a permit issued by the Minister for Education and all authorised pre-school centres are subject to inspection by an officer of the Ministry.

**TABLE 10.1 — PRE-PRIMARY EDUCATION : JULY**

	1986	1987	1988
Number of centres—			
Government —			
Pre-primary	478	483	506
Community pre-school	149	136	133
Non-government—			
Pre-primary	82	87	92
Independent pre-school	20	22	24
<b>Total</b>	<b>729</b>	<b>728</b>	<b>755</b>
Number of teaching staff (a)	546	555	594
Number of children—			
Government —			
Pre-primary	19,430	21,474	23,721
Community pre-school	7,549	6,985	6,859
Non-government			
Pre-primary	2,408	2,434	2,826
Independent pre-school	1,000	1,136	1,296
<b>Total</b>	<b>30,387</b>	<b>32,029</b>	<b>34,702</b>

(a) Numbers shown are for full-time equivalents rounded to the nearest whole number. Excludes non-government and independent pre-school teachers.

### PRIMARY AND SECONDARY EDUCATION

Children may commence school at the beginning of the year in which they attain the age of six years. Except in special circumstances, attendance is then compulsory to the end of the year in which the child attains the age of fifteen years. Instruction in the primary school is provided over a seven-year period. A child who makes normal progress completes the course at the age of twelve years and may then enter secondary school.

**TABLE 10.2 — GOVERNMENT AND NON-GOVERNMENT SCHOOLS, FULL-TIME STUDENTS CLASSIFIED ACCORDING TO AGE (a): JULY 1988**

Age last birthday (years)	Government schools (b)	Non-government schools (c)	Total
Under 6	9,282	2,233	11,515
6	19,736	4,789	24,525
7	19,084	4,679	23,763
8	18,787	4,595	23,382
9	18,801	4,775	23,576
10	19,161	4,892	24,053
11	18,476	4,983	23,459
12	18,128	5,856	23,984
13	17,231	6,773	24,004
14	16,855	6,765	23,620
15	15,438	6,088	21,526
16	11,514	5,259	16,773
17	5,784	2,807	8,591
18 and over	1,791	836	2,627
<b>Total</b>	<b>210,068</b>	<b>65,330</b>	<b>275,398</b>

(a) Excludes pre-primary and technical school students. (b) Includes students attending education support schools, centres and units. (c) Includes students attending special schools.

Specialist assistance is provided to handicapped children through Education Support schools, centres and units run by the Ministry of Education and special schools conducted by the non-government sector.

The Ministry of Education provides a range of facilities for children with a hearing impairment including separate schools, units within primary and secondary schools, and a visiting teacher service to assist students and teachers.

Secondary education is provided over a period of five years – School Years 8 to 12. Generally, students may leave at the end of Year 10 or continue through Year 12 to attain a Certificate of Secondary Education.

TABLE 10.3 — GOVERNMENT SCHOOLS: JULY

	1986	1987	1988
NUMBER OF SCHOOLS			
Primary schools	531	532	534
Education support schools/centres	51	50	57
Secondary schools —			
District high schools	59	58	59
High schools	4	7	5
Senior high schools	80	81	83
Senior colleges	2	2	2
Distance Education Centre	1	1	1
<b>Total</b>	<b>728</b>	<b>731</b>	<b>741</b>
NUMBER OF TEACHING STAFF (a)			
Engaged in teaching duties—			
Primary	6,413	6,478	6,657
Secondary	5,995	5,788	5,869
Education support (b)	317	315	353
<b>Total</b>	<b>12,725</b>	<b>12,581</b>	<b>12,879</b>
NUMBER OF FULL-TIME STUDENTS			
Level of education—			
Primary (c)	128,875	131,510	134,181
Secondary—			
Years 8, 9 and 10 (c)	55,940	53,069	51,365
Years 11 and 12	19,703	21,093	22,003
Senior colleges	894	1,148	1,387
Other (d)	2,014	1,207	1,132
<b>Total</b>	<b>207,426</b>	<b>208,027</b>	<b>210,068</b>
Males	107,067	107,297	108,277
Females	100,359	100,730	101,791

(a) Numbers shown are for full-time equivalents rounded to the nearest whole number. (b) Excludes teachers working in education support units attached to primary and secondary schools. (c) Includes ungraded and education support students. (d) Students attending education support schools and centres who cannot be assigned a level. Prior to 1987 all education support school and centre students were included in this category.

Western Australia also has two Senior Colleges run by the Ministry which provide 'second chance' secondary education for those people who left the school system before achieving their goals.

Distance education in Western Australia operates as an adjunct to the general school system. The Distance Education Centre of the Ministry of Education provides basic schooling to a wide

variety of groups in the community who are unable to attend normal schools. These groups include children living in remote areas, isolated Aboriginal communities, students (adults and children) who for various medical and social reasons are unable to attend normal schools, students at smaller schools who cannot have maximum choice of subjects because of the small size of the teaching staff, prisoners in gaols, students travelling interstate and overseas with their parents, and adults seeking a second chance at a basic education.

A feature of the service offered by the Distance Education Centre is the field support given to students by visiting tutors and teaching staff as well as its links with the five Schools of the Air.

Schools of the Air are conducted through the radio network of the Royal Flying Doctor Service from bases at Carnarvon, Derby, Kalgoorlie, Meekatharra and Port Hedland to supplement tuition provided by the Distance Education Centre.

The Secondary Education Authority approves courses of study and issues certificates recording student achievement in secondary education in Western Australia (details of which are to be found later in this Chapter).

TABLE 10.4 — NON-GOVERNMENT SCHOOLS: JULY

	1986	1987	1988p
NUMBER OF SCHOOLS			
Primary	134	137	143
Secondary	35	37	39
Primary/secondary combined	59	58	56
Special	5	5	5
<b>Total</b>	<b>233</b>	<b>237</b>	<b>243</b>
NUMBER OF TEACHING STAFF (a)			
Primary	1,543	1,595	1,692
Secondary	2,091	2,185	2,352
Special	27	27	25
<b>Total</b>	<b>3,661</b>	<b>3,807</b>	<b>4,069</b>
NUMBER OF FULL-TIME STUDENTS			
Level of education—			
Primary (b)	31,828	32,941	34,012
Secondary—			
Years 8, 9 and 10 (b)	19,618	19,892	20,346
Years 11 and 12	8,726	9,756	10,896
Special	83	73	76
<b>Total</b>	<b>60,255</b>	<b>62,662</b>	<b>65,330</b>
Males	30,035	31,240	32,552
Females	30,220	31,422	32,778

(a) Numbers shown are for full-time equivalents rounded to the nearest whole number. (b) Includes students in ungraded classes.

### Primary and secondary curricula.

The curricula of both the primary and secondary schools are organised into seven study areas: English, Languages and Communication; Mathematics; Science and Technology; Social Studies; Practical and Creative Arts; Personal and Vocational Education; and Physical Education.

The curriculum in Years 1 to 3 of primary school focuses on the development of language abilities and functional literacy and numeracy. Middle and upper primary students study an integrated curriculum which covers the seven broad categories.

Lower secondary school students, Years 8 to 10, progress through the Unit Curriculum which is designed to ensure a general and balanced education whilst providing scope for a choice of units from those offered. Each unit is intended to take about forty hours. Generally, students are expected to study four units of English and Mathematics in each year and to complete at least one unit from each of the seven curriculum components.

Students in Years 11 and 12 study year-long courses which lead to their accreditation and admittance to higher education.

Education in government schools is secular in character but periods may be set aside during which representatives of various religious denominations may attend to give special religious instruction. In addition, elements of religion may be included, in one or more of the seven study areas, by individual teachers.

Although Aboriginal children normally work in the mainstream education program, practically orientated courses are offered when needed. The functions of the Ministry of Education provide for the formulation of policy, the identification of curriculum strategies, the production of suitable learning materials and the provision of supplementary funding and advisory assistance to teachers of Aboriginal children in Government schools. The Aboriginal Community Liaison Unit assist Government schools and districts with the implementation of education for Aboriginal children in local situations.

Agricultural education in the form of full-time residential courses is available at a number of centres. Day instruction is also provided at a number of secondary schools. Some private schools offer courses in agriculture.

### The Secondary Education Authority

The Secondary Education Authority is responsible to the Minister for Education for the accreditation and registration of courses of study in secondary education.

**Student achievement.** At the end of three years of studying the Unit Curriculum, students are issued with a Certificate of Lower Secondary Studies. This certificate lists the units satisfactorily completed in the last two years of compulsory schooling—Years 9 and 10.

The Certificate of Secondary Education is awarded to students who have completed at least one of Years 11 and 12. Students in these years study year-long courses selected from 150 Accredited Courses and a range of Registered Courses approved by the Secondary Education Authority (SEA). Assessment is school-based and grades in Accredited Courses are moderated by the SEA to ensure comparability across all schools in the State. Grades in Registered Courses are not moderated.

In the twenty-eight Year 12 Accredited Courses which can contribute to a student's Tertiary Entrance Score (called TES subjects) an external examination is conducted. A numerical score for TES subjects is reported on the Certificate of Secondary Education, as well as a grade. This numerical score is a 50:50 combination of the moderated school assessment and the standardised examination mark. The combined mark is scaled using the Australian Scholastic Aptitude Test (ASAT).

Entrance to higher education institutions is based on the Tertiary Entrance Score (TES), which is a weighted average of scores in a student's best three, four or five TES subjects. Ten per cent of the student's ASAT score is also included. The maximum TES is 510.

The student must also have satisfied the requirements for Secondary Graduation, satisfactory performance (an average grade of C over six Year 12 courses); and English Language Competence (a final score of 50 in Year 12 English or English Literature).

### POST-SECONDARY EDUCATION

#### The Western Australian Post-Secondary Education Commission

The Western Australian Post-Secondary Education Commission advises the Government,

post-secondary and higher education institutions and the Commonwealth Tertiary Education Commission on the planning, coordination, development and financing of post-secondary and higher education.

### Technical and Further Education

The Office of Technical and Further Education coordinates the provision of technical and further education (TAFE) in Western Australia, although three independent colleges also offer TAFE programs (details of their operations are shown later in this Chapter).

Vocational education and training programs are provided for managers, supervisors, technicians, skilled tradespersons, semi-skilled personnel, and other kindred support staff required by industry and commerce.

These programs also provide an alternative to those of the upper secondary schooling system. Included are vocationally related courses, bridging, and link courses for young people aged fifteen to nineteen years of age. Increasingly, TAFE programs are becoming available as part of the upper secondary school curriculum. Further services provided include specialist and mid-career training and retraining, and a range of cultural, recreational and leisure programs for the State's adult population.

TABLE 10.5 — TECHNICAL AND FURTHER EDUCATION

	1986	1987	1988
NUMBER OF INSTITUTIONS			
Colleges	16	16	16
Evening technical schools	8	8	8
Technical centres	73	89	99
NUMBER OF TEACHING STAFF (a)			
Colleges	1,729	1,727	1,767
Evening technical schools	80	63	61
Technical centres	89	90	89
NUMBER OF STUDENT ENROLMENTS (b)			
Colleges	76,896	75,616	83,647
Evening technical schools	35,939	23,372	23,323
Technical centres	21,347	19,944	20,934

(a) Full-time equivalent. (b) Each student is counted only once, even though they may have enrolled in more than one course, or on more than one occasion. From 1987, students enrolled in adult education (hobby) courses were similarly counted only once, even though they may have enrolled in more than one adult education course.

The Office of Technical and Further Education has developed a variety of mechanisms to make its programs more accessible to students. It operates a

network of sixteen colleges, thirteen in the metropolitan area and three in the country, which offer a wide range of courses in the days and evenings. Many colleges are, however, equipped for specialist areas of study. Eight metropolitan evening technical schools operate from local community and high school premises. Although some offer daytime classes, most cater for part-time evening students.

Technical centres, including full-time TAFE centres in several major country towns, are distributed throughout the rural areas of the State. These facilities provide for the needs of local communities whenever there is sufficient demand for classes. For those students who have difficulty in attending institutional based programs, the TAFE External Studies college provides a comprehensive range of courses.

The TAFE Rural Coordinator scheme operates in several country centres, and serves the needs of the local populations for vocational programs by harnessing the resources and expertise in the regions.

Short intensive skills training and retraining courses are also provided to meet specific vocational needs, such as small business management. In addition, courses may be designed and delivered on a user-pays basis, to suit the special needs of industry.

The TAFE Counselling Service provides education, vocational and general guidance to students and prospective students of TAFE. A limited range of consultancy services are also available to industry and commerce, in areas such as staff selection, training and evaluation.

The Office of TAFE, in conjunction with a number of Commonwealth Government agencies, provides a range of courses to meet the particular needs of women, Aborigines, migrants, disabled and non literate students. The major objective of these programs is to enhance the students' prospects of gaining employment or pursuing further education and training.

### HIGHER EDUCATION

#### The Tertiary Institutions Service Centre (Incorporated)

The Tertiary Institutions Service Centre (Incorporated) processes applications for admission to the higher education institutions and carries out such other functions as agreed by the institutions.



Applicants seeking admission to a first year undergraduate course (or later years in the case of Murdoch University and Curtin University) or to a Diploma in Education course apply through a joint system operated by the Centre. Applicants list four preferences from all the higher education courses available and offers are then made by the institutions for each course on the basis of a ranked order.

### **The Higher Education Contribution Scheme**

From 1989, the Commonwealth Government introduced the Higher Education Contribution Scheme for students enrolled at higher education institutions.

Students are liable for an annual course charge of \$1,800 for each year of equivalent full time study that they undertake. They are able to pay this charge through tax instalment deductions or as a payment in advance with a 15% discount. No payment is required until personal income reaches \$22,000 in a year at which time payment will commence at the rate of 1% of taxable income. For annual incomes of \$25,000 to \$34,999 the rate is 2% and for those of \$35,000 and over, it is 3%.

### **The Colleges**

Multi-level post-secondary education colleges may be established by the Minister for Education, on the advice of the Western Australian Post-Secondary Education Commission. Such colleges may, with the Minister's approval, provide advanced education, technical and further education, and education at other levels in specified circumstances.

Hedland College and Karratha College are situated in the Pilbara region in the north-west of the State and Kalgoorlie College is situated in the Eastern Goldfields region in the south-east of the State.

The Hedland, Karratha and Kalgoorlie Colleges provide courses mainly in the technical and further education sector, but also provide higher education for local students in cooperation with institutions based in the Perth metropolitan area. These colleges provide a focus for educational and cultural activities within their respective communities. In addition to academic subjects, the colleges also provide personal interest courses.

**Western Australian College of Advanced Education.** Five metropolitan colleges (Churchlands, Claremont, Joondalup, Mount Lawley and Nedlands) and the Bunbury Institute of Advanced Education combine to form the Western Australian College of Advanced

Education, with each as a campus. In April 1988 the total enrolment was 12,719 comprising 6,974 full-time, 4,210 part-time and 1,535 external students.

The College offers 163 different under-graduate and post-graduate courses over six teaching schools: Arts and Applied Sciences, Business, Community and Language studies, Education, Nursing and Performing Arts.

The academic programs range through diploma, degree, masters, doctoral and other post-graduate awards.

The College fosters links with the community by providing research and consultancy services, implementing training programs for industry and by offering a wide variety of community courses.

*Western Australian Academy of Performing Arts.* The Academy of Performing Arts enjoys a wide and semi-autonomous brief in the Western Australian College, though administratively it is a school of the College, and has access to its resources and facilities.

The Academy provides for the preparation of aspiring professionals who seek full-time employment in the performing arts, in-service training of practising professionals in the performing arts in Western Australia and servicing of the performing arts needs of the Western Australian community at large.

Courses within the Academy are planned in such a way that all students have the opportunity to integrate their professional development in their chosen area through both course work and performance, and to study other aspects of the performing arts.

In addition to providing formal courses for its students, the Academy serves the Western Australian community at large in a variety of ways. Music centres are established at Hedland College, Kalgoorlie College and Esperance. In the areas of dance, music and theatre, the Academy offers frequent in-service and professional refresher programs, both on campus and throughout selected centres in Western Australia.

In 1988 the Academy had 479 full-time students and 114 part-time students enrolled in its music, theatre, musical theatre, dance, arts management and media performance programs.

The initial report which led to the formation of the Academy suggested that the institution should liaise with and utilise resources of related

institutions in Western Australia. To support this proposal, students from other tertiary institutions attend open classes taught by Academy staff and a close affiliation has been established with the University of Western Australia. Students in the dance, theatre, and production and design programs have substantial contact with professional companies such as the Western Australian Theatre Company, the West Australian Ballet Company and the Western Australian Opera Company. Performance opportunities with these companies enable students to work with professionals in large scale public productions as part of their training programs.

### The Universities

**The University of Western Australia.** The University of Western Australia was established in 1911 and teaching began in 1913. The University is located close to the city of Perth adjacent to the Swan River.

The University has five residential colleges and a hall of residence for students, an art gallery, a museum of geology and a museum of anthropology. There are also five theatres, a music auditorium and Winthrop Hall which is used for arts attractions, mainly orchestral and choral works. These venues are used by arts practitioners within and outside from the University and are used particularly during the annual Festival of Perth.

In the near future, the University will also become the new home for the bells from the Church of St Martin-in-the-Fields in Trafalgar Square, London. Negotiations with the Australian and New Zealand Society of Bellringers and the Bicentennial Authority successfully concluded an agreement to transfer the bells to the University and to construct on the campus a bell tower in which they can be hung. The tower will be constructed at the edge of the Swan River and adjustable glass panels will enable the music to be directed towards the river or campus.

As well as admitting students with a sufficiently high Tertiary Entrance Score who satisfy individual faculty pre-requisites, entry may also be offered to an applicant who has satisfied the admission requirements of another university in Australia or of an overseas university in which there is a reasonable correspondence in admission requirements. Persons twenty years of age or older may be admitted without the necessary pre-requisites if they are able to demonstrate that there is a reasonable prospect of their being able to assimilate and benefit from their course.

The University offers Bachelor, Honours, Masters and Doctors degrees. Bachelors degrees vary between three and six years duration, some requiring successful completion of the first year course of another faculty for admission and others the completion of a first degree course. Honours degrees generally entail an additional year of study. Masters and Doctors degrees are conferred in a number of disciplines and a post-graduate Diploma in Education is also available.

**TABLE 10.6 — THE UNIVERSITY OF WESTERN AUSTRALIA: AT 30 APRIL**

	1985	1986	1987
<b>NUMBER OF STAFF</b>			
Teaching—			
Full-time—			
Professors	70	71	71
Associate professors, readers	89	92	89
Senior lecturers	201	191	197
Lecturers, teaching registrars	132	126	137
Other (a)	112	106	106
Total	604	586	600
Part-time (b)—			
Lecturing	11	8	12
Tutoring/ demonstrating	74	67	68
Total	85	75	80
Research—			
Full-time	211	221	229
Other—			
Full-time	1,370	1,388	1,418
Part-time (b)	122	140	131
<b>Total staff</b>	<b>2,392</b>	<b>2,410</b>	<b>2,458</b>
<b>NUMBER OF STUDENTS</b>			
Internal—			
Full-time	6,702	6,704	7,096
Part-time	2,700	2,739	2,479
External	63	69	50
<b>Total</b>	<b>9,465</b>	<b>9,512</b>	<b>9,625</b>
Males	5,294	5,187	5,178
Females	4,171	4,325	4,447

(a) Assistant lecturers, teaching fellows, tutors and demonstrators.

(b) Figures for part-time staff have been converted to a full-time equivalent on the basis of 250 hours per annum for lecturers, 700 hours per annum for tutors and demonstrators and 35 hours per week for all other staff.

University Extension is responsible for community education activities, of which the annual Summer School, with a long tradition, is an important component.

The University makes awards of research studentships for post graduate study to eligible students. Graduates may also apply for Hackett Studentships for overseas study. Some large private industrial concerns also make awards for study at post-graduate level.

**TABLE 10.7 — THE UNIVERSITY OF WESTERN AUSTRALIA: 1987**

	<i>Number</i>
<b>STUDENTS WHO COMPLETED COURSES (a)</b>	
Field of study—	
Agriculture, animal husbandry	58
Architecture, building	18
Arts, humanities and social science	496
Business administration, economics	369
Education	179
Engineering, surveying	129
Health	123
Law, legal studies	179
Science	472
<b>Total</b>	<b>2,023</b>
<b>DEGREES CONFERRED</b>	
Bachelors	1,197
Honours	316
Masters	142
Doctors (b)	56

(a) Year ended 31 December. (b) Includes higher doctorates.

Some \$20.5 million was expended on research activity in the University in 1987. This came from a number of sources including the Australian Government through the Commonwealth Tertiary Education Commission, which provided general support to departments; from a number of outside granting agencies which support individual projects and from bequests and benefactions from members of the public.

**TABLE 10.8 — THE UNIVERSITY OF WESTERN AUSTRALIA—FINANCE (a)**  
(\$'000)

	1985	1986	1987
<b>INCOME</b>			
Commonwealth Government Grants—			
Specific capital purposes (b)	373	520	1,902
Other	72,765	79,031	83,490
State Government grants	1,490	1,825	1,751
Donations and endowments	9,619	13,104	18,449
Other	6,908	7,866	10,183
<b>Total</b>	<b>91,155</b>	<b>102,346</b>	<b>115,775</b>
<b>EXPENDITURE</b>			
Teaching and research	63,114	69,333	74,458
Administration and general overhead	9,166	10,433	11,245
Libraries	4,930	6,680	6,310
Buildings, premises, grounds	6,706	8,675	10,109
Sundry auxiliary expenditure	3,433	3,911	4,703
<b>Total</b>	<b>87,349</b>	<b>99,032</b>	<b>106,825</b>

(a) Year ended 31 December. (b) Income received specifically for new buildings, major alterations and additions to buildings, installation of services, purchase of land and buildings and major equipment.

*Radio Station 6UVS FM.* Station 6UVS is owned and operated by University Radio Ltd, a consortium of the University of Western Australia and Murdoch University. The station derives its funding from the two universities, corporate sponsorship and a variety of fundraising activities. The main studios are located in Nedlands with additional studios on the campus of Murdoch University. The station has a full-time staff of thirteen and over 300 volunteer staff including students from both Universities. The station commenced broadcasting in 1977 and was Perth's first stereo FM radio station. The coverage of the arts has been an important part of the station's contribution to the community.

**Murdoch University.** Murdoch University was established in 1973. The University, situated some 13 km from Perth, comprises over 230 hectares including the University farm.

On campus accommodation is provided for 332 students. Student House provides self-service accommodation with each student having a single study/bedroom. Groups of students share common kitchen, dining and lounge areas.

The University won the Civic Design Award in 1988 for the best blend of gardens and architecture for any site in Western Australia.

The gardens are a feature of the University and some 60,000 native trees, plants and wildflowers have been planted which attract many native birds. Incorporated into the gardens is an amphitheatre which is used by arts practitioners from within and outside the University. The stage area is lawn and the seating comprises re-cycled wooden railway sleepers set into grassed hillsides. There is also a Chinese garden, the materials for which were donated by Chinese communities in Asia. Craftspeople from Taiwan visited Perth to assemble the garden.

Murdoch has a flexible policy concerning admissions. In determining the eligibility of a prospective student, consideration is given to examination results, information obtained from school reports, the results of selection tests and interviews with applicants. Special incentives are provided to Aborigines, women and mature-age students.

The University admitted full fee-paying overseas students for the first time in 1987. Ninety-eight students were accepted mainly into the commerce program. An additional 143 enrolled in 1988 over several fields of study.

**TABLE 10.9 — MURDOCH UNIVERSITY: AT 30 APRIL**

	1986	1987	1988
NUMBER OF STAFF			
Teaching—			
Full-time—			
Professors	22	21	22
Associate professors, readers	23	25	35
Senior lecturers	60	71	62
Lecturers, teaching registrars	59	59	65
Other (a)	44	44	44
Total	208	220	228
Part-time (b)—			
Lecturing	1	1	1
Tutoring/demonstrating	19	16	26
Total	20	17	27
Research—			
Full-time	14	14	16
Other—			
Full-time	462	478	505
Part-time (b)	11	7	21
<b>Total staff</b>	<b>715</b>	<b>736</b>	<b>797</b>
NUMBER OF STUDENTS			
Internal—			
Full-time	2,050	2,346	2,772
Part-time	1,029	906	1,009
External	1,545	1,372	1,415
<b>Total</b>	<b>4,624</b>	<b>4,624</b>	<b>5,196</b>
Males	2,221	2,258	2,550
Females	2,403	2,366	2,646

(a) Assistant lecturers, teaching fellows, tutors and demonstrators. (b) Figures for part-time staff have been converted to a full-time equivalent on the basis of 250 hours per annum for lecturers, 700 hours per annum for tutors and demonstrators and 35 hours per week for all other staff.

**TABLE 10.10 — MURDOCH UNIVERSITY**

	1986	1987	1988
STUDENTS WHO COMPLETED COURSES (a)			
Field of study—			
Divinity	—	1	6
Education	113	111	126
Biological and			
environmental sciences	59	76	85
Humanities	150	77	93
Mathematical and			
physical sciences	35	46	68
Social sciences	109	87	144
Veterinary studies	93	106	99
General studies	7	3	7
<b>Total</b>	<b>1466</b>	<b>507</b>	<b>628</b>
DEGREES CONFERRED			
Bachelors	307	315	409
Honours	66	88	102
Masters	31	22	32
Doctors	16	30	21

(a) Year ended 30 June.

The University offers Bachelor, Honours, Masters and Doctors degrees. Bachelor degrees are between three and five years duration. Honours degrees, when available, require a further year of study. Special provision has been made for

external students, and a substantial and innovative program of external studies has been developed.

Community education programs for all ages are provided by cooperation with University Extension.

Undergraduate and postgraduate scholarships are offered and private organisations also provide awards for postgraduate studies.

Various government authorities and private organisations provided \$4.2 million for basic and applied research during 1987. The University's development company, Murmin is involved in an \$11 million research and development joint agreement with an American corporation to develop a zinc bromine battery.

**TABLE 10.11 — MURDOCH UNIVERSITY—FINANCE (a) (\$'000)**

	1985	1986	1987
INCOME			
Commonwealth Government Grants—			
Specific capital purposes (b)	2,182	5,923	3,170
Other	23,936	27,684	31,703
State Government grants	556	551	627
Donations and endowments	165	68	297
Other	2,288	2,566	3,311
<b>Total</b>	<b>29,127</b>	<b>36,792</b>	<b>39,108</b>
EXPENDITURE			
Teaching and research	16,264	19,004	22,307
Administration and			
general overhead	3,920	4,633	5,121
Libraries	2,013	2,240	2,429
Buildings, premises, grounds	3,136	8,108	8,250
Sundry auxiliary expenditure	2,921	2,998	3,553
<b>Total</b>	<b>28,254</b>	<b>36,983</b>	<b>41,660</b>

(a) Year ended 31 December. (b) Income received specifically for new buildings, major alterations and additions to buildings, installation of services, purchase of land and buildings and major equipment.

Substantial funding for energy research has been received from State, Federal and industry sources.

**Curtin University of Technology.** The Curtin University of Technology, formerly the Western Australian Institute of Technology was established on 1 January 1987. The main campus of the University is set on 112 hectares of landscaped parkland in the Perth suburb of Bentley, 10 km from the city centre. The Schools of Occupational Therapy, Physiotherapy and Podiatry are located in the Royal Perth (Rehabilitation) Hospital grounds at Shenton Park. Specialist campuses are the Muresk Institute of Agriculture in the Avon Valley near Northam and the campuses of the Western Australian School of Mines at the gold mining centre of Kalgoorlie and in the south-west, at the coal mining town of Collie.

Curtin is concerned with technology as the range of ideas, operations and materials by which people apply knowledge to real situations. The University fosters close links with the community through its teaching programs and research and development activities.

Minimum entrance requirements for undergraduate courses are based on Tertiary Entrance Scores. Holders of other qualifications which are assessed as equivalent and who possess evidence of adequate literacy may be considered for selection. Mature age provisions allow for alternative assessment methods for applicants at least twenty years of age.

**TABLE 10.12 — CURTIN UNIVERSITY OF TECHNOLOGY: AT 30 APRIL**

	1985	1986	1987
<b>NUMBER OF TEACHING STAFF</b>			
Full-time—			
School and department heads	56	55	54
Senior lecturers	149	146	169
Lecturers	276	301	301
Assistant lecturers, tutors, demonstrators, etc	74	82	94
<b>Total</b>	<b>555</b>	<b>584</b>	<b>618</b>
Part-time (a)	124	151	103
<b>Total teaching staff</b>	<b>679</b>	<b>735</b>	<b>721</b>
<b>NUMBER OF STUDENTS IN APPROVED COURSES</b>			
Internal—			
Full-time	5,960	6,206	7,076
Part-time	4,931	5,277	4,676
External	1,131	1,103	917
<b>Total</b>	<b>12,022</b>	<b>12,586</b>	<b>12,669</b>
Males	6,860	6,969	6,733
Females	5,162	5,617	5,936

(a) Full-time equivalent units of part-time teachers based on number of hours worked.

**TABLE 10.13 — CURTIN UNIVERSITY OF TECHNOLOGY**

	1985	1986	1987
<b>STUDENTS WHO COMPLETED COURSES</b>			
Field of study—			
Agriculture	66	47	48
Architecture	110	105	112
Arts	408	430	483
Business studies	544	513	569
Education	318	298	310
Engineering	235	219	226
Health	517	599	625
Science, pure and applied	204	203	192
<b>Total</b>	<b>2,402</b>	<b>2,414</b>	<b>2,565</b>
<b>DEGREES CONFERRED</b>			
Bachelors	1,622	1,467	1,665
Masters	64	53	79

The University offers 160 courses at undergraduate and postgraduate levels leading to associate diploma, diploma, bachelors degree, graduate and postgraduate diploma, masters degree or Ph D qualifications. The courses vary in duration according to the level and may be undertaken as full-time or part-time studies. It is also possible to study some courses on an external (correspondence) basis.

**TABLE 10.14 — CURTIN UNIVERSITY OF TECHNOLOGY—FINANCE (a)**  
(\$'000)

	1985	1986	1987
<b>INCOME</b>			
Commonwealth Government Grants—			
Specific capital purposes (b)	448	587	1,942
Other	56,351	62,902	64,256
State Government grants	1,434	3,853	8,144
Donations and endowments	853	842	1,236
Other	11,791	16,362	23,578
<b>Total</b>	<b>70,877</b>	<b>84,546</b>	<b>99,156</b>
<b>EXPENDITURE</b>			
Salaries and wages	44,862	50,290	50,717
Library	808	938	1,056
Buildings, grounds and equipment	5,588	5,395	11,556
Sundry auxiliary expenditure	16,572	24,758	32,897
<b>Total</b>	<b>67,830</b>	<b>81,381</b>	<b>96,226</b>

(a) Year ended 31 December. (b) Income received specifically for new buildings, major alterations and additions to buildings, installation of services, purchase of land and buildings and major equipment.

*Western Australian School of Mines.* The Western Australian School of Mines comprises the Departments of Mineral Exploration and Mining Geology; Minerals Engineering and Extractive Metallurgy; and Mining Engineering and Mine Surveying. Associate diploma, bachelor's degree, postgraduate diploma and master's degree courses are offered.

The increasing emphasis on applied research and consultancy within the School led to the establishment of the Brodie-Hall Mining Research and Consultancy Centre in Kalgoorlie in 1986, which is currently funding the appointment of a Research Fellow in the field of mining geophysics.

The Collie Federated School of Mines is also a campus of the Curtin University of Technology where the first year of the degree programs is being run as well as an associate diploma course in coal mining technology. The development of teaching and research facilities at Collie has consolidated the role of the School and expanded its base as a South-West Regional/Bentley Campus research centre.

In April 1987 there were 191 students enrolled in the Western Australian School of Mines.

*Muresk Institute of Agriculture.* Muresk Institute of Agriculture which comprises Schools of Agricultural Technology and Rural Management, is situated near Northam. Muresk offers a range of courses which allows its graduates to fill almost any role in the rural industry. The Associate Diploma in Agriculture, a two year course, is for those planning a career in farming or areas related to farming. The Bachelor of Business (Agriculture) is a three and a half year course for those wishing to pursue a position in management in one of the rural associated industries, or to manage a large scale farming enterprise.

The campus of some 1,800 hectares contains a cereal and sheep farm, a piggery, and a thoroughbred horse stud. Research facilities include laboratories, glass and tunnel houses and the Clyde Smith Rural Management Centre which houses the Rural Management Unit and its wide range of microcomputer hardware and software. Through this unit and with the establishment of the Farm Management Foundation of Australia (Inc.) on the campus, Muresk has expanded its applied research profile in the agricultural business field. This research concentrates on the development and application of new technologies in both broadacre and intensive farming systems and on assisting farmers to incorporate these developments into decision support systems.

Numerous short courses are held at Muresk, including in-service training schools for personnel of the Department of Agriculture and for field and service staff of agricultural firms.

The number of students enrolled at the College in 1988 was 267.

#### COMMONWEALTH GOVERNMENT ASSISTANCE FOR EDUCATION

The State Government has the major responsibility for education, including the administration and substantial funding of primary, secondary and technical and further education. The Commonwealth Government provides supplementary finance to the State and is responsible for the total funding of universities and colleges of advanced education. The Commonwealth also has special responsibility for Aboriginal people and for migrants, as well as the power to provide assistance for students.

The National Board of Employment, Education and Training was established in 1988, one function

being the provision of advice and information on education to the Commonwealth Government.

**TABLE 10.15 — COMMONWEALTH GOVERNMENT  
ASSISTANCE FOR EDUCATION: WESTERN  
AUSTRALIA  
(\$'000)**

<i>Nature of assistance</i>	<i>1984-85</i>	<i>1985-86</i>
Assistance of a revenue nature—		
Universities	85,199	93,936
Colleges of advanced education (a)	85,273	95,118
Technical and further education	12,804	13,475
Schools	98,497	110,292
Participation and equity program	8,140	6,260
Aboriginal education	2,945	3,048
Pre-school education	4,860	2,430
<i>Total</i>	<i>297,718</i>	<i>324,559</i>
Assistance of a capital nature—		
Universities	5,440	6,662
Colleges of advanced education (a)	3,618	5,353
Technical and further education	15,725	16,138
Schools	22,061	22,156
Aboriginal education	19	—
Pre-school education	—	—
Video facilities	99	149
<i>Total</i>	<i>46,962</i>	<i>50,458</i>
<b>Total</b>	<b>344,680</b>	<b>375,017</b>

(a) Including teachers colleges.

#### Financial Assistance for Students

**AUSTUDY.** In 1987 AUSTUDY replaced the Tertiary Education Assistance Scheme, Adult Secondary Education Allowance Scheme, and the Secondary Allowances Scheme as the main scheme for community-wide student assistance.

Subject to eligibility criteria, AUSTUDY provides support for full-time students 16 years of age and older studying secondary, technical and further education, undergraduate and some postgraduate course at universities and colleges of advanced education. Higher degree students, who are eligible for postgraduate awards do not qualify for AUSTUDY.

**TABLE 10.16 — AUSTUDY: RATES OF BENEFIT:  
JANUARY 1988**

	\$
Student living at home —	
Secondary and tertiary —	
16-17 years of age	50.00
18 years of age and over	60.00
Student not living at home or independent (a) —	
16-17 years of age	76.00
18 years of age and over	91.20

(a) Not available for secondary students under the age of 19.

**Postgraduate Award Scheme.** This scheme provides awards to selected higher degree students

undertaking Masters and Doctor of Philosophy programs at Australian universities and colleges of advanced education. They are made on academic merit, are taxable and, although not income-tested, are not available if a certain level of income is received from other awards.

**Assistance for Isolated Children Scheme.** This scheme assists families whose homes are too remote for normal daily access to government schools. It provides allowances for eligible students living away from home to attend school, for students studying by correspondence or when a second home is maintained for student occupation. The scheme also covers children regarded as isolated due to medical disability.

### EXPENDITURE ON EDUCATION BY STATE AND LOCAL AUTHORITIES

TABLE 10.17 — STATE AND LOCAL GOVERNMENT  
AUTHORITIES (a)— OUTLAY ON EDUCATION (b)  
(\$'000)

	1985–85	1985–86
Pre-school education—		
Current	23,638	25,535
Capital	116	54
Primary and secondary education—		
Current	582,036	623,555
Capital	33,524	65,679
Tertiary education—		
Technical and further education—		
Current	89,008	106,885
Capital	24,487	35,492
University education		
Current	80,721	90,321
Capital	12,496	10,480
Other higher education		
Current	82,451	80,046
Capital	7,315	12,486
Education n.e.c. (c)—		
Current	33,271	37,040
Capital	1,022	1,290
Transportation of students—		
Current	23,584	26,961
<b>Total</b>	<b>993,669</b>	<b>1,115,824</b>
Current	914,710	990,343
Capital	78,959	125,481

(a) State authorities comprise State Government departments and instrumentalities. Local authorities refer to municipal governments set up under local government legislation. (b) Includes expenditure from Commonwealth Government Grants for education. (c) Includes special education and education not definable by level.

### Financial Assistance for Schools and Students

The State Government provides financial aid to non-government schools by means of a direct annual grant in respect of each student enrolled. The grant incorporates a needs component and separate rates are applicable to pre-primary, primary and secondary students.

Assistance is also given to non-government schools by way of low interest loans and interest subsidies on moneys borrowed to help meet expenditure on new residential accommodation, classrooms and associated facilities and school site acquisition. The scheme also applies to the provision of teacher accommodation north of the twenty-sixth Parallel.

A boarding-away-from-home allowance, to supplement the isolated children's allowance paid by the Commonwealth Government is also provided. The allowance of \$500 per annum ensures a combined minimum payment of \$1,489 per annum for an isolated child who is obliged to live away from home to attend school.

The State Government Additional Assistance and Clothing Assistance Schemes are also available to indigent parents who have children in Years 8 to 12 aged under 16. These schemes aim to assist parents to meet the costs of education.

## Chapter 11

# CULTURE, SCIENCE AND RECREATION

## Culture

Tangible evidence of Western Australia's cultural development is apparent in the provision of major facilities for the arts. Located in Northbridge close to central Perth, the Perth Cultural Centre provides a focus for the arts and culture. Its heart is a large paved plaza with an amphitheatre for outdoor performances. Around the perimeter are housed the State Library Service in the Alexander Library, the Western Australian Museum, the Art Gallery of Western Australia and the Perth Institute of Contemporary Arts. It is planned to have the precinct enhanced with landscaping, additional performance facilities and sidewalk cafes by the end of the decade.

Around the Perth Cultural Centre are a number of arts resource organisations, including the National Exhibitions Touring Structure, responsible for taking small exhibitions to Western Australian country centres; Artemis Women's Art Forum; the Australian Association of Dance Education; Evos Music, exponents of contemporary music; and the Australian and Regions Artists' Exchange, a body established to enable dialogue and exchange between artists from Australia and the Pacific region. Artists' studios are also located in and near the Centre. The new Forrest Chase development links the Cultural Centre with the city.

The last few years have seen the development of regional arts facilities and there is a steady flow of country touring activity by professional companies.

### DEPARTMENT FOR THE ARTS

Through the Department for the Arts, the State Government funds the Arts portfolio which includes the Western Australian Film Council, the State Censorship Office and the statutory authorities of the Western Australian Museum, the Art Gallery of Western Australia, the Library Board of Western Australia and the Perth Theatre Trust.

The Department provides support to a number of organisations for performing arts including theatre, music and dance, the visual arts and crafts including the Crafts Council, the Fremantle Arts Centre and a large number of groups and individuals working in these fields; literature, including the Katherine Susannah Pritchard Writers Centre, Fremantle Arts Centre Press; Aboriginal arts including theatre, music and the visual arts and crafts; ethnic arts; film and

television and a range of organisations which foster broad community participation in the arts. Six Arts Development Programs have been established to assist the professional development of artists in all fields: Creative Development, Regional Arts, Aboriginal Arts, Public Art, Arts Marketing and Community Arts.

The distribution of grants to arts organisations and individual practitioners is a major function of the Department. Financial assistance is provided in two major categories, base grant general purpose funding to arts agencies and arts development grants for projects.

Western Australia has nine major subsidised performing arts organisations: the Western Australian Ballet Company, the Western Australian Arts Orchestra, the Western Australian Youth Orchestra, The Western Australian Opera Company, Deck Chair Theatre Company, the Hole



in the Wall Theatre, Spare Parts Puppet Theatre, Swan Theatre Company and the Western Australian Theatre Company. These organisations performed to audiences totalling more than 400,000 patrons in 1988. In the same year the annual Festival of Perth accounted for ticket sales of over 575,000 with a box office turnover of more than \$2 million, and featured 72 international attractions during a three and a half week period.

Regional arts facilities include art galleries at Geraldton and Bunbury and performing arts facilities at Karratha, Geraldton and Esperance. Demand from non-metropolitan regions for professional arts tuition and services is met by the Department's Regional Arts Development Program. This offers support for a range of activities including the short-term arts residency schemes, touring activities, community arts projects and Arts Access workshops.

Fremantle Arts Centre Press has published more than 140 titles, and launched many Western Australian writers and their work into national and in some cases international prominence. Sales of their publications have now exceeded \$1 million. The arts industry in Western Australia generated some \$325 million during 1987-88.

TABLE 11.1 - DEPARTMENT FOR THE ARTS  
GRANTS, 1987-88  
(\$'000)

	General purpose	Special projects	Total
Aboriginal Arts	-	158.4	158.4
Community Arts	-	344.4	344.4
Dance	663.6	150.7	814.3
Film & Television	206.5	100.0	306.5
Literature	136.8	79.9	216.6
Music	1,514.2	266.0	1,780.2
Theatre	1,144.4	442.4	1,586.8
Visual Arts & Crafts	688.6	480.2	1,168.8
Other/Arts Facilities	571.0	565.2	1,136.2
S.T.A.R.S. (a)	-	13.8	13.8
Country Caps	-	7.6	7.6
Arts Access	-	11.8	11.8
<b>Total</b>	<b>4,925.1</b>	<b>2,620.3</b>	<b>7,545.4</b>

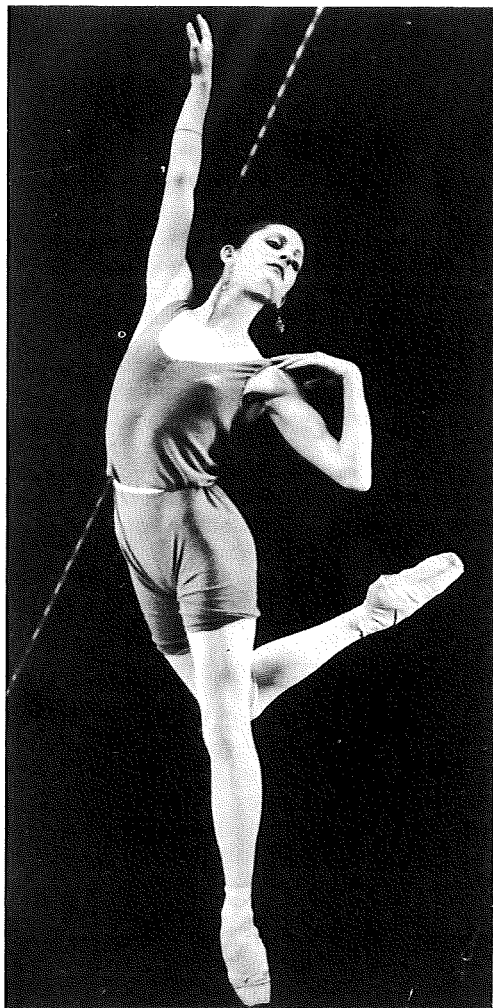
(a) Short Term Arts Residency Scheme.

### THE WEST AUSTRALIAN BALLET

The West Australian Ballet is a non-profit making organisation funded by the Western Australian Government through the Department for the Arts and is financially assisted by the Australia Council - the Federal Government's arts funding and advisory body. State and Federal government funding represents some sixty per cent of the company's income with the balance generated through box-office earnings and corporate sponsorships.

Executive management of the company is headed by a board of eight members who are elected annually from the business and arts community.

The company has a permanent staff of twenty-six, including sixteen dancers and a part-time staff of six. For the presentation of major full-length ballets, the company expands to approximately twenty-six dancers with an increased production team.



1988: Principal dancer, Natasha Middleton

Photograph: West Australian Ballet

The West Australian Ballet was founded in 1952 by the Russian dancer Mme Kira Bousloff. The company's early growth was based on the European ballet tradition but Mme Bousloff was keen to encourage and develop a uniquely Australian style for the company. She

commissioned many young Australian musicians, painters and dancers to create their own ballets and by 1968 the company had become fully professional, gaining recognition as the State's official ballet company funded by government.

There followed a progressive period during the 1970s when several noted directors contributed to the company's development and international guest artists featured in its programs.

In 1980, under the directorship of Garth Welch, the company became resident in the newly refurbished His Majesty's Theatre presenting the opening performance.

In 1983 Barry Moreland was appointed Artistic Director. He had been resident choreographer with the London Contemporary Dance Theatre and London Festival Ballet. As an Australian he had retained his links with Australian dance by frequently working in this country with the Australian Ballet and major state dance companies.

As Artistic Director of the West Australian Ballet, Moreland has created four full-length and twelve one act works for the company. He has encouraged new and established designers and composers to provide a distinctive company style. Moreland has commissioned artists including Charles Blackman and John Coburn to design for the company. The 1988 bicentennial production *Visions* offered commissions for new symphonic scores to three contemporary Australian composers.

During the past five years many notable artists have been attracted to work with the company. Dame Beryl Greg CBE, the British director, has twice visited the company to reproduce the classic *Giselle*. Principal guest stars from Australia, America and Europe have danced in the company's productions.

### THE LIBRARY BOARD OF WESTERN AUSTRALIA

The Library Board of Western Australia is constituted to advise the Minister and local authorities on matters of general policy relating to libraries and to administer the funds made available by Parliament for the State library and information service.

The State Library Service comprises: The State Reference Library which includes the J.S. Battye Library of West Australian History, the general reference library, the State Film Centre, the Music Library and Infolink, the State Archives; and Network Services, which includes the Public

Library Services Branch. These units are coordinated by the Board to provide an integrated and comprehensive library and information service throughout the State.

TABLE 11.1 - THE LIBRARY BOARD OF WESTERN AUSTRALIA

	Unit	1987-88
Expenditure	\$	21,569,770
Staff (a) (b)	Number	270
Associated public libraries	"	220
Books —	"	
Total circulation stock (a)	"	1,889,269
Received and dispatched in the exchange program with local libraries	"	796,444
Inter-library requests received	"	118,153
Visitors to reference libraries	"	717,107

(a) At 30 June. (b) Number of full-time staff plus full-time equivalent units of part-time staff.

### The State Reference Library

All general reference services are provided by the State Reference Library. The J.S. Battye Library of West Australia History has a mandate to seek out, acquire and make available local materials for research covering printed records, film archives and oral history. Infolink has responsibility for providing community and State Government information services to the public. The State Film Centre provides a free film and video lending service to groups and organisations throughout Western Australia. The Music Library provides a cassette and musical scores lending service to the general public.

### The State Archives

Under legislation passed in 1974 the Board has responsibility for the control and custody of all State archives. These include the records not only of the Government but also of all local authorities and all other bodies established under statute. When records cease to be in current use they become the responsibility of the Board and their destruction is prohibited without the approval of the Board.

### Network Services

Network Services provides acquisitions and cataloguing facilities, a centralised inter-library loans system and the Public Library Services Branch. Public libraries in Western Australia are a cooperative venture between the Library Board of Western Australia and the 139 local government authorities throughout the State. The Public Library Services Branch is responsible for the provision of fully processed bookstock and other

resource materials and also the professional back-up services to all public libraries in the Statewide network. The provision of local premises and the employment of local staff are the responsibility of the local authority concerned.

### THE WESTERN AUSTRALIAN MUSEUM

The Western Australian Museum has its headquarters and principal display galleries in Perth, with branches in Fremantle (Fremantle Museum, Western Australian Maritime Museum, Samson House and "B" Shed), Albany (Albany Residency Museum) and Geraldton (Geraldton Museum). The Museum has responsibilities for Aboriginal material, including sites, and for historic shipwrecks. The Director also has delegated powers in respect of wrecks and material under Commonwealth control.

TABLE 11.2 - THE WESTERN AUSTRALIAN MUSEUM:  
1987-88

	<i>Unit</i>	
Expenditure(a)	\$	6,856,882
Staff (b)	No.	187
Days spent on field work	"	2,214
Public attendance -		
Western Australian Museum Perth	"	251,703
Fremantle Museum	"	61,302
Western Australian Maritime Museum	"	130,321
Samson House	"	4,269
"B" Shed	"	13,734
Albany Residency Museum	"	64,102
Geraldton Museum	"	30,493

(a) Excludes capital works (b) At 30 June.

The work of the Museum is concerned mainly with natural sciences and human studies. Emphasis in both display and research is on the fauna and the human population, past and present, of Western Australia.

The Trustees of the Museum are empowered to assist in establishing and maintaining local museums. The Museum's role is mainly to assist by making available the expertise of its own staff in advising on the maintenance of collections, restoration of objects, and on museum design, and by depositing objects for display in recognised museums. At present eighteen local museums are recognised under the provisions of the Museum Act.

The Museum is an active educational instrument. Members of the scientific staff lecture in various departments of tertiary educational organisations. Educational Centres, staffed by teachers provided by the Ministry of Education, conduct classes at the Museum in Perth and the Fremantle Branch throughout the year. Regular classes for primary

schools are held during school term and special visits are arranged for secondary schools at both Perth and Fremantle. In addition special visits at both museums, as well as at Albany and Geraldton, are made by children from schools not included in the regular series. During school holidays quizzes are available at the Education Centres at Perth, Fremantle, Albany and Geraldton.

The Museum is often called upon to act in an advisory capacity to government departments. Senior staff serve on Government committees for protection of the heritage, the environment and wildlife. The Museum is assisted in certain fields by Honorary Associates, some of whom serve on advisory committees appointed by the Trustees.

### THE ART GALLERY OF WESTERN AUSTRALIA

The Art Gallery of Western Australia incorporates seven major galleries, an auditorium, conservation laboratories, a prints and drawings study room, a restaurant and a bookshop. The Gallery Administration Centre, incorporates a library, a theatre and the Art Gallery Society rooms. As well as exhibiting works from the permanent collection, activities of the Gallery involve the presentation of important exhibitions from overseas; lectures and exhibitions by visiting artists and an artist in residence program.

TABLE 11.3 - THE ART GALLERY  
OF WESTERN AUSTRALIA: 1986-87

	<i>Unit</i>	
Expenditure	\$	3,813,077
Staff (a)	Number	78
Exhibits for display (a)	"	8,978
Exhibitions for year	"	38
Visitor attendances	"	356,776

(a) At 30 June.

The Gallery's collection includes both Australian and International art, and is divided into four curatorial departments; Aboriginal and Asian; Craft; Painting and Sculpture; and Prints and Drawings. Current acquisition policy concentrates on the post 1960 era.

The Art Gallery has over fifty volunteer guides who maintain a regular program of guided tours to the public. Their aim is to enrich personal experience and public awareness of the collection and exhibition program.

The Art Gallery Society supports the Gallery through functions organised both within the Gallery and at other venues. Donations from fund

raising efforts make possible the acquisition of many important art works which otherwise may not have been obtained.

### **Geraldton Regional Art Gallery**

The Geraldton Regional Art Gallery was opened in August 1984 in the former Town Hall building. Exhibitions are supplied by the Art Gallery of Western Australia from its program, together with displays arranged by the Curators and Committee of Management in Geraldton.

Assistance from the Department for the Arts and the Geraldton Cultural Trust made possible the bringing to Geraldton of Trevor Woodward (a contemporary painter) by the Geraldton Art Society as artist-in-residence for a month.

A quartet from the Western Australian Arts Orchestra gave a performance in the Gallery as part of their midwest tour arranged by the Western Australian Opera Company.

During 1986-87, 21,677 persons visited the gallery.

### **Bunbury Regional Art Gallery**

In February 1987, the Bunbury Regional Art Gallery opened as part of the launching of the

Bunbury Arts Complex. The Gallery is housed in the former historic Convent of Mercy.

The Gallery consists of an upper gallery which was formerly the chapel and the lower gallery, previously the sisters' sleeping quarters. The lower gallery leads through an open foyer area to the City of Bunbury Art Gallery (distinct from the Bunbury Regional Gallery).

During the first five months of operation, some 10,000 people visited the Gallery

## **THE ABORIGINAL ARTS BOARD**

The Aboriginal Arts Board. It supports activities involving the preservation and continuation of traditional cultural practices and their associated art forms as well as the generation of new artistic expression among Aboriginal people in urban and country areas.

The Aboriginal Arts Board awarded 39 grants totalling \$539,875 for arts programs in Western Australia during 1987-88. This compares with 45 grants amounting to \$653,377 awarded for Western Australian Aboriginal arts projects in 1986-87.

## **Science**

### **STATE GOVERNMENT OBSERVATORY**

The primary instruments at the Observatory are the 61-cm Lowell Cassegrain reflector, and the 33-cm Astrographic refractor. Other telescopes are used as required and include the 41-cm University reflector, built by the Physics Department of the University of Western Australia, a 35-cm Celestron Cassegrain reflector and two 20-cm portable Meade Cassegrain reflectors.

The Lowell telescope is equipped with a photoelectric photometer to measure the brightness of celestial objects and a plate camera for direct photographs. It is used principally for photometry of solar system objects.

The Astrographic telescope is able to be used for investigating photographically the motion of stars over long periods of time; observations of minor planets; observation of comets (including recovery of periodic comets) enabling orbits to be computed; and for securing photographs of the southern skies. Since August 1987, when the

Observatory's activities were reduced, the first of these functions has not been performed.

The Meridian Transit Circle, which had been on loan from the Hamburg Observatory, was taken out of action in August 1987. It is soon to be dismantled and returned to Germany for a museum display.

The Perth Observatory cooperates directly with other observatories in the area of astrometric and photometric research and provides astronomical information for Western Australia.

### **CHEMISTRY CENTRE, WESTERN AUSTRALIA**

The Chemistry Centre (WA), formerly the Government Chemical Laboratories, is a division of the Department of Mines and provides a wide range of scientific analytical and consultancy services to government, industry and the general public. The Centre assists in mineral processing, soil and fertilizer analysis, agricultural trials, water

quality assessment, food nutritional quality evaluation, forensic science, environmental monitoring, chemical aspects of occupational and physical environments, and materials testing. It undertakes research and development in all these areas.

TABLE 11.4 - CHEMISTRY CENTRE (WA): 1987-88

Laboratory	Samples submitted for examination	Staff Numbers (a)
Agricultural Chemistry	73,762	27
Engineering Chemistry	1,103	17
Food & Industrial Hygiene	16,321	16
Forensic Science	10,056	18
Kalgoorlie Metallurgical	4,545	8
Materials Science	539	7
Mineral Science	6,062	24
Water Science	16,271	16
<b>Total</b>	<b>128,659</b>	<b>(b) 149</b>

(a) At 30 June (b) Includes 16 administrative staff.

### COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION

The Commonwealth Scientific and Industrial Research Organization (CSIRO), the largest scientific research organisation in Australia, is a statutory body employing some 7,500 staff in more than 100 laboratories and field stations throughout Australia. Seven laboratories and field stations involving three hundred staff operate in Western Australia.

The work of the CSIRO is carried out within six Institutes: Information and Communication Technologies; Industrial Technologies; Minerals, Energy and Construction; Animal Production and Processing; Plant Production and Processing; and Natural Resources and Environment. Each Institute consists of several Divisions. Of these Divisions, two, Water Resources Research and Minerals and Exploration Geoscience, have their headquarters in Perth. Divisional groups from Forestry and Forest Research, Entomology, Animal Production, and Plant Industry and Soils, are represented in the Laboratory for Rural Research (Perth). Other Divisions established in Western Australia include Fisheries, Food Processing, Geomechanics, Mathematics and Statistics, Mineral Products, and Wildlife and Ecology.

CSIRO maintains strong links with tertiary institutions, industry and the community to ensure that its research effort is targeted to national needs. Advisory committees make a significant contribution to divisional operations. Further industry input is obtained by the appointment of individuals to Sector Advisory Committees.

### DEPARTMENT OF AGRICULTURE

Reference to the scientific work of the Department of Agriculture appears in the section *The Department of Agriculture* in Chapter 13.

#### BOTANIC GARDEN

The Western Australian Botanic Garden is in Kings Park (see following section *Public Parks and Reserves*). It specialises in the display of the State's native flora in particular that of the South-West. Much of the indigenous flora only occurs naturally in this region. Many species are spectacularly beautiful and some are curiously adapted to the harsh environmental conditions. Seed and other materials have been collected from the wild and the propagation of these plants investigated to bring them into cultivation and maintain the living collections of nearly 2,000 species native in this State. Also growing in Kings Park and the Botanic Garden are about 1,500 species from other parts of the world, especially those which share with Perth a "mediterranean" climate - cool moist winters alternating with hot dry summers. The main Botanic Garden occupies more than twenty hectares of which nearly seventeen hectares are devoted to Western Australian flora and about one hectare each to plants from California, South Africa and the Mediterranean basin.

More than fourteen hectares are planted with native trees in an arboretum. There are other smaller collections embellishing particular features such as a bed planted with native species suitable for Perth suburban gardens at the Hale Recreation Area, where there is also a sensory trail of trees having contrasting scents, textures, colours and growth habits. Aromatic herbs and shrubs have been planted in a raised bed in the Ivey Watson Playground.

The display glasshouses extend the range of plants exhibited with species unsuited to growing in the open ground. These include some from the drier inland parts of the Pilbara and Kimberley regions of the State, salt bushes and other succulents. Plants requiring humid conditions, such as carnivorous plants and ferns, are kept in separate sections of the display glasshouse complex. A collection of cycads surrounds a pool with aquatics in the central courtyard. Nearby there is a garden planted with rare and endangered species.

There is active scientific research by the botanical and horticultural staff into the biology, propagation and cultivation of the native flora, especially species threatened with extinction. Surplus seed

and tissue cultures are distributed to botanical institutions throughout the world. Public interest in and motivation towards the conservation of the flora are fostered through advice on the growing of native plants, educational and interpretative

programs. These and many other aspects are put on show during the annual spring Wildflower Festival, which is a major tourist attraction, as are Kings Park and the Botanic Garden throughout the year.

## Recreation

### PUBLIC PARKS AND RESERVES

The Governor, acting on the advice of Executive Council, may order the reservation of Crown Lands for a variety of specific purposes which serve the public interest.

Some Crown Land is reserved for public recreation and amusement, National Parks and other public parks; and for the conservation of flora and fauna. Such reserves are often placed under the control of Statutory bodies, some of which are dealt with in this section.

#### Department of Conservation and Land Management

The Department of Conservation and Land Management is required to manage public lands, waters and wildlife for the benefit of present and future generations of Western Australians. National Parks management encourages public enjoyment of the natural attributes of these lands, meeting the diverse needs of the community, but in a manner that does not compromise conservation objectives.

National Parks and Marine Parks are vested with the National Parks and Nature Conservation Authority, a statutory body responsible to the Minister for Conservation and Land Management. A majority of the Authority's members represent community interests.

The State's 4.7 million hectares of National Parks contain picturesque landscapes ideally suited to more passive nature-based activities such as sightseeing, photography, bushwalking, nature study and picnicking and camping in designated areas. This system of fifty-seven National Parks is complemented by almost two million hectares of State forest, which offers opportunities for picnicking, camping, backpacking, canoeing, fishing, marooning, orienteering and other pursuits. Within certain specified areas, other activities including horse and trail bike riding are permitted, subject to certain management controls.

Nature reserves are for the purposes of wildlife and landscape conservation, scientific study and

preservation of features of archaeological, historic or scientific interest. Wildlife values may not be commercially exploited, and no recreation which damages natural ecosystems is allowed. At 30 June 1988, there were ten million hectares of conservation of flora and fauna reserves.

Marine Parks are managed for marine conservation and recreation, with areas zoned for commercial fishing on a sustained yield basis. There are two marine parks in Western Australia; one at Marmion; and the other at Ningaloo (off Exmouth) which was created for the bicentenary. The area of marine parks at 30 June 1988 was some 233 thousand hectares.

Extensive limestone caves are features at several places in the south-west part of the State as well as in the Kimberley and the Nullabor Plain. Some between Cape Naturaliste and Cape Leeuwin and at Yanchep, have been developed for public inspection, and certain areas of the surrounding land have been reserved within Leeuwin - Naturaliste National Park, adjacent areas at Yallingup, Margaret River and Augusta; and within Yanchep National Park.

The total Department of Conservation and Land Management terrestrial estate constitutes 6.7 per cent of the land area of Western Australia

#### Kings Park

The Kings Park Board administers an area of approximately 400 hectares close to the centre of Perth. There are several scenic vantage points on Mount Eliza overlooking the city and Swan River with views to the Darling Scarp. The original purpose when development began in 1895 was to provide for public recreation, health and enjoyment. This is still catered for by drives, dual use paths, grassed walks, formal gardens, picnic lawns with barbeque fireplaces under shade trees, and playgrounds of various types. Subsequently other roles have been added.

The State War Memorial, the Pioneer Women's Memorial, avenues of dedicated trees and many other features commemorating the service and

sacrifice of Western Australians in peace and war have been placed here making Kings Park the State's principal shrine. There are also several historic sites in Kings Park, visited by early explorers or used by the pioneer settlers and the aborigines before them.

The decision in 1959, implemented three years later, to create the Western Australian Botanic Garden in Kings Park has led to the display in gardens and glasshouses of about 2,000 species of the native flora and the undertaking of research into its biology, conservation and propagation, especially of rare and endangered plants. About two-thirds of Kings Park is still native bushland, scarred in places by the extraction of timber, firewood and kindling by the early settlers, and subsequent weed invasion and too frequent bushfires. Nevertheless the resilience of the indigenous vegetation and active rehabilitation programs have combined to make Kings Park a remnant nature reserve unique in its proximity to a capital city.

The Kings Park Guides are volunteers who give their time to operate an information centre and to lead walks through Kings Park and Botanic Garden to share its many interesting aspects with tourists and other visitors.

### **Perth Zoological Gardens**

The Zoological Gardens Board administers nineteen hectares of lawns and gardens and displays a wide range of animals in natural settings. The Perth Zoo's central aim is to contribute to the development of positive attitudes towards wildlife and the conservation of life on earth.

Perth Zoo exhibits the State's largest and most complete collection of Australian animals as well as a comprehensive collection of exotic animals. During the year ended 30 June 1988, 102 species of mammals, 145 species of birds and 45 species of (1,528 specimens in all) reptiles were exhibited.

To manage the zoo, the equivalent of eighty full-time staff are employed. Special features are free school holiday activities for children and adults and guided tours by trained volunteers, called Docents.

Recent developments are the elephant exhibit, bear exhibits, otter enclosure and the Bicentennial Education Centre.

Other principal attractions are the Australian Wildlife Park including koala and wombat exhibits, the nocturnal house, water bird and

gibbon lakes, primate enclosures, great cat enclosures, picnic lawns and landscaped gardens.

Developments currently underway include the African savannah exhibit and Children's World projects.

The Perth Zoo, which is open to the public every day of the year, ranks as one of the State's major tourist attractions. Attendance has increased 70 per cent over the last three years and some 577,573 people visited it during the year ended 30 June 1988.

### **Rottneest Island**

The Rottneest Island Authority administers, as a tourist and holiday resort, a reserve of 1,930 hectares comprising almost the whole of Rottneest Island, which is situated about eighteen kilometres west of Fremantle.

During the year ended 30 June 1988, 318,554 persons visited the island by the daily commercial air and sea transport services.

## **LOCAL GOVERNMENT RESERVES**

Many local authorities hold land for recreational purposes, the areas having been either Crown land vested in the Council, acquired by way of purchase, or received under private bequest. Included in these local government reserves are areas required to be surrendered to the Crown by private owners to provide recreation areas where land is divided into private residential lots. The reserves are frequently developed as public parks or to provide facilities for sports or camping.

## **MINISTRY OF SPORT AND RECREATION**

Throughout the State, the Ministry works closely with all levels of government, the private sector, and communities to influence the planning and provision of community leisure needs. To assist this work, there are specialist branches relating to sport, facility development, outdoor recreation and active recreation programs involving all population groups. A comprehensive regional network ensures provision of services in many country locations.

The Ministry makes recommendations concerning Sports Lottery funds and other government grants to local government authorities and community groups for capital works; special development projects; for training courses for coaches, leaders, officials and administrators; salary subsidies to sporting associations; travel subsidies for selected persons travelling to national championships;

hosting national and international championships and regional games; single and multi-sport camps; innovative projects; resource development and long-term sports development plans.

The Ministry conducts training courses, education programs and seminars for people working in a voluntary capacity in sport and recreation. A number of services which relate specifically to sport are also conducted. Of particular significance are the Coaching Accreditation Scheme which trains up to 600 sports coaches in Western Australia each year. The Ministry also works closely with a wide range of community based agencies and individuals serving the needs of the community. High priority is placed on equality of access to recreational opportunities initiated a number of activity programs, seminars, courses and information services have been initiated which aim at improving the recreational opportunities and choices of the elderly, those with disabilities and young people.

### RECREATIONAL FISHING 1987

A survey of recreational fishing was conducted throughout Western Australia in July 1987 by the Australian Bureau of Statistics. The survey asked about fishing habits during the twelve month period to July 1987.

An estimated 284,100 persons or 26.6 per cent of the Western Australian population aged 15 years and over, went fishing during the year. More than twice as many males than females went fishing. This difference remained consistent across all age groups.

### Fishing Participation by Age and Sex

Participation rates vary according to a persons usual place of residence. Some 34 per cent of country residents went fishing compared with 24 per cent of metropolitan residents. Of the people who chose to fish, 58 per cent fished in the metropolitan area and most did so on less than five occasions during the year.

The largest group of people (some 43 per cent) went fishing for "other" fish types which were not identified separately in this survey or for no species in particular.

Of the people who fished, 65 per cent did so from shore, just under 26 per cent from a boat and some 9 per cent from shore and boat equally.

DIAGRAM 11.1— FREQUENCY OF FISHING BY AREA OF USUAL RESIDENCE

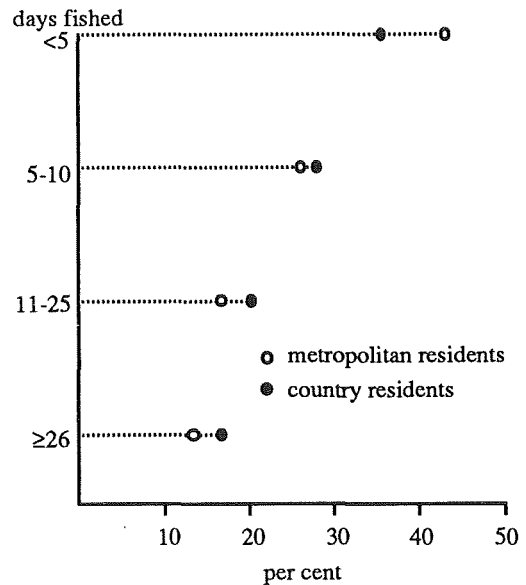


TABLE 11.5 — PERSONS WHO FISHED (A): TYPE OF FISH SOUGHT BY FREQUENCY OF FISHING

Type of fish	Days spent fishing during year		Percentage seeking that fish type
	Less than 5	5 and over	
Number of persons			
Shellfish—			
Abalone	6,300	3,100	1.2
Crabs	47,600	29,700	10.2
Rock Lobster	10,100	14,400	3.2
Marron	24,000	9,000	4.4
Prawns	36,000	14,600	6.7
Other shellfish	12,700	5,300	2.4
Finfish—			
Herring	51,800	59,000	14.6
Freshwater fish	11,700	6,700	2.4
Gamefish	5,300	7,400	1.7
Salmon	19,300	14,900	4.5
Snapper/Jewfish	26,500	34,400	8.0
Tailor	40,500	46,100	11.4
Whiting	46,400	46,300	12.2
Other fish (b)	62,900	66,000	17.0
Total	401,300	356,800	100.0

(a) A person may have fished for more than one species during the year and therefore will be counted more than once. (b) Includes shark, squid, octopus, other finfish and fishing for no species in particular.



## Chapter 12

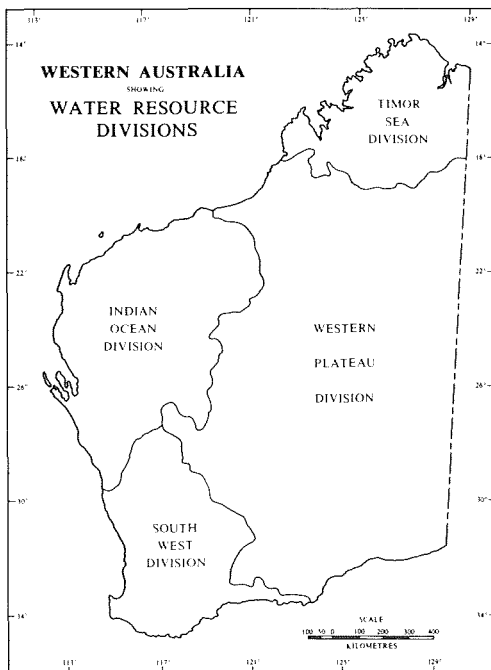
### WATER

Water, being a scarce commodity in Western Australia, is a precious resource. Of the inhabited continents, Australia has the lowest average rainfall and the highest proportion of rainfall that is lost back to the atmosphere through evaporation and transpiration. Western Australia's average annual rainfall is 310mm compared with the Australian average of 420mm, and the average annual run-off from this western third of the continent is only eleven per cent of the nation's total.

#### WATER RESOURCES

The amount of usable surface and groundwater resources available in each of the drainage divisions of Western Australia is shown in Table 12.1. These divisions, which are based on surface water hydrological boundaries, are shown in Diagram 12.1.

DIAGRAM 12.1



Eighty-six per cent of the State's fresh/marginal water resources (on a sustainable yield basis) are surface water and fourteen per cent are groundwater. The majority of the resources, seventy-three per cent of the State's total, are in

the Timor Sea Division. The next most abundantly endowed division is the South West, with twenty-two per cent of the State's potable resources. The remaining five per cent of divertible potable resources are in the Indian Ocean Division and the Western Plateau Division.

TABLE 12.1 - DIVERTIBLE SURFACE AND GROUNDWATER RESOURCES  
(million cubic metres per annum)

Drainage division	Surface	Ground-water	Total
South West	1,860	876	2,735
Indian Ocean	285	262	546
Timor Sea	8,660	523	9,183
Western Plateau	1	155	156
Total	10,806	1,815	12,620

#### WATER AUTHORITY OF WESTERN AUSTRALIA

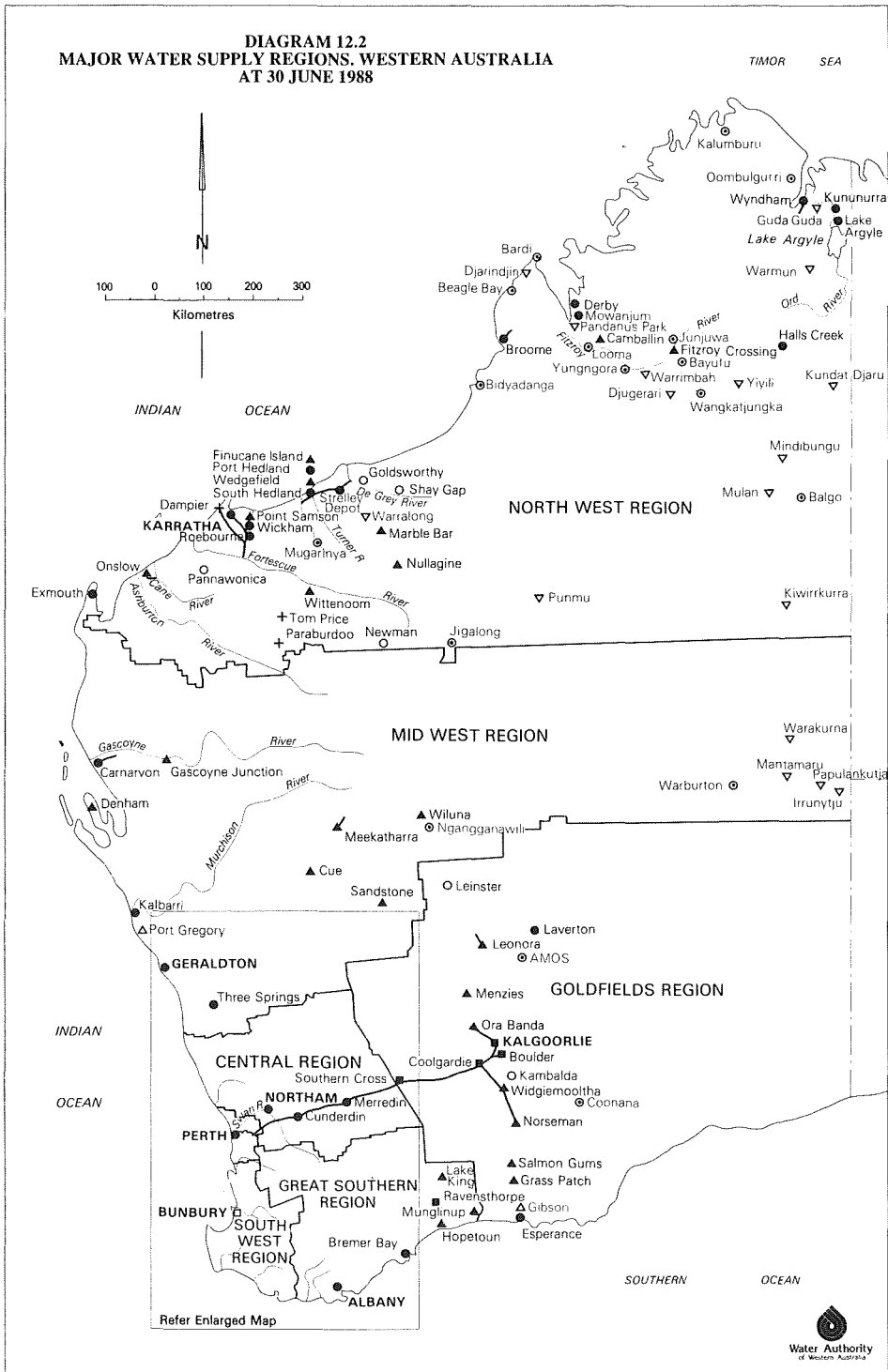
The Water Authority of Western Australia controls the majority of water-related services in Western Australia.

It is responsible for the following water-related services: water supply in the Perth metropolitan area and the majority of country towns; water resources assessment and management throughout the State; Government irrigation schemes; sewerage schemes in the Perth metropolitan area and several country towns; major drains in the Perth metropolitan area and drainage in several country areas.

#### WATER SUPPLY

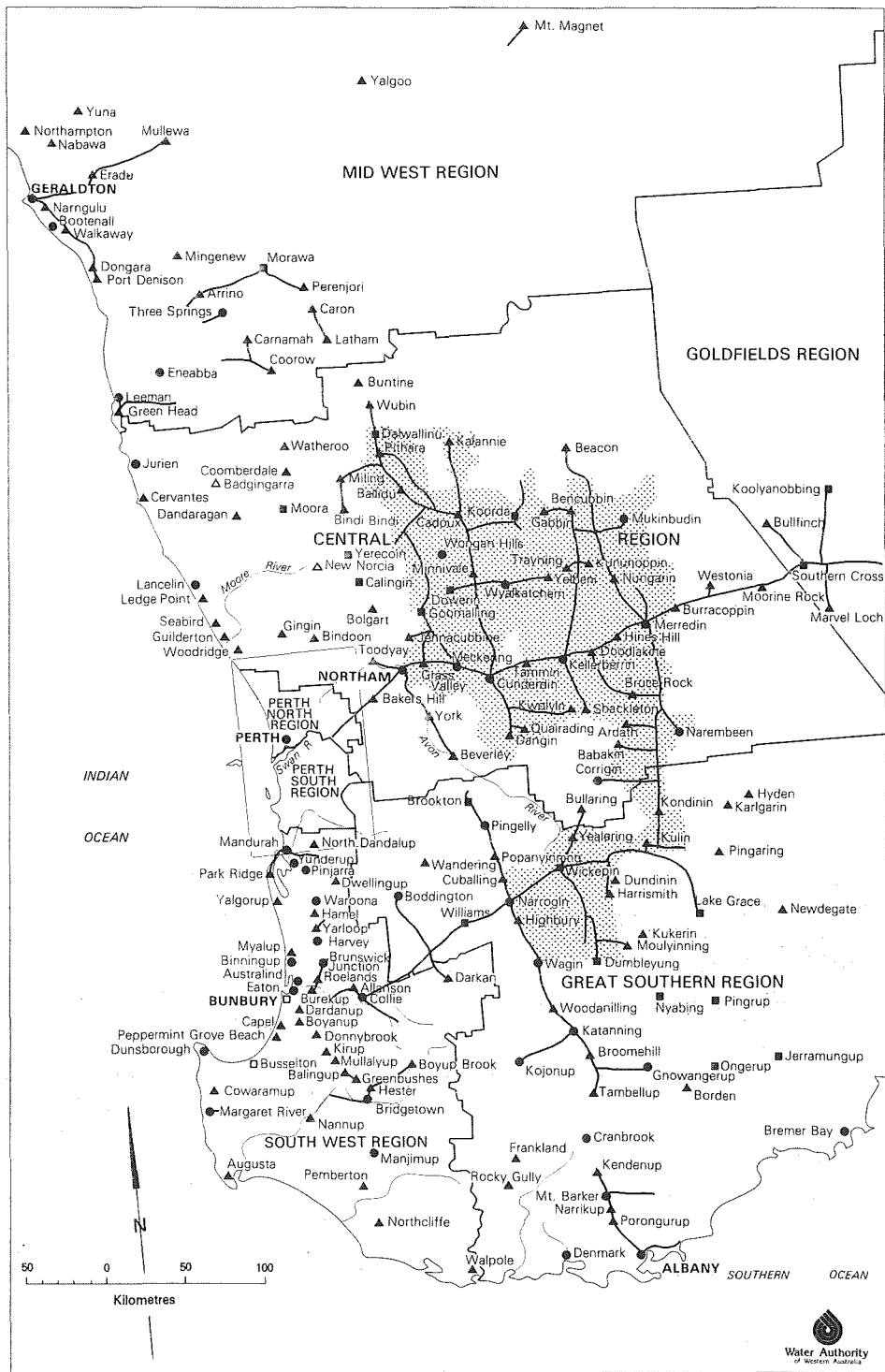
Western Australia has a great variation in the size and complexity of water supply schemes, which range from town schemes serving fewer than 100 people to the Perth metropolitan scheme servicing a population of more than 1 million.

DIAGRAM 12.2  
MAJOR WATER SUPPLY REGIONS, WESTERN AUSTRALIA  
AT 30 JUNE 1988



- Water Authority of W.A. Water Supply  
Water Authority of W.A. Water Supply and Sewerage  
Water Authority of W.A. Water Supply, Other Authority Sewerage  
Water Authority of W.A. Sewerage, Other Authority Water Supply  
Aboriginal Community Water Supply  
Aboriginal Community Water Supply and Sewerage
- ▲ Water Authority of W.A. and Other Authority Water Supply and Sewerage  
● Other Authority Water Supply  
■ Other Authority Water Supply and Sewerage  
□ Regional Centre  
▽ Main Water Pipeline  
○
- KARRATHA

DIAGRAM 12.3  
MAJOR WATER SUPPLY REGIONS, SOUTH WEST OF WESTERN AUSTRALIA  
AT 30 JUNE 1988



Water Authority of W.A. Water Supply  
Water Authority of W.A. Water Supply and Sewerage  
Water Authority of W.A. Water Supply, Other Authority Sewerage  
Water Authority of W.A. Sewerage, Other Authority Water Supply  
Farmlands Retention

Water Authority of W.A. and Other Authority Water Supply and Sewerage +  
Other Authority Water Supply ●  
Other Authority Water Supply and Sewerage ■  
Regional Centre □  
Main Water Pipeline

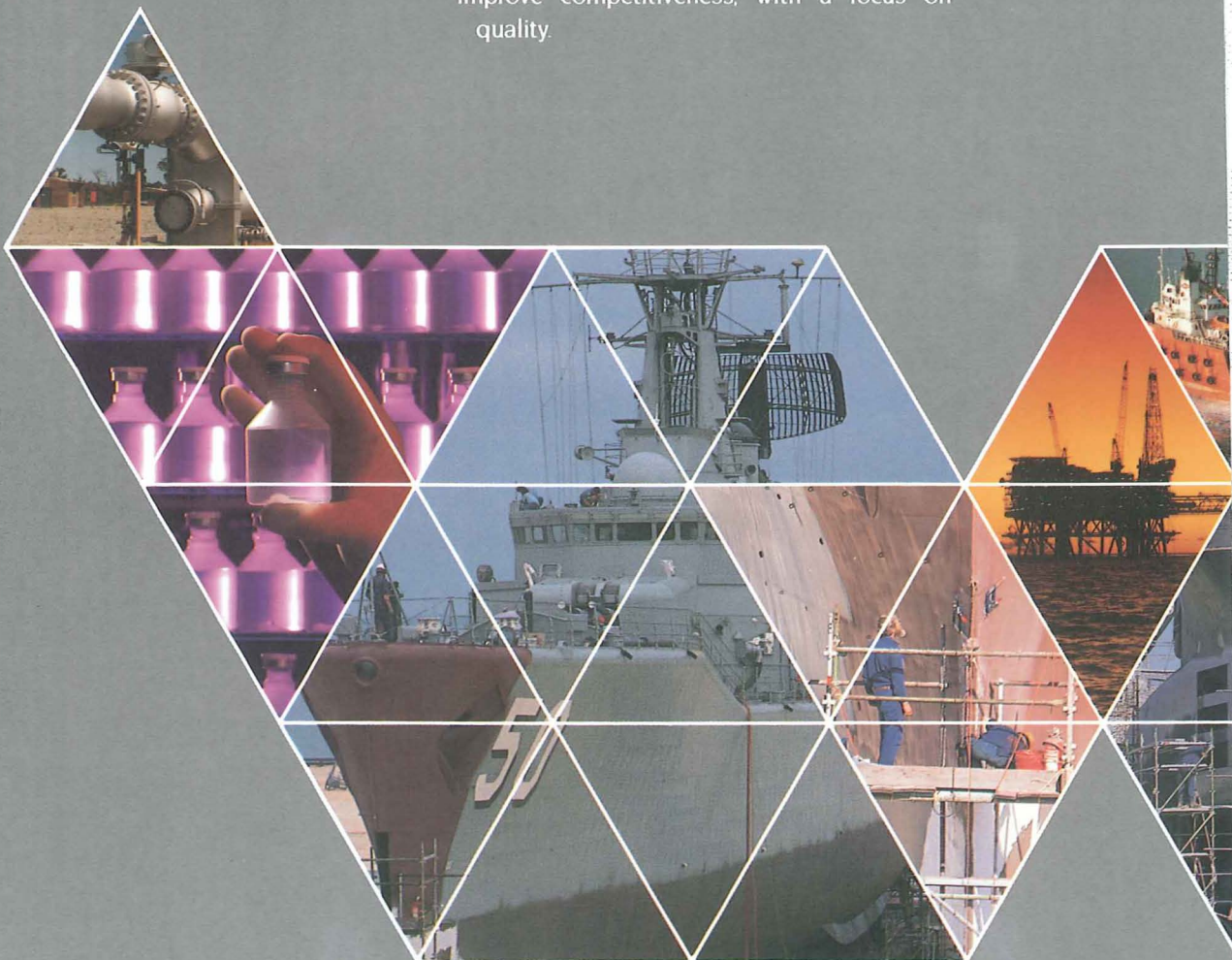
BUNBURY



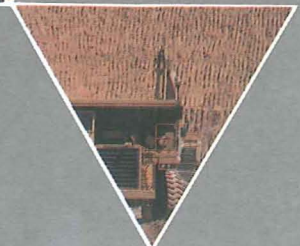
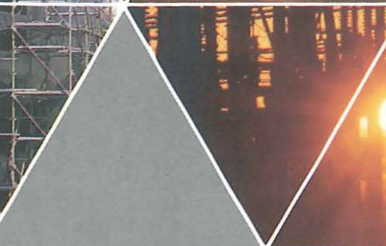
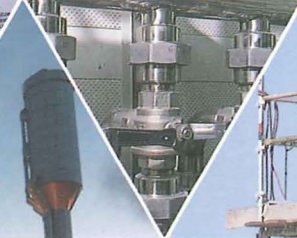
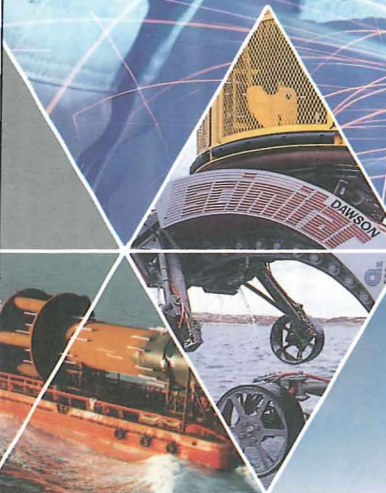


**O**ur State has a large primary industry i.e. mining and agriculture, and many manufacturing companies support these sectors. The further processing of primary products is strongly encouraged by the State Government as a means of ensuring that the value added benefits the Western Australian economy.

**T**he small size of WA's internal market means that to continue to grow and prosper Western Australian companies must seek opportunities in other markets. The key to tapping new markets is to be internationally competitive with quality, design and price. WA's Technology and Industry Development Authority assists companies with a range of programs to improve competitiveness, with a focus on quality.



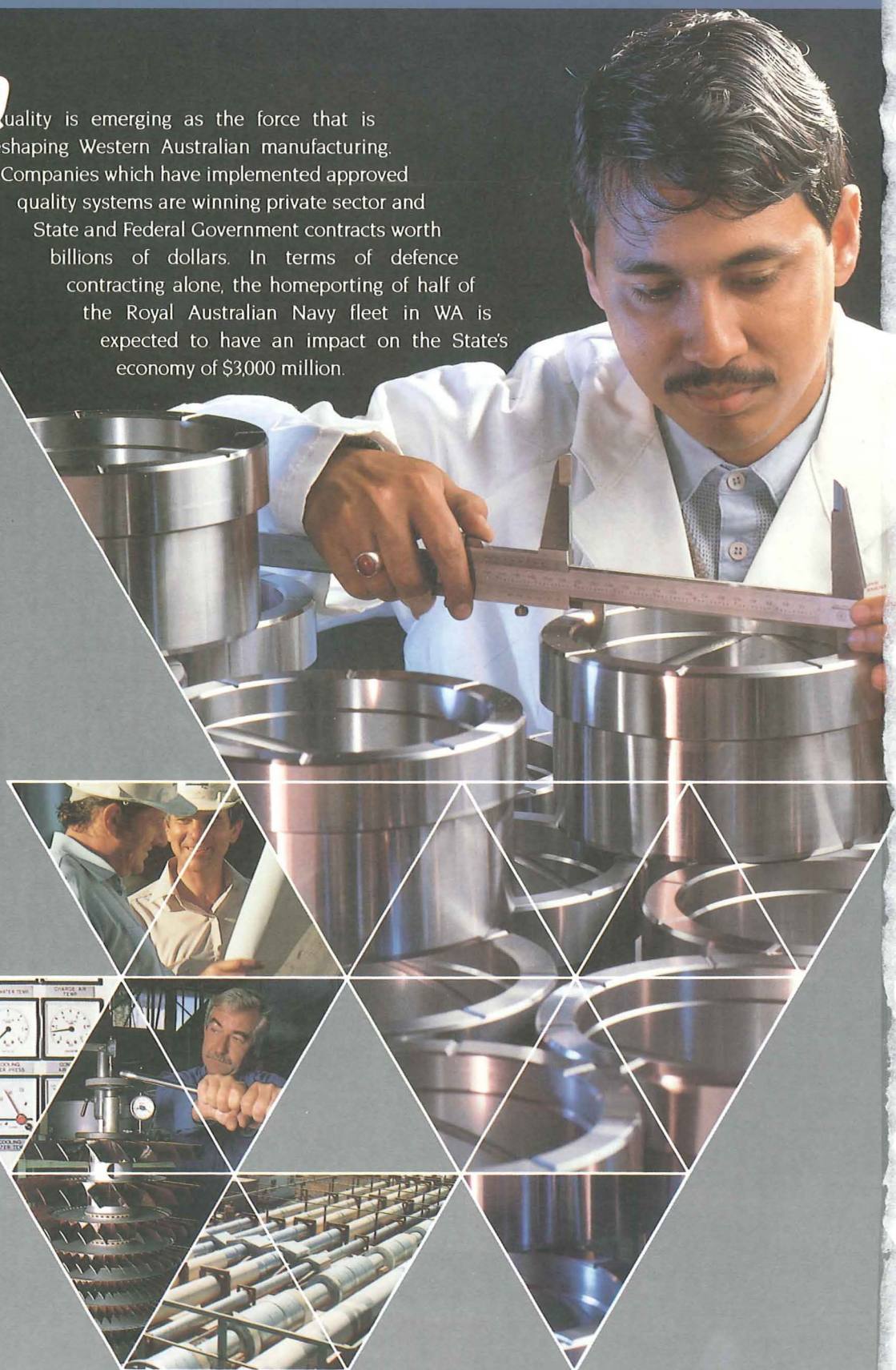




Transperth



**Q**uality is emerging as the force that is reshaping Western Australian manufacturing. Companies which have implemented approved quality systems are winning private sector and State and Federal Government contracts worth billions of dollars. In terms of defence contracting alone, the homeporting of half of the Royal Australian Navy fleet in WA is expected to have an impact on the State's economy of \$3,000 million.



Considerable use is made of groundwater by individual farmers, pastoralists, market gardeners and others and it is estimated that over 92,000 bores are in use in the State. The quality of water is variable and much of it is too saline for irrigation or even for stock. Both artesian and non-artesian sources are used to supply or augment the supplies of numerous towns, including such major centres as Perth, Albany, Bunbury, Busselton, Carnarvon, Dampier, Esperance, Exmouth, Geraldton, Karratha and Port Hedland. In a number of ports and mining towns in the north-west mining companies are responsible for the provision of their own water supplies.

Industries also use groundwater in substantial quantities, particularly in the processing of titanium, iron and alumina. Recent mineral discoveries in several areas have given rise to very large demands for water, the search for which has had to be intensified. Marked advances in the knowledge of aquifers and quality of water in the main sedimentary basin have been made as a result of extensive geological surveys and exploratory drilling by the Geological Survey (a branch of the Department of Mines), several oil companies, and the Water Authority.

**TABLE 12.2 – DAMS AND RESERVOIRS—STORAGE CAPACITY (a)**  
(<sup>000</sup> kilolitres)

<i>Dam or reservoir</i>	<i>Storage capacity</i>
Big Brook Dam	700
Canning Reservoir	90,500
Churchman Brook Reservoir	2,200
Drakes Brook Dam	2,290
Fitzroy Dam	4,650
Glen Mervyn Dam	1,490
Harding Dam	63,800
Harvey Weir	9,126
Kununurra Diversion Dam (b)	97,400
Logue Brook Dam	24,300
Mundaring Weir	77,000
North Dandalup Pipehead Dam	(c)
Ord River Dam (Lake Argyle)	5,797,000
Samson Brook Dam	9,170
Serpentine Pipehead Reservoir	2,640
Serpentine Reservoir	194,500
17-Mile Dam (d)	5,489
South Dandalup Reservoir	208,000
Stirling Dam	56,123
Victoria Reservoir	860
Waroon Dam	14,954
Wellington Dam	184,900
Wungong Reservoir	60,000

(a) At 30 June 1988. (b) Ord River Diversion Dam. (c) Diversion weir only.  
(d) On Uralla Creek, an anabranch of the Fitzroy River.

### Perth Metropolitan Water Supply

The sources of the Metropolitan water supply are South Dandalup Reservoir, Serpentine Reservoir and Pipehead Reservoir, Canning Reservoir,

Wungong Reservoir, Churchman Brook Reservoir, Victoria Reservoir, North Dandalup Pipehead Dam, groundwater from the shallow unconfined aquifers of the Swan Coastal Plain and artesian water from the deep confined aquifers. The supply from these sources is supplemented as necessary from a pipeline link with Mundaring Weir.

**TABLE 12.3 – METROPOLITAN WATER SUPPLY QUANTITIES OF WATER DRAWN(a)**  
(<sup>000</sup> kilolitres)

<i>Source</i>	<i>1985–86</i>	<i>1986–87</i>	<i>1987–88</i>
Canning Reservoir	16,092	24,670	22,148
Churchman Brook Reservoir	2,893	1,841	2,952
Mundaring Weir	1,031	885	920
North Dandalup Pipehead Dam	8,232	8,735	8,969
Serpentine and Serpentine Pipehead Reservoirs	50,033	45,686	52,518
South Dandalup Reservoir	25,237	20,466	18,334
Victoria Reservoir	1,780	2,904	3,362
Wungong Reservoir	19,328	17,680	21,344
Transferred to Mundaring Weir	–	–	(5,378)
<b>Total hills sources output</b>	<b>124,626</b>	<b>122,867</b>	<b>125,169</b>
<b>Total groundwater output</b>	<b>61,705</b>	<b>69,568</b>	<b>73,274</b>
<b>Gross output</b>	<b>186,331</b>	<b>192,435</b>	<b>198,443</b>
Less output to Mandurah	3,606	3,632	4,015
<b>Output to Metropolitan Area</b>	<b>182,725</b>	<b>188,803</b>	<b>194,428</b>

**TABLE 12.4 – METROPOLITAN WATER SUPPLY**

	<i>1985–86</i>	<i>1986–87</i>	<i>1987–88</i>
Number of services	342,700	353,604	368,389
Length of water mains (kilometres)	8,766	8,955	9,396
Water supplied ( <sup>000</sup> kilolitres)	180,000	187,472	191,645

Water from storages in the Darling Range is conveyed to the metropolitan area by the Canning Tunnel, the Wungong Tunnel, and large trunk mains. It is then distributed by feeder, distribution and reticulation mains, either directly from the trunk main or from large storage service reservoirs at Mount Yokine, Mount Eliza, Bold Park, Mount Hawthorn, Richmond, Melville, Buckland Hill, Hamilton Hill, Thompson Lake, Greenmount, Mirrabooka, Wanneroo, Whitfords and Tamworth Hill and from summit tanks and water towers situated at high points throughout the area supplied. The Canning and Wungong Tunnels are designed to help meet the peak summer demand for water by producing high capacity links to Canning Dam and Wungong Reservoir respectively. In addition, groundwater is



distributed, after treatment, into the supply system. The groundwater is treated at water treatment plants situated at Gwelup, Mirrabooka, Wanneroo and Jandakot.

### Country Water Supplies

The Water Authority is responsible for all town water supply schemes in the country towns of Western Australia, with the exception of the Bunbury, Busselton and Harvey schemes which are run by local Water Boards. There are also a small number of town water supply schemes operated by mining companies. Individual water supplies serve railways, timber mill towns, isolated mines, pastoral properties, stock routes and agricultural areas, mainly from dams, tanks, wells and bores.

In country areas total control has been exercised on groundwater usage in Broome, Gascoyne, Swan and South-West coastal groundwater areas. The control of other areas has been tailored to specific problems which are known to exist.

**Great Southern Towns Water Supply.** This scheme provides water to the coal mining town of Collie, together with towns and farmlands in the Great Southern Area. Water is drawn from Wellington Dam, and is supplied to towns from Brookton and Kondinin in the north to Kojonup and Gnowangerup in the south. It also supplies 600,000 hectares of farmland.

TABLE 12.5 – GREAT SOUTHERN TOWNS WATER SUPPLY

Item	1985–86	1986–87	1987–88
Number of services	13,736	13,972	13,691
Length of water mains (kilometres)	2,370	2,362	2,320
Water supplied ('000 kilolitres)	6,939	7,082	7,326

**Goldfields and Agricultural Areas Water Supply.** This scheme provides water to consumers in the Central Agricultural Areas and Eastern Goldfields. Water is supplied to 93 towns and to 2,650,000 hectares of farmland in the central and north-eastern wheatbelt. Water is pumped from Mundaring Weir on the Helena River, augmented by the Lower Helena Pipehead Dam and supplemented by the metropolitan system when necessary. The main pipeline between Mundaring and Kalgoorlie is 554 kilometres long, with eighteen pumping stations and extensions to country towns and agricultural areas at several points.

TABLE 12.6 – GOLDFIELDS AND AGRICULTURAL AREAS WATER SUPPLY

	1985–86	1986–87	1987–88
Number of services	30,480	30,187	30,774
Length of water mains (kilometres)	7,956	8,384	8,138
Water supplied ('000 kilolitres)	22,354	23,175	25,637

### Local and Regional Schemes

#### Lower Great Southern Towns Water Supply.

This scheme supplies the towns of Albany, Mount Barker and Kendenup. Water is drawn from three sources; Two Peoples Bay east of Albany (the water from which is treated for colour removal), Limeburners's Creek, and bores which are located on the west of Princess Royal Harbour.

**Mandurah Regional Supply.** This scheme provides water to the town of Mandurah, plus the localities of Yunderup, Furnissdale, Ravenswood, Riverside Gardens and Coodanup (located east of Mandurah), together with Erskine, Falcon, Avalon, Wannanup, Placid Waters, Florida, Melros and Dawesville (located south of Mandurah).

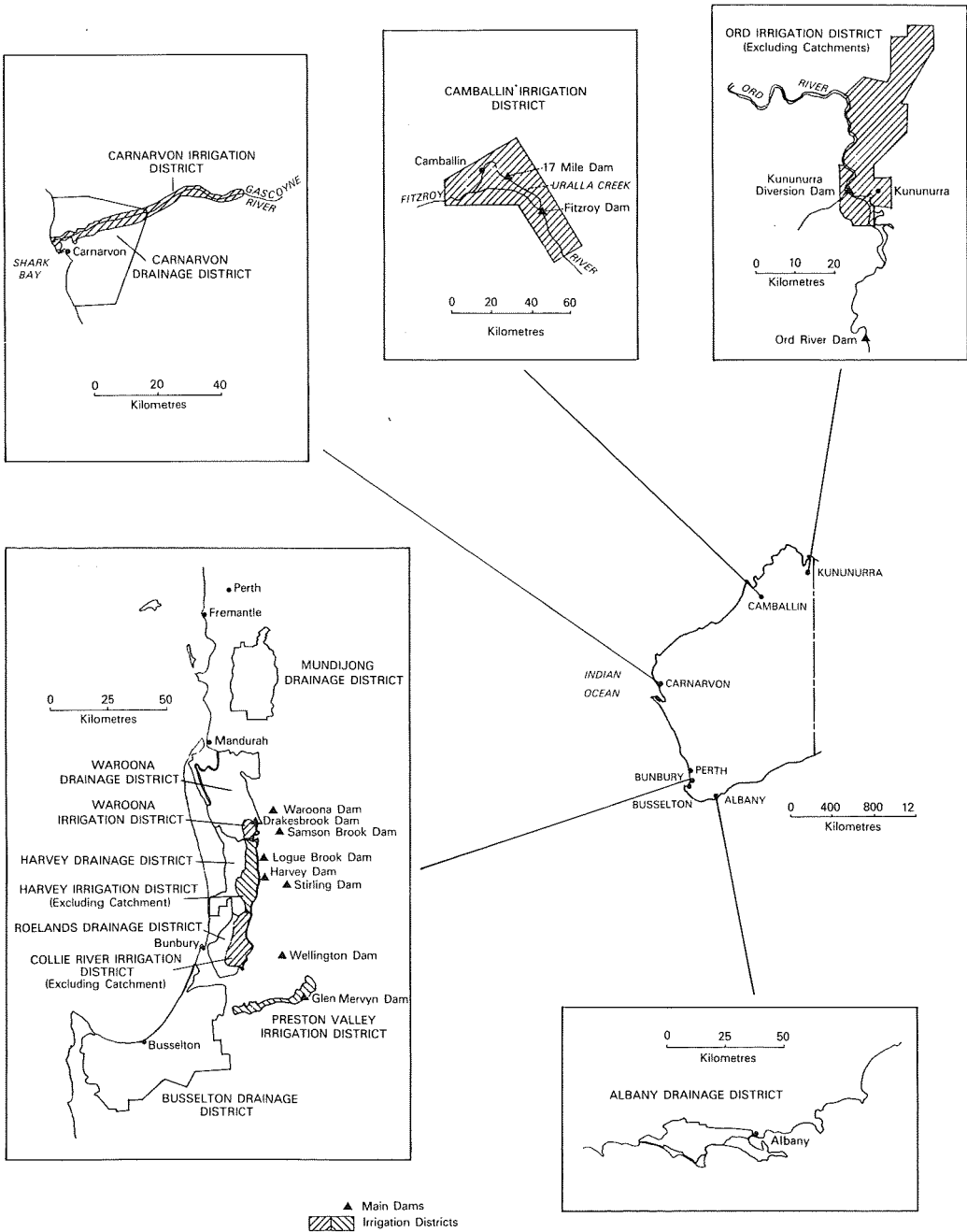
Approximately 90 per cent of the water consumed is supplied by gravity from the South Dandalup Dam with the remainder being injected into the supply main from bores at Ravenswood. At present the scheme supplies some 10,000 services and is the most rapidly growing scheme in the State.

**Geraldton Regional Water Supply.** The Geraldton Regional Water Supply serves consumers in the towns of Geraldton, Dongara, Port Denison, Mullewa, Walkaway, Drummonds Cove, Eradu and Narngulu with water being drawn from the Wicherina, Allanooka and Wye Springs borefields.

**Port Hedland Regional Water Supply.** The Port Hedland Regional Water Supply provides water for the consumers of Port Hedland, Finucane Island and South Hedland from the complementary De Grey and Yule River borefields.

**West Pilbara Water Supply.** The West Pilbara Water Supply serves the towns of Dampier, Karratha, Wickham and Point Samson, and also the industrial complexes at Dampier, the Burrup Peninsula and Cape Lambert in the north of the State. Water is drawn from the Harding Dam in conjunction with the Millstream aquifer.

**DIAGRAM 12.4**  
**IRRIGATION AND DRAINAGE DISTRICTS**  
**AT 30 JUNE 1988**



**Supplies to other Country Towns.** One hundred and eight towns are supplied with water from stream flow, dams, tanks, wells and bores, the schemes being administered under the provisions of the *Country Areas Water Supply Act 1947*.

The Water Authority is also responsible for the provision and maintenance of tanks and wells as a source of cartage water for a number of small communities in gold mining and agricultural areas.

TABLE 12.7 – LOCAL AND REGIONAL SCHEMES

	1985–86	1986–87	1987–88
Number of services	72,090	74,742	74,994
Length of water mains (kilometres)	4,227	3,913	4,124
Water supplied ('000 kilolitres)	54,246	55,415	57,929

**Aboriginal Communities.** The Commonwealth Department of Aboriginal Affairs is currently funding the progressive upgrading of water supply and sewerage facilities at forty large permanently established Aboriginal communities and at sixty newly emerging communities. The investigation, design and upgrading of works is being undertaken by the Water Authority.

### Water Resources Assessment and Management

The Water Authority, in conjunction with the Western Australian Water Resources Council, is responsible for the assessment and management of water resources in Western Australia.

**Supply and Development.** The Authority is responsible for the evaluation, measurement and general management of surface and groundwater resources, including research, investigation and hydrological studies.

**Water Quality.** The Authority monitors and controls salinity and contamination of water supplies by an extensive sampling and treatment program. It also monitors land use management in catchment areas, particularly in relation to bauxite mining and forest management.

### IRRIGATION SCHEMES

Irrigation activities conducted by the Water Authority are restricted to designated schemes within the North West, Mid West and South West Regions.

Water entitlements vary between schemes. The Ord River Scheme at Kununurra in the North West Region provides virtually an open water

entitlement due to the small scope of the existing irrigation area in relation to the potential capacity of the scheme. Water is used throughout the year from surface storage.

All other schemes limit water entitlement in relation to the rated irrigable land of each irrigation. Water entitlements vary according to seasonal factors and water availability.

Schemes in the South West Region, at Waroona, Harvey, Collie River and Preston Valley, provide water only during the summer months from surface storages replenished over the preceding winter. Entitlements vary between schemes and between sub-areas of schemes depending on available storages.

In 1987–88 water conservation measures were introduced in the South West irrigation dams, following a number of years of below average rainfall. With water allocations reduced by up to 50 per cent in some areas, the area irrigated in the South West dropped from 13,474 hectares in 1986–87 to only 11,005 hectares in 1987–88.

The Gascoyne scheme at Carnarvon in the Mid West Region provides water throughout the year from underground sources beneath the Gascoyne riverbed. Irrigators supplement the scheme supply from their own underground sources. Use of water from all sources is limited by individual entitlements which vary between seasons within each year. Entitlements are affected by the length of time since underground aquifers were last replenished by a river flow.

TABLE 12.8 – IRRIGATION

	1985–86	1986–87	1987–88
Length of channels and drains (kilometres)	999	999	890
Assessments (number)	1,200	1,276	1,382
Area irrigated (hectares)	20,402	22,679	18,929
Water consumed ('000 kilolitres)	209,000	195,000	148,279

### DRAINAGE

The Water Authority is responsible for the provision of a number of drainage and drainage-related services throughout Western Australia.

It is responsible for the preparation and implementation of an arterial drainage scheme for metropolitan area, whereby it receives surplus water from local drainage systems into controlled main drains and disposes of it through outlets to

the sea or rivers, or by groundwater recharge where practicable. This scheme provides a means of coordinating the Water Authority's drainage planning activities with those of local authorities, particularly for potential areas of new land development.

The Water Authority operates and maintains proclaimed Drainage Districts, which are mainly located on the coastal plain south of Perth between Wungong/Serpentine and Busselton. Other declared Drainage Districts are between Denmark and Albany, and at Carnarvon. Many of these drainage districts are an inseparable adjunct to irrigation schemes on the coastal plain. Local Authorities are responsible for drainage activities in other areas.

Advice on flood plain management and river improvement matters is provided by the Water Authority. This involves performing flood studies in order to identify and assess flood prone areas of the State. This service has received increased attention in recent years.

### SEWERAGE SCHEMES

The Water Authority aims to ensure the effective collection, conveyance, treatment and disposal of wastewater and industrial waste so as to safeguard community health and protect the environment.

#### Metropolitan Sewerage

The Water Authority operates five major wastewater treatment plants throughout the metropolitan area.

Over ninety-eight per cent of the treated effluent from these plants is discharged to the ocean where it is diluted and dispersed by currents and wave action. The remainder is discharged to effluent soakage basins for land disposal.

**TABLE 12.9 – METROPOLITAN SEWERAGE SYSTEMS**

	1985–86	1986–87	1987–88
Number of sewered assessments	278,900	289,499	303,640
Length of sewers (kilometres)	4,701	4,872	5,088

#### Country Towns Sewerage

At 30 June 1988 the Water Authority operated sixty-three town sewerage schemes throughout the country areas of Western Australia. In addition, a further twenty-three sewerage schemes are operated by local government authorities under provisions of the Health Act, and a number by major mining companies in towns established to service mining operations. Several other local government authorities have reached an advanced stage of planning to commence schemes in future years.

**TABLE 12.10 – COUNTRY SEWERAGE SYSTEMS**

	1985–86	1986–87	1987–88
Number of towns sewered	57	61	63
Length of sewers (kilometres)	1,406	1,408	1,466
Number of services	54,170	58,059	59,641

### REFERENCES

Water Authority of Western Australia, *Annual Report 1988*.

Western Australian Water Resources Council, *Water Resource Perspectives Western Australia; Report No. 2 – Water Resources and Water Use*.

## Chapter 13

# AGRICULTURE, FORESTRY AND FISHING

## Agriculture

### INTEGRATED AGRICULTURAL STATISTICS

The principal source of statistics relating to the agricultural sector is the Integrated Agricultural Commodity Census, which is conducted annually by the Australian Bureau of Statistics (ABS). Units (establishments) included in the census are defined and classified in accordance with the Australian Standard Industrial Classification (ASIC).

While no financial data are collected in the census, an 'estimated value of agricultural operations' (EVAO) is calculated for each establishment by applying unit values to reported production and/or stock data. This procedure enables establishments

in the census to be classified according to industry (ASIC) and also according to size of operations.

Since 1976-77, small establishments have been excluded from the census, to reduce ABS processing costs and minimise respondent burden. From 1976-77 to 1980-81 an EVAO cut-off of \$1,500 was used. The cut-off was raised to \$2,500 in 1981-82, and further raised to \$20,000 in 1986-87.

The effect of the pre-1986-87 cut-offs on statistics, other than counts of establishments, is minimal. The \$20,000 cut-off applying from 1986-87 does have a significant effect on some items, and estimates of the undercoverage are available from the ABS.

TABLE 13.1 — NUMBER OF ESTABLISHMENTS WITH AGRICULTURAL ACTIVITY  
INDUSTRY AND ESTIMATED VALUE OF AGRICULTURAL OPERATIONS: 1987-88

Industry of establishment		Estimated value of agricultural operations (\$'000)						Total
		Less than 20	20- 49	50- 99	100- 199	200- 499	500 and over	
ASIC code	Description							
0124	Poultry for meat	-	1	4	20	16	6	47
0125	Poultry for eggs	4	7	13	12	37	20	93
0134	Grapes	17	58	26	6	1	2	110
0135	Plantation fruit	4	20	41	64	2	-	131
0136	Orchard and other fruit	47	155	92	91	23	9	417
0143	Potatoes	2	19	27	49	48	5	150
0144	Vegetables (except potatoes)	40	102	126	79	52	21	420
0181	Cereal grain (incl. oil seeds)	12	52	83	139	280	79	645
0182	Sheep - cereal grains	8	121	633	1,885	2,211	366	5,224
0183	Meat cattle - cereal grains	2	3	4	8	4	2	23
0184	Sheep - meat cattle	26	130	203	145	64	20	588
0185	Sheep	125	447	774	1,086	727	93	3,252
0186	Meat cattle	136	398	194	101	79	32	940
0187	Milk cattle	8	38	188	257	60	2	553
0188	Pigs	6	27	32	43	36	9	153
0191	Sugar cane	-	-	-	-	-	-	-
0192	Peanuts	-	1	2	1	-	-	4
0193	Tobacco	-	-	-	-	-	-	-
0194	Cotton	-	-	-	-	-	-	-
0195	Nurseries	55	64	46	34	16	14	229
0196	Agriculture n.e.c.	39	101	67	24	16	-	247
01	Total agriculture	531	1,744	2,535	4,044	3,672	680	13,226
..	Other industries	13	55	33	24	14	2	141
..	Total all industries	544	1,799	2,588	4,068	3,686	682	13,367

**TABLE 13.2 — NUMBER OF ESTABLISHMENTS WITH AGRICULTURAL ACTIVITY  
INDUSTRY AND AREA OF ESTABLISHMENT: 1987-88**

Industry of establishment		Area of establishment (hectares)						Total
		0-49	50-499	500-2,499	2,500-9,999	10,000-99,999	100,000 and over	
ASIC code	Description							
0124	Poultry for meat	45	2	—	—	—	—	47
0125	Poultry for eggs	77	16	—	—	—	—	93
0134	Grapes	84	25	1	—	—	—	110
0135	Plantation fruit	127	3	1	—	—	—	131
0136	Orchard and other fruit	282	133	2	—	—	—	417
0143	Potatoes	31	104	15	—	—	—	150
0144	Vegetables (except potatoes)	340	73	6	—	—	1	420
0181	Cereal grains (incl. oilseeds n.e.c.)	—	43	353	239	10	—	645
0182	Sheep — cereal grains	—	183	3,448	1,548	45	—	5,224
0183	Meat cattle — cereal grains	—	4	14	4	—	1	23
0184	Sheep — meat cattle	6	293	235	33	2	19	588
0185	Sheep	40	826	1,910	229	68	179	3,252
0186	Meat cattle	26	588	161	15	11	139	940
0187	Milk cattle	11	482	59	—	—	1	553
0188	Pigs	36	74	41	2	—	—	153
0191	Sugar cane	—	—	—	—	—	—	—
0192	Peanuts	—	3	1	—	—	—	4
0193	Tobacco	—	—	—	—	—	—	—
0194	Cotton	—	—	—	—	—	—	—
0195	Nurseries	199	23	6	1	—	—	229
0196	Agriculture n.e.c.	105	123	18	1	—	—	247
01	Total agriculture	1,409	2,998	6,271	2,072	136	340	13,226
..	Other industries	44	53	33	4	1	6	141
..	Total all industries	1,453	3,051	6,304	2,076	137	346	13,367

Statistics on the financial performance of the agricultural sector are obtained from the Agricultural Finance Survey, which has been conducted periodically by the ABS. This survey, which provides estimates of turnover, expenditure, cash operating surplus, capital expenditure and indebtedness was recommenced on an annual basis from 1986-87. Detailed definitions and explanatory notes about the survey are published in the bulletin *Agricultural Industries, Financial Statistics, Australia, 1986-87* (Catalogue No. 7507.0).

**TABLE 13.3 — FINANCIAL STATISTICS,  
AGRICULTURAL ENTERPRISES: 1986-87**

	\$ million
Sales of crops	1,116.5
Sales of livestock	439.7
Sales of livestock products	700.1
Turnover	2,427.3
Purchases and selected expenses	1,333.6
Value added(a)	1,283.9
Adjusted value added(a)	1,147.2
Gross operating surplus(a)	997.6
Cash operating surplus(b)	596.5
Total net capital expenditure	158.7
Gross indebtedness	1,708.6
Total interest paid	231.7
Number of enterprises	11,777

(a) Includes estimated value of increase in livestock. (b) Excludes estimated value of increase in livestock.

### VALUE OF AGRICULTURAL COMMODITIES PRODUCED

For agricultural production the *gross value* is based on the wholesale price realised in the market place. Where commodities are consumed at the place of production or where they become raw material for secondary industry within the State, these points of consumption are taken as the market places.

**TABLE 13.4 — GROSS VALUES, MARKETING COSTS  
AND LOCAL VALUES OF AGRICULTURAL  
COMMODITIES  
(\$ million)**

	1985-86	1986-87	1987-88
Crops and pastures—			
Gross value of production	r1,185.6	1,361.9	1211.4
Marketing costs	175.9	210.9	167.3
Local value of production	1,009.7	1,152.7	1,044.1
Livestock slaughtering and other disposals—			
Gross value of production	371.0	409.4	435.5
Marketing costs	20.9	35.9	35.5
Local value of production	350.1	373.5	400.0
Livestock products—			
Gross value of production	r656.6	806.2	1,347.4
Marketing costs	30.2	32.5	33.9
Local value of production	626.4	73.7	1,313.5
Total agriculture—			
Gross value of production	2,213.1	2,577.5	2,994.3
Marketing costs	226.9	279.3	236.7
Local value of production	1,986.2	2,299.9	2,757.6

The *local value* is the value at the place of production and is obtained by deducting marketing costs from the gross value. Marketing costs comprise freight, cost of containers, commission, and other charges incurred in marketing. Gross values provide a reliable measure of the value of production of any particular commodity or group but when comparing or combining values for agricultural industries with those for secondary

industries the value added series of financial statistics from the Agricultural Finance Survey should be used.

Wool (including fellmongered and exported on skins) was the most important item in 1987-88 with a gross value of \$1,252 million, followed by wheat with \$658 million.

TABLE 13.5 — SUMMARY OF AUSTRALIAN STATISTICS: 1987-88

	Unit	NSW	Vic	Qld	SA	WA	Tas	Australia (a)
Agricultural establishments—								
Number		38,035	32,688	25,717	14,768	13,543	3,504	128,600
Area	'000 ha	61,599	13,085	152,466	59,598	113,476	1,871	472,094
Area of crops	'000 ha	4,906	2,158	2,870	2,990	5,334	84	18,356
Sown pasture	'000 ha	6,281	5,970	4,179	3,700	7,561	332	28,649
Gross value of—								
Crops	\$m	2,169	1,392	1,760	944	1,211	182	7,677
Livestock slaughtering and disposals	\$m	1,471	1,109	1,403	393	436	120	5,022
Livestock products	\$m	2,293	1,983	706	703	1,347	239	7,283

(a) Includes Northern Territory and Australian Capital Territory.

### LAND USE ON AGRICULTURAL ESTABLISHMENTS

In 1987-88 there were 13,543 agricultural establishments with an estimated value of agricultural operations over \$20,000 in the State, comprising 113 million hectares of land or about 45 per cent of the total area of Western Australia.

Of the total area of these establishments, 5.3 million hectares were used for crops and 7.6 million hectares were under sown pasture in 1987-88. The balance consisted mainly of uncleared land (most of which is pastoral leases held by sheep and cattle stations), but it also included cleared land which was used for grazing

or which was resting during the season, fallowed areas and newly cleared land.

TABLE 13.6 — LAND USE

	Unit	1985-86	1986-87	1987-88
Agricultural establishments	No.	13,259	13,852	13,543
Land use during the season—				
Used for crops	'000 ha	5,954	5,930	5,334
Under sown pasture	"	6,934	7,105	7,556
Lucerne (all purposes)	"	6	6	5
Other	"	96,704	99,693	100,581
Total area of establishments	"	109,598	112,734	113,476

TABLE 13.7 — LAND USE IN EACH STATISTICAL DIVISION 1987-88

Statistical division	Agricultural establishments (number)	Land use during the season ('000 hectares)				Total area of establishments ('000 hectares)
		Used for crops	Under sown pastures	Lucerne (all purposes)	Other	
Perth	1,127	7.9	39.9	0.2	35.4	83.4
South-West	2,293	33.3	532.5	1.7	218.2	785.7
Lower Great Southern	2,362	509.0	1,873.7	0.8	439.5	2,823.0
Upper Great Southern	1,992	984.4	1,701.3	0.1	715.4	3,401.2
Midlands	3,270	2,441.7	1,668.3	0.6	2,912.9	7,032.5
South-Eastern	787	314.2	1,028.7	1.4	16,048.2	17,392.5
Central	1,508	1,039.6	709.8	0.1	40,562.5	42,312.0
Pilbara	62	—	0.1	—	15,042.2	15,042.3
Kimberley	142	4.4	1.8	—	24,596.8	24,603.0
<b>Total</b>	<b>13,543</b>	<b>5,334.5</b>	<b>7,556.1</b>	<b>4.9</b>	<b>100,580.0</b>	<b>113,475.5</b>

Table 13.7 gives details of rural land use according to statistical division for 1987–88. Maps showing the boundaries of the statistical divisions and their component local government areas are located inside the back cover.

## AGRICULTURE

### Wheat

Although wheat has been grown from the earliest years of settlement, cultivation was confined to limited areas as late as 1890 when an area of approximately 14,000 hectares was grown. In 1987–88 3.31 million hectares were sown. This was well below the 1982–83 figure of 4.87 million hectares, which was the largest area ever sown to wheat in the State.

A summary of the history of the wheat industry in Western Australia, which covers the development of new areas, the effects of such factors as the decline in the goldmining industry, government land settlement policies and the introduction of new marketing practices is contained on pages 365–7 of the *Western Australian Year Book*, No. 20—1982.

TABLE 13.8 — WHEAT FOR GRAIN  
AREA AND PRODUCTION

	Unit	1985–86	1986–87	1987–88
Area	'000 ha	4,143	4,260	3,312
Production—				
Total	'000 t	4,362	5,377	3,882
Per hectare	tonnes	1.04	1.26	1.17
Gross value	\$'000	736,334	836,016	657,691

**Size Classification of Farms with Wheat.** Of the 13,534 agricultural establishments in the State in 1987–88, wheat for grain was grown on 6,031 or 44.6 per cent of the total. The median wheat crop was just under 400 hectares.

TABLE 13.9 — ESTABLISHMENTS GROWING WHEAT  
FOR GRAIN CLASSIFIED ACCORDING  
TO AREA SOWN  
SEASON 1987–88

Area of wheat for grain	Number of establishments	Total area sown to wheat for grain
Hectares		'000 hectares
1 — 9	91	0.5
10 — 49	340	10.1
50 — 99	410	29.3
100 — 249	1,346	229.7
250 — 499	1,572	572.0
500 — 999	1,321	918.9
1,000 — 1,499	557	656.4
1,500 and over	394	895.5
<b>Total</b>	<b>6,031</b>	<b>3,312.4</b>

**Bulk Handling of Wheat.** The rapid increase in the production and export of wheat between 1910 and 1920 caused problems of transport and storage, and proposals for the bulk handling of the grain led to the formation of a company for this purpose in 1920. This original undertaking did not commence operations owing to technical difficulties and problematical savings in handling costs. Constant attempts were made during the 1920s to find cheaper methods of storage and transportation of wheat.

A series of experiments in the 1930s led to the development of an economical bulk handling system and the grower co-operative company, Co-operative Bulk Handling Limited was set up in 1933 to operate the system. A detailed account of the history of Co-operative Bulk Handling Limited's method of operation and the techniques developed for handling the State's grain production is given on pages 369–70 of the *Western Australian Year Book*, No. 20—1982.

**Marketing of Wheat.** The Australian Wheat Board is the sole authority for the marketing of wheat within Australia and of wheat and flour for export. The Board is also authorised to issue permits to growers to enable them, subject to certain conditions, to deliver their wheat other than to the authorised receiver of the Board. The Board derives its authority from the *Wheat Marketing Act 1984* established under joint Commonwealth and State legislation and applies to the season which commenced on 1 October 1984, and each of the next five succeeding periods of 12 months.

The Act, details of which are given on page 290 of the *Western Australian Year Book*, No. 24—1986, provides the industry with support from the Government that is designed to help overcome any short-run downturn in producers' returns, modified by longer-run adjustments in market returns whether these adjustments be for a rising or a falling market. To date, it has not been necessary for the Government to meet any deficiency between the net pool return rate and the Guaranteed Minimum Price.

**Domestic Wheat Sales.** The arrangements for the pricing of wheat sold on the domestic market recognise the different segments of the market, namely, the use of wheat for milling into flour for human consumption and the use of wheat for stockfeed and for industrial purposes.

The 1984 Act has changed the method of setting the domestic price for human consumption wheat. The price is now determined each quarter by averaging the export prices for the forward and



past quarters and then adding a margin for the additional costs of servicing the domestic market.

The domestic prices for industrial and stockfeed wheats are quoted by the Board in the light of its commercial judgement and having regard to orderly marketing considerations. Prices are quoted by the Board each day and buyers may enter into contracts to fix the price of wheat for delivery up to six months in advance.

Official standard samples are widely distributed to commercial interests and appropriate Government Departments and instrumentalities both locally and overseas, as being representative of the wheat of the particular season which is on offer to the world grain markets.

### Exports of Wheat

Most of the State's wheat is exported as grain. Flour exports, which had been as high as 160,000 tonnes in the mid 1950s, now account for a minimal proportion of the State's wheat crop.

**TABLE 13.10 — OVERSEAS EXPORTS OF WHEAT AND FLOUR (tonnes)**

	1985-86	1986-87	1987-88
Wheat	5,342,918	4,872,265	4,029,089
Flour	1,733	1,455	5,093
Estimated total wheat equivalent	5,345,362	4,874,317	4,036,270

### Oats

Although oats have been grown in Western Australia since the early development of wheat farming, cultivation was somewhat limited until stimulated by the introduction of large-scale sheep raising in the agricultural areas, when their high nutritional worth as stock feed made them a very valuable crop. In addition to their importance as local stockfeed, significant quantities of oats are also exported. The area sown to oats for grain increased from 78,000 hectares in 1920 to a peak of 538,000 in 1960. More recently, area sown has been subject to considerable fluctuations.

**TABLE 13.11 — OATS FOR GRAIN AREA AND PRODUCTION**

	Unit	1985-86	1986-87	1987-88
Area	'000 ha	286	302	373
Production—				
Total	'000 t	336	414	502
Per hectare	tonnes	1.18	1.37	1.35
Gross value	\$'000	38,314	43,505	52,166

### Barley

Barley grows well over a wide range of climatic and soil conditions and generally yields better than other cereals. It is more successful on saline soils where other crops may not do well, and as a first crop on newly-developed land. Both 'two-row' and 'six-row' barley are grown. Part of the crop is retained on farms for stockfeed, while the balance is sold locally and overseas for malting or stockfeed manufacture.

In terms of area sown, barley was for some years the second most important crop in the State, after wheat. The 623,000 hectares sown in 1970-71 moved barley ahead of oats for the first time. Since that year, although barley plantings have fluctuated from a low of 387,000 hectares in 1974-75 to a high of 965,000 hectares in 1984-85, they have exceeded oat plantings each year. Since 1986-87, expanded lupin plantings have exceeded the area of barley.

The Grain Pool of W.A. is the sole marketing authority for barley in Western Australia and is responsible for the marketing of barley for both export and local consumption in accordance with the *Grain Marketing Act 1975*. The licensed receiver for the Grain Pool is Co-operative Bulk Handling Limited.

**TABLE 13.12 — BARLEY FOR GRAIN AREA AND PRODUCTION**

	Unit	1985-86	1986-87	1987-88
Area	'000 ha	824	468	461
Production—				
Total	'000t	1,022	601	617
Per hectare	tonnes	1.24	1.28	1.34
Gross value	\$'000	124,449	71,348	81,610

### Lupins

The large-scale growing of lupins has been undertaken in Western Australia since the early 1970s. Apart from the drought-affected 1985-86 season, area sown has increased significantly each year since 1980-81, when 55,000 hectares were planted. Since 1986-87, lupins have been the second most important crop in the state, after wheat.

Before 1974-75, marketing of lupins was conducted through a voluntary pool operated by The Grain Pool of W.A. In November 1975, under the provisions of the *Grain Marketing Act 1975* the marketing of nominated varieties of lupins became the responsibility of The Grain Pool of W.A. Significant amounts of lupins are exported overseas.

**TABLE 13.13 — LUPINS FOR GRAIN  
AREA AND PRODUCTION**

	Unit	1985-86	1986-87	1987-88
Area	'000 ha	492	653	876
Production—				
Total	'000t	410	683	730
Per hectare	tonnes	0.83	1.05	0.83
Gross value	\$'000	63,925	116,346	127,207

### Other Grains and Oilseeds.

There was considerable interest in the production of rapeseed in the early 1970s, and plantings reached 42,000 hectares in 1972-73. Subsequent problems with disease saw plantings reach a low of 200 hectares in 1982-83. Since then area sown has expanded and reached 4,800 hectares in 1985-86. Plantings fell back to 2,000 hectares in 1987-88.

Triticale, a wheat/rye cross, was first recorded in the Agricultural Census in 1978-79, and since then plantings increased each year to 1984-85 when 39,000 hectares were sown. Area planted dropped back to 30,100 hectares in the 1987-88 season.

Grain sorghum, linseed, rye, field peas, vetches, safflower and sunflower are also grown but only in small quantities.

### Hay

Large quantities of pasture hay are cut from clover and grass pastures, production in 1987-88 being 342,000 tonnes from 103,000 hectares. The principal cereal hay crop is oats and 320,000 tonnes of oaten hay were cut in 1987-88 from 95,000 hectares. Wheat is the only other cereal crop which is used extensively for this purpose and in 1987-88 the production was 92,000 tonnes from 36,000 hectares. Barley, vetches, rye and lupins are also used for hay making but they are of minor importance.

**TABLE 13.14 — HAY—AREA AND PRODUCTION**

	Unit	1985-86	1986-87	1987-88
Pasture (a)				
Area	'000 ha	88	99	103
Production	'000 t	286	321	342
Crop (b)				
Area	'000 ha	100	119	140
Production	'000 t	309	359	435

(a) Includes lucerne. (b) Principally from oats and wheat.

### Pastures

Of the 7.5 million hectares of improved pastures in the south-west region over 6 million are sown to the legume subterranean clover. Other species used include medic, rose clover, serradella, lucerne and a variety of grasses, principally Wimmera ryegrass. The use of perennial grasses such as perennial ryegrass, kikuyu, phalaris and cocksfoot is restricted to a small area having a long growing season along the south coast.

Dominant legume pastures are initially easily established following the clearing of the native vegetation. As most of the soils are infertile a range of fertilisers must be used. Phosphorus, as superphosphate, is usually applied annually while minor elements such as copper, zinc and sometimes molybdenum, have to be applied at least once. Over time, other elements may also need to be applied for good pasture growth to be maintained. Potassium in particular can become deficient on the sandy soils of high rainfall areas.

While pastures are green for only 4-9 months of the year, sufficient feed is produced for sheep and cattle to be maintained on the paddocks all year. Supplementary feeding of breeding stock is sometimes required, particularly if the autumn break to the season comes late. At such times the dry paddock feed is almost exhausted and the regenerating pasture is growing slowly.

**TABLE 13.15 — PASTURE SEED HARVESTED**

	Unit	1985-86	1986-87	1987-88
Subterranean clover—				
Area harvested	'000 ha	8.8	13.7	18.1
Production	tonnes	1,680	2,949	3,775
Lupins—				
Area harvested	'000 ha	3.3	3.2	3.3
Production	tonnes	801	591	739
Barrel Medic—				
Area harvested	'000 ha	2.7	5.4	4.4
Production	tonnes	492	910	677
Total pasture seed —				
Area harvested	'000 ha	16.5	24.3	28.0

An active legume breeding and selection programme, centred at Perth, has produced many cultivars. From the cultivars now available it is possible to select one or more that are suited to environments ranging in annual rainfall from 350-1200 mm and in soil type from acid to alkaline. Cultivars have been selected that are persistent, tolerant of a range of diseases and insect pests, and that are low in fertility-reducing oestrogenic compounds.

### Potatoes

The cultivation of potatoes, the State's principal vegetable crop, is confined largely to the higher-rainfall areas of the south-west. Winter crops are planted during June and early July on the frost-free hillsides and drained flats of the coastal areas between Waroona, Donnybrook and Marybrook and on market garden land in the Perth Statistical Division. Mid-season plantings are made during August to October on sprinkler-irrigated land in the Manjimup area. Late crops are planted between mid-November and the end of February in all districts growing early or mid-season crops, other than the Perth Statistical Division. In recent years, potatoes have accounted for over a quarter of the State's vegetable area.

Potato production in Western Australia is controlled, under the provisions of the *Marketing of Potatoes Act 1946*, by the Western Australian Potato Marketing Board, which is the sole marketing authority for potatoes produced in the State. The object of this provision is to ensure adequate supplies for local consumption and effective marketing of crops. While production is principally for the local market, occasional surpluses are marketed overseas or in other Australian states.

### Onions

The production of onions is confined largely to the Spearwood area near Perth and to Manjimup and Pemberton in the south-west. Yields of up to 55 tonnes per hectare are obtained. Over most of the last decade the area of onions planted has been steadily increasing although the 1987-88 planting of 411 hectares was a little below the 1984-85 record.

Onions are imported annually into Western Australia during the winter but a surplus is produced locally during summer months and is exported.

### Tomatoes

The main centres of production of tomatoes are at Carnarvon and Geraldton and in the south-west districts including Perth. At Carnarvon and Geraldton, because of the warm winter climate, growers are able to produce 'out of season' crops and complement those grown in more southerly areas during the summer months.

Supplies to the Perth market from December to June are grown in and near the metropolitan area, principally in the City of Wanneroo and in the hills at Jarrahdale. Tomatoes are also grown in a

number of districts in the South-West and Lower Great Southern Statistical Divisions.

**TABLE 13.16 — PRINCIPAL VEGETABLES  
AREA, PRODUCTION AND GROSS VALUE**

	Unit	1985-86	1986-87	1987-88
<b>Carrots—</b>				
Area	hectares	614	769	785
Production	tonnes	21,261	29,715	30,266
Gross value	\$'000	8,007	11,145	11,356
<b>Cauliflowers—</b>				
Area	hectares	784	774	671
Production	tonnes	17,330	15,673	14,364
Gross value	\$'000	8,763	9,531	9,737
<b>Lettuce—</b>				
Area	hectares	358	373	444
Production	tonnes	10,448	12,788	13,841
Gross value	\$'000	4,340	6,121	9,593
<b>Onions—</b>				
Area	hectares	317	367	411
Production	tonnes	13,332	18,674	21,280
Gross value	\$'000	2,935	5,153	6,503
<b>Potatoes—</b>				
Area	hectares	1,887	1,778	2,034
Production	tonnes	69,270	67,618	72,290
Gross value	\$'000	22,117	22,568	24,019
<b>Tomatoes—</b>				
Area	hectares	276	275	277
Production	tonnes	8,268	7,896	8,059
Gross value	\$'000	7,870	8,041	10,375
<b>All vegetables—</b>				
Area	hectares	6,461	7,018	7,786
Gross value	\$'000	72,915	89,153	103,175

### Other vegetables

In addition to the cultivation of potatoes, onions and tomatoes previously mentioned, many other vegetables are produced, the bulk of them in or near the metropolitan area where growers benefit not only from proximity to the principal market but also from an underground water supply at relatively shallow depths. Significant quantities of green peas for processing are produced in the Shires of Manjimup and Plantagenet. The Manjimup Shire is also a significant producer of onions and of beans for processing, and small quantities of vegetables are produced in other country districts.

### Fruit

Fruit production is largely confined to the temperate regions between Gingin to the north of Perth and Albany on the south coast. The cool, wet winters and warm, dry summers of this area permit the successful cultivation of a wide variety of fruits. In the southern and south-western sections, apples, pears and stone fruits are grown extensively, and grapes are of increasing

importance, while in the districts around Perth the principal crops are apples, stone fruits, citrus fruits and grapes. Outside this main fruit-growing area, banana plantations have been established at Carnarvon in the north-west and at Kununurra in the north.

**TABLE 13.17 — FRUIT—AREA AND GROSS VALUE OF PRODUCTION**

	Unit	1985-86	1986-87	1987-88
Area—				
Orchard fruit	ha	4,855	5,103	5,291
Plantation and berry fruit	"	484	544	599
Grapes	"	1,743	1,705	1,765
<b>Total</b>	<b>"</b>	<b>7,082</b>	<b>7,352</b>	<b>7,656</b>
Gross value of production—				
Orchard fruit	\$'000	31,624	42,264	34,324
Plantation and berry fruit	"	13,590	16,596	14,086
Grapes	"	7,014	11,980	11,395
<b>Total</b>	<b>"</b>	<b>52,228</b>	<b>70,840</b>	<b>59,804</b>

### Apples and pears

Apples, which are the principal fruit crop, account for more than half of the total orchard area. Donnybrook, Manjimup and the hills area near Perth are the most important centres but other districts in the south-west still produce significant quantities. In 1987-88, the number of apple trees recorded in the Census was 702,000. Granny Smiths accounted for over 70 per cent of the 40,196 tonnes produced. Pears are usually grown in conjunction with apples, and although apples are still considerably more important, pear tree numbers have increased by 50 per cent in the last 10 years. Exports of both apples and pears are significant, mainly to South East Asian countries.

### Citrus fruit

The Shire of Chittering, north of Perth, is a major citrus fruit producer, while other important areas near Perth are in the Shires of Kalamunda and Swan and the City of Armadale, and in the south-west, in the Shires of Harvey and Capel. Although oranges are by far the most important crop, substantial quantities of lemons and mandarins, and lesser quantities of grapefruit are also produced. Production is largely for local consumption but there is some export trade especially in lemons.

### Stone fruits

Stone fruits are grown mainly in the hills districts in the Darling Ranges near Perth, and in the Shires

of Manjimup and Donnybrook-Balingup in the south-west of the State; however some stone fruits are grown in many other districts of the south-west.

**TABLE 13.18 — ORCHARD FRUIT—TREES, PRODUCTION AND GROSS VALUE**

	Unit	1985-86	1986-87	1987-88
Apples—				
Trees	'000	697	700	702
Production	tonnes	46,074	54,470	40,196
Gross value	\$'000	17,613	24,217	17,943
Pears—				
Trees	'000	120	128	132
Production	tonnes	6,169	7,107	6,604
Gross value	\$'000	3,466	4,442	4,701
Lemons and limes—				
Trees	'000	20	20	21
Production	tonnes	1,629	1,551	1,440
Gross value	\$'000	743	875	695
Mandarins—				
Trees	'000	29	36	44
Production	tonnes	687	727	878
Gross value	\$'000	720	1,016	980
Oranges—				
Trees	'000	132	183	178
Production	tonnes	5,188	5,432	5,217
Gross value	\$'000	1,833	2,568	2,141
Nectarines—				
Trees	'000	58	77	88
Production	tonnes	958	1,035	1,120
Gross value	\$'000	811	963	1,166
Peaches—				
Trees	'000	100	106	110
Production	tonnes	2,148	2,500	2,503
Gross value	\$'000	1,544	2,543	1,816
Plums and prunes—				
Trees	'000	97	106	130
Production	tonnes	3,033	2,828	2,801
Gross value	\$'000	3,774	3,482	2,999

### Vineyards

Historically, the 'Swan Valley' region in the Shire of Swan has dominated the State's viticulture industry. In the early 1970s this region accounted for some 70 per cent of the State's vineyard area. Since then, pressures of urban growth in the Swan Valley have reduced the area under vines there, and new vineyards have been developed elsewhere in the state; principally at Margaret River, Mount Barker/Frankland and Bindoon/Gingin. As a result, the Swan Valley now accounts for just over 34 per cent of the State's vineyard area. The Margaret River and Mount Barker/Frankland grape production is almost entirely used for winemaking; in other areas table and drying grapes are also significant.

**TABLE 13.19 — GRAPES—AREA AND PRODUCTION**

	<i>Unit</i>	<i>1985-86</i>	<i>1986-87</i>	<i>1987-88</i>
Area of vines—				
Bearing	ha	1,645	1,592	1,584
Not yet bearing	ha	98	113	181
Grapes for wine making and table use—				
Quantity	tonnes	8,176	9,400	8,500
Gross value	\$'000	5,791	10,101	10,145
Dried vine fruits—				
Quantity	tonnes	538	584	515
Gross value	\$'000	1,223	1,879	1,250
Wine production—				
Beverage	kilolitres	4,543	5,012	4,633
Distillation	kilolitres	86	35	12

### Other fruit

Production of bananas is mainly confined to a narrow strip of land along the Gascoyne River at Carnarvon, with small, but increasing areas at Kununnurra on the Ord River. The Carnarvon plantations are dependent on water pumped from bores which tap a subterranean flow in the sands of the usually dry river bed. As a surface flow in the river channel results only from heavy rains, which do not occur every year, a problem is presented in the falling-off of water supplies and in the increase in the salt content of the underground water during long dry periods. These conditions and also periodic damage from cyclones cause fluctuations in the area cropped and in production. The crop is transported by road to Perth and sold locally in competition with bananas imported from other Australian States.

Strawberry production has increased significantly in recent years, although difficulties in hiring pickers saw much of the crop unharvested in 1987-88. Nearly 90 per cent of the area planted is within the Perth Statistical Division.

**TABLE 13.20 — BANANAS—AREA AND PRODUCTION**

	<i>Unit</i>	<i>1985-86</i>	<i>1986-87</i>	<i>1987-88</i>
Area of plants—				
Bearing	ha	337	382	399
Not yet bearing	ha	72	71	82
Production—				
Total quantity	tonnes	11,065	13,128	14,251
Gross value	\$'000	10,992	13,259	10,261

### Nurseries

The main concentration of commercial nurseries is in the Perth Statistical Division in the areas of Wanneroo, Kalamunda and Kelmscott. Most nurseries produce ornamental shrubs and trees;

some specialise in the production of bedding plants while others concentrate on cut-flower production. Fruit trees, mainly citrus, are produced by specialist nurseries in the Perth Statistical Division while pome and stone fruit trees are mostly produced in the South-West Statistical Division at Manjimup and Donnybrook. Cultivated turf production has assumed increasing significance in recent years.

**TABLE 13.21 — NURSERIES (a)**  
**AREA AND GROSS VALUE**

	<i>Unit</i>	<i>1985-86</i>	<i>1986-87</i>	<i>1987-88</i>
Area	hectares	840	1,832	1,841
Gross value	\$'000	32,383	33,890	41,603

(a) Including cultivated turf.

### Artificial fertiliser

Soils in Western Australia are acutely deficient in phosphate and regular applications of phosphatic fertiliser are required for crop and pasture growth. Newly cleared land in particular requires heavy applications of superphosphate for satisfactory yields. Nitrogen deficiencies are also common. Legume pastures and lupins have assisted greatly in increasing nitrogen supplies. Potassium deficiency is primarily a problem on sandy soils in high rainfall areas.

Many Western Australian soils and particularly sandy soils are also deficient in trace elements. The use of fertilisers is therefore a significant factor in the State's farming activity.

**TABLE 13.22 — ARTIFICIAL FERTILISER USED ON RURAL HOLDINGS**

	<i>Unit</i>	<i>1985-86</i>	<i>1986-87</i>	<i>1987-88</i>
Crops—				
Area fertilised	'000 ha	5,148	5,123	5,000
Quantity used—				
Superphosphate	'000 t	278	283	314
Other	'000 t	320	297	279
<b>Total</b>	<b>'000 t</b>	<b>598</b>	<b>580</b>	<b>593</b>
Pastures—				
Area fertilised	'000 ha	3,812	3,823	4,782
Quantity used—				
Superphosphate	'000 t	393	392	507
Other	'000 t	40	46	49
<b>Total</b>	<b>'000 t</b>	<b>433</b>	<b>438</b>	<b>556</b>

### PASTORAL PRODUCTION

Throughout this section, where mention is made of the 'pastoral areas' the portion of the State referred to comprises the Kimberley and Pilbara Statistical

Divisions and the Sub-divisions of Lefroy, Gascoyne and Carnegie. The balance of the State, referred to as the 'agricultural areas', comprises the Perth, South-West, Upper Great Southern, Lower Great Southern and Midlands Statistical Divisions and the Sub-divisions of Johnston and Greenough River.

In the early days of settlement, pastoral activities in Western Australia were confined largely to what are now the agricultural areas and were usually associated with the cultivation of crops. However, beginning with Captain George Grey's visit in 1838 to the area known as the West Kimberley, explorers increasingly drew attention to the pastoral possibilities of large sections of the present Kimberley, Pilbara and Central Statistical Divisions.

In 1857 and 1858, F.T. Gregory noted the existence of good pastoral country in the Murchison and the Gascoyne districts and in the course of a journey further to the north in 1861 he discovered the Ashburton, Fortescue, De Grey and Oakeover Rivers. His reports of good grazing lands in the area led to the establishment of sheep stations by pastoralists from the south, the first of such ventures in 1863, being in the De Grey district of what is now the Pilbara Statistical Division. Graziers were also turning their attention to the south-east and in the 1870s pastoral lands were being taken up in the coastal areas to the south of the Nullarbor Plain. Another development in the extension of pastoral activity began with Alexander Forrest's journey through the Kimberley in 1879 and his favourable reports on the suitability of the country for grazing. Leases along the Fitzroy and the Ord Rivers were stocked not only with livestock shipped from the south and from the other Australian Colonies but also with cattle brought overland to the area, principally from Queensland and New South Wales, by remarkable feats of droving.

## Sheep

The State's sheep numbers peaked at 34.8 million in 1976. Since the end of the Second World War, sheep numbers had shown an almost continuous increase until the mid 1970s. Since then numbers have fluctuated, reflecting variations in seasonal conditions and prices for wool and meat. The strong increases in sheep numbers since 1985 have resulted from relatively strong wool prices and poor wheat prices.

In the agricultural areas, sheep farming is usually carried out in conjunction with grain growing, while in the pastoral areas sheep are generally

grazed on large specialist 'sheep stations'. As a result, large flocks predominate in the pastoral areas. In 1986, the average sheep flock in agricultural areas was 3,260; in pastoral areas 9,666. Merinos are the dominant breed. In 1986, purebred merinos comprised 94.2 per cent of the State's sheep flock, while merino comebacks accounted for a further 2.5 per cent.

TABLE 13.23 — SHEEP NUMBERS AND DISTRIBUTION AT 31 MARCH

	In agricultural areas		In pastoral areas		State total
	Number	Proportion of State total	Number	Proportion of State total	
	'000	per cent	'000	per cent	'000
1960	13,396	81.6	3,016	18.4	16,412
1970	29,844	88.7	3,790	11.3	33,634
1980	28,730	94.4	1,701	5.6	30,431
1986	30,690	92.4	2,522	7.6	33,213
1987	30,922	92.4	2,541	7.6	33,463
1988	31,525	92.8	2,426	7.2	33,951

TABLE 13.24 — SHEEP FLOCKS AT 31 MARCH 1988 CLASSIFIED ACCORDING TO SIZE OF FLOCK

Size of flock (numbers)	Flocks	Sheep ('000)
1 — 99	252	10
100 — 999	1,301	743
1,000 — 1,999	2,198	3,298
2,000 — 4,999	4,275	13,711
5,000 — 9,999	1,489	9,998
10,000 — 19,999	348	4,514
20,000 and over	59	1,676
<b>Total</b>	<b>9,922</b>	<b>33,951</b>

## Marketing of lamb

**Lamb Marketing Board.** All lamb produced for slaughter south of the twenty-sixth parallel in Western Australia is marketed through the Western Australian Lamb Marketing Board. The Board was established by the *Marketing of Lamb Act 1971* and began operations in December 1972. It came into being mainly as a result of pressure from, and following a referendum of, the State's lamb producers, who looked to the Board to improve the stability of their industry and increase returns.

The major aims of the Board are to administer an orderly method of marketing and encourage producer participation in lamb marketing, to operate an advance price schedule and a weight

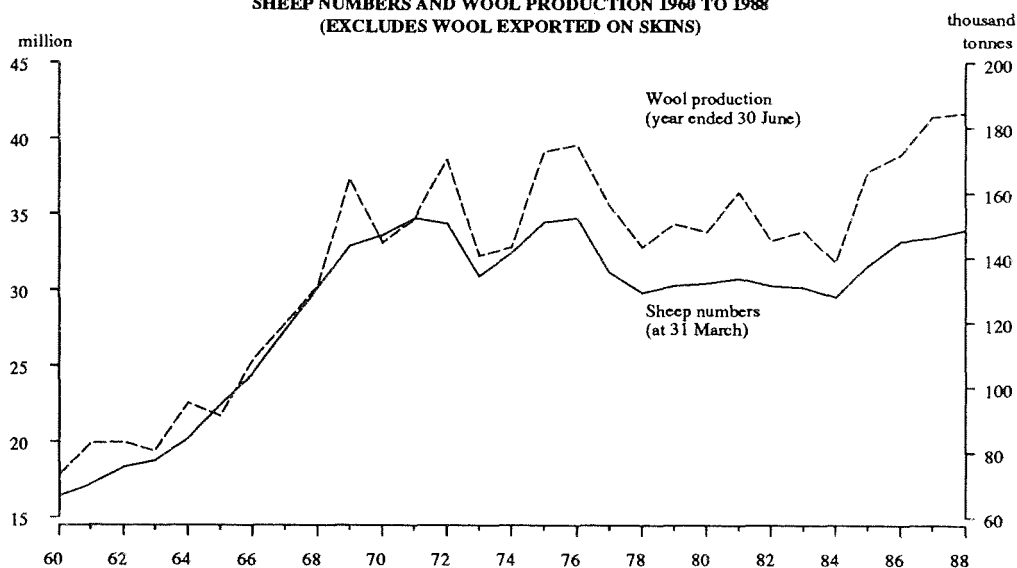
and grade system, and to rationalise procedures throughout the industry.

Apart from promoting lamb on the local market the Board is also responsible for lamb exports. During the period of the Board's operations there has been a marked change in the pattern of export sales of Western Australian lamb with reliance on the traditional United Kingdom market being replaced by other markets to the extent that the Board now exports to a wide diversity of overseas countries.

## Wool

The increasing sheep numbers of the last two years, combined with improving average clips per head, resulted in a record shorn wool production in 1987-88. The 40.6 million sheep and lambs shorn returned a clip of 184,200 tonnes of wool. A further 4,134 tonnes was accounted for by dead and fellmongered wool and wool exported on skins.

**DIAGRAM 13.1**  
**SHEEP NUMBERS AND WOOL PRODUCTION 1960 TO 1988**  
**(EXCLUDES WOOL EXPORTED ON SKINS)**



**TABLE 13.25 — SHEEP SHORN AND WOOL PRODUCTION**

	Unit	1985-86	1986-87	1987-88
Sheep shorn	'000	29,756	30,777	31,670
Lambs shorn	"	8,838	8,583	8,912
<b>Total</b>	"	<b>38,594</b>	<b>39,360</b>	<b>40,582</b>
Average weight of wool shorn	kg	4.43	4.65	4.54
Wool production (greasy)—				
Shorn	'000 t	171	183	184
Dead and fellmongered	"	1	0	0
Exported on skins	"	4	5	4
<b>Total</b>	"	<b>176</b>	<b>189</b>	<b>188</b>

During the war years wool was compulsorily acquired by the Commonwealth Government in

accordance with an agreement with the United Kingdom. Government control ceased after the war and the auction system was reintroduced. Since then, there has been a range of legislative action taken with the aim of promoting the use of wool and wool products, encouraging efficient marketing and providing a steadying influence on market prices. A summary of this government action is contained on page 386 of the *Western Australian Year Book*, No. 20—1982.

A major development in the administration of the wool industry was the passing of the *Wool Industry Act 1972*, which brought into existence the Australian Wool Corporation on 1 January 1973. The functions of the Corporation relate to wool marketing, wool use promotion, wool research and the management of wool stores.

Sale by sample and test certificate is now used for 99 per cent of the woolclip sold by auction or tender. This system has enabled sale by separation, where wool is stored in one centre and sold in another. Wool selling centres with infrequent sales use this method to reduce delays in payment to growers.

Following amendments to the Wool Industry Act in 1977 the Corporation now has an active role in negotiating sea freights for wool to Australia's main markets.

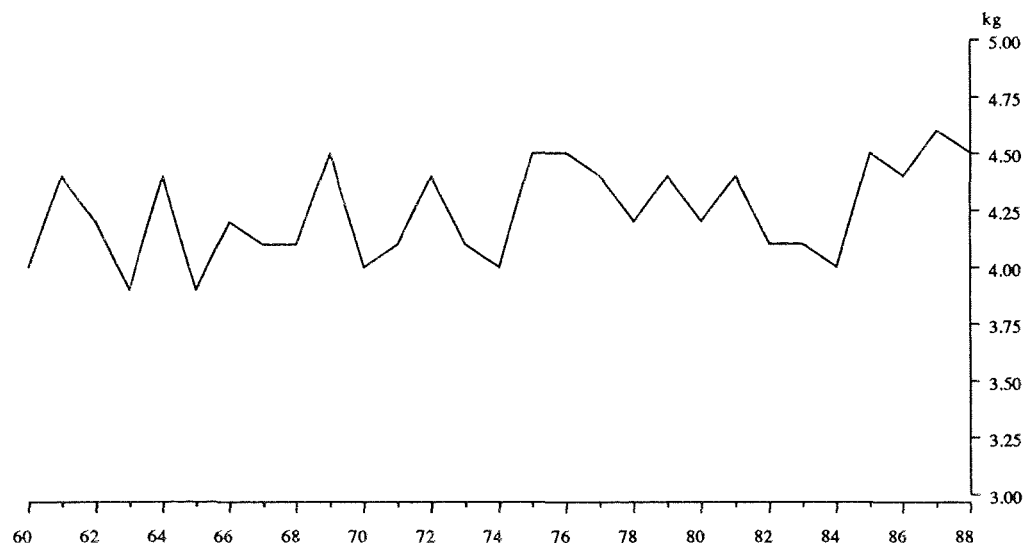
Although the greater proportion of the wool clip is exported in the grease, scouring or degreasing is done in the State and degreased wool is an appreciable item in the external wool trade. During 1987-88 exports of greasy and degreased wool

were 139,540 tonnes and 25,800 tonnes respectively. Further details of exports of greasy and degreased wool, both interstate and overseas, are given in Chapter 20—Foreign and Interstate Trade.

TABLE 13.26 — GROSS VALUE OF WOOL PRODUCTION (\$'000)

	1985-86	1986-87	1987-88
Shorn wool	569,564	706,010	1,239,713
Dead wool and fellmongered wool	1,456	875	862
Wool exported on skins	6,254	9,379	11,553
<b>Total</b>	<b>577,273</b>	<b>716,263</b>	<b>1,252,128</b>

DIAGRAM 13.2  
AVERAGE WEIGHT OF WOOL PER SHEEP SHORN



## Cattle

Cattle statistics are classified according to the two broad categories of 'meat production' and 'milk production', regardless of breed. At 31 March 1988, meat cattle comprised over 93 per cent of the State's cattle herd. Nearly 60 per cent of the State's meat cattle are located in the pastoral areas of the State, where extensive grazing on very large cattle stations is carried out. In 1988, the average meat

cattle herd size in the pastoral areas was 3,850 compared to 165 in the agricultural areas.

The cattle which were originally shipped or driven overland from the other Australian Colonies to start the industry in the northern pastoral areas were predominantly shorthorn breeds and these still form the great bulk of all cattle kept for meat production in those areas. However, Brahman and Brahman infused breeds are increasing.



**TABLE 13.27 — CATTLE FOR MEAT PRODUCTION AT 31 MARCH  
CLASSIFIED ACCORDING TO SIZE OF HERD AND LOCATION**

Size of herd (number)	In agricultural areas		In pastoral areas		Whole state	
	Number of		Number of		Number of	
	Herds	Cattle	Herds	Cattle	Herds	Cattle
		'000		'000		'000
1988—						
1 — 29	1,103	12.9	10	0.1	1,113	13.0
30 — 99	1,113	67.2	16	0.9	1,129	68.1
100 — 299	1,287	229.4	27	5.0	1,314	234.6
300 — 499	302	115.3	20	7.8	322	123.0
500 — 999	178	120.8	29	21.0	207	141.8
1,000 — 1,999	48	62.5	33	48.3	81	110.8
2,000 — 4,999	17	51.5	44	134.2	61	185.7
5,000 — 9,999	1	7.3	31	210.0	32	217.3
10,000 and over	—	—	30	496.0	30	496.0
<b>Total 1988</b>	<b>4,049</b>	<b>666.9</b>	<b>240</b>	<b>923.3</b>	<b>4,289</b>	<b>1,590.2</b>
Total 1987	4,190	680.1	250	861	4,440	1,541.2

## Slaughtering

Beef from cattle slaughtered at Broome in the Kimberley Division is principally for export. The local market for meat is supplied mainly from abattoirs at Fremantle, Waroona, Harvey, Bunbury, Albany, Woorooloo, Geraldton and Katanning. Most of these establishments also slaughter for the export trade. Small establishments operating in country towns also contribute to total production, and most stations and many farms slaughter sufficient for all or part of their own requirements. Over half of all exports are destined for the United States of America.

While the agricultural areas account for only 42 per cent of the State's cattle numbers, higher productivity and turnover than in the pastoral areas enables the agricultural areas to account for about 75 per cent of the State's beef production.

**TABLE 13.28 — LIVESTOCK SLAUGHTERED AND MEAT PRODUCED**

	Unit	1985-86	1986-87	1987-88
Livestock slaughtered (a)—				
Sheep	'000	2,802	3,043	3,102
Gross value (b)	\$'000	36,126	30,113	46,761
Lambs	'000	1,085	1,168	1,136
Gross value (b)	\$'000	20,508	23,673	27,059
Cattle and calves	'000	462	482	492
Gross value (b)	\$'000	140,198	156,172	170,173
Meat produced (c)—				
Mutton and lamb	tonnes	67,676	72,032	74,166
Beef and veal	tonnes	90,771	95,353	100,870

(a) Mainly slaughterings for human consumption but also includes quantities condemned and small numbers of livestock slaughtered for boiling down. (b) Value on hoof at principal market. (c) Dressed carcass weight; excludes condemned carcasses and offal.

## OTHER LIVESTOCK

### Dairying

Compared with the wheat, wool and meat producing industries, dairying as a major well-organised rural activity is of fairly recent origin. Its growth was retarded initially by the difficulty of clearing heavily-timbered country in the south-west and the need for special methods of pasture establishment. As these problems were progressively overcome dairying became a significant feature of primary production. After a period of intense rationalisation in the 1970s, the industry has been concentrated on the production of milk for the local liquid milk and fresh dairy products markets.

A summary of the history of the dairying industry in Western Australia, with specific reference to legislative and marketing arrangements, price instability and subsidy schemes, is contained on pages 391-2 of the *Western Australian Year Book*, No. 20—1982.

**TABLE 13.29 — CATTLE FOR MILK PRODUCTION  
AT 31 MARCH  
(<sup>'000</sup>)**

	1986	1987	1988
Bulls	1	1	1
Bull calves (a)	—	—	—
Commercial dairy—			
Cows	68	67	65
Heifers	28	28	27
Heifer calves (a)	22	20	20
House cows and heifers	2	2	2
<b>Total</b>	<b>121</b>	<b>118</b>	<b>115</b>

(a) Under one year.

The bulk of the State's dairy cattle are concentrated in the high rainfall, near-coastal strip from Pinjarra to Augusta, with lesser numbers being found further east to Albany. Irrigation of pastures during the drier summer months plays an important role in the industry.

**TABLE 13.30 — CATTLE FOR MILK PRODUCTION CLASSIFIED ACCORDING TO SIZE OF HERD AT 31 MARCH**

Size of herd (numbers)	Number of herds	Total cattle '000
1 - 9	724	1.9
10 - 49	58	1.4
50 - 99	55	4.2
100 - 149	109	13.7
150 - 199	142	24.5
200 - 249	105	23.2
250 and over	133	46.1
<b>Total</b>	<b>1,326</b>	<b>115.0</b>

**TABLE 13.31 — WHOLE MILK PRODUCTION (a)**

	Unit	1985-86	1986-87	1987-88
Quantity	million L	243	248	251
Gross value	\$ '000	53,397	58,979	62,325

(a) Includes milk used for processing.

### Pig raising

The principal pig raising districts are the grain growing areas of the Midlands and the Upper and Lower Great Southern Statistical Divisions. At 31 March 1988, 66 per cent of pigs were within these divisions. Although the greater proportion of production is consumed locally, there is some export trade.

**TABLE 13.32 — PIG NUMBERS AT 31 MARCH ('000)**

	1985-86	1986-87	1987-88
Boars	3.2	3.3	3.4
Breeding sows	32.8	35.8	34.5
Gilts for breeding	5.2	5.6	4.9
Other pigs	233.5	250.2	264.2
<b>Total</b>	<b>274.7</b>	<b>294.8</b>	<b>307.0</b>

Intensive piggeries have assumed greater importance in recent years, and there has been a reduction in the number of pigs being raised in small or 'mixed farm' operations. While there has been little change in pig numbers over the last ten years, the number of herds at 31 March 1988 was

less than half the number in 1976. Over the same period the proportion of pigs which were in herds of 500 or more has increased from 20 per cent to 66 per cent.

**TABLE 13.33 — PIGS SLAUGHTERED AND MEAT PRODUCED**

	Unit	1985-86	1986-87	1987-88
Pigs slaughtered	'000	462	502	509
Gross value (a)	\$'000	46,723	48,221	51,835
Pigmeat produced (b)	tonnes	25,967	28,119	29,504
Bacon and ham produced	tonnes	8,174	8,502	8,377

(a) Value 'on hoof' at principal market or at factory door. (b) Dressed carcass weight; excludes condemned carcasses and offal but includes quantities used to produce ham.

**TABLE 13.34 — PIG HERDS AT 31 MARCH 1988 CLASSIFIED ACCORDING TO SIZE OF HERD**

Size of herd (numbers)	Number of herds	Total pigs '000
1 - 9	129	0.6
10 - 49	287	8.0
50 - 99	193	13.9
100 - 199	160	23.2
200 - 499	191	60.2
500 - 999	99	67.4
1,000 and over	48	133.8
<b>Total</b>	<b>1,107</b>	<b>307.0</b>

### Livestock in Australia

**TABLE 13.35 — LIVESTOCK NUMBERS AT 31 MARCH 1988, AUSTRALIA ('000)**

State or Territory	Sheep	Cattle		Pigs
		Milk	Meat	
New South Wales	54,927	419	4,542	853
Victoria	26,997	1,436	2,038	437
Queensland	14,367	322	8,504	617
South Australia	17,352	153	794	441
<b>Western Australia</b>	<b>33,951</b>	<b>115</b>	<b>1,590</b>	<b>307</b>
Tasmania	4,764	134	408	48
Northern Territory	-	2	1,385	3
Australian Capital Territory	97	-	11	-
<b>AUSTRALIA</b>	<b>151,808</b>	<b>2,579</b>	<b>19,271</b>	<b>2,706</b>

### Poultry farming

Poultry farming in Western Australia is a specialised industry located almost entirely within the Perth Statistical Division. A few commercial egg farms are established in the more populous of the country areas.

Almost all the egg production and a large proportion of the chicken meat production is on holdings which specialise in the production of either poultry meat or eggs. A few laying birds are kept for commercial production on orchards, dairy farms and wheat farms throughout the agricultural areas.

The Western Australian Egg Marketing Board, constituted under the *Marketing of Eggs Act 1945*, is the statutory authority controlling the commercial production of eggs. Two other Acts, the *Poultry Industry Levy Act 1965* and the *Chicken Meat Industry Act 1977*, are used to regulate and control poultry farming.

Details of how these Acts control and regulate poultry farming is contained on page 311 of the *Western Australian Year Book*, No. 24—1986.

**TABLE 13.36 — POULTRY NUMBERS AT 31 MARCH ('000)**

	1986	1987	1988
Fowls	4,470	5,014	5,144
Ducks	3	2	3
Turkeys	17	15	2

**TABLE 13.37 — EGG PRODUCTION AND POULTRY SLAUGHTERED FOR TABLE PURPOSES YEAR ENDED 30 JUNE**

	Unit	1986	1987	1988
Egg production—				
Quantity (a)	'000 dozen	15,858	17,490	17,597
Gross value	\$'000	23,469	26,709	26,874
Poultry slaughtered for table purposes—				
Dressed weight	tonnes	31,151	26,674	28,029
Gross value	\$'000	45,509	47,548	52,145

(a) Source: Western Australian Egg Marketing Board.

### Beekkeeping

Commercial producers of honey in Western Australia may be divided into three categories. There are a comparatively small number of specialist apiarists, engaged solely or mainly in honey production, who operate on a large scale and transport their hives from district to district. There are also some substantial producers who are engaged in agricultural activities and use their farms as a central site from which they may transport their hives to other areas as necessary. Finally there are the many farmers and orchardists who keep a few hives and produce honey as a minor supplementary activity.

**TABLE 13.38 — BEEKEEPERS, BEEHIVES AND HONEY PRODUCTION 1987-88**

	Numbers of hives					
	less than 200	200-299	300-399	400-499	500-799	800 and over
Beekeepers—Number	3	3	10	16	13	11
Productive beehives ('000)	—	0.7	2.9	6.5	6.6	8.8
Honey production (tonnes)	1	40	389	638	664	776

**TABLE 13.39 — BEEKEEPERS AND PRODUCTION OF HONEY AND BEESWAX**

	Unit 1985-86 1986-87 1987-88		
Beehives—			
Productive	'000	26	27
Unproductive	'000	6	6
Honey production—			
Quantity	tonnes	2,258	2,458
Gross value	\$'000	2,251	3,921
Beeswax production—			
Quantity	tonnes	38	42
Gross value	\$'000	165	194

In 1987-88 exports of honey totalled 2,352 tonnes, the export value being \$3,033,000.

### THE DEPARTMENT OF AGRICULTURE

A Bureau of Agriculture was formed in 1894 and became the Department of Agriculture in 1898. At that time cleared, arable land in Western Australia was less than one per cent of present farm land.

The Department of Agriculture, which has expanded progressively, has a broad role to foster the State's agriculture and to advise on marketing of its products. By representation on the Australian Agriculture Council, it helps establish nationally acceptable policies.

It is the branch of the State Government service which communicates scientific advice to farmers, pastoralists and allied industries, conducts a wide range of research and administers relevant Acts of Parliament. It maintains services to assist farmers and its regulatory work consists of carrying out the provisions of some of the laws relating to agriculture.

The Head Office at South Perth houses the main administrative, research, specialist and diagnostic

staff and there are twenty-four district offices and twenty-four research stations. Most research stations are for the wheat and sheep, beef, and dairying industries but specific stations cater for fruit, vegetables, poultry, pigs, viticulture and tropical agriculture.

The greater part of the Department's extension activities are carried out by the advisers and veterinary officers stationed at its Regional and District Offices. Regional and District Offices are also responsible for thirteen country research stations.

A detailed description of the Department of Agriculture, including its history, structure and the services it provides to the agricultural sector is contained in pages 313-318 of the *Western Australian Year Book*, No. 24—1986.

### **AGRICULTURE PROTECTION BOARD**

The Agriculture Protection Board is the body responsible for ensuring that the State's agriculture resources are protected from the sometimes devastating effects of plant and animal pests.

The Board administers the Agriculture and Related Resources Protection Act which replaced the Noxious Weed Act and the Vermin Act in 1976. Plants and animals can be declared by the Board to be 'declared animals' for the purposes of the Act.

The Agriculture Protection Board's role is to co-ordinate the control effort and see that declared plants and declared animals are dealt with according to its policies. In addition to co-ordinating overall agriculture protection policies, the Board advises on methods of control, maintains services to prevent pest animals and plants entering the State, and conducts research into the biology and control of vertebrate pests.

### **ADVISORY COMMITTEES**

Responsibility for advising the Minister for Agriculture on various aspects of agricultural activity is vested in a number of advisory committees, whose members are drawn from government departments and authorities, industry organisations and marketing and storage organisations.

These committees include the State Wheat Advisory Committee, the State Coarse Grains and Seeds Advisory Committee, the State Soil Conservation Advisory Committee, Drought Consultative Committee and the Ord Project Co-ordinating Committee.

### **HERD IMPROVEMENT SERVICE OF WESTERN AUSTRALIA**

The Herd Improvement Service of Western Australia (HIS) was established in November 1984 under the provisions of the *Herd Improvement Service Act 1984*. HIS is an independent corporate body based in Bunbury. It was created to amalgamate the services previously provided by the Artificial Breeding Board and the Department of Agriculture's Dairy Herd Recording Scheme. Accordingly the purpose of HIS is to promote improvements of the quality and productive genetics of Western Australia's livestock through extensive use of advanced artificial breeding practices and scientific measurement of production as with the Dairy Herd Recording Service.

### **FARM MANAGEMENT SERVICE LABORATORY**

The University of Western Australia, by resolution of the Senate, approved the establishment of the Farm Management Service Laboratory within the University in 1966. The aims of the Laboratory are to develop concepts and services in management accounting, computer planning and animal breeding which are specially suited to the needs of farmers; to make these developments available to farmers; and to use information processed by the Laboratory for teaching and research at the University of Western Australia.

## **Forestry**

### **FORESTS FOR WOOD, WATER AND WILDLIFE**

Most of Western Australia's native hardwood forests grow in the south-west of the State, between Walpole and Perth. From these forests are drawn a wide variety of essential resources, both tangible and intangible: the beauty and durability

of their timbers is renowned world-wide, and generates a considerable income for Western Australia each year; the forests also provide an increasingly popular environment for recreation, within easy reach of major cities and towns. Catchment areas, which supply high quality water for domestic and agricultural use to the most populated areas of the State, occur throughout the

forests; and conservation areas for native wildlife and plants ensure the long-term survival of many species, as well as providing an invaluable scientific and educational resource.

At present 1,820,365 hectares have been permanently dedicated as State forest, 144,855 hectares are held as Timber Reserves, and 32,243 hectares of freehold land is vested mainly for pine production.

### THE PRIME INDIGENOUS FORESTS

Jarrah (*Eucalyptus marginata*) is the State's principal timber and the prime forest covers almost 1.4 million hectares. Karri (*E. diversicolor*) is next in importance and is distributed over some 155,000 hectares. Wandoo (*E. wandoo*) accounts for a smaller portion of the dedicated area and Tuart (*E. gomphocephala*), another valuable timber, has a restricted area of about 1,000 hectares. Blackbutt (*E. patens*) occurs in patches throughout the jarrah and karri forests and is an important milling timber with properties and uses similar to jarrah. Marri (*E. calophylla*), the most widespread of the commercial eucalypts, is used to a limited extent as building scantling, pole timber and as the principal material for an export woodchip industry based in the Manjimup region.

Other eucalypts and many trees of different genera occur within the prime forest belt but they are not of major economic importance. The main distribution of the prime forests, which are practically confined to the south-western portion of the State, is shown on Diagram 13.3.

### THE INLAND FORESTS

East of the area of prime forest is an inland woodland, within which are a number of eucalypts (both tree and mallee form), as well as several types of Acacia, such as the wattles and mulgas, tea tree (*Melaleuca spp.*) and casuarinas. Sandalwood (*Santalum spicatum*), indigenous to the wheat belt and semi-arid areas of the State, is exported to Asian countries for use in the manufacture of incense.

The major emphasis of forestry activities in the goldfields area is the conservation of woodlands. During recent years, soil conservation in the regions of low rainfall has received increasing attention and the importance of controlling clearing, grazing and firewood cutting has been recognised. The Department of Conservation and

Land Management maintains a staff to exercise these controls and to advise on tree planting. Work is proceeding with demarcation of areas representing important inland ecotypes for which long-term conservation proposals have been prepared.

### FORESTRY ADMINISTRATION

Forests in Western Australia are managed by the Department of Conservation and Land Management, within a General Working Plan of multiple use management and regulation of an allowable hardwood sawlog cut. Major uses include wood production, water production, forest and catchment protection, recreation, flora, fauna and landscape conservation, scientific study and education, public utility and mining.

Timber harvesting in both natural forests and plantations is tightly controlled and closely monitored to meet environmental protection and disease management requirements, and to achieve the most efficient use of the resource.

To supplement native forest production, pine forests have been established throughout the South-West. There are over 60,000 hectares of State owned plantations and an increasing amount of forests planted on private land. *Pinus radiata* and *pinus pinaster* are the principal species.

Other major forest-related roles of the department include reduction of forest diseases, particularly jarrah dieback (*Phytophthora cinnamomi*), fire surveillance and control measures and the granting of sawmilling permits and forest produce licences.

### FOREST PRODUCTION

Sawn timber from jarrah and karri is the principal form of forest wood production, but there will be a gradual increase in the use of pine in the future. Karri and locally grown pine logs together with imported logs are used for plywood. During recent years, there has been a greater use of local logs for plywood manufacture. Small sized logs from thinning pine plantations and manufacturing residues are used for the production of particleboard. Hardwood mill wastes and bush residues of marri and karri form the basis of an important export woodchip industry located in the southern forests.

In addition to these major wood products, the State's forest wealth includes sandalwood for

export, firewood for general purposes, and various seeds and plants for propagation both in Australia and abroad. The karri, wandoo, marri and some inland scrub species are important nectar producers for apiarists, who move their bees to various forest sites to follow the nectar flow.

Of the hardwood chiplogs supplied from State forest in 1987–88, 21 per cent were karri and 79 per cent were marri.

Sawmilling and production are also referred to under Manufacturing in Chapter 16.

**TABLE 13.40 — TIMBER PRODUCTION**  
(cubic metres)

	1985–86	1986–87	1987–88
Sawlog production (a)—			
Hardwood	879,487	844,939	792,292
Softwood	89,082	104,000	127,556
Other log production (b)—			
Hardwood	579,350	652,616	809,851
Softwood	187,676	187,597	206,052
Sawn timber production—			
Hardwood	295,160	280,542	270,723
Softwood	33,816	36,116	47,929

(a) Includes sawlogs and logs used in the production of plywood veneer. (b) Includes chiplogs.

## Fisheries

### GENERAL FISHERIES

Rock lobsters are the most important item of production of the Western Australian fishing industry. The most important commercial species of rock lobster in Western Australian waters is the western rock lobster, which is fished off the south-west coast between Murchison River and Bunbury. The principal localities around which rock lobsters are caught are the Abrolhos Islands, Geraldton, Dongara, Green Head, Jurien Bay, Cervantes, Lancelin, Ledge Point and Fremantle. The industry is protected from overfishing by numerous measures and the catch is processed at shore stations licensed under the *Fisheries Act 1905* as processing establishments.

The catches of Australian salmon, which school in the bays on the south and lower south-western coasts, yield a significant proportion of the production of inshore and beach fishing and are used almost exclusively for canning. The remainder of the catch from this type of fishing comprises chiefly Australian herring, western sand whiting and sea mullet sold mainly as wet fish on the local market, and pilchard and scaly mackerel, sold as bait and for pet food. There is an important fishery for southern bluefin tuna on the south coast of the State and investigations are being conducted on the commercial potential of tuna stocks in northern waters.

The coastal waters northward from the mouth of the Murchison River to North West Cape and Exmouth Gulf are the source of several species of commercial importance. Snapper are caught between the Murchison River and North West Cape during the northern schooling season from May to August. Cod and Spanish mackerel, though in smaller quantities, are also caught between the Murchison River and North West Cape.

Prawn fisheries have been established at Shark Bay and Exmouth Gulf, with the catch processed at Carnarvon and Learmonth respectively. The major species caught are western king prawns and brown tiger prawns, as well as quantities of banana and endeavour prawns. In these areas and the smaller fisheries at Nickol Bay and Onslow the number of boats licensed to fish for prawns is restricted as a conservation measure.

Significant catches of scallops are taken in Shark Bay while a smaller fishery occurs at the Abrolhos Islands. In 1986–87 the value of the scallop fisheries was over \$7 million.

Shark fishing is an important activity on the lower west and south coasts. The other major species caught offshore in this region is the Westralian jewfish.

Abalone are taken by licensed divers in the southern half of the State with most production coming from the south coast. Species taken are greenlip, blacklip, brownlip and Roe's abalone. The 1986–87 value of the fishery was almost \$3 million.

The first fishing grounds to be exploited were the estuaries and rivers and, although they are not now as important as other grounds, they still provide substantial quantities of fish of a fairly wide variety. The principal species are cobble and yellow-eye mullet, sea mullet and Perth herring most of which are caught in the Swan and Harvey Estuaries and the Peel and Leschenault Inlets. Other species taken include sand whiting, King George whiting, tailor, garfish and pilchard. Crabs, school prawns and western king prawns are also caught commercially in these waters.

TABLE 13.41 — FISH, CRUSTACEANS AND MOLLUSCS — CATCH AND VALUE

Species—Common name	Quantity (a) (tonnes)			Value (b) (\$'000)		
	1984–85	1985–86r	1986–87	1984–85	1985–86r	1986–87
<b>Fish—</b>						
Barramundi (Giant perch)	83	55	69	444.5	254.9	393.7
Cobbler	152	173	97	361.5	624.4	493.0
Emperor (North-west snapper)	243	252	257	413.2	586.2	636.9
Herring, Australian	1,269	837	980	685.4	476.9	817.1
Jewfish, Westralian	244	297	206	1,450.5	1,872.4	1,607.2
Mackerel, Spanish	260	322	222	627.6	907.6	779.6
Mullet, sea	591	449	509	479.0	444.1	534.7
Mullet, yellow-eye	444	390	246	297.7	273.0	200.9
Pilchard	4,213	5,391	6,161	1,685.3	1,994.5	5,173.0
Salmon, Australian	2,587	2,064	1,538	776.1	722.3	794.0
Scaly mackerel	1,415	1,287	478	622.5	605.0	357.7
Shark, bronze whaler	469	462	392	792.2	1,239.0	1,492.1
Shark, whiskery	285	310	256	407.0	717.2	834.6
Shark, other	817	828	633	821.8	1,112.6	1,575.8
Snapper	1,526	1,319	1,064	3,478.7	3,363.6	3,254.3
Tuna, southern bluefin	1,297	1,697	947	973.0	1,391.7	1,115.7
Whiting, western sand	243	231	139	478.6	579.7	337.0
Other species	1,526	1,913	1,699	2,474.9	3,788.5	3,552.3
<b>Total fish</b>	<b>17,663</b>	<b>18,276</b>	<b>15,893</b>	<b>17,269.5</b>	<b>20,953.5</b>	<b>23,949.4</b>
<b>Crustaceans—</b>						
Crabs	173	190	193	487.1	504.4	590.4
<b>Prawns—</b>						
Banana	279	127	217	2,035.4	1,219.0	2,497.7
Brown tiger	456	610	693	4,220.8	6,461.0	6,831.2
Endeavour	308	291	175	1,655.1	1,576.5	1,113.9
Western king	1,905	1,714	1,630	13,680.1	13,216.6	12,923.3
Other species	231	154	130	412.0	247.2	309.2
<i>Total prawns</i>	<i>3,180</i>	<i>2,896</i>	<i>2,845</i>	<i>22,003.4</i>	<i>22,720.4</i>	<i>23,675.2</i>
Rock lobsters	9,095	7,391	7,718	121,855.4	91,076.3	108,970.9
<b>Total crustaceans</b>	<b>12,448</b>	<b>10,477</b>	<b>10,756</b>	<b>144,345.9</b>	<b>114,301.1</b>	<b>133,236.6</b>
<b>Molluscs—</b>						
Abalone	327	249	224	1,978.9	3,326.2	2,963.3
Scallops	708	2,046	2,370	1,367.1	3,726.0	7,314.1
Other molluscs	397	554	366	481.2	727.6	655.3
<b>Total molluscs</b>	<b>1,433</b>	<b>2,849</b>	<b>2,960</b>	<b>3,827.2</b>	<b>7,779.7</b>	<b>10,932.7</b>
<b>TOTAL WESTERN AUSTRALIA</b>	<b>31,544</b>	<b>31,602</b>	<b>29,609</b>	<b>165,442.6</b>	<b>143,034.3</b>	<b>168,118.6</b>

(a) Live (whole) weight. (b) Gross value paid to fishermen.

## FISHERIES ADMINISTRATION

The Western Australian Fisheries Department conducts research on a wide range of commercially important fish species such as rock lobsters, prawns, snapper, Australian salmon, pearl oysters and tuna. The Department is also involved in research on recreational fisheries, estuaries, freshwaters and environmental matters relating to fisheries. Much of this research is carried out in association with the Commonwealth Scientific and Industrial Research Organization, other State and Commonwealth bodies and tertiary education institutions.

Research is carried out chiefly at two centres. The marine research centre at Waterman, was built for the Fisheries Department and incorporates several separate laboratories and a large aquarium with

circulating water, for experiments and studies on a wide range of species. A second centre, the Commonwealth Scientific and Industrial Research Organization marine research centre at Marmion was opened in 1976.

## AQUACULTURE AND INLAND FISHING

Limited commercial production of marron began in 1977 following the passing of legislation which established fish farming guidelines, including licensing of marron farms. A number of other aquaculture ventures are proposed, including the commercial rearing of prawns, Atlantic salmon, brine shrimp and abalone.

Brown trout, rainbow trout and English perch have been introduced into the streams of the south-west, and rainbow trout are also reared commercially on

a number of fish farms. These species together with indigenous stocks of freshwater cobbler, marron, barramundi and cherabin, provide sport for amateur inland fishermen.

### PEARL-SHELL FISHING AND PEARL CULTURE

Pearl and pearl-shell fishing has been a valuable industry for many years, the main centre being Broome. The natural pearls obtained were once an important feature of production but the success of the industry now depends almost entirely on the shell produced and the price obtainable for it, and cultured pearl production from licensed farms.

### AUSTRALIAN FISHING ZONE

The Australian Fishing Zone (A.F.Z.) covering waters within 200 nautical miles of Australia was declared on 1 November 1979. Under licence from the Commonwealth Government, foreign fishing vessels are permitted to fish within the Zone. A number of joint-venture feasibility studies and test fishing programs have been conducted in the Zone since its declaration.

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*Value of Agricultural Commodities Produced, Western Australia* (7502.5)

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#### Other Publications

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## CHAPTER 14

### MINING

**From a largely rural based economy Western Australia has emerged as a major force on the world mineral scene and is one of the world's leading producers of a number of key minerals.**

#### MINING IN WESTERN AUSTRALIA

In 1885 gold was discovered in the Kimberley region of Western Australia. This find encouraged extensive prospecting which culminated in the rich discoveries of gold at Kalgoorlie and Coolgardie in the 1890s and by the end of the first decade of the 20th Century almost every known mineral had been found in Western Australia.

The emergence of the mining industry in Western Australia is marked by the mineral boom of the late 1960s which, while centred on iron ore in the Pilbara, encompassed many other mineral developments. These included: nickel at Kambalda; bauxite on the Darling Scarp; oil at Barrow Island; natural gas from the Dongara Fields; mineral sands at Capel and Eneabba; solar salt at Shark Bay, Port Hedland, Dampier, Lake MacLeod and Lake Lefroy; and talc at Mount Seabrook.

From a largely rural-based economy Western Australia emerged as one of the world's leading producers of a number of key minerals including iron ore, bauxite, nickel, ilmenite, rutile and zircon.

Mining activity in most of the 1970s and early 1980s was subdued in comparison with the late 1960s and early 1970s. More recently the pace of activity has quickened considerably, mainly through increases in gold prices and consequently in gold mining activity, the development of the North West Shelf Gas project and the mining of diamonds at Argyle.

A more comprehensive picture of the history of mining and mineral exploration can be found in the *Western Australian Year Book* — No. 24, 1986.

In Western Australia the development of minerals occurs under a variety of statutes, notably the Mining Act administered by the Department of Mines. Coordination of major resource development projects is undertaken by the Department of Resources Development which was established by the State Government in 1980 in recognition of the special approach required to effectively support projects of the magnitude undertaken in this State.

#### The Western Australian Department Of Mines

The primary role of the Department is to facilitate the orderly exploration and development of minerals and petroleum in Western Australia for the benefit of the community, now and in the future. It also provides scientific and technical advice to Government agencies and the public on geotechnical and mining related matters, provides chemical consultancy services, regulates and records the ownership of mining tenements and regulates for public safety in matters concerning explosives and dangerous goods.

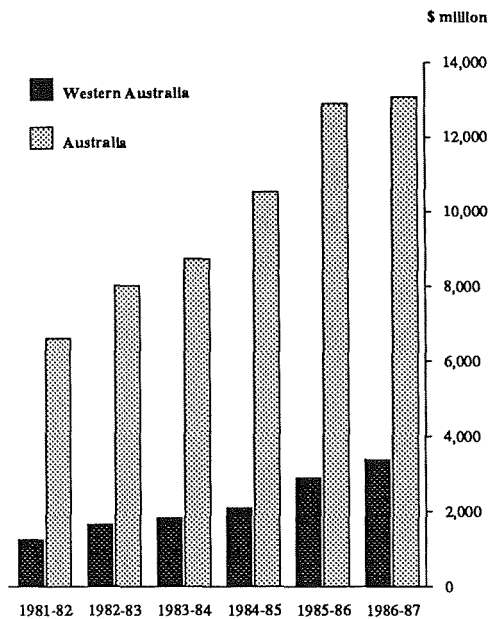
The Department is responsible for the collection of royalties for minerals owned by the Crown. Royalties for the State Government in 1987-88 amounted to \$166 million.

#### The Western Australian Department Of Resource Development

By presenting a single point of contact with the Government, the Department of Resources Development facilitates development projects by coordinating the activities of government agencies in relation to a particular project and resolves issues between agencies and the developer or between agencies themselves.

## MINING STATISTICS

**DIAGRAM 14.1**  
**MINING ESTABLISHMENTS: VALUE ADDED**  
**WESTERN AUSTRALIA IN RELATION**  
**TO AUSTRALIA**



### Australian Standard Industrial Classification (ASIC)

Information presented in this and the following three chapters comes mainly from a system of integrated economic censuses based on the Australian Standard Industrial Classification (ASIC). ASIC classifies all economic

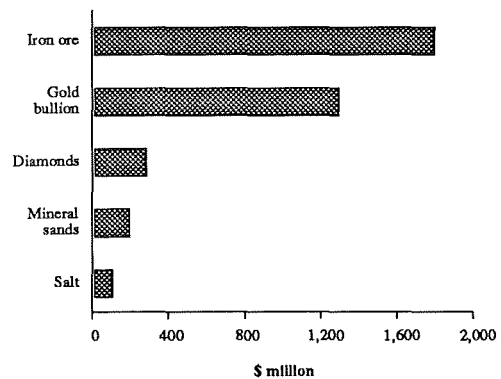
activities into four hierarchic levels. At the broadest level of the classification, economic activities are grouped into 'industry divisions'. Each industry division is further divided into industry sub-divisions, groups and classes.

For a detailed explanation of ASIC refer to *Australian Standard Industrial Classification, Volume 1—1983 edition* (Catalogue No. 1201.0)

### Census of Mining Establishments

In 1986-87 mining establishments in Western Australia employed 19,617 persons, paid \$670 million in wages and salaries while value added was \$3,469 million.

**DIAGRAM 14.2**  
**MINERAL PRODUCTION**  
**EX-MINE VALUE: 1986-87**



**TABLE 14.1 - MINING ESTABLISHMENTS—SUMMARY OF OPERATIONS BY INDUSTRY SUBDIVISION**

Industry sub-division	Number of establishments operating at 30 June	Persons employed (a)	Wages and salaries (b) (\$m)	Turnover (\$m)	Value added (\$m)
<b>1986-87</b>					
Metallic minerals	133	14,982	510.0	3,958.9	2,466.9
Coal, oil and gas	11	3,014	109.2	775.5	679.8
Construction materials (c)	34	293	7.2	55.2	31.6
Other non-metallic minerals	36	1,328	44.0	357.3	290.3
<b>Total Mining, 1986-87</b>	<b>214</b>	<b>19,617</b>	<b>670.5</b>	<b>5,147.0</b>	<b>3,468.6</b>
1985-86	205	19,884	623.0	4,644.4	2,970.1
1984-85	218	18,900	530.4	3,625.2	2,184.2

(a) Average over whole year. Includes working proprietors. (b) Excludes drawings of working proprietors. (c) Excludes sand and gravel.

**TABLE 14.2 – MINING ESTABLISHMENTS—PERSONS EMPLOYED, TURNOVER AND VALUE ADDED  
BY INDUSTRY SUBDIVISION  
WESTERN AUSTRALIA AND AUSTRALIA : 1986–87**

Industry sub-division	Persons employed (a)			Turnover			Value added		
	Western Australia	Australia	Western Australia as a percentage of	Western Australia	Australia	Western Australia as a percentage of	Western Australia	Australia	Western Australia as a percentage of
			Australia			Australia			Australia
	'000	'000	%	\$m	\$m	%	\$m	\$m	%
Metallic minerals	15.0	29.5	51	3,958.9	6,699.2	59	2,466.9	4,168.4	59
Coal, oil and gas	3.0	39.9	8	775.5	11,308.1	7	679.8	8,086.9	8
Construction materials	(b)0.3	5.9	5	(b)55.2	930.1	6	(b)31.6	499.0	6
Other non-metallic minerals	1.3	2.8	46	357.3	556.9	64	290.3	397.7	73
<b>Total mining</b>	<b>19.6</b>	<b>78.1</b>	<b>25</b>	<b>5,147.0</b>	<b>19,494.4</b>	<b>26</b>	<b>3,468.6</b>	<b>13,152.0</b>	<b>26</b>

(a) Average over whole year. Includes working proprietors. (b) Excludes sand and gravel.

### Mineral Production

Iron ore remains the most important mineral with 92 million tonnes, valued at \$1,802 million, being produced in 1986–87. This figure represents 36 per cent of the value of all minerals produced in Western Australia. Gold production increased

by 41 per cent from 1985–86 (46.1 tonnes) to 1986–87 when 64.9 tonnes were produced. The resurgence in the gold industry is the result of buoyant gold prices. New gold developments are taking place at the rate of 20–30 new mines per year.

**TABLE 14.3 – MINERAL PRODUCTION**

Mineral	Unit	1984–85		1985–86		1986–87	
		Quantity	Value (a)	Quantity	Value (a)	Quantity	Value (a)
			\$'000		\$'000		\$'000
Metallic minerals—							
Bauxite (b)	'000 tonnes	18,421	n.p.	19,413	n.p.	20,438	n.p.
Copper concentrate	"	(c)45	n.p.	15	n.p.	—	—
Gold bullion	'000 grams	45,156	507,717	56,852	704,367	75,450	1,295,854
Iron ore	'000 tonnes	87,726	1,480,197	92,990	1,794,972	92,468	1,801,585
Mineral sands concentrates—							
Ilmenite	"	1,123	42,908	1,058	53,019	1,070	78,840
Leucoxene	"	17	3,881	n.p.	n.p.	26	10,437
Monazite	"	14	5,980	16	9,227	11	7,135
Rutile	"	(d)75	25,941	n.p.	n.p.	(d)88	n.p.
Xenotime	tonnes	(b)42	(b)398	n.p.	n.p.	n.p.	n.p.
Zircon	'000 tonnes	336	36,063	339	43,525	291	51,672
<b>Total mineral sands</b>	..	..	115,170	..	149,257	..	196,851
Nickel concentrate (b)	'000 tonnes	486	n.p.	455	n.p.	406	n.p.
Tantalite–columbite concentrate	tonnes	185	4,827	n.p.	n.p.	n.p.	n.p.
Tin concentrate	"	628	5,528	(b)679	n.p.	(b)73	n.p.
Zinc concentrate	'000 tonnes	(c)52	n.p.	14	n.p.	—	—
<b>Total value metallic minerals</b>	..	..	2,624,072	..	3,154,571	..	3,756,524
Coal, oil and gas—							
Coal	'000 tonnes	(b)3,673	(b)109,120	(b)3,765	(b)126,841	(e)3,782	n.p.
Crude oil (including condensate) (d)	megalitres	1,415	n.p.	1,812	n.p.	2,174	n.p.
L.P.G. (d)	"	1	n.p.	1	n.p.	—	n.p.
Natural gas (d)	gigalitres	1,912	n.p.	2,928	n.p.	3,377	n.p.
<b>Total value coal, oil and gas</b>	..	..	n.p.	..	712,933	..	n.p.
Construction materials—							
Building and monumental stone	'000 tonnes	46	n.p.	94	1,394	79	n.p.
Crushed and broken stone—							
Limestone	"	2,128	7,727	2,972	15,566	2,124	n.p.
Other	"	3,991	36,244	4,680	47,796	4,605	39,915
<b>Total value construction materials</b>	..	..	n.p.	..	64,757	..	n.p.

TABLE 14.3 – MINERAL PRODUCTION (continued)

Mineral	Unit	1984–85		1985–86		1986–87	
		Quantity	Value (a)	Quantity	Value (a)	Quantity	Value (a)
			\$'000		\$'000		\$'000
Other non-metallic minerals—							
Clays —							
Brick clay and shale	'000 tonnes	1,633	8,752	n.p. 92	n.p. 2,564	1,756	11,729
Other (f)	"						
Diamonds (b)	'000 carats	5,5679	45,057	17,472	147,568	32,165	284,095
Gypsum	'000 tonnes	596	5,663	370	3,634	201	1,331
Limestone	"	n.p.	n.p.	2,045	7,065	1,507	6,134
Salt	"	4,819	84,461	4,676	88,632	(b)5,051	(b)107,382
Silica	"	343	2,126	414	2,864	332	2,349
Spodumene	tonnes	(b)8,505	(b)1,853	n.p.	n.p.	(c)9,150	n.p.
Talc	'000 tonnes	(b)(c)155	n.p.	(c)146	n.p.	(c)181	n.p.
Other (g)	"	..	n.p.	..	19,473	..	14,679
<b>Total value other non-metallic minerals</b>	..	..	<b>162,684</b>	..	<b>271,801</b>	..	<b>427,698</b>
<b>TOTAL VALUE ALL MINERALS</b>	..	..	<b>3,295,934</b>	..	<b>4,204,122</b>	..	<b>5,009,887</b>

(a) Ex-mine value. (b) Source: Department of Mines. (c) Source: Production from published producers' reports. (d) Source: Department of Primary Industries and Energy. (e) Source: Joint Coal Board. (f) Includes attapulgite. (g) Includes diatomite, dolomite, felspar, garnet concentrates, diatomite, mica, peat, semi-precious stones, vermiculite and those minerals for which values are not available separately for publication.

### PRIVATE MINERAL EXPLORATION (Other than for petroleum)

Mineral exploration (other than for petroleum) is carried out over a large portion of the State and is concerned chiefly with exploration for: bauxite; coal; copper; diamonds; gold; iron ore; lead; mineral sands; nickel; tin; uranium and zinc.

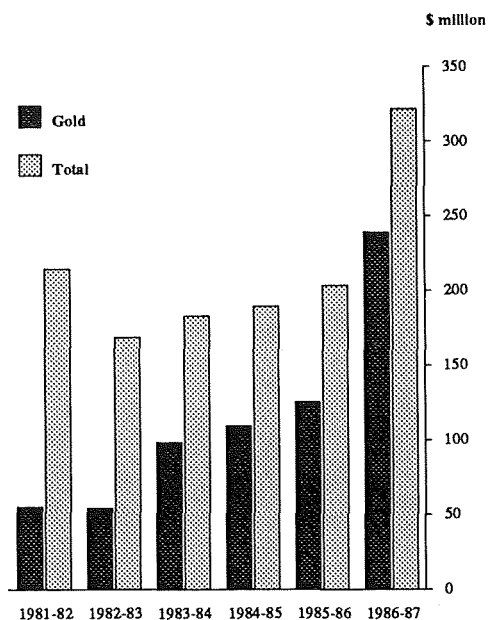
\$216.1 million in 1981–82, before a downturn in the following year. Since then expenditure has slowly increased before surging to an all-time high of \$323.3 million in 1986–87.

TABLE 14.4 – PRIVATE MINERAL EXPLORATION  
(OTHER THAN FOR PETROLEUM)  
EXPENDITURE BY TYPE OF MINERAL SOUGHT  
(\$million)

Type of mineral sought	Total private exploration		
	1984–85	1985–86	1986–87
Coal	3.7	3.9	3.7
Construction materials	0.2	1.5	0.3
Copper, lead, zinc, silver, cobalt and nickel	32.9	33.8	27.7
Diamonds	14.2	11.8	10.8
Gold	111.1	127.2	240.3
Iron ore	15.5	10.9	10.6
Mineral sands	0.8	2.4	3.7
Tin/tungsten	1.0	1.0	0.9
Uranium	5.3	6.5	14.2
Other	6.5	6.3	11.0
<b>Total</b>	<b>191.0</b>	<b>205.2</b>	<b>323.3</b>

Expenditure on private mineral exploration peaked at \$86.1 million in 1970–71, marking the culmination of the extensive activity which followed the discovery of nickel at Kambalda in 1966. Thereafter, exploration activity declined, and, notwithstanding the rate of inflation throughout the 1970s, it was not until 1979–80 that the 1970–71 peak was exceeded. Strong growth in exploration for gold and diamonds was largely responsible for exploration expenditure peaking at

DIAGRAM 14.3  
PRIVATE MINERAL EXPLORATION  
EXPENDITURE: GOLD AND TOTAL



In 1980–81, expenditure on gold exploration was \$49.0 million, 26.2 per cent of total exploration expenditure (\$186.7 million). By 1986–87 this figure had risen to 74.3 per cent (\$240.3 million).

Over the same period, metres drilled on non-core operation had also risen, reflecting the large-scale search for open pittable ore bodies.

**TABLE 14.5 – PRIVATE MINERAL EXPLORATION (OTHER THAN FOR PETROLEUM) EXPENDITURE AND DRILLING**

	Unit	1984–85	1985–86	1986–87		Total
				On production leases	On other areas	
Exploration expenditure —	\$m					
Wages and salaries	"	39.0	37.3	9.9	38.9	48.8
Stores, materials and fuels purchased	"	19.0	19.8	7.3	21.4	28.7
Payment to contractors, consultants, etc	"	68.4	77.4	36.0	70.7	106.7
Other current expenses	"	57.8	58.3	18.6	88.4	107.0
Net capital expenditure	"	6.8	12.4	15.1	17.0	32.1
<b>Total exploration expenditure</b>	"	<b>191.0</b>	<b>205.2</b>	<b>86.8</b>	<b>236.5</b>	<b>323.3</b>
Drilling expenditure (a) —						
On core drilling	"	25.6	27.5	20.1	18.4	38.5
On non-core drilling	"	23.8	32.3	10.9	38.6	49.5
<b>Total drilling expenditure</b>	"	<b>49.4</b>	<b>59.8</b>	<b>31.0</b>	<b>57.0</b>	<b>87.9</b>
Drilling operations —	'000 metres					
Core drilling	"	490	643	325	414	740
Non-core drilling	"	1,637	1,824	493	2,303	2,797
<b>Total drilling operations</b>	"	<b>2,128</b>	<b>2,467</b>	<b>819</b>	<b>2,718</b>	<b>3,536</b>

(a) Included in 'Exploration expenditure' above.

**TABLE 14.6 – PRIVATE MINERAL EXPLORATION WESTERN AUSTRALIA IN RELATION TO AUSTRALIA 1986–87**

	Unit	Western Australia	Australia	Western Australia as a percentage of Australia
Exploration expenditure	\$m	323.3	556.8	58
Drilling expenditure (a)	\$m	87.9	133.9	66
Drilling operations	'000 metres	3,536	4,963	71

(a) Included in 'Exploration expenditure'.

## PETROLEUM EXPLORATION

Exploration for petroleum began in the Canning Basin as early as 1922. However, it was not until the 1950s when drilling began in the Carnarvon Basin that exploration was encouraged. Commercial quantities of oil were eventually discovered at Barrow Island in 1964. Natural gas was discovered at Dongara in 1966 and, until the discovery and subsequent production of gas from the North West Shelf, formed the basis of supplies piped to Perth and its nearby industrial areas.

In 1972 large deposits of natural gas were discovered on the North West Shelf, offshore from Dampier. Development of the gas field, which also

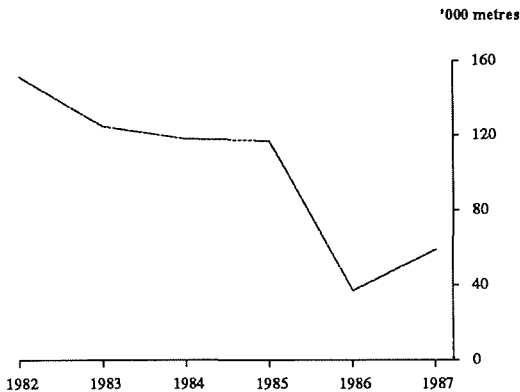
includes condensate—a light crude oil—constitutes the largest resource development project ever undertaken in Australia. Domestic gas production commenced in 1984 and construction of the liquefied natural gas (LNG) plant is proceeding, with the first exports of LNG scheduled for October 1989. Exports will build up to a peak of six million tonnes a year during 1994–2008.

The high levels of activity associated with the development of the North West Shelf gas field, and the discovery of oil and gas at a number of offshore and onshore locations peaked in 1982. In that year private exploration expenditure was \$463 million and 151,456 metres were drilled. Since

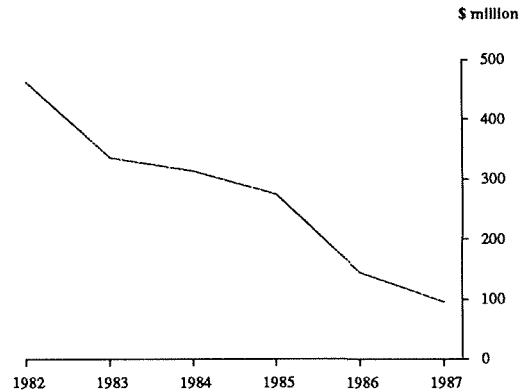
then exploration activity has declined markedly principally owing to a world-wide decline in crude

oil prices. Exploration expenditure in 1987 was \$95 million with only 59,240 metres drilled.

**DIAGRAM 14.4**  
**PRIVATE PETROLEUM EXPLORATION**  
**DEPTH DRILLED**



**DIAGRAM 14.5**  
**PRIVATE PETROLEUM EXPLORATION**  
**EXPENDITURE**



**TABLE 14.7 – PRIVATE PETROLEUM EXPLORATION—WELLS AND DEPTH DRILLED**

	Unit	1985	1986	1987
Wells drilled (i.e. those which reached final depth)—				
As oil producers	No.	20	1	4
As gas producers	"	—	1	—
As oil and gas producers	"	2	1	1
Plugged and abandoned	"	44	15	28
<b>Total</b>	"	<b>66</b>	<b>18</b>	<b>33</b>
Drilling still in progress at 31 December (uncompleted holes)				
Wells drilled or drilling over 3,000 metres	"	8	2	1
Depth drilled—				
Completed wells	metres	116,947	37,046	59,240
Uncompleted holes	"	—	91	—
<b>Total</b>	"	<b>116,947</b>	<b>37,137</b>	<b>59,240</b>
Average final depth of wells drilled	"	1,847	2,058	1,757

**TABLE 14.8 – PRIVATE PETROLEUM EXPLORATION**  
**EXPENDITURE**  
**(\$million)**

Expenditure	1986	1985	1987
Geological (onshore)	8.6	5.5	2.9
Geophysical	65.7	39.7	30.6
Drilling	189.7	95.3	43.5
Other	9.6	3.11	8.1
<b>Total</b>	<b>273.6</b>	<b>143.6</b>	<b>95.2</b>

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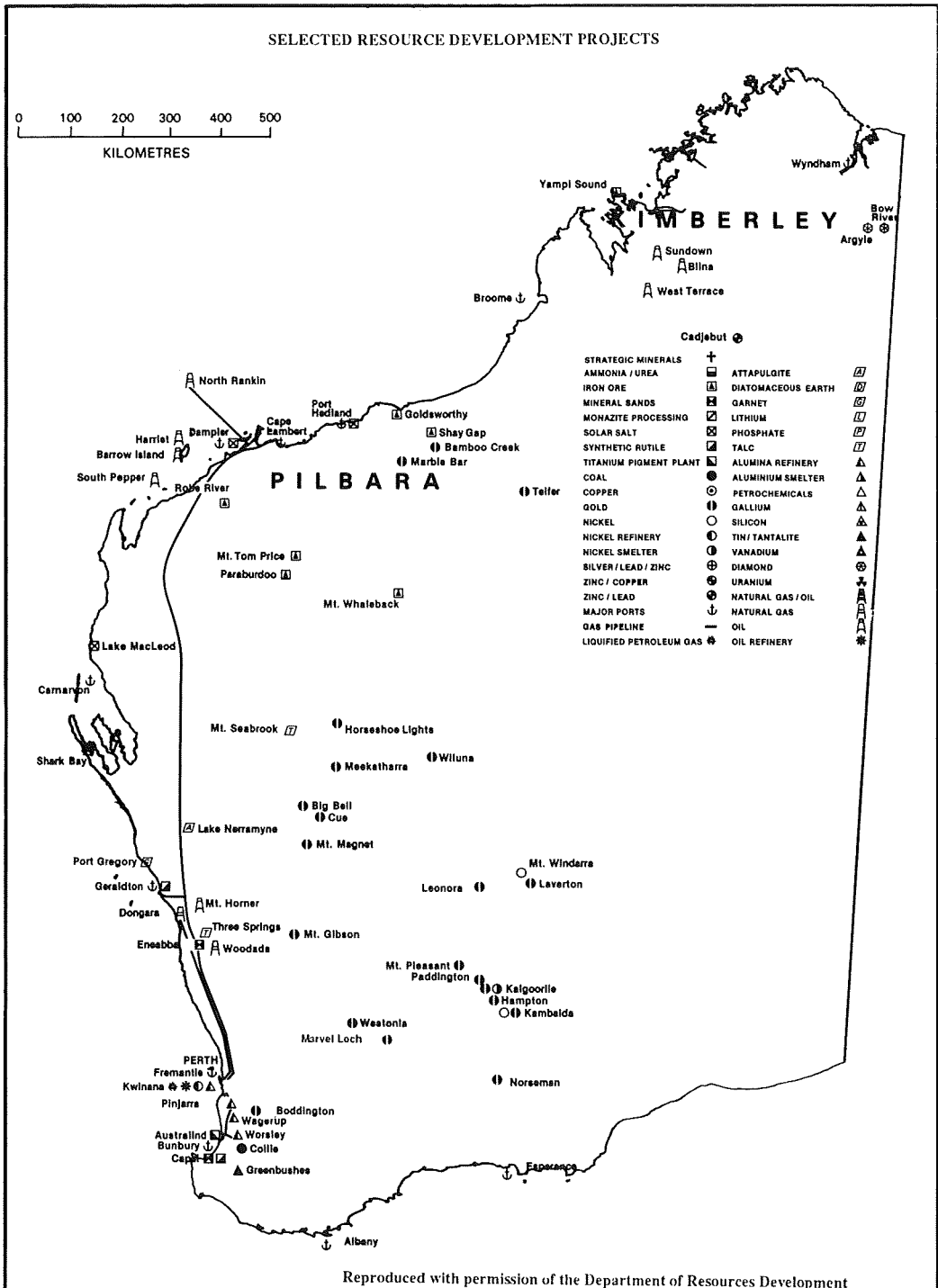
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*Mining: Western Australia* (8404.5)

*Principal Mining Statistics, Western Australia* (8405.5)

*Mineral Exploration (Other than for petroleum), Western Australia, Preliminary* (8402.5)

DIAGRAM 14.6



*Census of Mining Establishments: Details of  
Operations by Industry Class : Australia (8402.0)*

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## Chapter 15

### ENERGY

The availability of energy is an important factor in the economic and social development of any country, and this is no less so in Australia, which ranks among the highest per capita energy users in the world. In Western Australia, the per capita energy consumption is some 10 per cent higher than that for the rest of Australia, primarily because of two factors:

- (a) The vast area of the State in relation to its population and the resultant high demand for transport energy.
- (b) The development and expansion of large scale mining and mineral processing industries since the mid 1960s which has added considerably to energy demand.

Energy, its sources, prices, distribution and related aspects are thus of considerable significance to this State.

For many years, Western Australia's only major indigenous source of primary energy (other than firewood and wind power) was black coal, which has been mined in the Collie region since the 1890s. Production of crude oil at Barrow Island (1967) and natural gas at Dongara (1971) further broadened the State's energy supply base. More recently, large deposits of natural gas in the North West Shelf area of Western Australia have been developed. Production from this source commenced in 1984.

Several deposits of energy minerals are at various stages of exploration, evaluation or development. In addition, research and development work continues on the various alternative sources of energy including solar and wind energy.

While Western Australia is still dependent on imports of some petroleum products, it is considerably more energy self-sufficient than it was in the early 1960s. One of the factors influencing previous economic development of this State has been the limited availability of local energy supplies. With the development of the North West Shelf natural gas project, a substantial energy surplus has been created for the first time in the history of the State.

#### Energy Resources

Western Australia's resources of energy minerals are shown in Table 15.1. To put these resources

data into perspective, recent State production data have also been shown.

**TABLE 15.1 — FUEL MINERALS—  
RESOURCES AND PRODUCTION, 1987-88**  
(Sources: Joint Coal Board;  
Western Australian Department of Mines)

Type	Unit	Re- sources (a)	Pro- duction
Hydrocarbon liquids —			
Crude oil	million cu m	(b)20.3	1.9
Condensate	million cu m	(b)90.0	1.2
Natural Gas	million cu m	(b)859,180	4,126
Black coal	million tonnes	3,430	3.7
Uranium	tonnes U3O8	79,508	—

(a)At 30 June 1988. (b)Probability greater than 90 per cent that resources shown are recoverable

The resources data shown represent amounts which are expected to be profitably extractable, given existing knowledge of mineral deposits, current prices and technology. Resources data are therefore subject to considerable revision if any of these factors change.

While it is not possible to quantify such resources, Western Australia's geographical and climatic characteristics are such that it has considerable potential to take advantage of advances in the use of solar, wind and biomass energy, as well as tidal power.

## ENERGY PRODUCTION, CONVERSION AND UTILISATION

### Electricity

Most of the electricity production in the State is generated by the State Energy Commission of Western Australia (SECWA) whose responsibilities include ensuring the effective and efficient use of the State's energy resources and the provision of economical and reliable supplies of electricity and gas. Significant amounts of electricity are also generated by private enterprise, particularly large scale mining companies in the Pilbara region.

**TABLE 15.2 — PRODUCTION OF ELECTRICITY**  
(million kWh)

Generated by	1985-86	1986-87	1987-88
Government	7,102	7,562	8,179
Private	2,874	2,850	2,917
<b>Total</b>	<b>9,976</b>	<b>10,412</b>	<b>11,096</b>

SECWA operates two power grid systems which supply the electricity needs of 98 per cent of the State's population. The two systems are:

(a) *The South-West interconnected system* servicing an area from Kalbarri in the north to Albany in the south and from Perth east to Kalgoorlie. Three major thermal power stations provide the bulk of electricity for the system. They are located at Muja (1,040MW capacity) and Bunbury (120MW), both coal fired; and at Kwinana (880MW), mainly fuelled by North West Shelf natural gas. Gas turbines at Kwinana, Geraldton and Kalgoorlie (each of 20MW capacity) provide peak and emergency power. At 30 June 1988, the installed capacity of generating plant within this system was 2,100MW. An additional three 36MW gas turbine generating units will be commissioned (two near Geraldton and one at Kalgoorlie) in 1989.

(b) *The Pilbara interconnected system* interconnecting Karratha, Dampier, Cape Lambert, Wickham, Roebourne and Port Hedland. Electricity is supplied from Cliffs Robe River Iron Associates' gas-fired power station at Cape Lambert. Additional power can be drawn from the SECWA stand-by diesel generating facility at Port Hedland and from Hamersley Iron Pty Ltd's power station at Dampier.

Outside the electricity grid systems, SECWA operates another twenty-nine smaller diesel power stations with a total capacity at 30 June 1988 of 172MW. It also provides support services for the Federal Department of Aboriginal Affairs to help

run thirty-seven Aboriginal village power stations in remote areas of the State.

At 30 June 1988, SECWA had 585,020 customer accounts for electricity throughout Western Australia.

**TABLE 15.3 — STATE ENERGY COMMISSION OF  
WESTERN AUSTRALIA**  
**FUELS USED FOR ELECTRICITY GENERATION**

Fuel	Unit	1985-86	1986-87	1987-88
Coal	'000 tonnes	2,387	2,333	2,363
Fuel oil	'000 tonnes	32	19	15
Distillate	'000 tonnes	52	54	56
Natural gas	Terajoules	27,700	34,442	42,128

### Petroleum fuels

Until 1954, Western Australia was wholly dependent on imports for its supplies of petroleum fuels. The opening of an oil refinery at Kwinana in that year brought some local input into petroleum fuel production although, initially, all the feedstock for the refinery was imported.

The first commercial deposits of oil were found on Barrow Island, off the north-west coast of the State, in 1964 and shipments commenced in 1967. This oil is refined at several Australian refineries, including Kwinana.

In 1966, natural gas was discovered at Dongara, to the north of Perth. At that time gas manufactured from (mainly Collie) coal and naptha (a light distillate) was being reticulated by SECWA and the Fremantle Gas and Coke Company within the Perth Metropolitan Area. A pipeline was later constructed linking Dongara with the metropolitan gas mains system and with Pinjarra south of Perth. The replacement of manufactured gas commenced in December 1971 and was completed before the end of 1972. On 1 October 1986, SECWA purchased the gas reticulation facility operated by the Fremantle Gas and Coke Company.

The North West Shelf provides most of the gas supplied to SECWA with a small amount of gas being received by SECWA from the onshore Woodada gas field (near Dongara). In addition to reticulating (principally) North West Shelf natural gas to customers linked to the Dampier to Bunbury pipeline, SECWA also reticulates tempered liquefied petroleum (TLP) gas, using feedstock provided by a Kwinana refinery, to customers in Albany on the south coast.

At 30 June 1988, there were 208,205 customer accounts for natural gas and 2,409 customer accounts for TLP gas.

The North West shelf project is based on the use of the North Rankin and Goodwyn gasfields which contain expected recoverable hydrocarbons

currently estimated at 301,000 million cubic metres of gas and 53 million cubic metres of condensate (with a 90 per cent probability that these volumes are recoverable). In North Rankin, the first field to be developed, the natural gas reservoir is trapped in layers of porous sandstone, more than three kilometres below the sea floor. The gas-saturated sandstone beds have a cumulative thickness of approximately 300 metres and extend over an area of more than 50 square kilometres.

Construction of the offshore and onshore facilities for the project involved two phases; the first (the Domestic Gas Phase) to supply gas to Western Australia, while the second (the Liquefied Natural Gas (LNG) phase) is to supply LNG to Japan.

The Domestic Gas Phase is complete. The LNG phase, involving the construction of LNG processing "trains", LNG storage tanks to store the refrigerated LNG ready for export and seven LNG tankers to ship the LNG to Japan, is on schedule with the first shipment of LNG scheduled for mid 1989.

When both phases are fully operational at planned plateau production levels, output from the project will include:

(a) 10.5 million cubic metres (414 Terajoules) of gas per day for the domestic market in Western Australia.

(b) 6 million tonnes of LNG per year for the Japanese market.

(c) 1.9 million cubic metres of condensate per year (33,000 barrels per day). Production could treble once the Goodwyn Platform is in operation.

During the year ended 30 June 1988 the North Rankin field produced 3,651 million cubic metres of gas and 1,173,611 cubic metres of condensate. The field currently produces about 23 million cubic metres of gas per day of which 13 million cubic metres is re-injected into the reservoir, resulting in increased condensate production. Peak flow rate of gas supplied to SECWA was 412.5 Terajoules (10.4 million cubic metres).

In 1984 SECWA constructed a 1,500 kilometre pipeline from Dampier to Wagerup, at a cost of approximately \$1,000 million, to carry gas to its Perth distribution network, and to major industrial customers in the South-West of the State. The pipeline has been extended to Bunbury, with lateral lines constructed to Geraldton and major industrial customers in the Pilbara.

Petroleum exploration has continued at a high level in recent years. Statistics relating to this activity and to the production of crude oil and natural gas are contained in tables in Chapter 14.

An LPG extraction plant using North West Shelf gas to produce propane and butane became fully operational in October 1988. About 100,000 tonnes per year will be exported to Japan.

Table 15.4 shows sales of petroleum products in Western Australia. The data relate only to sales of refinery products (whether produced in this State or imported), and hence exclude products such as natural gas, which do not go through a refining process; or crude oil, which is a refinery input.

**TABLE 15.4 — SALES (a) OF PETROLEUM PRODUCTS**  
(Source: Department of Primary Industries and Energy)  
(megalitres)

	1985-86	1986-87	1987-88
LPG	93	81	67
Automotive gasoline—			
Premium Leaded	(b)1,489	1,437	1,399
Regular Unleaded	—	—	212
Premium Unleaded	43	122	9
<i>Total</i>	<i>1,532</i>	<i>1,559</i>	<i>1,621</i>
Aviation gasoline	15	16	16
Aviation turbine fuel	279	300	285
Automotive diesel oil—			
Inland	1,345	1,430	1,529
Bunkers	13	12	80
<i>Total</i>	<i>1,358</i>	<i>1,442</i>	<i>1,609</i>
Industrial and marine diesel fuel—			
Inland	2	—	—
Bunkers	57	59	64
<i>Total</i>	<i>59</i>	<i>59</i>	<i>65</i>
Fuel oil—			
Inland	183	111	78
Bunkers	197	190	242
<i>Total</i>	<i>380</i>	<i>301</i>	<i>320</i>
Lubricating oils and greases	55	57	60
Bitumen	59	59	54
Lighting kerosene	28	28	20
Other products (c)	64	58	17
<b>Total products</b>	<b>3,922</b>	<b>3,958</b>	<b>4,134</b>

(a) Includes reporting companies' own use, but excludes refinery fuel. (b) Includes 1 megalitre of Regular Leaded. (c) Includes heating oil.

## Coal

Commercial production of coal commenced in the 1890s at Collie. For many years coal was the major source of energy in the State, being used to generate electricity, to manufacture 'town' gas and to provide fuel for steam locomotives and industry generally. Today, the major user of coal mined in the Collie basin is SECWA. Coal is the main fuel for electricity generation for SECWA's South-West interconnected system.

Data showing trends in coal production since 1900 are contained in the Statistical Summary, Chapter 26.

Apart from the deposits being worked at Collie, several other deposits of both black and brown coal have been identified and are at present being evaluated. Chapter 14 contains statistics relating to exploration and production of coal.

### **Solar energy**

The use of solar radiation for the production of domestic hot water is well established in Western Australia, and is the most common application of solar energy. In 1985-86, over 23 per cent of private dwellings in the State had solar hot water systems, and such systems are accepted as being competitive with other forms of domestic water heating.

There is also a well established use of photovoltaic cells which convert light directly into electrical energy for the refrigeration of food, and basic lighting and radio communications equipment in remote localities. More recent developments have been the use of solar energy for water and space heating in commercial applications and in agriculture, where solar power can be used to pump water from reservoirs and to electrify fencing.

At present, economical application of solar energy is largely restricted to relatively small scale heating purposes, with some more sophisticated applications in remote localities where factors such as the transport costs of conventional fuels are significant.

### **Biomass**

Biomass, relates to living matter which can be used as a source of energy and it includes matter which can be used directly as a fuel (e.g. firewood) or after conversion (e.g. sugar cane converted to sugar, sugar converted to ethanol). The concept of biomass includes organic waste materials such as sawdust and crop refuse, but excludes fossil fuels such as coal and petroleum. The most significant form of biomass to have been used as an energy source in Western Australia is firewood, and this is still an important source of household energy.

Research is at present continuing on the further use of biomass as an energy source. This is largely concerned with the use of oil from oil-seed crops in diesel-type engines, and the production of ethanol from sugar, grain crops and organic waste materials. The Orbital Engine Company of Perth provided one of the two key engine components used by CSIRO in converting and testing a production model fuel-injected sedan run on ethanol.

### **Uranium**

No uranium has been mined on a commercial basis in Western Australia to date, though small amounts of ore have been extracted and processed for test purposes. A number of uranium ore bodies have been identified in the State, and exploration for this mineral is continuing. Further details of uranium exploration are contained in Chapter 14.

### **Wind energy**

Wind power was of some significance as an energy source in the early days of settlement and is still used extensively in agricultural and pastoral areas for pumping water for stock. A wind power generator is being used to augment the electricity supply on Rottnest Island. At Salmon Beach, a few kilometres west of the south coastal town of Esperance, six 60 kilowatt wind turbines were commissioned by SECWA in March 1987 to augment the local electricity supply.

Owing to its intermittent nature, wind power does not at present appear a viable large scale source of energy, particularly in view of the high costs of electricity storage. However, for small scale applications, particularly in remote areas where transport costs of conventional fuels are a significant factor, there are prospects for extending the use of wind power beyond its present major application in the pumping of water.

### **Other energy sources**

There are several other energy sources which have potential use in Western Australia. A small hydro-electricity plant is currently in operation at Collie. There are several sites in the Kimberley region in the north of the State which would be suitable for hydro-electricity generation, including the existing dam on the Ord River. Parts of the Kimberley coastline, where very large tidal ranges occur, have been identified as suitable sites for tidal electricity generation. Some small deposits of oil shale have been identified in the south-east of the State.

### **Research**

The principal energy research organisations in Western Australia are SECWA, the Minerals and Energy Research Institute of Western Australia (MERIWA) and Murdoch University's Energy Research Institute (MURI).

SECWA is primarily responsible for the efficient and effective use of energy resources available to the State of Western Australia. Consistent with this responsibility it is engaged in an active

program of investigation and evaluation of alternative sources and applications of energy which may become significant in the future.

SECWA has undertaken studies into the use of alternative fuels for power generation and for use in motor vehicles. Vegetable oils have been tested with some success as alternative liquid fuels for generating electricity and tests are continuing into the use of LPG and compressed natural gas in both light vehicles and buses operated by the Metropolitan (Perth) Passenger Transport Trust.

MERIWA approves and arranges funding for projects intended to develop or demonstrate uses of solar and alternative forms of energy which have potential for economically viable application in the short to medium term. These include projects ranging from energy storage systems to the use of various forms of biomass.

MURI is principally involved in research and development of solar energy (solar radiation) systems. In addition, MURI carries out a range of tests for manufacturers and research workers on a confidential basis.

Since 1984, staff engaged at MURI have undertaken field trials in remote areas on photovoltaic systems for producing electricity. Staff are now engaged in developing systems suitable for remote Aboriginal communities, under funding from the Federal Departments of Aboriginal Affairs and Primary Industries and Energy.

There are also a number of other testing facilities in the State, some operating under contract. These facilities, and the institutions responsible for operating them include:

(a) Corrosion Testing Facility—Curtin University of Technology.

(b) Materials Performance Testing Facility—Curtin University of Technology.

(c) Materials Standards Laboratory—University of Western Australia.

At the national level, CSIRO and the Commonwealth Department of Primary Industries and Energy (through the National Energy Research Development and Demonstration Program (NERDDP)) are involved in a number of energy research programs. NERDDP is a grant scheme to encourage energy research. A major new study is being commissioned under NERDDP which, in conjunction with the private sector will investigate and make recommendations on the timing, planning and coordination of further research and development into the use of natural gas for vehicles (NGV).

### NATIONAL ENERGY SURVEY OF HOUSEHOLDS

National Energy Surveys were conducted by the Australian Bureau of Statistics in November 1980, June 1983 and over the twelve months commencing 17 June 1985. The surveys were based on a sample of private dwellings but excluded certain types of dwellings, such as non-private dwellings (hospitals, hotels, motels, etc.), caravan parks and dwellings occupied by more than one household. Also excluded were foreign diplomatic personnel and members of non-Australian defence forces stationed in Australia.

The 1985–86 Survey sought information about the types of domestic appliances held and water heating facilities, room heating, air-conditioning, insulation and swimming pools installed. Additional data obtained were: the number of adults and children and gross income of the household; consumption of electricity and reticulated gas by households over a twelve-month period; and the number of rooms in the dwelling.

TABLE 15.5 — HOUSEHOLDS BY MAJOR APPLIANCES AND FACILITIES: JUNE 1983 AND 1985–86  
WESTERN AUSTRALIA AND AUSTRALIA

	Western Australia			Australia		
	June 1983	1985–86		June 1983	1985–86	
	Per cent (a)	'000	Per cent (a)	Per cent (a)	'000	Per cent (a)
Refrigerator	99.7	460.7	99.6	99.6	5,023.5	99.6
Freezer	46.4	210.3	45.5	46.0	2,342.4	46.4
Hot plates	97.5	455.7	98.5	97.7	4,953.1	98.2
Oven	99.1	456.0	98.6	99.0	4,980.4	98.7
Microwave oven (b)	12.9	154.8	33.5	10.0	1,509.5	29.9
Electric frypan/skillet (b)	35.9	301.1	65.1	38.0	3,521.2	69.8
Vertical grill (b)	5.7	53.7	11.6	6.9	777.7	15.4
Dishwasher	13.1	68.5	14.8	17.1	995.2	19.7
Washing machine	92.1	425.8	92.0	91.8	4,684.6	92.9

**TABLE 15.5 — HOUSEHOLDS BY MAJOR APPLIANCES AND FACILITIES: JUNE 1983 AND 1985-86**  
**WESTERN AUSTRALIA AND AUSTRALIA (continued)**

	Western Australia			Australia		
	June 1983	1985-86		June 1983	1985-86	
	Per cent (a)	'000	Per cent (a)	Per cent (a)	'000	Per cent (a)
Clothes dryer	30.1	159.1	34.4	45.2	2,428.3	48.1
Ceiling fan (c)	(d)	113.0	24.4	(d)	852.7	16.9
Air conditioning	37.1	186.4	40.3	32.3	1,783.0	35.3
Main heating, non-shared—						
Electric	30.4	130.3	28.2	44.2	2,103.1	41.7
Gas	15.3	82.8	17.9	21.9	1,232.1	24.4
Oil	12.9	42.3	9.2	7.6	281.3	*5.6
Wood/solid fuel	21.3	120.1	26.0	12.4	794.6	15.8
<i>Total</i>	<i>92.5</i>	<i>421.9</i>	<i>91.2</i>	<i>92.5</i>	<i>4,646.8</i>	<i>92.1</i>
Hot water system (e)	99.0	459.6	99.2	98.7	5,001.8	98.9
Wall insulation (f)	4.6	21.3	4.9	*12.1	672.8	*15.0
Roof insulation (f)	39.2	201.5	46.2	43.7	2,239.4	49.8
Swimming pool (f)	12.7	56.6	13.0	10.1	518.3	11.5
Bore/well pump (f)	(d)	96.4	22.1	(d)	279.5	6.2
<b>Total households</b>	<b>100.0</b>	<b>462.6</b>	<b>100.0</b>	<b>100.0</b>	<b>5,044.1</b>	<b>100.0</b>

(a) Percentage of total households. (b) For June 1983, included only if used more than once a week. For 1985-86, included if the household had any of the appliances as distinct from actually using them. (c) Permanently fixed large bladed fans only. (d) Not asked. (e) Includes shared systems. (f) Not asked at flats, mobile, and improvised dwellings. \* Care should be exercised when using this figure—subject to high sampling variability.

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## Chapter 16

### MANUFACTURING

**Western Australia's manufacturing base is small compared to the rest of Australia. However, the State's manufacturing industry is heavily orientated towards the development of its mineral resources, and in this area Western Australia is an important contributor to the Australian aggregates. In particular, Western Australia is second only to New South Wales in the manufacture of base metal products.**

Up to the early 1950s, most Western Australian factories were small and medium sized establishments supplying the small local market and carrying out some processing of the State's primary products for export. Acute shortages of capital and raw materials (including energy supplies) had affected the development of secondary industry.

The discoveries of Western Australia's large mineral resources provided the impetus for heavy industry and large scale operations. As well, an integrated industrial complex was established with the opening in 1954 of a large oil refinery at Kwinana, on Cockburn Sound, south of Perth. This interrelated complex of metal, fuel and chemical plants is served by a harbour, railway lines linked with mining centres and the other States, and pipelines from the natural gas fields north of Perth.

A major portion (in terms of turnover) of Western Australia's manufacturing industry has been centred around local materials such as minerals, forests, and the products of farms and fisheries. Industries such as alumina production, nickel smelting, clay brick production, log sawmilling, woodchipping, abattoirs and the processing of rock lobsters are all based on the ready availability of these raw materials in Western Australia.

In recent years there have been few new major projects in the manufacturing sector. However, efforts to stimulate new projects based on Western Australia's huge gas reserves and other mineral resources are starting to yield results.

A more comprehensive picture of the history of manufacturing in Western Australia can be found in the *Western Australian Year Book*, No. 24—1986.

Two Government bodies are responsible for encouraging the establishment of new industries in Western Australia.

#### **Technology and Industrial Development Authority (TIDA)**

TIDA was established in June 1987. Its goal is to broaden the State's industrial and technological base by encouraging the establishment of new industries based on advanced technology.

The Authority monitors world movements in specific areas of technological growth. It identifies opportunities for, and assists with investments in, technology and industry in Western Australia. It also develops strategic overseas markets and helps companies access these markets.

#### **Department of Resources Development**

As mentioned in Chapter 14, Mining, this Department facilitates major development projects based on Western Australia's huge mineral resources.

### MANUFACTURING STATISTICS

Western Australia's manufacturing activity is concentrated in the Perth Statistical Division. The region has about 81 per cent of all manufacturing establishments and 83 per cent of manufacturing employment but approximately 72 per cent of the total population of the State. The region's contribution to the State's turnover is about 73 per cent. In contrast the South-West Statistical Division has approximately 8 per cent of the State's population, 8 per cent of all manufacturing establishments and 10 per cent of manufacturing

employment, but has about 18 per cent of turnover.

Despite the growth in Western Australia's secondary industry since the 1950s, the State's contribution to Australia's manufacturing sector remains small. The proportion the State contributes in this sector is paralleled in population statistics where Western Australia has 9.2 per cent of the population total for Australia.

Western Australian manufacturing establishments employing 100 or more persons account for only 3 per cent of total establishments, but 41 per cent of employment, and about half of wages and salaries, value added and turnover. In comparison, Australian manufacturing establishments employing 100 or more persons account for 4 per cent of total establishments, 53 per cent of employment, and about 60 per cent of wages and salaries, value added and turnover.

**TABLE 16.1 – MANUFACTURING ESTABLISHMENTS — SUMMARY OF OPERATIONS  
BY STATISTICAL DIVISION: 1986-87**

(Note: Data in this table exclude operations by single establishment manufacturing enterprises employing fewer than four persons.)

<i>Statistical division</i>	<i>Establishments at 30 June</i>	<i>Persons employed at 30 June(a)</i>	<i>Wages and salaries (b)</i>	<i>Turnover</i>
	No.	No.	\$m	\$m
Perth Statistical Division	2,145	57,661	1,145.3	5,961.0
Other divisions—				
South-West	210	6,958	155.7	1,456.3
Lower Great Southern	72	1,091	25.1	131.3
Upper Great Southern	22	195	2.1	14.5
Midlands	53	508	7.8	76.0
South-Eastern	49	1,008	22.4	292.6
Central	59	940	15.9	171.7
Pilbara	38	882	27.3	83.9
Kimberley	12	209	5.2	24.9
<i>Total</i>	<i>515</i>	<i>11,791</i>	<i>261.7</i>	<i>2,215.1</i>
<b>Western Australia</b>	<b>2,660</b>	<b>69,452</b>	<b>1,407.0</b>	<b>8,215.1</b>

(a) Includes working proprietors. (b) Excludes amounts drawn by working proprietors.

**TABLE 16.2 – MANUFACTURING ESTABLISHMENTS OPERATING AT 30 JUNE 1987  
SELECTED VARIABLES BY EMPLOYMENT SIZE  
WESTERN AUSTRALIA AND AUSTRALIA**

<i>Particulars</i>	<i>Fewer than 4 persons</i>	<i>4-19 persons</i>	<i>20-49 persons</i>	<i>50-99 persons</i>	<i>100 or more persons</i>	<i>Total</i>
<b>WESTERN AUSTRALIA</b>						
No. of establishments	1,403	2,060	366	127	107	4,063
Employment	2,853	17,206	12,346	9,435	29,276	71,116
Wages and salaries (\$m)	18.0	259.0	231.0	188.8	686.0	1,382.7
Turnover (\$m)	138.4	1,442.1	1,273.2	1,163.8	4,279.6	8,297.1
Value added (\$m)	n.a.	546.2	470.2	451.4	1,513.8	(a)2,981.6
<b>AUSTRALIA</b>						
No. of establishments	13,333	21,179	4,122	1,718	1,827	42,179
Employment	27,099	182,374	140,517	132,261	550,028	1,032,279
Wages and salaries (\$m)	210.6	2,816.3	2,657.1	2,682.2	12,624.0	20,990.1
Turnover (\$m)	1,323.1	14,484.7	14,937.7	16,175.6	70,464.6	117,385.7
Value added (\$m)	n.a.	5,741.7	5,803.8	6,228.1	27,771.6	(a)45,545.3
<b>WESTERN AUSTRALIA AS A PERCENTAGE OF AUSTRALIA</b>						
No. of establishments	10.5	9.7	8.9	7.4	5.9	9.6
Employment	10.5	9.4	8.8	7.1	5.3	6.9
Wages and salaries	8.5	9.2	8.7	7.0	5.4	6.6
Turnover	10.5	10.0	8.5	7.2	6.1	7.1
Value added	n.a.	9.5	8.1	7.2	5.5	(a)6.5

(a) Excludes single establishment enterprises employing fewer than 4 persons.

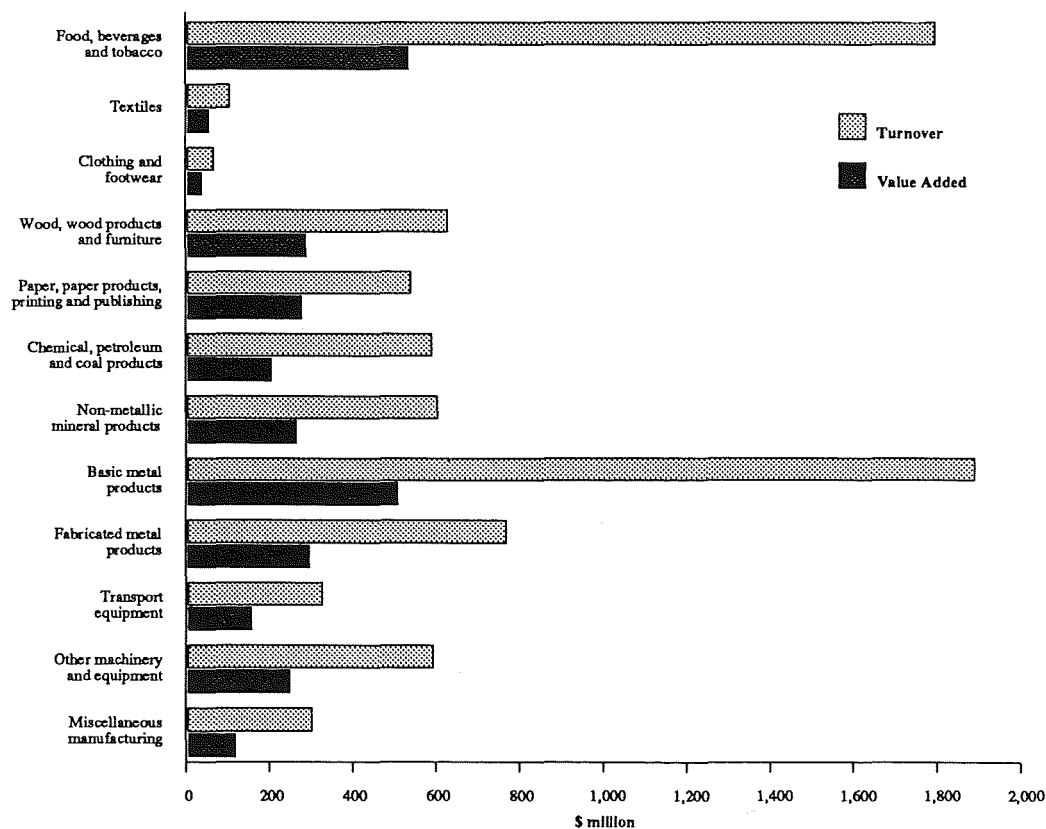


**TABLE 16.3 — MANUFACTURING ESTABLISHMENTS**  
**SUMMARY OF OPERATIONS BY INDUSTRY SUBDIVISION (a)**  
 (Manufacturing establishments of multi-establishment enterprises, and single establishment manufacturing enterprises employing four or more persons.)

Industry subdivision		Establishments operating at 30 June (No.)	Persons employed (b) (No.)	Wages and salaries (c) (\$m)	Turnover (\$m)	Value added (\$m)
ASIC code(d)	Description					
1986-87						
21	Food, beverages and tobacco	356	12,586	235.8	1,796.5	535.3
23	Textiles	38	1,214	20.6	104.9	55.4
24	Clothing and footwear	77	1,790	24.4	65.8	39.6
25	Wood, wood products and furniture	459	8,369	128.5	629.5	289.4
26	Paper, paper products, printing and publishing	267	7,761	144.7	540.2	278.6
27	Chemical, petroleum and coal products	66	2,936	78.5	591.1	206.3
28	Non-metallic mineral products	203	4,947	106.8	604.4	264.1
29	Basic metal products	56	6,416	190.2	1,890.7	509.0
31	Fabricated metal products	447	8,543	173.6	768.8	297.0
32	Transport equipment	146	4,605	99.0	326.6	157.0
33	Other machinery and equipment	348	7,123	151.7	593.5	249.5
34	Miscellaneous manufacturing	197	3,037	53.2	303.0	117.7
<b>Total Manufacturing</b>		<b>2,660</b>	<b>69,327</b>	<b>1,407.0</b>	<b>8,215.1</b>	<b>2,998.7</b>
		1984-85	2,451	64,242	1,137.6	2,513.2
		1983-84	2,408	61,997	1,047.4	2,136.7

(a) Includes establishments operating part year and ancillary locations. (b) Average over whole year. Includes working proprietors. (c) Excludes amounts drawn by working proprietors. (d) Australian Standard Industrial Classification.

**DIAGRAM 16.1 — MANUFACTURING ESTABLISHMENTS — TURNOVER AND VALUE ADDED  
 BY INDUSTRY SUB-DIVISION: 1986-87**



**TABLE 16.4 – MANUFACTURING ESTABLISHMENTS:  
SUMMARY OF OPERATIONS BY INDUSTRY SUBDIVISION**  
(Single establishment manufacturing enterprises employing fewer than four persons.)

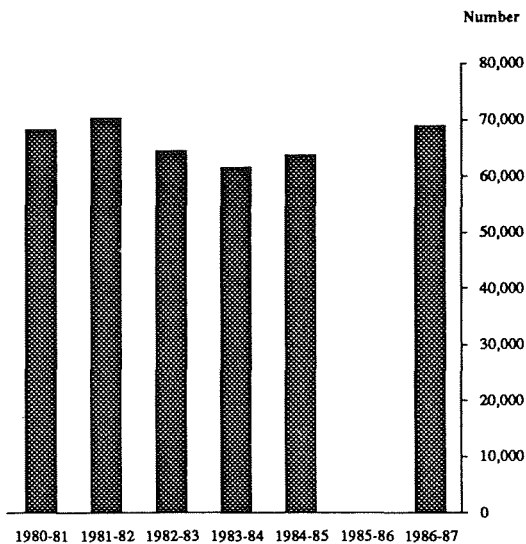
<i>Industry subdivision</i>		<i>Establishments operating at 30 June (No.)</i>	<i>Persons employed at 30 June(a) (No.)</i>	<i>Wages and salaries (b) (\$m)</i>
<i>ASIC code(c)</i>	<i>Description</i>			
1986–87				
21	Food, beverages and tobacco	106	228	1.3
23	Textiles	28	59	0.5
24	Clothing and footwear	30	59	0.3
25	Wood, wood products and furniture	418	838	4.3
26	Paper, paper products, printing and publishing	112	242	1.6
27	Chemical, petroleum and coal products	20	42	0.7
28	Non-metallic mineral products	62	129	0.6
29	Basic metal products	15	24	0.1
31	Fabricated metal products	232	478	3.5
32	Transport equipment	92	179	1.4
33	Other machinery and equipment	128	258	2.1
34	Miscellaneous manufacturing	160	317	1.5
<b>Total Manufacturing</b>		<b>1,403</b>	<b>2,853</b>	<b>18.0</b>
		1984–85	2,996	14.1
		1983–84	3,231	12.8

(a) Includes working proprietors. (b) Excludes amounts drawn by working proprietors. (c) Australian Standard Industrial Classification.

In 1986–87, persons employed in Western Australia's manufacturing industry accounted for 10.9 per cent of the employed labour force and 4.8 per cent of the State estimated resident population of 1.5 million. While these percentages

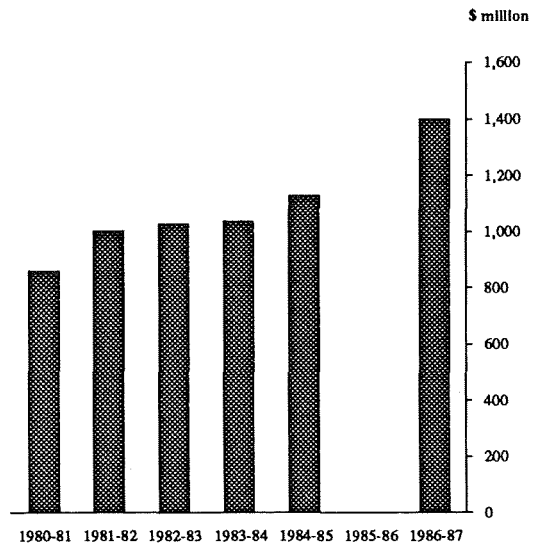
have remained stable for the last 4 years, they have shown a gradual decline from the 1976–77 levels of 13.6 per cent and 5.7 per cent respectively.

**DIAGRAM 16.2  
MANUFACTURING ESTABLISHMENTS  
EMPLOYMENT (a)**



(a) A manufacturing census was not conducted in respect of 1985-86.

**DIAGRAM 16.3  
MANUFACTURING ESTABLISHMENTS  
WAGES AND SALARIES (a)**



(a) A manufacturing census was not conducted in respect of 1985-86.

**TABLE 16.5 – PRODUCTION OF SELECTED COMMODITIES**  
(Includes quantities produced and used in own establishment)

Commodity	Unit	1985–86	1986–87	1987–88
Aerated and carbonated waters (a)	'000L	(b)120,712	106,360	n.p.
Alumina (c)	'000t	5,431	5,727	6,063
Automotive 12 volt batteries (a)	number	16,784	18,855	n.p.
Bacon and ham (a)	tonnes	8,174	r8,502	8,377
Butter (d)	"	1,595	1,400	1,505
Cheese (d)	"	r3,400	r3,727	3,772
Cordials and syrups (a)	'000L	4,597	5,646	n.p.
Footwear (a)(e)	pairs	r286,022	r287,816	288,843
Ice cream (a)	'000L	15,217	r19,045	17,136
Inedible tallow (a)	tonnes	30,354	r31,251	34,464
Paints (a)(f)	'000L	r6,036	r5,875	5,942
Ready-mixed concrete (a)	'000 cu m	r1,350	r1,261	1,339
Rock lobster tails (a)(g)	tonnes	2,820	r2,656	4,259
Scoured wool from greasy shorn wool (a)	"	22,992	r29,109	25,820
Soap and soap substitutes (a)(h)	"	r5,799	r6,605	6,779
Stock and poultry foods (a)—				
Meat and bone meal	"	r38,359	r37,844	39,471
Prepared stock and poultry food	"	r296,517	r351,388	316,675
Solar collectors (a)	sq metres	r115,248	92,627	104,566
Terracotta and concrete tiles (a)(i)	'000 sq m	3,386	r2,967	3,369
Timber (j)—				
Local logs sawn	cu metres	r960,886	r941,794	919,848
Sawn timber produced	"	r328,976	r316,658	318,652

(a) Excludes production by single establishment manufacturing enterprises employing fewer than four persons, and by establishments predominantly engaged in non-manufacturing activities. (b) Includes very low alcohol beer. (c) *Source*: Department of Mines. (d) *Source*: Australian Dairy Corporation. (e) Excludes footwear wholly of rubber. (f) Excludes stains and thinners. (g) Prepared and/or preserved by chilling or freezing. (h) Includes detergents. (i) Excludes roofing accessories such as ridge cappers. (j) Derived from data supplied by the Department of Conservation and Land Management.

## REFERENCES

### ABS Publications

*Census of Manufacturing Establishments: Industry and Area Data: Western Australia.* (8202.5)

*Census of Manufacturing Establishments: Selected Items of Data Classified by Industry and Employment Size: Western Australia.* (8203.5)

*Census of Manufacturing Establishments: Details of Operations by Industry Class: Australia.* (8203.0)

*Census of Manufacturing Establishments: Selected Items of Data Classified by Industry and Employment Size: Australia.* (8204.0)

*Manufacturing Commodities: Principal Articles Produced: Australia.* (8303.0)

## Chapter 17

### INTERNAL TRADE

#### WHOLESALE TRADE

Wholesale trade is described as the resale of new or used goods to retailers and other business users (including farmers, builders, government and professional bodies).

A sample survey of wholesale establishments was conducted in respect of the year ended 30 June 1982 and provides the latest information available about the wholesale sector. Estimates were produced at the national level and are contained in *Wholesale Establishments, Details of Operations by Industry Class, Australia* (Catalogue No. 8638.0).

#### RETAIL TRADE

Retail trade is described as the re-sale of new or used goods to final consumers for personal or household consumption. Detailed information

about the retail sector has been collected using Censuses of Retail Establishments, the first of which was taken in respect of the year 1947-48. Eight censuses have been taken since then. Results from each census are published for each State and Territory and for Australia as a whole. Surveys of retail trade, which were introduced from 1956, have enabled the production of estimates of retail trade on a less detailed but more frequent basis.

#### Census of Retail establishments

The most recent census was taken in respect of the year ended 30 June 1986 and included all establishments classified to the Retail Trade subdivision of the Australian Standard Industrial Classification (ASIC), excluding bread and milk vendors, shoe repairers and electrical appliance repairers n.e.c. Builders' hardware dealers were included for the first time.

TABLE 17.1 — RETAIL ESTABLISHMENT  
SUMMARY OF OPERATIONS BY INDUSTRY GROUP 1985-86

	<i>Establishments at 30 June</i>	<i>Persons employed at 30 June (a)</i>	<i>Wages and salaries (b)</i>	<i>Turnover</i>
	No.	'000	\$ m	\$ m
Retail establishment—				
Department and general stores	62	9.7	97.9	737.5
Clothing, fabric and furniture stores	6,963	7.8	73.3	657.2
Household appliance and hardware stores	1,297	5.0	50.2	553.1
Motor vehicle dealers, petrol and tyre retailers	3,750	19.8	234.9	3,431.4
Food stores	4,347	32.2	235.5	2,414.8
Other retailers	2,641	8.9	58.3	611.1
<b>Total retail establishments</b>	<b>14,060</b>	<b>83.3</b>	<b>750.1</b>	<b>8,405.0</b>

(a) Includes working proprietors. (b) Excludes drawings of working proprietors.

TABLE 17.2 — CENSUSES OF RETAIL ESTABLISHMENTS, WESTERN AUSTRALIA AND AUSTRALIA:  
1979-80 AND 1985-86

	<i>Western Australia</i>			<i>Australia</i>		
	<i>1979-80</i>	<i>1985-86 p</i>	<i>Increase (per cent) p</i>	<i>1979-80</i>	<i>1985-86 p</i>	<i>Increase (per cent) p</i>
Establishments (at 30 June)	12,335	14,080	14.0	142,063	160,160	12.7
Persons employed ('000)	69.9	83.3	19.1	790.5	928.5	17.5
Turnover (\$m)	6,545.3	8,405.0	28.4	74,140.6	92,406.5	24.6

The growth of the retail sector in Western Australia is illustrated in Table 17.2 which compares 1985-86 census results with those of the previous census, conducted for 1979-80. To enable comparison, adjustments have been made to 1979-80 data to compensate for scope differences between the two censuses. 1979-80 turnover is expressed in terms of 1985-86 constant prices.

The growth in establishments, persons employed and turnover experienced in Western Australia over the five years exceeds that experienced by Australia as a whole. In Western Australia average turnover per establishment increased by 11.6 per cent from \$530,000 in 1979-80 to \$592,000 in 1985-86. This compares with a national increase of 10.5 per cent, from \$522,000 in 1978-79 to \$579,000 in 1985-86. In both Western Australia and Australia turnover per person employed increased from \$94,000 to \$100,000, a rise of 6 per cent.

### Survey of Retail Establishments

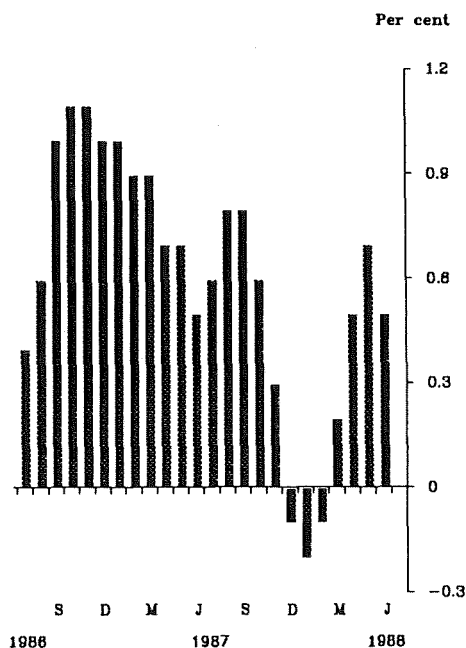
Since 1956 intercensal estimates of the value of retail sales have been produced by means of sample surveys. Surveys were initially conducted quarterly but are now conducted on a monthly basis (references to publications are listed at the end of the chapter).

**TABLE 17.3 — RETAIL ESTABLISHMENTS—  
ESTIMATES OF RETAIL SALES BY INDUSTRY  
GROUPS : 1985-86 TO 1987-88**  
(\$ million)

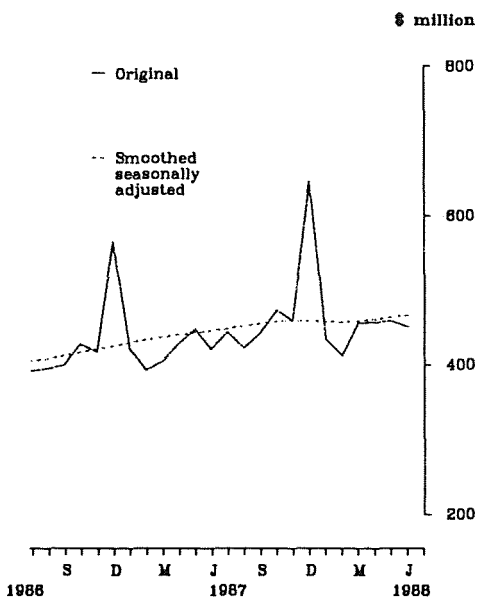
Industry group	1985-86	1986-87	1987-88
Grocers, confectioners, tobacconists	1,615.4	1,764.1	1,914.1
Butchers	74.1	65.3	62.9
General stores	76.0	92.1	102.2
Other food stores	313.5	323.6	383.1
Hotels, liquor stores, licensed clubs	624.5	673.5	724.4
Clothing and fabric stores	420.0	456.5	457.8
Department stores	455.8	514.6	562.8
Footwear stores	85.4	86.6	92.8
Domestic hardware stores, jewellers	82.4	101.8	109.9
Electrical goods stores	277.9	283.0	301.2
Furniture stores	109.5	116.2	127.1
Floor coverings stores	66.6	64.9	64.0
Chemists	160.6	176.0	182.3
Newsagents	136.5	177.4	192.5
Other	211.2	223.7	271.5
<b>Total</b>	<b>4,709.1</b>	<b>5,119.4</b>	<b>5,548.6</b>

Diagrams 17.1 and 17.2 illustrate the seasonal nature of retail sales, the long term upward trend and the monthly variations that can occur. Data are presented in original current price terms.

**DIAGRAM 17.1  
MONTHLY CHANGE IN RETAIL SALES**



**DIAGRAM 17.2  
MONTHLY ESTIMATES OF RETAIL CHANGE**



## TOURISM

Responsibility for the development of the tourism industry in Australia is exercised by government bodies at Commonwealth, State and regional levels. At the State level the Western Australian Tourism Commission (WATC) is responsible for marketing Western Australia as a tourist destination for international, interstate and intrastate visitors.

Information provided by the WATC shows that, during 1987-88, interstate and intrastate visitors (persons aged 14 years and over) made 4.6 million trips to or within Western Australia. This represents 9.8 per cent of total domestic trips made within Australia. The major proportion (46 per cent) of trips to or within the State were 'pleasure or holiday' trips following by 'visiting friends and relatives' trips (24 per cent). The main destination regions for domestic travel were Perth (27 per cent of trips) and the South-West (32 per cent).

**TABLE 17.4 — TOURIST ACCOMMODATION (a)**  
31 December 1988

	<i>Perth Statistical Division</i>	<i>Rest of State</i>	<i>Western Australia</i>
<b>HOTELS AND MOTELS, WITH FACILITIES (b)</b>			
Establishments	93	219	312
Guest rooms	6,847	6,879	13,726
Bed spaces	16,776	17,878	34,654
<b>HOTELS AND GUEST HOUSES, WITHOUT FACILITIES (b)</b>			
Establishments	12	144	156
Guest rooms	486	2,132	2,618
Bed spaces	730	3,881	4,611
<b>CARAVAN PARKS (c)</b>			
Establishments	33	258	291
Sites	3,671	21,778	25,449

(a) Hotels, motels and guest houses must have breakfast available for guests. Caravan parks must provide powered sites and toilet, shower and laundry facilities for guests. (b) Establishments providing predominantly short term accommodation (i.e. for periods of less than two months). (c) Establishment providing short term or long term accommodation.

Tourism is one of the largest growing industries in Western Australia as evidenced by the increased development of luxury hotels and tourist attractions over the last three years. As the State capital, Perth receives the majority of interstate and international visitors and, therefore, has experienced a major share of the development in tourist accommodation. From December 1985 to December 1988, four and five star hotel and motel accommodation in the Perth metropolitan area increased from 2,232 guest rooms to 3,243 guest

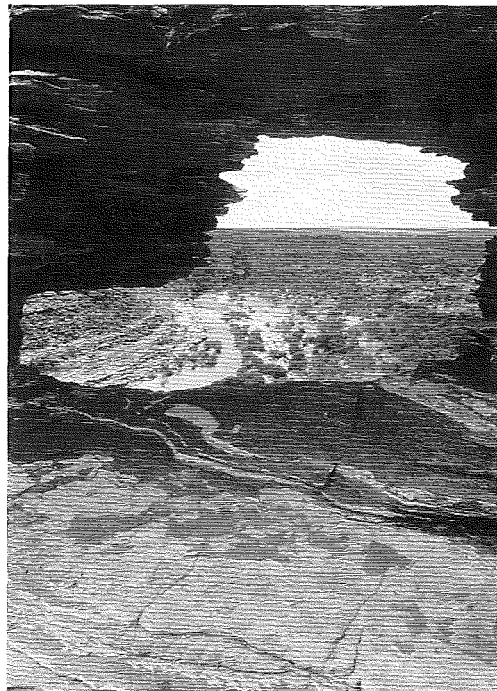
rooms. There are seven international standard five star hotels in the Perth area.

Development of tourism has not been restricted to Perth. The towns of Broome and Kalbarri in the north and Margaret River in the south are also experiencing significant growth.



Streeter's Jetty, Broome

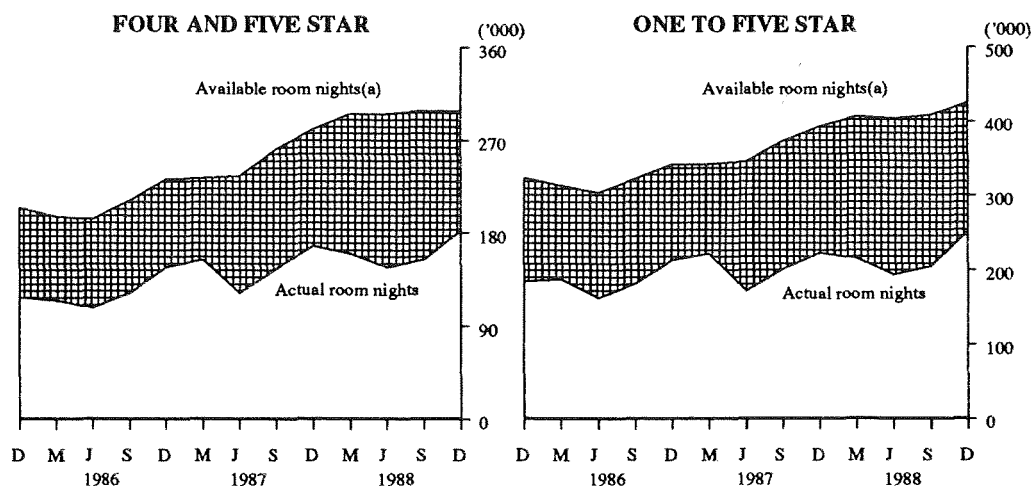
Photograph: Western Australian Tourism Commission



Nature's Window, Murchison Gorges, Kalbarri

Photograph: Western Australian Tourism Commission

**DIAGRAM 17.3**  
**STAR GRADED HOTELS AND MOTELS**  
**PERTH STATISTICAL DIVISION**



(b) The total number of nights each guest room is available for occupancy during the quarter.

**TABLE 17.5 — HOTELS, MOTELS AND GUEST HOUSES**

Year	Guest rooms (a)	Room occupancy rate	Guest arrivals	Takings (b)
	No.	per cent	'000	\$'000
1986	15,149	46	1,635	109,937
1987	16,161	46	1,809	134,300
1988	16,344	47	1,880	147,038

(a) At 31 December. (b) Takings only from accommodation.

**TABLE 17.6 — CARAVAN PARKS**

Year	Sites (a)	Site occupancy rate	Guest arrivals	Takings (b)
	No.	per cent	'000	\$'000
1986 (c)	22,751	36	1,032	20,948
1987	23,749	37	1,145	25,530
1988	25,449	37	1,129	29,307

(a) At 31 December. (b) Takings only from accommodation. (c) Up to 30 June 1986, includes caravan parks providing predominantly short term accommodation. From 1 July 1986 includes both short term and long term caravan parks.

## CONSUMER AFFAIRS

The Department of Consumer Affairs was formed in April 1983 and in January 1988 became the Ministry of Consumer Affairs. The Ministry has as its Corporate Mission the promotion and maintenance of fair trading in the market place. Functions of the Ministry are to promote the interests of consumers, to assist them in their assessment and use of goods and to regulate through licensing boards the operations of a number of consumer-orientated trades and occupations.

During 1986-87 the Department was restructured to reflect its changing role, particularly as a result of legislative initiatives, and now comprises two Divisions; a Consumer Services Division and a Commercial Services Division.

The Consumer Services Division is responsible for the consumer advice and consumer assistance programs, consumer education and product safety programs, and research into areas of consumer interest; the Commercial Services Division is responsible for the occupational licensing program which features administrative support for the Commercial Tribunal, Occupational Licensing Boards and the Weights and Measures Branch.

**TABLE 17.7 — DEPARTMENT OF CONSUMER AFFAIRS COMPLAINTS FINALISED 1987-88**

	<i>No.</i>	<i>Per cent</i>
Full redress obtained for consumer	2,087	31.0
Partial redress obtained for consumer	393	5.8
Situation clarified between consumer and trader	6	0.1
Complaint justified but no redress obtained	127	1.9
Trader warned but no redress obtained	90	1.3
Proceedings initiated under State or Federal law	10	0.1
Insufficient evidence to resolve complaint	179	2.7
Incapable of resolution due to conflict of evidence	172	2.6
Trader bankrupt or in liquidation	657	9.8
Trader unable to be located	89	1.3
Complaint referred to Small Claims Tribunal	747	11.1
Complaint outside Ministry's jurisdiction (includes referrals to other organisations)	467	6.9
Complaint withdrawn or lapsed	198	3.0
Complaint not justified	616	9.2
Complaint lodged for information purposes only	10	0.1
Other reason	882	13.1
<b>Total</b>	<b>6,730</b>	<b>100.0</b>

**TABLE 17.8 — DEPARTMENT OF CONSUMER AFFAIRS: SUMMARY OF PRODUCT COMPLAINTS RECEIVED 1985-86 TO 1987-88**  
(Source: Department of Consumer Affairs)

<i>Product classification</i>	<i>Number of product complaints</i>		
	<i>1985-86</i>	<i>1987-87</i>	<i>1987-88</i>
Food, beverages, tobacco	99	270	113
Clothing, footwear, drapery	149	211	183
Consumer durables	875	795	859
Motor vehicles and transport equipment	1,568	1,291	1,656
Building and construction	942	861	928
Miscellaneous products	413	444	484
Transport and energy services	195	238	394
Insurance and finance	409	532	500
Real estate and accommodation	177	204	391
Miscellaneous services	776	687	1,445
<b>Total</b>	<b>5,903</b>	<b>5,533</b>	<b>6,953</b>

In February 1987 the Government's Price Monitoring Unit was established to monitor grocery prices in metropolitan and country supermarkets (Price Check Campaign), investigate supermarkets, investigate consumer price complaints and provide advice and information to consumers about prices.

As part of its activities the Ministry provides specialised legal advice on a wide range of consumer related legal issues involved in the handling of complaints, investigates offences and, where necessary, initiates prosecution. There were 239 prosecutions successfully initiated during 1987-88.

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### ABS Publications

*Retail Industry: Details of Operations, Western Australia, 1985-86, Preliminary* (8622.5)

*Tourist Accommodation, Western Australia* (8635.5)

*Retail Trade, Australia* (8501.0)

### Other Publications

Western Australian Tourism Commission, *Domestic Travel in Western Australia, July 1986 - June 1987*

Western Australian Tourism Commission, *Western Australian Regional Tourism Research Monitor, July 1986 - June 1987*

Ministry of Consumer Affairs, *Annual Report 1988*



## Chapter 18

### HOUSING AND CONSTRUCTION

The typical dwelling in Western Australia is single, detached, of double brick construction, on its own block of land. It has three bedrooms and is owned or being purchased by the occupier. Information from the 1986 Census of Population and Housing indicates that throughout the State 80.1 per cent of the 456,515 private households lived in single detached houses. Only 7,016 (1.5 per cent) private households occupied multi-storey high rise flats (3 or more storeys). The remainder were accommodated in duplexes, row or terrace houses or similar medium density housing.

#### HOUSING AND THE CENSUS

TABLE 18.1 — DWELLINGS AND PERSONS  
ENUMERATED  
CENSUSES, 1981 AND 1986  
(<sup>000</sup>)

	1981	1986
DWELLINGS		
Occupied dwellings—		
Private (a)	403.6	456.5
Non-private	2.4	2.2
Caravans, etc in parks (b)	n.a.	10.7
<b>Total occupied dwellings (b)</b>	<b>406.0</b>	<b>469.5</b>
Unoccupied private dwellings	42.1	53.9
PERSONS		
Persons enumerated in—		
Private dwellings	1,205.8	1,322.6
Caravans, etc in parks (b)	n.a.	26.4
Other structures	67.8	58.0
<b>Total persons</b>	<b>1,273.6</b>	<b>1,406.9</b>

(a) Excludes caravans in caravan parks. (b) In 1981, caravan parks were treated as non-private dwellings. The number of caravans in caravan parks was not recorded and the figures for total occupied dwellings in 1981 and 1986 are not comparable.

The definitions below relate to data derived from the Census of Population and Housing.

*Occupied Dwellings.* For the purpose of the census an occupied dwelling is any habitation occupied on census night by a household group living together as a domestic unit, and may comprise the whole of a building or only part of it. This means the total number of occupied dwellings, as measured by the census, may be greater than the known number of structures.

*Unoccupied Private Dwellings.* An unoccupied private dwelling is defined as a structure built specifically for private living purposes and

capable of being lived in, though unoccupied at the time of the census.

*Private Dwellings* comprise houses, including self-contained flats, and other dwellings such as sheds, tents, garages, caravans, houseboats, etc., occupied on a permanent or semi-permanent basis.

*Non-Private Dwellings* are dwellings which provide communal eating facilities including hospitals, homes for the aged, motels, hotels, boarding houses, gaols, religious and charitable institutions, defence establishments etc.

Between the censuses of 1981 and 1986, the number of private occupied dwellings in the State increased by 13.1 per cent. The number of persons enumerated in private dwellings showed an increase of 9.7 per cent.

#### CONTROL OF BUILDING

Each of the local government authorities as constituted under the provisions of the *Local Government Act 1960* has the power to exercise general control over the erection of buildings in its own district. The powers of local government authorities to control building derive from the Town Planning and Development Act and the Local Government Act.

A more detailed description of these Acts appears on page 374 of the *Western Australian Year Book* No. 24—1986.

#### BUILDING STATISTICS

##### Scope

The statistics in this section relate to the erection of new buildings and alterations and additions.

Non-building construction of railways, roads, bridges, earthworks, etc. is excluded. Also excluded are particulars of repairs and maintenance to buildings.

### Source of Data

Data relating to the building approvals, dwelling unit commencements and building activity series are based on permits issued by local government authorities together with contracts let or day labour work authorised by Commonwealth, State, semi-government and local government authorities. Major building activity which takes place in areas not subject to the normal administrative approval processes (e.g. buildings on remote mine sites) is also included.

**TABLE 18.2 — NEW RESIDENTIAL BUILDING APPROVED BY SECTOR**  
(Number of dwelling units)

<i>Class of building</i>	1985-86	1986-87	1987-88
<b>PRIVATE SECTOR</b>			
Houses	13,195	12,885	16,296
Other residential buildings	3,667	3,066	3,976
<b>Total</b>	<b>16,862</b>	<b>15,951</b>	<b>20,272</b>
<b>PUBLIC SECTOR</b>			
Houses	1,091	484	666
Other residential buildings	606	510	634
<b>Total</b>	<b>1,697</b>	<b>994</b>	<b>1,300</b>
<b>TOTAL</b>			
Houses	14,286	13,369	16,962
Other residential buildings	4,273	3,576	4,610
<b>Total</b>	<b>18,559</b>	<b>16,945</b>	<b>21,572</b>

### Definitions

*Ownership.* The ownership of a building is classified as either 'public sector' or 'private sector' according to the sector of the intended owner of the completed building as evident at the time of approval.

*Residential buildings.* A residential building is defined as a building predominantly consisting of one or more dwelling units. Residential buildings can be either 'houses' (a detached building predominately used for long term residential purposes and consisting of only one dwelling unit), or 'other residential buildings'.

*Non-residential building.* Relates to construction work on buildings other than residential buildings. Additions and alterations to 'non-residential building' are also included.

*Commenced.* A building job is regarded as commenced when the first physical building activity has been performed on site.

*Completed.* A building job is regarded as completed when building activity has progressed to the stage where the building can fulfil its intended function.

*Value of building completed.* Represents the actual completion value based on the market or contract price of building jobs.

*Value of building work done.* Represents the estimated value of building work actually carried out during the period on building jobs which have commenced.

**TABLE 18.3 — VALUE OF BUILDING APPROVED BY SECTOR**  
(\$ million)

<i>Class of building</i>	1985-86	1986-87	1987-88
<b>PRIVATE SECTOR</b>			
New residential building—			
Houses	661.7	669.9	931.9
Other	127.7	116.9	151.2
<b>Total</b>	<b>789.4</b>	<b>786.9</b>	<b>1,083.0</b>
Alterations and additions (a) to residential buildings	67.2	72.1	92.9
Non-residential building	453.6	495.0	881.5
<b>Total building</b>	<b>1,310.3</b>	<b>1,354.0</b>	<b>2,057.4</b>
<b>PUBLIC SECTOR</b>			
New residential building—			
Houses	57.2	31.7	40.5
Other	24.4	21.9	24.0
<b>Total</b>	<b>81.5</b>	<b>53.6</b>	<b>64.4</b>
Alterations and additions (a) to residential buildings	0.5	2.0	1.4
Non-residential building	256.8	241.6	200.1
<b>Total building</b>	<b>338.8</b>	<b>297.2</b>	<b>266.0</b>
<b>TOTAL</b>			
New residential building—			
Houses	718.9	701.6	972.3
Other	152.1	138.9	175.1
<b>Total</b>	<b>871.0</b>	<b>840.5</b>	<b>1,147.5</b>
Alterations and additions (a) to residential buildings	67.7	74.2	94.3
Non-residential building	710.4	736.6	1,081.6
<b>Total building</b>	<b>1,649.1</b>	<b>1,651.3</b>	<b>2,323.4</b>

(a) Valued at \$10,000 and over.

The number of houses and total dwelling units approved during 1987-88 increased by 26.9 and 27.3 respectively when compared with 1986-87.

The total value of building at current prices, approved during 1987-88 increased by 40.7 per cent on the previous year. This comprised increases of 36.5 and 46.8 per cent respectively in the new residential and non-residential components.

Office development approvals accounted for the largest increase in non-residential building, with an increase of 202.2 per cent from \$128.0m to \$386.9m.

### Building Activity Survey

The number of houses and other dwelling units commenced during 1987-88 increased by 19.5 and 22.7 per cent respectively compared with 1986-87. The value of residential building commenced increased 27.4 per cent from \$792.3 million to \$1,009.7 million in these years.

**TABLE 18.4 — VALUE OF BUILDING COMMENCED BY CLASS OF BUILDING (\$ million)**

<i>Class of building</i>	<i>1985-86</i>	<i>1986-87</i>	<i>1987-88</i>
New residential building—			
Houses	673.6	657.7	846.2
Other	162.5	134.5	163.6
<i>Total new residential building</i>	<i>836.1</i>	<i>792.3</i>	<i>1,009.7</i>
Alterations and additions (a) to residential buildings	66.7	72.3	87.8
Non-residential building (b)—			
Hotels, etc	47.0	25.7	45.3
Shops	108.7	152.7	144.7
Factories	46.6	47.6	106.3
Offices	197.4	119.5	233.0
Other business premises	77.2	80.8	143.8
Educational	82.0	100.3	94.5
Religious	4.1	6.3	6.7
Health	53.0	34.8	70.3
Entertainment and recreational	40.7	44.1	50.3
Miscellaneous	63.0	42.2	93.0
<i>Total non-residential building</i>	<i>719.8</i>	<i>654.1</i>	<i>987.9</i>
<b>Total building</b>	<b>1,622.6</b>	<b>1,518.7</b>	<b>2,085.5</b>

(a) Valued at \$10,000 and over (b) Valued at \$30,000 and over.

The value of non-residential building commenced during 1987-88 (987.9 million) increased 51.0 per cent over 1986-87 while the total value of building commenced increased by 37.3 per cent, from \$1,518.7 million to \$2,085.5 million.

The total value of building work done in 1987-88 was \$1,881.2 million, an increase of 10.8 per cent over 1986-87. Private sector projects accounted

for 84.2 per cent of the work done. The largest amount of work done in non-residential building was in office developments which accounted for approximately 25 per cent of the total.

**TABLE 18.5 — VALUE OF BUILDING COMPLETED BY CLASS OF BUILDING (\$ million)**

<i>Class of building</i>	<i>1985-86</i>	<i>1986-87</i>	<i>1987-88</i>
New residential building—			
Houses	615.7	651.5	694.4
Other	158.1	144.3	140.6
<i>Total new residential building</i>	<i>773.9</i>	<i>795.8</i>	<i>835.0</i>
Alterations and additions (a) to residential buildings	60.5	70.4	80.2
Non-residential building (b)—			
Hotels, etc	40.1	116.3	86.4
Shops	46.3	124.0	143.8
Factories	91.5	39.0	63.4
Offices	149.9	155.8	208.1
Other business premises	61.0	100.9	101.7
Educational	65.3	99.2	120.9
Religious	4.1	5.1	6.4
Health	27.8	80.8	36.7
Entertainment and recreational	98.2	18.0	58.2
Miscellaneous	46.5	55.8	58.8
<i>Total non-residential building</i>	<i>630.8</i>	<i>794.9</i>	<i>884.5</i>
<b>Total building</b>	<b>1,465.1</b>	<b>1,661.1</b>	<b>1,799.7</b>

(a) Valued at \$10,000 and over. (b) Valued at \$30,000 and over.

**TABLE 18.6 — VALUE OF BUILDING WORK DONE BY CLASS OF BUILDING (\$ million)**

<i>Class of building</i>	<i>1985-86</i>	<i>1986-87</i>	<i>1987-88</i>
New residential building—			
Houses	643.5	668.0	737.2
Other	158.9	139.4	151.1
<i>Total new residential building</i>	<i>802.4</i>	<i>807.4</i>	<i>888.3</i>
Alterations and additions (a) to residential buildings	64.8	73.3	86.1
Non-residential building (b)—			
Hotels, etc	110.6	84.8	33.1
Shops	83.1	133.3	175.8
Factories	44.9	47.0	64.4
Offices	194.7	185.8	225.1
Other business premises	88.4	83.3	113.9
Educational	95.5	100.8	93.1
Religious	4.3	5.7	6.6
Health	67.7	79.1	63.7
Entertainment and recreational	96.4	39.7	56.9
Miscellaneous	47.5	58.4	74.3
<i>Total non-residential building</i>	<i>833.2</i>	<i>817.8</i>	<i>906.8</i>
<b>Total building</b>	<b>1,700.4</b>	<b>1,698.5</b>	<b>1,881.2</b>

(a) Valued at \$10,000 and over. (b) Valued at \$30,000 and over.

**TABLE 18.7 — HOUSES AND OTHER RESIDENTIAL BUILDINGS COMMENCED CLASSIFIED BY OWNERSHIP**

<i>Class of building</i>	<i>1985-86</i>	<i>1986-87</i>	<i>1987-88</i>
Private sector— Houses (a)	12,060	11,680	13,920
Other residential buildings (b)	3,592	2,856	3,660
Public sector— Houses	1,067	503	653
Other residential buildings (b)	627	534	500
<b>Total—</b>			
<b>Houses (a)</b>	<b>13,120</b>	<b>12,190</b>	<b>14,570</b>
<b>Other residential buildings (b)</b>	<b>4,219</b>	<b>3,390</b>	<b>4,160</b>

(a) Figures are rounded to nearest ten units. (b) Number of dwelling units.

**Dwelling Unit Commencement Series**

A consequence of the sampling techniques used for private sector house building in the Building Activity Survey is that estimates for this class of building cannot be produced at finer levels of geographic disaggregation than State/Territory levels without incurring unacceptably high sampling errors.

To compensate for this loss of detail, a monthly Dwelling Unit Commencement series was implemented in July 1980. The data are compiled from monthly returns supplied by local and other government authorities. However, because this methodology is different from that of the Building Activity Survey, total figures for Western Australia differ between the two series by a small margin.

**TABLE 18.8 — DWELLING UNITS COMMENCED IN STATISTICAL DIVISIONS BY OWNERSHIP : 1987-88**

<i>Statistical division</i>	<i>Private sector</i>			<i>Public sector</i>			<i>Total</i>		
	<i>Houses</i>	<i>Other residential buildings</i>	<i>Total</i>	<i>Houses</i>	<i>Other residential buildings</i>	<i>Total</i>	<i>Houses</i>	<i>Other residential buildings</i>	<i>Total</i>
Perth Statistical Division	10,663	2,928	13,591	230	446	676	10,893	3,374	14,267
Other divisions—									
South-West	1,583	265	1,848	57	12	69	1,640	277	1,917
Lower Great Southern	239	40	279	5	6	11	244	46	290
Upper Great Southern	59	2	61	1	2	3	60	4	64
Midlands	294	16	310	10	6	16	304	22	326
South-Eastern	271	158	429	76	10	86	347	168	515
Central	347	117	464	36	28	64	383	145	528
Pilbara	91	103	194	98	11	109	189	114	303
Kimberley	93	16	109	103	12	115	196	28	224
<b>Total</b>	<b>2,977</b>	<b>717</b>	<b>3,694</b>	<b>386</b>	<b>87</b>	<b>473</b>	<b>3,363</b>	<b>804</b>	<b>4,167</b>
<b>Total Western Australia</b>	<b>13,640</b>	<b>3,645</b>	<b>17,285</b>	<b>616</b>	<b>533</b>	<b>1,149</b>	<b>14,256</b>	<b>4,178</b>	<b>18,434</b>

**TABLE 18.9 — HOUSES COMMENCED, BY MATERIAL OF OUTER WALLS**

<i>Type of material</i>	<i>1985-86</i>	<i>1986-87</i>	<i>1987-88</i>
Double brick (a)	11,393	10,548	12,470
Brick veneer	1,055	806	716
Fibre cement	579	575	644
Other	260	276	426
<b>Total new houses</b>	<b>13,287</b>	<b>12,205</b>	<b>14,256</b>

(a) Includes houses built with outer walls of stone or concrete.

**CONSTRUCTION (OTHER THAN BUILDING) OPERATIONS**

This series covers non-building construction such as roadworks, railways, bridges and earthworks. It comprises work by private contractors on construction (other than building) prime contracts

(including alterations and additions) valued at \$100,000 or more at commencement of the contract.

**TABLE 18.10 — CONSTRUCTION (OTHER THAN BUILDING): PRIME CONTRACTS BY STAGE OF CONSTRUCTION**

<i>Stage of construction</i>	<i>1983-84</i>	<i>1984-85</i>	<i>1985-86</i>
Commenced—			
Number	306	388	365
Value (\$m)	269	476	583
Completed—			
Number	291	418	375
Value (\$m)	481	1,258	458
Under construction (a)—			
Number	174	144	134
Value (\$m)	1,301	546	745
Work done during period (\$m)	738	596	534
Work yet to be done (a) (\$m)	309	234	355

(a) At end of period.

Construction undertaken by government authorities involving day labour, and own account construction by private sector enterprises are excluded.

Prime contracts are those where the contractor is legally liable to the owner of the project. Table 18.10 shows the number and value of such contracts classified by stage of construction.

This series has now been replaced by the Engineering Construction Survey.

### ENGINEERING CONSTRUCTION SURVEY

**TABLE 18.11 — ENGINEERING CONSTRUCTION ACTIVITY BY STAGE OF CONSTRUCTION**  
(\$ million)

<i>Stage of construction</i>	<i>1986-87r</i>	<i>1987-88</i>
Commenced during period	1,199.1	1,196.7
Work done during period	1,220.3	1,556.8
Work yet to be done	687.7	404.1

The collection, scope and methodology used for this survey differs from the 'Construction (Other

than Building)', survey it replaces. This survey aims to measure all engineering construction work undertaken whereas the survey it replaces only measured work undertaken by the private sector.

### CONSTRUCTION INDUSTRY STATISTICS

In 1978-79 the Australian Bureau of Statistics conducted a sample survey of private sector construction establishments, and a complete enumeration of public sector enterprises engaged in significant construction activity. This survey was repeated in 1985 for the 1984-85 year.

The survey forms part of the system of integrated economic censuses. Details of the 1978-79 survey, and tables of results appear on pages 338-40 of the *Western Australian Year Book* No. 21-1983.

### Construction Industry Survey (Private Sector)

Statistics in this section were compiled from a sample survey of private sector construction establishments in respect of the year 1984-85. The survey is part of the system of integrated economic censuses.

**TABLE 18.12 — PRIVATE SECTOR CONSTRUCTION ESTABLISHMENTS SUMMARY OF OPERATIONS BY INDUSTRY CLASS : 1984-85**

<i>Industry class</i>	<i>Number of establishments operating at 30 June</i>	<i>Average employment over whole year</i>	<i>Wages and salaries</i>	<i>Turnover</i>	<i>Value added</i>
		<i>Persons</i>	<i>\$m</i>	<i>\$m</i>	<i>\$m</i>
General construction establishments—					
Building construction—					
House construction	1,671	3,937	29.0	578.1	98.6
Residential building construction n.e.c.	79	208	2.5	45.3	6.8
Non-residential building construction	273	2,544	49.2	491.8	118.0
Total	2,023	6,689	80.7	1,115.2	223.4
Non-building construction—					
Road and bridge construction	117	1,181	24.5	173.6	59.9
Non-building construction n.e.c.	278	2,361	55.6	260.6	114.7
Total	396	3,542	80.2	434.2	174.6
<b>Total general construction establishments</b>	<b>2,419</b>	<b>10,231</b>	<b>160.9</b>	<b>1,549.4</b>	<b>398.0</b>
Special trade construction establishments—					
Concreting	372	1,187	10.4	70.2	25.3
Bricklaying	1,420	2,669	8.3	58.8	38.2
Roof tiling	115	349	1.8	15.8	6.7
Floor and wall tiling	385	623	0.8	11.4	7.0
Structural steel erection	149	435	6.6	21.6	11.5
Plumbing	845	2,235	17.7	107.6	42.9
Electrical work	992	3,443	47.4	176.2	83.8
Heating and airconditioning	71	628	10.5	59.2	17.6
Plastering and plaster fixing	627	1,361	7.2	52.2	22.9
Carpentry	1,147	1,931	6.9	47.4	27.6
Painting	934	2,168	17.3	79.2	45.3
Earthmoving and dredging	386	1,888	27.8	137.7	58.8
Special trades n.e.c.	558	1,835	20.1	105.9	43.0
<b>Total special trade construction establishments</b>	<b>8,001</b>	<b>20,754</b>	<b>182.7</b>	<b>943.3</b>	<b>430.6</b>
<b>TOTAL CONSTRUCTION ESTABLISHMENTS</b>	<b>10,420</b>	<b>30,985</b>	<b>343.6</b>	<b>2,492.7</b>	<b>828.6</b>

**TABLE 18.13 — PRIVATE SECTOR CONSTRUCTION ESTABLISHMENTS**  
**VALUE OF CONSTRUCTION WORK DONE**  
**BY TYPE OF CONSTRUCTION AND TYPE OF PROJECT : 1984-85**  
**(\$ million)**

	Trade contracting		General construction		
	Prime contract	Sub-contract	Prime contract	Sub-contract	Speculative construction
<b>Building construction</b>					
Houses—					
New	6.8	119.8	436.9	5.0	12.7
Alterations, additions and improvements	44.3	32.8	69.1	2.7	—
Other residential buildings—					
New	0.4	32.3	59.7	(a)0.7	14.5
Alterations, additions and improvements	3.5	7.4	1.6	—	—
<i>Total residential building</i>	<i>55.0</i>	<i>272.4</i>	<i>567.3</i>	<i>8.5</i>	<i>27.2</i>
Non-residential building—					
New work, alterations, additions and improvements	55.3	251.8	421.0	n.p.	n.p.
<i>Total non-residential building</i>	<i>55.3</i>	<i>251.8</i>	<i>421.0</i>	<i>n.p.</i>	<i>n.p.</i>
<b>Total building construction</b>	<b>110.4</b>	<b>524.1</b>	<b>988.3</b>	<b>n.p.</b>	<b>n.p.</b>
<b>Engineering construction—</b>					
New work, alterations and additions to—					
Roads, highways and related structures	22.9	19.5	119.7	n.p.	n.p.
Bridges	n.p.	n.p.	14.6	—	—
Railways and tramways	n.p.	0.4	n.p.	—	—
Harbours	n.p.	n.p.	n.p.	—	—
Dams, water supply pipelines	7.3	2.4	12.5	—	—
Electric power transmission lines	n.p.	n.p.	7.9	—	—
Electric power distribution lines	n.p.	1.3	n.p.	—	—
Water distribution systems	6.2	(a)1.1	(a)8.5	—	—
Sewer systems	5.3	1.9	9.4	0.9	—
Pipelines n.e.c.	(a)2.1	5.6	29.5	13.5	—
Heavy electrical generating plant and equipment	n.p.	10.0	n.p.	—	—
Heavy industrial plant and equipment n.e.c.	35.5	19.3	50.6	3.4	—
Telecommunications towers, lines and structures	(a)0.4	—	0.9	1.5	—
Other	34.5	9.1	61.6	n.p.	—
<b>Total engineering construction</b>	<b>116.5</b>	<b>74.2</b>	<b>348.8</b>	<b>43.3</b>	<b>n.p.</b>
<b>Repair, maintenance and demolition</b>	<b>75.8</b>	<b>15.8</b>	<b>60.0</b>	<b>n.p.</b>	<b>—</b>
<b>TOTAL CONSTRUCTION</b>	<b>302.7</b>	<b>614.2</b>	<b>1,397.1</b>	<b>91.9</b>	<b>35.6</b>

(a) Included for completeness, high standard error.

## REFERENCES

### ABS publications:

*Estimated Stocks of Dwellings in Census Collection Districts and Statistical Local Areas, Western Australia* (8705.5)

*Building Approvals, Western Australia* (8731.5)

*Dwelling Unit Commencements Reported by Approving Authorities* (8741.5).

*Building Activity, Western Australia* (8752.5)

*Construction Industry Survey: Private Sector Construction Establishment, Details of Operations, Australia* (8772.0)

*Engineering Construction Survey, Australia* June quarter 1987 (8762.0).

# Chapter 19

## TRANSPORT AND COMMUNICATION

### Transport

Western Australia's main transport systems are based generally on Perth, the capital, and on Fremantle, the principal port. Subsidiary systems are centred on a number of outports north and south of Fremantle and on some inland towns. International flights operate through the airports at Perth and the north-west town of Port Hedland.

#### ROAD TRANSPORT

##### Roads

The Main Roads Department is the principal road authority in Western Australia. In conjunction with local government authorities it is responsible for the planning, design, construction and maintenance of the State road network.

The basis of the Western Australian road system is a series of declared highways and main roads which are the responsibility of the Department. These highways and roads carry traffic to major internal centres and interstate. Other connecting or local roads, declared as secondary or unclassified are controlled by individual local councils.

Road statistics at 30 June 1988 were:

Highways	7,949 km
Main Roads	7,460 km
Secondary Roads	8,645 km
Unclassified Roads	115,637 km

State sealed road length totalled 41,193 kilometres.

Excluded from these statistics are forestry roads, which are the responsibility of the Department of Conservation and Land Management.

TABLE 19.1 – ROUTE DISTANCES BETWEEN MAJOR TOWNS IN WESTERN AUSTRALIA (a)  
(Source: Main Roads Department)  
(kilometres)

	Perth	Albany	Broome	Bunbury	Carnarvon	Esperance	Geraldton	Kalgoorlie	Kununurra	Manjimup	Newman	Port Hedland
Perth	–	409	2,232	176	902	721	424	596	3,209	300	1,184	1,641
Albany	409	–	2,977	337	(b)1,311	482	(b)833	797	3,954	208	1,929	2,386
Broome	2,232	2,977	–	(b)2,408	1,458	2,578	1,926	2,180	1,045	(b)2,532	1,052	611
Bunbury	176	337	(b)2,408	–	(b)1,078	757	(b)600	782	(b)3,385	124	(b)1,360	(b)1,817
Carnarvon	902	(b)1,311	1,458	(b)1,078	–	(b)1,623	480	1,462	2,472	(b)1,202	988	872
Esperance	721	482	2,578	757	(b)1,623	–	(b)1,145	398	255	690	1,530	1,987
Geraldton	424	(b)833	1,926	(b)600	480	(b)1,145	–	984	2,908	(b)724	952	1,340
Kalgoorlie	596	797	2,180	782	1,462	398	984	–	3,157	808	1,132	1,169
Kununurra	3,209	3,954	1,045	(b)3,385	2,472	355	2,908	3,157	–	(b)3,509	2,029	1,588
Manjimup	300	208	(b)2,532	124	(b)1,202	690	(b)724	808	(b)3,509	–	(b)1,484	(b)1,941
Newman	1,184	1,929	1,052	(b)1,360	988	1,530	952	1,132	2,029	(b)1,484	–	464
Port Hedland	1,641	2,386	611	(b)1,817	872	1,987	1,340	1,169	1,588	(b)1,941	464	–

(a) Via the shortest practical declared route. (b) Via Perth

A comprehensive route numbering system for roads was established in Western Australia during 1986. The system consists of 43 State Routes in the metropolitan area and 15 in the country. Other road developments include the construction of

bypass and arterial or perimeter routes in major metropolitan and country areas.

The Mitchell Freeway now extends 20 kilometres north of Perth and a reserved bus lane is being

constructed on the Kwinana freeway to improve access for public transport to Perth. Upgrading of the Eyre, Great Northern and North West Coastal Highways is continuing.

For further information on roads, including road finance, refer to the *Western Australian Year Book* No. 24—1986 and the Main Roads Department.

### Motor vehicles

The responsibility for the registration and licensing of vehicles and the licensing of motor vehicle drivers has been delegated to the Commissioner of Police by the Traffic Board of Western Australia. The Traffic Board is responsible for the collection and analysis of road traffic accident statistics, and research into the causes and prevention of road traffic accidents.

**TABLE 19.2 – MOTOR VEHICLE REGISTRATIONS**

	1986	1987	1988
New motor vehicle registrations—			
Year ended 30 June—			
Motor cars and station wagons	42,645	33,642	36,040
Utilities and panel vans	8,274	5,758	5,403
Trucks and buses	5,402	4,440	5,214
Motor cycles	3,350	2,305	2,215
<b>Total</b>	<b>59,671</b>	<b>46,145</b>	<b>48,872</b>
Vehicles on register—			
At 30 June—			
Motor cars and station wagons	632,182	647,734	670,158
Utilities and panel vans	132,350	133,588	135,850
Trucks and buses	86,501	89,442	94,311
Motor cycles	36,324	35,287	35,442
<b>Total</b>	<b>887,357</b>	<b>906,051</b>	<b>935,761</b>

**TABLE 19.5 – ANNUAL KILOMETRES TRAVELLED (a)**  
**YEAR ENDED 30 SEPTEMBER 1985**

Vehicle type	Area of travel			Total
	Perth Statistical Division	Rest of State	Interstate	
Cars and station wagons	6,996.1	3,194.4	108.6	10,299.1
Utilities and panel vans	1,167.5	1,061.6	31.7	2,260.9
Rigid trucks	366.9	548.1	10.2	925.3
Articulated trucks	61.4	224.4	40.5	326.3
Other truck types	16.2	14.0	—	30.2
Motor cycles	138.5	72.7	6.2	217.4
<b>Total</b>	<b>8,746.7</b>	<b>5,115.2</b>	<b>197.3</b>	<b>14,059.2</b>

(a) Vehicles registered in Western Australia

**TABLE 19.3 – CURRENT DRIVERS LICENCES**  
(Source: Western Australian Police Service)

At 30 June 1988			
Age group	Male	Female	Total
Under 17	223	28	251
17 – 20	38,877	33,800	72,677
21 – 24	44,158	41,568	85,726
25 – 29	58,868	56,592	115,460
30 – 39	115,858	109,115	224,973
40 – 49	88,521	75,449	163,970
50 – 59	61,185	45,669	106,854
60 and over	69,065	40,638	109,703
<b>Total</b>	<b>476,755</b>	<b>402,859</b>	<b>879,614</b>

**TABLE 19.4 – DRIVERS LICENCES DISQUALIFICATIONS AND CANCELLATIONS (a): 1988**  
(Source: Western Australian Police Service)

Nature of offence	Number
Alcohol related—	
Driving under the influence	5,672
Driving with 0.08% or more	6,586
Refusing test	410
Other	544
Dangerous, reckless or careless driving	1,736
Speeding	752
Driving under disqualification	2,369
Driving without a licence	2,352
Demerit points suspension	3,957
Other	2,552
<b>Total</b>	<b>26,930</b>

(a) Includes some cases carried forward from the previous year.

A survey of motor vehicle usage is undertaken by the Australian Bureau of Statistics every three years, the latest survey results relating to the twelve months ended 30 September 1985. The survey is based on a sample of approximately 60,000 vehicles across Australia (7,000 vehicles in Western Australia), of which 80 per cent were trucks and other commercial vehicle types.



**TABLE 19.6 – FUEL CONSUMPTION AND TONNES CARRIED (a)  
YEAR ENDED 30 SEPTEMBER 1985**

Vehicle type	Fuel consumption (million litres)				Tonnes carried ('000)
	Petrol	Diesel	Other (b)	Total	
Cars and station wagons	1,181.8	31.0	17.2	1,230.0	—
Utilities and panel vans	262.9	44.6	0.8	308.3	6,188
Rigid trucks	86.0	136.6	3.4	225.9	71,006
Articulated trucks	0.7	172.8	—	173.6	46,913
Other truck types	4.1	4.4	—	8.5	—
Motor cycles	12.3	—	—	12.3	—
<b>Total</b>	<b>1,547.7</b>	<b>389.4</b>	<b>21.5</b>	<b>1,958.6</b>	<b>124,107</b>

(a) Vehicles registered in Western Australia. (b) Including LPG and dual fuelled.

Detailed information appears in the publication *Survey of Motor Vehicle Usage, Twelve months ended 30 September 1985* (Catalogue No. 9208.0).

### Bicycle services

In the Metropolitan area and regional centres of Western Australia a range of bicycle facilities have been developed to cater for the growing number of pedal cyclists. The responsibility for bicycle policy lies with the Minister for Local Government and his department. A State Bicycle Committee is responsible for coordinating the various inputs to bicycle policy. 'Bike West' (comprising the State Bicycle Committee and a Bicycle Management Team) was established within the Department of Local Government and is responsible for the development and implementation of the Bikeplans with assistance from local groups. Community participation is a key objective of Bike West's aim to educate the community on the need for safer cycling.

An estimated 500,000 Western Australians (one-third of the population) currently use bicycles, the greatest growth being in adult cycling. In Perth City an estimated 6 per cent of all daily vehicle trips are made by bicycle with most of these trips replacing private car trips.

Outside the metropolitan area, Bike Plans have been completed for the following areas: Albany; Augusta-Margaret River; Bunbury; Carnarvon; Esperance; Geraldton and Mandurah.

### Bus and ferry services

The Metropolitan (Perth) Passenger Transport Trust (MTT) bears overall responsibility for all of Perth's metropolitan public transport (bus, ferry and train services). The metropolitan area is designated as being within a 50 kilometre radius of the Perth Town Hall as well as the area west of the South-West Highway between Perth and Pinjarra. The ferry service operates on the Swan River

between Perth and South Perth. Buses and ferries are also available for charter from Transperth.

**TABLE 19.7 – TRANSPERTH BUS AND FERRY SERVICES (a)**

(Source: Metropolitan (Perth) Passenger Transport Trust)

	1985-86	1986-87	1987-88
<b>Buses—</b>			
Number (b)	884	881	887
Route kilometres	1,723	1,771	1,784
Bus kilometres ('000)	45,743	46,031	46,172
Passenger journeys ('000)	51,267	52,368	52,108
<b>Ferries—</b>			
Number (b)	5	5	4
Route kilometres	3	3	3
Kilometres run ('000)	54	51	52
Passenger journeys ('000)	494	512	544

(a) Includes private charter and tourist services and, in the case of buses, clipper and school specials. (b) At 30 June.

A new Bus Station is being constructed in Perth City and construction is expected to be completed by the end of 1989. The Perth City Bus Junction will connect directly with the new bus lane being constructed on the Kwinana Freeway.

For information about metropolitan rail services refer to the section 'Rail Services'.

A growing number of privately owned ferry companies operate tours to the wine growing regions of the Swan River as well as river and harbour cruises around Perth and Fremantle, and trips to Rottnest Island.

Road transport of passengers outside the metropolitan area is provided by both the railway road services (see the section 'Rail Services') and privately operated bus services. The railway coach services operate in the southern part of the State (a private company competes with Westrail on the Perth-Augusta and Perth-Pemberton routes), and the privately operated bus services cater predominantly for those areas north of Geraldton.

Privately operated express bus services operate a restricted service between Perth and Kalgoorlie.

Intratown bus services are provided in a number of the larger country towns by private operators, although in the Kalgoorlie – Kambalda – Boulder region services are undertaken by the Eastern Goldfields Transport Board.

In certain country areas private operators, under Government contract, run school bus services taking country children to and from school.

### Taxi services

The Taxi Control Board controls the operations of taxis in the Perth Metropolitan Traffic Area and any other designated areas.

In addition to unrestricted use taxis, private taxicars (luxury type vehicles used mainly for VIP work and tours where a chauffeur driven limousine is required) are licensed to cater for a demand for this type of vehicle. To cater for peak demand and 'special event' situations such as the America's Cup restricted hour taxi licences are issued. Restricted area licences have been issued for areas that would otherwise be poorly serviced. Multi Purpose Taxis, for use primarily by disabled people, have also been licensed.

The Department of Transport is responsible for taxi operations in country areas.

**TABLE 19.8 – LICENSED TAXI CARS – 30 JUNE 1988**  
(Source: Taxi Control Board, (State) Department of Transport)

Metropolitan area	
Metered taxis	841
Restricted use taxis (a)	21
Private taxis	23
Multi purpose taxis	5
	890
Country areas	238

(a) Comprises restricted hour and restricted area taxis.

### Road traffic accidents

Statistics of road traffic accidents are prepared from information concerning accidents in public thoroughfares, as supplied by the Western Australian Police Department. The statistics are confined to accidents which satisfied all of the following conditions: (a) the accident was reported to the police; (b) the accident occurred on a road, street etc. open to the public, including railway level crossing; (c) it involved a road vehicle or driven animal which at the time of the accident was in motion; (d) the accident resulted in the death of a person within 30 days after the accident

or bodily injury to a person to an extent requiring surgical or medical treatment.

Tables 19.9 and 19.10 show, for the years 1985 to 1987, the number of fatalities and injuries which occurred in Western Australia, classified by type of road user and age group.

**TABLE 19.9 – ROAD TRAFFIC ACCIDENTS  
CASUALTIES BY TYPE OF ROAD USER**

Type of road user	1985	1986	1987
<b>PERSONS KILLED</b>			
Drivers of motor vehicles	85	85	91
Motor cyclists (a)	32	18	22
Pedal cyclists	4	14	4
Passengers—			
Motor vehicle	71	r61	56
Motor cycle	3	2	—
Pedestrians	47	48	38
Other (b)	1	—	2
<b>Total</b>	<b>243</b>	<b>r228</b>	<b>213</b>
<b>PERSONS INJURED</b>			
Drivers of motor vehicles	4,746	5,144	5,351
Motor cyclists (a)	923	824	784
Pedal cyclists	406	464	505
Passengers—			
Motor vehicle	2,975	2,880	3,003
Motor cycle	140	125	120
Pedestrians	552	540	551
Other (b)	129	208	207
<b>Total</b>	<b>9,871</b>	<b>10,185</b>	<b>10,521</b>

(a) Includes riders of motor scooters. (b) Includes passengers on pedal cycles, bystanders, train crews, riders of horses, drivers of animal-drawn vehicles and road user type not stated.

**TABLE 19.10 – ROAD TRAFFIC ACCIDENTS  
CASUALTIES CLASSIFIED BY AGE**

Age group	1985	1986	1987
<b>Persons killed—</b>			
Under 5	7	r9	6
5 – 9	9	9	6
10 – 16	11	15	7
17 – 20	42	33	40
21 – 24	37	27	39
25 – 29	27	31	20
30 – 39	30	24	27
40 – 49	28	20	15
50 – 59	8	17	15
60 and over	44	43	37
Not stated	—	—	1
<b>Total</b>	<b>243</b>	<b>r228</b>	<b>213</b>
<b>Persons injured—</b>			
Under 5	201	180	211
5 – 9	249	272	272
10 – 16	836	784	790
17 – 20	1,929	2,039	2,042
21 – 24	1,481	1,402	1,496
25 – 29	1,091	1,163	1,229
30 – 39	1,436	1,578	1,600
40 – 49	860	966	964
50 – 59	533	593	625
60 and over	621	641	688
Not stated	634	567	604
<b>Total</b>	<b>9,871</b>	<b>10,185</b>	<b>10,521</b>

Road traffic accidents for 1985 to 1987 are classified in Table 19.11 by the nature of the accident and the feature of roadway.

For additional information on road traffic accidents in this State, refer to *Road Traffic Accidents Involving Casualties, Reported to the Police Department*, quarterly publication (Catalogue No. 9405.5) and to the annual publication (Catalogue No. 9406.5).

**TABLE 19.11 ROAD TRAFFIC ACCIDENTS**

	<i>Casualty accidents</i>	<i>Persons killed</i>	<i>Persons injured</i>
1986			
Nature of accident —			
Multi-vehicle accident	5,379	r88	7,006
Single vehicle accident—			
Struck object	1,018	41	1,298
Struck pedestrian	576	45	560
Overturning	594	43	854
Falling (a)	236	6	245
Other	93	1	114
Unknown	79	4	108
<b>Total</b>	<b>7,975</b>	<b>r228</b>	<b>10,185</b>
Feature of roadway —			
Intersection	4,008	r55	5,169
Straight road	2,880	104	3,564
Curve or bend	917	63	1,236
Other	170	6	216
<b>Total</b>	<b>7,975</b>	<b>r228</b>	<b>10,185</b>
1987			
Nature of accident —			
Multi-vehicle accident	5,564	70	7,280
Single vehicle accident—			
Struck object	939	48	1,197
Struck pedestrian	574	34	567
Overturning	690	56	989
Falling (a)	225	3	250
Other	67	—	82
Unknown	123	2	156
<b>Total</b>	<b>8,182</b>	<b>213</b>	<b>10,521</b>
Feature of roadway —			
Intersection	4,137	56	5,341
Straight road	3,023	106	3,814
Curve or bend	863	50	1,142
Other	159	1	224
<b>Total</b>	<b>8,182</b>	<b>213</b>	<b>10,521</b>

(a) Includes all motor cycle and pedal cycle accidents where the driver or passenger fell from the vehicle regardless of whether the vehicle overturned.

### RAIL SERVICES

A railway system extends from Fremantle, Perth and Midland into the mining, agricultural and forestry areas in the southern half of the State. The railways in this part of the State are operated by the Western Australian Government Railways Commission (trading under the name Westrail). The system is linked with railways in other States at Kalgoorlie where it joins Australian National Railways. In addition to the Westrail service for

general and passenger traffic there are private railways for the haulage of iron ore in the north of the State and timber and alumina in the south.

Westrail also operates road services for passengers and freight, and interstate, intrastate and charter tours involving rail and road services.

**TABLE 19.12 – WESTRAIL SERVICES (a)**  
(Source: Westrail)

	1985–86	1986–87	1987–88
Kilometres of railway (a)—			
Route kilometres	5,553	5,553	5,553
Track kilometres (b)	7,047	7,021	6,986
Kilometres run ('000)—			
Train	10,364	9,436	9,465
Road bus (c)	2,430	2,309	2,447
Passenger journeys ('000)—			
Rail	209	214	288
Road (c)	164	162	161
Tonnes carried ('000) (d)	20,877	21,264	21,946

(a) Excludes suburban rail. Excludes charter and tourist services.  
(b) Includes sidings. (c) In addition to its rail services, Westrail operates a system of road services for passengers and freight. (d) Paying goods only.

At 30 June 1988 there were 5,553 kilometres of railway owned and operated by Westrail, with a further 731 kilometres of rail owned by the Commonwealth Government and operated by Australian National Railways.

Westrail introduced a new faster Australind passenger service (between Perth and Bunbury) in November 1987. Railway facilities at Albany and Geraldton are being relocated to facilitate foreshore redevelopment in these towns for tourism and commercial purposes.

Suburban passenger rail operations are administered and operated by Westrail for Transperth, with Transperth being responsible for policy and finance.

**TABLE 19.13 – SUBURBAN RAIL SERVICES**  
(Source: Metropolitan (Perth) Passenger Transport Trust)

	1985–86	1986–87	1987–88
Rail cars and carriages (number)	94	106	106
Route kilometres	67	67	63
Train kilometres ('000)	2,348	2,177	2,314
Passenger journeys ('000)	9,742	9,837	9,564

The suburban rail network is scheduled to be fully electrified by 1992 with the first electric train running by September 1989. There are three existing lines involved in this program—Perth to Armadale (1989), Perth to Fremantle and Perth to Midland (1991). A new line extending northward

from Perth to Joondalup will be constructed to cater for the rapidly expanding northern suburbs.

The exploitation of extensive inland deposits of iron ore in Western Australia has necessitated the construction of private railways for the transport of ore from the mines to the coast. Conditions applying to the construction and operation of these railways are incorporated in agreements made between the State Government and mining companies. The private railways operate from Newman to Port Hedland (426 kilometres), Paraburdoo to Dampier (400 kilometres), Shay Gap to Port Hedland (180 kilometres) and Pannawonica to Cape Lambert (187 kilometres). The summary in Table 19.13 relates to railways used for the transport of iron ore for the years 1985–86 to 1987–88.

TABLE 19.14 – IRON ORE RAILWAYS

	1985–86	1986–87	1987–88
Kilometres	1,185	1,185	1,193
Locomotives in service	122	124	126
Ore wagons	5,516	5,514	5,467
Tonnes carried ('000)	82,723	88,037	90,297

A number of private organisations operate tourist railways in the south-west of the State principally on lines owned and maintained by Westrail. The tourist railways own the steam locomotives used on the tourist services. A tourist tramway operates in the south-west of the state between Pemberton and Northcliffe.

## AIR SERVICES

An extensive system of regular air services operates in Western Australia for the transport of passengers, freight and mail. Perth has frequent and direct links with major Western Australian regional centres, other Australian capital cities and Alice Springs. It also has direct overseas links which include Europe, Asia, Africa and New Zealand. Pacific and American connections are made via the Eastern States. Port Hedland, the second international airport in Western Australia, has direct international links with Bali.

The Civil Aviation Authority has responsibility for setting safety standards and day to day regulatory control of air services throughout Australia as well as operational responsibility for air traffic control, flight advisory services, communication,

navigation and surveillance systems and rescue and fire fighting services at airports.

The Bureau of Air Safety Investigations investigates aircraft accidents and incidents involving civil aircraft in Australia.

The operation of regular passenger air services over the main domestic routes, or trunk routes such as Perth to Adelaide, will no longer be restricted to the two major domestic airlines after October 1990.

The Federal Airports Corporation is responsible for the operations at Perth (and Jandakot) airports, including the new Perth International Terminal which is located twelve kilometres from the domestic terminal. The Terminal became operational on 27 October 1986. A feature of the new Perth International Terminal is the control tower which is 70 metres high—the highest in Australia.

The domestic and international airports at Perth are currently used by:

- 9 international operators
- 2 interstate operators
- 1 intrastate operator
- 3 commuter operators connecting Perth with 19 country centres.

Other commuter services connect townships and stations with ports on jet routes.

TABLE 19.15 – PASSENGER TRAFFIC BETWEEN PERTH AND PRINCIPAL AIRPORTS (a)

(Source: Department of Transport and Communications)

	Passengers		
	1985	1986	1987
Domestic —			
Adelaide	206,964	216,117	235,637
Alice Springs	33,119	34,746	42,481
Brisbane	8,571	6,798	6,365
Cairns	3,158	3,003	9,232
Melbourne	334,791	353,244	392,526
Sydney	204,156	228,448	290,067
International —			
Auckland	43,893	54,361	68,194
Denpasar	66,351	72,283	70,209
Hong Kong	46,580	62,185	56,461
Kuala Lumpur	47,972	52,331	72,438
London	59,664	66,671	65,331
Singapore (b)	163,682	184,242	220,177

(a) Total of embarkations and disembarkations. (b) Figures for Singapore include connections with countries not directly linked with Perth and other services involving connections at Singapore.

TABLE 19.16 – PASSENGER AND AIRCRAFT MOVEMENTS AT PRINCIPAL AIRPORTS

Airport	Passengers (a)			Aircraft movements (b)		
	1985	1986	1987	1985	1986	1987
Broome	26,703	32,067	34,384	1,868	1,837	1,890
Carnarvon	17,911	17,212	n.y.a.	1,182	1,060	n.y.a.
Derby	35,622	35,309	38,707	2,569	2,164	2,330
Geraldton	26,273	27,943	31,522	1,544	1,501	1,523
Kalgoorlie	67,084	71,590	88,978	1,536	1,618	1,864
Karratha	119,106	136,497	145,893	6,101	5,275	5,283
Kununurra	44,177	34,081	34,972	1,944	1,698	1,716
Learmonth	11,671	10,532	n.y.a.	1,050	816	n.y.a.
Newman	25,668	28,439	30,968	1,915	1,366	1,427
Paraburdoo	26,537	27,213	25,469	1,808	1,380	1,413
Perth —						
Internal (c)	1,194,602	1,264,444	1,432,115	16,036	16,647	18,596
International	502,169	568,965	648,837	2,951	3,280	3,307
Port Hedland —						
Internal	89,189	93,980	82,901	3,412	4,797	4,607
International	4,090	4,161	5,087	136	104	102

(a) Total of embarkations and disembarkations. (b) Total of arrivals and departures. (c) Interstate and intrastate.

Excluding Jandakot and Perth there were 47 aerodromes used for civil aviation in Western Australia at 30 June 1988, including the Department of Defence aerodrome at Learmonth and 16 aerodromes operated under the Aerodrome Local Ownership Plan (ALOP).

Derby airport in the far north west of the state will be redeveloped to allow the operation of larger aircraft in the region.

At 31 December 1988 there were 961 aircraft undertaking general aviation work (charter, private, aerial agriculture and other) based in Western Australia.

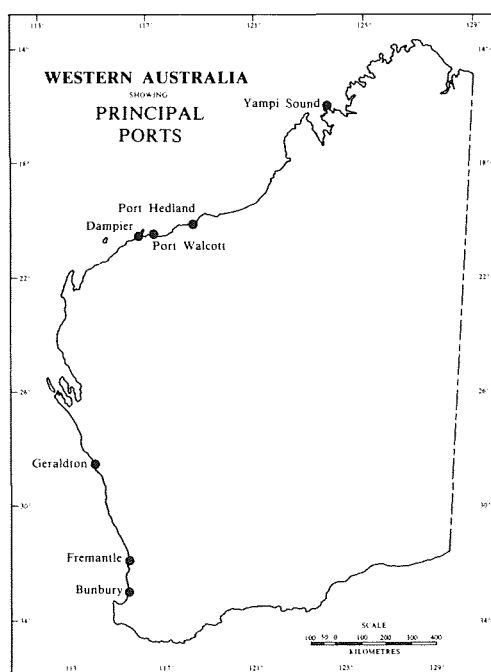
### SHIPPING

Western Australia's sea-borne trade is conducted through the Port of Fremantle and a number of outports. Of these, Geraldton, Bunbury, Albany and Esperance are situated in the more highly developed south-western and southern parts of the State. The less closely settled areas of the north-west and the north are served by ports and other landing points at Useless Loop (Shark Bay), Carnarvon, Cape Cuvier, Exmouth, Barrow Island, Dampier, Port Walcott (Cape Lambert), Port Hedland, Broome, Derby, Yampi and Wyndham.

Table 19.16 shows the number of arrivals into and departures from each port by vessels coming direct from or going direct to overseas ports for the period 1984–85 to 1986–87. The figures exclude particulars of naval vessels; yachts and other craft used for pleasure; foreign fishing vessels that neither load nor discharge cargo; geophysical and oceanographic research vessels; oil-drilling rigs

and vessels servicing them; and vessels of 200 registered net tonnes and under.

DIAGRAM 19.1



The importance of mineral developments in the north-west of the State is evident from the numbers of ship calls in the ports of Dampier, Port Hedland and Port Walcott. They are surpassed only by the Port of Fremantle, the principal port of Western Australia.

TABLE 19.16 – OVERSEAS SHIP CALLS (a) AT MAJOR PORTS

Port	Arrivals			Departures		
	1984–85	1985–86	1986–87	1984–85	1985–86	1986–87
Fremantle	1,018	988	1,069	1,016	1,077	1,057
Other ports—						
Bunbury	195	184	174	196	188	172
Cape Cuvier	13	7	—	13	7	—
Dampier	506	462	451	504	463	442
Geraldton	187	160	131	186	164	137
Port Hedland	448	449	403	424	434	408
Port Walcott	109	96	91	106	100	91
Yampi Sound	15	25	38	15	26	37
Other	300	229	223	302	226	227
<b>Total</b>	<b>1,773</b>	<b>1,612</b>	<b>1,511</b>	<b>1,746</b>	<b>1,608</b>	<b>1,514</b>
<b>All ports</b>	<b>2,791</b>	<b>2,600</b>	<b>2,580</b>	<b>2,762</b>	<b>2,585</b>	<b>2,571</b>

(a) Number of port visits made by ships engaged in overseas voyages.

Table 19.17 shows the amount of cargo loaded and discharged at each port during 1986–87. Cargo statistics are recorded in both revenue tonnes and gross weight tonnes. A revenue tonne is the basis on which freight is charged and may be measured by mass (tonnes) or volume (cubic metres). Gross weight is the total weight of cargo excluding the weight of containers, irrespective of the basis on which freight is charged.



The North West Sanderling, the first in a fleet of seven LNG carriers.

Photograph: BP Australia Ltd.

Apart from general cargo, overseas consignments discharged were principally petroleum and petroleum products, rock phosphate, caustic soda, iron, steel and sulphur. Outward cargoes from Fremantle consisted largely of alumina, cereal grains, wool, refined petroleum and sheep. Cargo loaded at Esperance comprised mainly cereal grains and gypsum; and at Albany cereal grains. At Bunbury the principal cargoes loaded were alumina, mineral sands and woodchips. Cereal grains and mineral sands were the main items loaded at Geraldton. Principal cargoes loaded in the northern part of the State were iron ore from Dampier, Port Hedland, Port Walcott and Yampi. Salt was loaded at Carnarvon, Dampier and Port Hedland.

The Western Australian Coastal Shipping Commission was established in 1965 to carry on the services formerly maintained by the State Shipping Service. The Commission's ships operate along the north-west and northern coasts, calling regularly at ports between Fremantle and Darwin (Northern Territory). Besides general cargo, the freight discharged at north-west and northern ports consists mainly of refined petroleum products, bulk cement and other building and construction materials, refrigerated cargo, vehicles and drilling equipment. Cargoes carried south to Fremantle are mainly primary products (such as meat, grains and prawns) and vehicles.

The Commission also maintains a regular link between Fremantle and Bunbury and the Eastern States.

In 1986 the Commission extended its operations to include Papua New Guinea; and in 1988, after a break of 50 years, the shipping service with South East Asia recommenced.

TABLE 19.18 – OVERSEAS CARGO LOADED AND DISCHARGED AT MAJOR PORTS 1986-87

Port	Loaded		Discharged	
	Revenue tonnes (a)	Gross weight tonnes (a)	Revenue tonnes (a)	Gross weight tonnes (a)
Fremantle	7,196,820	7,097,325	3,636,548	3,287,417
Other ports —				
Bunbury	3,848,225	3,825,392	499,542	497,237
Cape Cuvier				
Dampier	32,099,254	32,099,254	258,377	244,592
Geraldton	1,703,320	1,703,319	75,084	75,084
Port Hedland	32,299,330	32,299,330	133,472	128,734
Port Walcott	11,314,652	11,314,413	19,583	19,583
Yampi Sound	2,358,160	2,358,160	300	300
Other	2,610,725	2,610,700	226,091	226,091
Total	86,233,666	86,210,568	1,212,449	1,191,621
All ports	93,430,486	93,307,893	4,848,997	4,479,038

(a) See text preceding table.

### Administration of ports

The State Government, through the Marine and Harbours Department, controls the ports at Broome, Carnarvon, Derby, Port Walcott (Cape Lambert) and Wyndham. The ports at Albany, Bunbury, Esperance, Fremantle, Geraldton and Port Hedland are controlled by separately constituted authorities established by Act of Parliament. Private operators control the ports (or landing points) at Barrow Island, Cape Cuvier, Dampier, Exmouth, Useless Loop and Yampi.

### Description of principal ports

A brief description of the principal ports, at 30 June 1987 is given below. References to previous articles on ports appears in the *Appendix*.

**Albany.** The port of Albany (35° S latitude) is the most southerly port in Western Australia and comprises the waters of Princess Royal Harbour and King George Sound. The effect of tidal movements is negligible and as there is little trouble from fog or storm it is an all-weather port. It embraces an area of 11,800 hectares having an abundance of natural deep water and affording excellent protection to shipping and shore works.

Access to Princess Royal Harbour from King George Sound is by means of a channel of 12.2 metres minimum depth and 145 metres wide.

**Bunbury.** The port of Bunbury (33° S latitude) is situated in Koombana Bay, 104 nautical miles south of Fremantle, and comprises an inner and outer harbour. It is an all-weather port with a tidal rise and fall of 0.8 metres influenced by weather conditions.

Access to the inner harbour is by means of a dredged channel approximately 24 kilometres in length, 12.2 metres in depth and 121 metres wide.

**Esperance.** The port of Esperance (33° S latitude) is situated in Esperance Bay on the south coast of Western Australia.

The port has two land-backed berths of concrete and steel construction. The approach channel to the berths is 244 metres wide and is dredged to a depth of 11.0 metres. The deepest permissible loading draft is 10 metres.

**Fremantle.** The port of Fremantle (32° S latitude) is the principal port of Western Australia. It is an all-weather port, virtually tideless and little troubled by storm or fog. The port provides modern facilities for the handling of ships, passengers and cargo and is connected to the road and rail systems of Western Australia and Australia generally. It has an area of 87,600 hectares and comprises an Inner Harbour and an Outer Harbour.

The Inner Harbour which is constructed within the mouth of the Swan River, is approached through a short entrance channel dredged to a depth of 11 metres at low water. It encloses 81 hectares of water dredged throughout to 11 metres at low water and is the centre of the general cargo trade of the port.

The Outer Harbour is protected from the west by islands and reefs. It embraces three main anchorages of depths of up to 19 metres. Gage Roads, the most northerly of these anchorages, serves as an approach to the Inner Harbour. Owen Anchorage is centrally situated between Success and Parmelia Banks. The largest and most

protected of the anchorages, Cockburn Sound, lies to the south and serves the Kwinana industrial area.

**Geraldton.** The port of Geraldton (28° S latitude) is situated in Champion Bay on the west coast, 215 nautical miles in a north-westerly direction from Fremantle. The outer harbour, which is 10 metres deep, provides a good holding anchorage. The inner harbour, enclosed by a breakwater, affords ample protection for shipping and shore works. The depth of the inner harbour is 9.1 metres, but the rock base of the entrance channel restricts the loaded draught of vessels to 8.7 metres. With the use of tides, vessels may load to 9.1 metres at

mean sea level (0.8m tide), or to 9.3 metres at mean higher high water (1.1 m tide).

**Port Hedland.** Port Hedland (20° S latitude) is situated on the north-west coast of Western Australia, 957 nautical miles from Fremantle. Access to the harbour is by means of a dredged channel approximately 20 kilometres in length with a further 25 kilometres delineated by beacons. The channel has a minimum depth of 14.1 metres, and minimum width of 183 metres. Subject to the height of tide, the channel is navigable by vessels of up to 250,000 tonnes deadweight, and 325 metres in length with a maximum draft of 18.35 metres.

## Communications

### TELECOMMUNICATIONS

#### Internal services

Telecommunications services throughout Australia are controlled by the Australian Telecommunications Commission (Telecom). Telephone services available include teleconferencing as well as the standard exchange and public telephone services. Other services available include radio paging, videotex, teletex, telex, cellular mobile telephone services and a range of services such as digital data services, ISDN and Virtual Private Networks, tailored for corporate customers.

**TABLE 19.19 – TELECOM OPERATIONS IN WESTERN AUSTRALIA**  
(Source: Telecom)

	1985–86	1986–87	1987–88
Telephone services (a)—			
Metropolitan (b)	427,542	448,038	469,984
Country	148,348	157,172	165,802
<b>Total</b>	<b>575,890</b>	<b>605,210</b>	<b>635,786</b>
Telex services (a)	5,206	4,686	3,339
Telex internal calls ('000) (c)	5,578	3,979	2,946
Data services (a)—			
Datel services	6,989	7,415	6,892
Digital data services	2,207	4,291	5,786

(a) At 30 June. (b) Within a 32 kilometre radius of the General Post Office, Perth. (c) Includes Post Office official traffic.

To improve the capacity and security of the service in Western Australia, some new developments have been undertaken including the installation of an optical fibre cable between Perth and Adelaide, due for completion in September 1989. A digital radio system and cable system was

installed between Perth and the Overseas Telecommunications Commission (OTC) premises at Gnangara to link with Melbourne and Sydney OTC gateway exchanges.

The Royal Flying Doctor Service of Australia, through its extensive radio network, provides general telegram and radio-telephone facilities in addition to medical aid and advice in remote areas.

#### External services

The Overseas Telecommunications Commission (OTC) is responsible for telecommunication services between Australia and other countries.

Australia, represented by the Commission, is a member of the management body of the International Telecommunications Satellite Consortium (INTELSAT) which, in 1964, established a global communications satellite system. The Commission operates five standard earth stations (Carnarvon and Perth in Western Australia, Ceduna in South Australia, Healesville in Victoria and Moree in New South Wales) which communicate via satellite with stations in other countries.

In addition to transmission via satellite, OTC also uses submarine cables and high frequency radio for its services.

The Commission operates a coastal radio service which provides essential maritime communications covering distress signals, air-sea rescue and naval traffic. OTC also provides communications with ships at sea. Coastal radio stations in Western Australia are located at Perth, Broome, Carnarvon, Esperance and Geraldton.



In association with Telecom, OTC provides telephone, electronic mail, television and many other telecommunications services to other countries.

Radio communication station operators in Australia are licensed by the Department of Transport and Communications. These stations can be run by either organisations or private individuals and can be licensed to operate from fixed or mobile points.

### Internal satellite communications services

Australia's National Satellite System is owned and operated by AUSSAT Pty Ltd, a company established in 1981 to provide internal satellite communications for Australia and neighbouring regions.

AUSSAT's first two satellites were launched from Cape Canaveral in the United States of America on the Space Shuttles *Discovery* and *Atlantis* in August and November 1985. They began commercial operations on 1 January 1986. A third satellite was launched in September 1987 from Kourou, French Guyana, on the European Space Agency's *Ariane* rocket.

The major access points to the satellite system are though the company's eight major City Earth Stations located in each capital city. In Western Australia, the station is located at Lockridge, eleven kilometres north-east of Perth. Two stations—Belrose in Sydney and Lockridge—are responsible for monitoring and controlling the status of the orbiting satellites (Tracking, Telemetry, Command and Monitoring Stations). The Lockridge facility is equipped with a tracking and telemetry dish, two communications antennas for sending and receiving telecommunications and broadcasting signals and a microwave tower for land-based signal sending and receiving.

Each satellite has two national beams in the 'uplink' direction (ground to satellite) that can receive signals from anywhere in Australia and from offshore regions. In the 'downlink' direction,

each has two national beams and four spot beams covering:

Western Australia (the Western Australian beam)

Queensland (the North-East beam)

South Australia, Northern Territory (the Central Australian beam)

New South Wales, Victoria, Tasmania, Lord Howe and Norfolk Islands (the South-East beam).

In addition the third satellite has a beam which covers the south-west Pacific region including New Zealand.

AUSSAT's domestic satellite communications system complements existing land-based communications systems. It provides Telecom services to remote areas and improved communications for mining and exploration companies; provides emergency service organisations with more reliable communications than land-based systems; enables government departments, financial institutions and businesses generally to use AUSSAT for voice, video and data transmission; provides improved communications links between air traffic control centres and aircraft; enables television and radio services to reach more remote areas through the Australian Broadcasting Service (ABS) Homestead and Community Broadcast Satellite Service (HACBSS) and a Remote Commercial Television Service (RCTS); and provides a more cost-effective and flexible means for establishing interactive distance education.

### Radio and television services

Radio broadcasting stations have operated in Western Australia since 1924 when station 6WF (Westralian Farmers) opened in Perth.

Full scale transmission from a television station in Western Australia began in 1959 with the commercial station TVW 7 (Channel 7).

TABLE 19.29 – RADIO AND RADIO TRANSLATOR STATIONS, 30 JUNE 1988  
(Source: Department of Transport and Communications)

Location			Location		
Commercial stations—			Commercial stations (continued)—		
Perth	Call sign	6GL	Bunbury	Call sign	6TZ
Perth		6KY	Carnarvon		(b) 6LN
Perth (96 FM)		(a) 6NOW	Collie		6CI
Perth		6PM	Karratha/Dampier/Roeboorne		(c) 6KA
Perth		6PR	Esperance		6SE
Albany		6VA	Geraldton		6GE
Bridgetown		6BY	Kalgoorlie		6KG

**TABLE 19.29 – RADIO AND RADIO TRANSLATOR STATIONS, 30 JUNE 1988 (continued)**  
(Source: Department of Transport and Communications)

Location		Location	
Commercial stations (continued)—		National stations (d) (continued)—	
Katanning	Call sign	Fitzroy Crossing	Call sign
Mandurah		Geraldton	(g) 6ABC
Merredin			6GN
Narrogin			(a) 6ABC-FM
Northam		Halls Creek	(g) 6ABC
Port Hedland		Kalbarri	(f) 6ABC
<b>Total</b>	<b>Number</b>	Kalgoorlie	6GF
	<b>20</b>		(a) 6ABC-FM
Public stations—		Karratha	6KP
Perth	Call sign		(f) 6ABC
Perth		Koolan Island	(g) 6ABC
Perth (Sonshine FM)			(a) 6ABC-FM
Rockingham (101 FM)		Kununurra	6KW
Fremantle (100 FM)			(f) 6ABC
Newman		Laverton	(f) 6ABC
<b>Total</b>	<b>Number</b>	Leonora	(f) 6ABC
	<b>6</b>	Manjimup	6MJ
National stations (d)—		Marble Bar	(g) 6ABC
Perth	Call sign	Mawson	(a) 6ABC-FM
Perth		Meekatharra	(g) 6ABC
Perth		Menzies	(f) 6ABC
Perth		Mount Magnet	(f) 6ABC
Albany		Newman	6MN
			(f) 6ABC
Argyle		Northam	6NM
Bridgetown		Onslow	(f) 6ABC
Broome		Pannawonica	6PN
			(f) 6ABC
Busselton		Paraburdoo	6PU
Bunbury			(f) 6ABC
Carnarvon		Port Hedland	6PH
Cue			(f) 6ABC
Dalwallinu		Ravensthorpe	(g) 6ABC
Dampier		Tom Price	6TP
Denham			(f) 6ABC
Derby		Wagin	6WA
		Wyndham	6WH
Esperance			(f) 6ABC
Exmouth		Yalgoo	(f) 6ABC
		<b>Total</b>	<b>Number</b>
			<b>67</b>

(a) FM station. (b) Related translator station: Exmouth. (c) Related translator stations: Paraburdoo, Tom Price. (d) Services include Metropolitan Radio, Regional Radio, Radio National, ABC-FM, Shortwave Regional Radio. (e) Shortwave. (f) A satellite fed FM re-broadcast service. (g) Two satellite fed FM re-broadcast services.

The Australian Broadcasting Tribunal is responsible for the licensing of all commercial radio and television stations with the national broadcasting and television services being under the control of the Australian Broadcasting Corporation (ABC). The Australian Broadcasting Tribunal (ABT) operates within a framework of complex provisions designed to ensure diversity of ownership and control of commercial broadcasting services, including cross media interests.

A Remote Commercial Television Service (RCTS) began operating in Western Australia in October 1986. Remote licences were introduced by the ABT to provide a service to currently underserved regions via the AUSSAT satellites and to ensure that remote area residents receive at least one commercial television service.

In June 1987 the ABC introduced a Second Regional Radio Network (SRRN) to provide people in rural areas with access to at least two services. Program material is provided for HACBSS listeners and country areas fed by satellite transmission.

The ABC simulcasts major orchestral concerts, ballets and operas using ABC TV and ABC-FM radio.

The Special Broadcasting Service (SBS) was extended to Perth in March 1986. Programs originate in Sydney and are relayed to transmitters in each State via the AUSSAT satellite.

**TABLE 19.30 – TELEVISION AND TELEVISION TRANSLATOR STATIONS**  
**30 JUNE 1988**

(Source: Department of Transport and Communications)

Location			Location		
Commercial television stations—			National Television Stations (continued)—		
Perth	Channel	NEW 10	Morawa	Channel	ABCMW 8
Perth	"	STW 9	Norseman	"	ABNW 7
Perth	"	TVW 7	Port Hedland	"	ABPHW 7
Bunbury	"	BTW 3	Roebourne	"	ABRBW 9
Katanning (a)	"	BTW 10	Southern Agricultural	"	ABAW 2
Kojonup (a)	"	BTW 66	Southern Cross—Bullfinch	"	ABSBW 9
Mawson (a)	"	BTW 11	<b>Total</b>	<b>Number</b>	<b>16</b>
Narrogin (a)	"	BTW 50	National Television Translator Stations (g)—		
Northam (a)	"	BTW 59	Albany	Channel	7 (ABAW 2)
Wagin (a)	"	BTW 6	Bayulu	"	45
Geraldton	"		Broome	"	8
Mingenew (b)	"	GTW 62	Cervantes	"	46
Morawa (b)	"	GTW 30	Cockatoo Island	"	9
Mullewa (b)	"	GTW 63	Coodingup—Howick	"	6 (ABEW10)
Kalgoorlie	"	VEW 8	Cue	"	10
Baandee (c)	"	VEW 3	Dalwallinu	"	46
Esperance (c)	"	VEW 9	Denham	"	8
Kambalda (c)	"	VEW 3	Derby	"	8
Koolyanobbing (c)	"	VEW 6	Eneabba	"	46
Merredin (c)	"	VEW 6	Exmouth	"	8
Norseman (c)	"	VEW 9	Fitzroy Crossing	"	58
Southern Cross (c)	"	VEW 10	Halls Creek	"	8
Southern Agricultural	"	GSW 9	Jurien Bay	"	55
Albany (d)	"	GSW 10	Kalbarri	"	9
<b>Total</b>	<b>Number</b>	<b>24</b>	Kambalda	"	5 (ABKW 6)
National Television Translator Stations (e)—			Katanning	"	7
Argyle Mine Site	Channel	ABW 69	Koolan Island	"	6
Goldsworthy	"	ABW 2	Koolyanobbing	"	11 (ABSBW 9)
Kojonup	"	ABW 69	Kununurra	"	9
La Grange	"	ABW 67	Lake Grace	"	33
Nullagine	"	ABW 50	Laverton	"	10
Shay Gap	"	ABW 2	Leeman	"	5A
Warburton	"	ABW 69	Leinster	"	10
Wiluna	"	ABW 69	Leonora	"	8
<b>Total</b>	<b>Number</b>	<b>8</b>	Marble Bar	"	8
Remote Commercial Television Service			Meekatharra	"	8
(RCTS) (f)	Channel	WAW	Menzies	"	10
<b>Total</b>	<b>Number</b>	<b>1</b>	Merredin	"	8
Special Broadcasting Service (SBS)—			Mount Magnet	"	8
Perth	Channel	SBS 28	Mullewa	"	9 (ABGW 6)
<b>Total</b>	<b>Number</b>	<b>1</b>	Narrogin	"	57
National Television Stations—			Newman	"	7
Perth	Channel	ABW 2	Northampton	"	8 (ABGW 6)
Bunbury	"	ABSW 5	Onslow	"	8
Carnarvon	"	ABCNW 7	Pannawonica	"	11
Central Agricultural	"	ABCW 5A	Paraburdoo	"	6
Dampier	"	ABDW 10	Ravensthorpe	"	11
Esperance	"	ABEW 10	Salmon Gums	"	8
Geraldton	"	ABGW 6	Teutonic Bore	"	9
Kalgoorlie	"	ABKW 6	Tom Price	"	10
Karratha	"	ABKAW 7	Wagin	"	8
Moora	"	ABW 60	Wongan Hills	"	6
			Wyndham	"	10
			Yalgoo	"	10
			<b>Total</b>	<b>Number</b>	<b>46</b>

(a) Translator station, parent channel is BTW 3. (b) Translator station, parent channel is GTW 11. (c) Translator station, parent channel is VEW 8. (d) Translator station, parent channel is GSW 9. (e) Established under the self help broadcasting reception scheme (SBRs). (f) A satellite based service which replaces the service provided by the television repeater stations previously operating as well as providing a service to other remote areas in the northwest of WA. Currently covers 37 localities. (g) For translator stations where the parent station is not ABW 2 the parent station is shown in brackets.

## POSTAL SERVICES

Postal services throughout Australia are controlled by the Australian Postal Commission (Australia Post). Postal services made available by Australia Post include courier electronic mail services and standard mail services.

**TABLE 19.31 – AUSTRALIA POST OPERATIONS  
WESTERN AUSTRALIA**  
(Source: Australia Post)

	1985–86	1986–87	1987–88
Post offices at 30 June (a)	411	400	400
Postal articles handled (b) ('000)—			
Posted for delivery within Australia	241,081	252,084	266,774
Posted for delivery overseas	11,733	13,039	14,626
Received from overseas	12,398	12,988	13,402
<b>Total</b>	<b>265,212</b>	<b>265,123</b>	<b>294,802</b>

(a) Official and non-official. (b) Includes standard letters, non-standard and registered articles and parcels.

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## Chapter 20

### FOREIGN AND INTERSTATE TRADE

Foreign trade statistics are compiled from information contained in documents prepared by importers and exporters or their agents in accordance with the Customs Act. Particulars of Western Australia's foreign trade, as presented in this Chapter, are derived from data supplied by the Australian Bureau of Statistics (ABS), Canberra.

Statistics of Western Australia's trade with other Australian States are compiled by the Western Australian Office of the ABS from information contained in documents collected under authority of the *Census and Statistics Act 1905* from importers, exporters and other persons concerned with the distribution of goods.

#### The Customs Tariff

The first Commonwealth Customs Tariff was introduced on 8 October 1901, from which date uniform duties came into effect throughout Australia. The Australian Customs Tariff was developed in conformity with the policy of protecting economic and efficient Australian industries and of granting preferential treatment to imports from certain countries. Duties are imposed on some goods, generally of a luxury nature, for revenue purposes. Customs collections are a major source of revenue, but in its protective character the tariff has an important influence on the Australian economy.

The Australian Customs Tariff in use until December 1987 was introduced on 1 July 1965. The nomenclature used in the Tariff is that of the Convention on Nomenclature for the Classification of Goods in Customs Tariffs, an international agreement signed at Brussels on 15 December 1950. The system of naming established by the Convention is known as the 'Customs Co-operation Council Nomenclature' (previously the Brussels Tariff Nomenclature).

#### Classification of Commodities

Foreign imports and exports are classified according to the Australian Import and Export Commodity Classifications of some 6,000 import items and 2,500 export items. These classifications are based on the *United Nations Standard International Trade Classification*,

*Revision 2*, which is closely related to the Customs Co-operation Council Nomenclature used in the Australian Customs Tariff. The standard International Trade Classification consists of 10 broad commodity categories designated 'Sections' and comprising 62 commodity 'Divisions' which are further divided into 233 commodity 'Groups'. The structure of the classification serves to provide a summary of data relating to 1,818 basic items of international trade.

Interstate imports and exports are classified according to Interstate Trade Commodity Classifications which are based on the Australian Export Commodity Classification and the Australian Import Commodity Classification. The basic items of the Australian classifications are compressed or expanded according to their significance in Western Australia's trade to form interstate trade commodity categories.

#### The Harmonised Commodity Description and Coding System

On 1 January 1988, Australia adopted the new Harmonised Commodity Description and Coding System (H.C.D.C.S.). This system will be used internationally and replaces the Australian Import Commodity Classification and the Customs Tariff which are mentioned earlier in the chapter. The new classification for imports is the Australian Harmonised Import Commodity Classification (A.H.I.C.C). The Australian Harmonised Export

Commodity Classification (A.H.E.C.C.) replaces the Australian Export Commodity Classification.

These new classifications, which are based on the H.C.D.C.S., update those used formerly to reflect technological development and changes in international trade. They provide international uniformity in classifying and coding goods, and simplify the task of collecting, analysing and comparing foreign trade statistics. The A.H.I.C.C. and A.H.E.C.C. contain some 8,200 and 6,300 items respectively.

From January 1988, all import and export transactions are reported to the Australian Customs Service according to the H.C.D.C.S. classifications.

### Valuation of Items of Trade

**Foreign Trade.** All values in foreign trade statistics are determined on a 'free on board (f.o.b.) port of shipment' basis. This means that all charges (in particular the cost of freight and insurance) incurred after the goods have been exported from the port of shipment are excluded. Only transport and service charges incurred, or usually incurred, prior to export are included in the determination of trade values.

*Re-exports* are defined as goods, materials or articles which are exported either in the same condition as they were in when imported, or after minor repair or operations which leave them unchanged. These minor operations include blending, packaging, bottling, cleaning, sorting, husking or shelling.

**Interstate Trade.** Statistics of goods imported from other Australian States are recorded in terms of landed cost. The basis of valuation for goods exported to other Australian States is f.o.b., or its equivalent, at the point of final shipment.

### Direction of Trade

The term *Country of Origin*, as used in recording the statistics of foreign trade, means the country of production; *Country of Destination* means the country to which goods were consigned at the time of export. In compiling statistics of Western Australia's interstate imports and exports, goods are classified according to the State or Territory from which or to which they were consigned.

**TABLE 20.1 — VALUE OF IMPORTS INTO AND EXPORTS FROM WESTERN AUSTRALIA CLASSIFIED ACCORDING TO ORIGIN OR DESTINATION:**  
1986-1987  
(\$'000)

<i>Origin or destination</i>	<i>Imports</i>	<i>Exports</i>
Interstate (a)	5,071,476	1,805,667
Overseas—		
Argentina	4,607	62,498
Bahrain	4,725	59,112
Bangladesh	478	2,912
Belgium-Luxembourg	19,307	91,652
Brazil	4,578	12,531
Canada	67,848	166,195
China		
excluding Taiwan Province	16,618	448,875
Taiwan Province only	67,978	148,066
Christmas Island	6,449	2,959
Denmark	10,654	1,088
Egypt, Arab Republic of	29	126,608
Fiji	158	18,779
Finland	18,977	19,285
France	137,211	149,375
Germany, Democratic Republic of	1,121	6,431
Germany, Federal Republic of	134,469	199,907
Hong Kong	24,515	167,674
India	20,703	31,163
Indonesia	116,328	163,233
Iran, Islamic Republic of	228	73,751
Italy	88,788	148,080
Japan	472,643	1,996,217
Jordan	2	195
Korea, Republic of	37,652	233,027
Kuwait	29,887	19,142
Libyan Jamahiriya	—	20,617
Malaysia	26,586	85,410
Nauru, Republic of	12,889	53
Netherlands, Kingdom of the	126,616	117,735
New Zealand	48,398	29,393
Norway	9,739	560
Pakistan	3,087	13,163
Papua New Guinea	1,758	9,472
Philippines, Republic of	4,526	37,400
Poland	978	10,321
Qatar	64,025	9,986
Saudi Arabia	54,594	43,644
Singapore, Republic of	125,736	120,948
South Africa, Republic of	19,028	68,448
Spain	7,745	37,245
Sri Lanka	3,097	2,798
Sweden	25,024	1,738
Switzerland	19,171	277,208
Thailand	16,170	13,688
Union of Soviet Socialist Republics	1,269	227,689
United Arab Emirates	5,977	77,959
United Kingdom	213,310	205,577
United States of America	344,991	923,940
Yemen, People's Democratic	—	3,433
Yugoslavia, Republic of	2,110	10,883
Zimbabwe	282,903	429
Other countries, country unknown and re-exports	62,983	128,459
Ships' stores	—	84,476
<i>Total overseas</i>	<i>2,768,663</i>	<i>6,911,427</i>
<b>Total</b>	<b>7,840,139</b>	<b>8,717,094</b>

(a) Excludes interstate value of horses. Also excludes value of interstate ships' stores.

**TABLE 20.2 — VALUE OF FOREIGN EXPORTS  
OF SELECTED COMMODITIES  
MAIN COUNTRIES OF DESTINATION: 1986-87  
(\$'000)**

<i>Commodity and destination</i>	<i>Value</i>
Iron ore and concentrates—	
Japan	974,732
China – excluding Taiwan Province	186,326
Korea, Republic of	134,991
Germany, Federal Republic of	95,943
Taiwan	80,264
United Kingdom	60,830
France	54,821
Philippines, Republic of	30,203
Italy	28,161
Belgium – Luxembourg	16,815
Netherlands, Kingdom of the	14,974
Pakistan, Islamic Republic of	9,962
<b>Total exports</b>	<b>1,701,851</b>
Wheat, unmilled —	
China – excluding Taiwan Province	163,051
Egypt, Arab Republic of	126,602
Japan	117,437
Indonesia	68,493
Iran	65,749
Union of Soviet Socialist Republics	47,786
Malaysia	35,449
Korea, Republic of	20,854
Yemen, Arab Republic	15,113
South Africa, Republic of	10,704
Thailand	7,936
<b>Total exports</b>	<b>697,557</b>
Wool, greasy—	
Union of Soviet Socialist Republics	178,547
Japan	94,681
France	62,050
Germany, Federal Republic of	44,856
Italy	41,208
China – excluding Taiwan Province	20,439
Korea, Republic of	17,370
Belgium – Luxembourg	15,316
United States of America	14,858
Taiwan	13,380
United Kingdom	10,121
Poland	9,349
Spain	9,230
<b>Total exports</b>	<b>573,486</b>
Gold bullion—	
Japan	266,219
Hong Kong	83,814
United Kingdom	66,096
<b>Total exports</b>	<b>479,790</b>
Petroleum and petroleum products—	
United States of America	36,581
Polynesia (French)	23,715
Singapore, Republic of	22,415
Fiji	17,529
<b>Total exports</b>	<b>174,772</b>
Barley, unmilled—	
Japan	16,833
Brazil	7,933
Peru	4,161
Chile	3,670
<b>Total exports</b>	<b>39,880</b>

**TABLE 20.2 — VALUE OF FOREIGN EXPORTS  
OF SELECTED COMMODITIES  
MAIN COUNTRIES OF DESTINATION: 1986-87  
(\$'000) (continued)**

<i>Commodity and destination</i>	<i>Value</i>
Wool, degreased—	
Japan	40,525
Italy	31,938
China – excluding Taiwan Province	27,288
United States of America	26,678
<b>Total exports</b>	<b>157,865</b>
Rock lobsters, whole and tails, fresh or frozen—	
United States of America	77,434
Japan	60,960
<b>Total exports</b>	<b>143,665</b>
Salt—	
Japan	31,711
Taiwan	6,868
Korea, Republic of	5,878
<b>Total exports</b>	<b>49,111</b>
Live sheep and lambs for human consumption—	
Saudi Arabia	30,385
Libyan Jamahiriya	19,741
Kuwait	15,200
United Arab Emirates	11,225
Qatar	9,515
<b>Total exports</b>	<b>102,091</b>
Beef and veal, fresh, chilled or frozen—	
United States of America	50,910
Taiwan	9,979
<b>Total exports</b>	<b>88,348</b>
Feeding stuff for animals (a)—	
Netherlands, Kingdom of the	45,955
Japan	12,969
<b>Total exports</b>	<b>94,917</b>
Zirconium—	
Japan	26,309
<b>Total exports</b>	<b>59,381</b>
Ilmenite and Leucocene (b)—	
United States of America	16,476
<b>Total exports</b>	<b>55,398</b>
Mutton and lamb, fresh, chilled or frozen—	
Japan	10,066
United Kingdom	4,919
<b>Total exports</b>	<b>50,305</b>
Rutile—	
United States of America	17,292
Japan	8,018
<b>Total exports</b>	<b>38,543</b>
Hides and skins—	
Italy	15,051
<b>Total exports</b>	<b>40,292</b>

(a) Excludes unmilled cereals. (b) Excludes beneficiated ilmenite.

TABLE 20.3 — VALUE OF FOREIGN TRADE WITH SELECTED COUNTRIES BY SELECTED DIVISIONS: 1986-87  
(\$'000)

Division	Description	Imports				Exports			
		Japan	United States of America	United Kingdom	All countries	Japan	United States of America	United Kingdom	All countries
01	Meat and meat preparations	—	160	193	814	16,085	51,581	6,893	150,619
03	Fish, crustaceans and molluscs, and preparations thereof	3,088	912	1,482	39,603	104,378	79,195	34	201,600
04	Cereals and cereal preparations	116	471	435	5,378	157,136	14	56	766,738
05	Vegetables and fruit	58	2,877	431	17,188	256	241	668	35,756
08	Feeding stuff for animals (excluding unmilled cereals)	21	2,442	4	5,852	12,969	—	188	94,917
11	Beverages	55	1,002	2,454	11,815	—	24	239	1,065
24	Cork and wood	—	1,626	—	12,496	—	1,248	2,291	4,199
26	Textile fibres (other than wool tops) and their wastes (not manufactured into yarn or fabric)	1,345	29	1,233	11,316	135,210	41,538	16,737	731,687
27	Crude fertilisers and crude minerals (excluding coal, petroleum and precious stones)	110	3,461	184	51,982	41,091	2,023	68	67,121
28	Metalliferous ores and metal scrap	108	2,165	48	3,126	1,020,065	40,509	83,253	1,873,164
29	Crude animal and vegetable materials, n.e.s.	1,154	364	183	8,684	3,575	860	70	15,300
33	Petroleum, petroleum products and related materials	11	712	1,364	352,465	—	36,582	12	174,772
51	Organic chemicals	4,153	3,339	3,203	19,823	—	—	—	16
52	Inorganic chemicals	3,159	14,139	10,918	47,619	600	622	—	12,501
56	Fertilisers, manufactured	985	13,981	162	30,452	—	—	—	1,756
58	Artificial resins and plastic materials and cellulose esters and ethers	2,23	3,850	3,786	24,627	191	1,008	—	1,776
59	Chemical materials and products, n.e.s.	632	5,745	10,807	30,137	55	236	—	1,229
62	Rubber manufactures, n.e.s.	29,864	3,806	2,345	51,893	4	—	—	231
64	Paper, paperboard, and articles of paper pulp, of paper or of paperboard	7,156	1,288	2,662	52,130	21	88	31	3,436
65	Textile yarn, fabrics, made-up articles, n.e.s. and related products	3,530	1,881	3,845	46,211	33	29	—	647
66	Non-metallic mineral manufactures, n.e.s.	4,199	7,195	3,122	50,464	1,911	632	37	9,284
67	Iron and steel	45,781	2,906	22,129	90,694	2	—	—	916
68	Non-ferrous metals	868	336	531	5,48	—	335	2,543	3,680
69	Manufactures of metal, n.e.s.	20,488	10,026	5,310	68,588	1,382	447	22	12,143
71	Power generating machinery and equipment	16,567	30,106	4,296	75,040	46	100	77	2,345
72	Machinery specialised for particular industries	34,681	51,069	35,538	194,240	23	1,298	206	24,916
73	Metalworking machinery	1,211	1,572	1,265	11,148	—	16	226	1,015
74	General industrial machinery and equipment, n.e.s. and machine parts, n.e.s.	71,161	35,740	13,052	206,986	15	528	148	3,865
75	Office machines and automatic data processing equipment	4,140	11,615	932	27,373	—	2,588	99	6,088
76	Telecommunications and sound recording and reproducing apparatus and equipment	26,381	4,272	1,412	43,249	2	8	30	438
77	Electrical machinery, apparatus and appliances, n.e.s. and electrical parts	30,148	11,129	8,870	73,963	5	317	53	3,462
78	Road vehicles (including air cushion vehicles)	114,465	52,601	5,424	221,181	15	45	3	655
79	Other transport equipment	869	4,969	12,018	61,601	1,668	1,544	613	35,029
87	Professional, scientific and controlling instruments and apparatus, n.e.s.	4,343	13,715	4,976	34,331	5	660	215	2,341
88	Photographic apparatus, equipment and supplies and optical goods, n.e.s., watches and clocks	2,246	893	1,504	8,966	—	1,313	112	1,847
Total (a)		448,663	332,800	202,715	2,545,141	1,957,610	846,355	204,996	6,667,949

(a) Includes details not available for publication and divisions not shown separately.



TABLE 20.4 — VALUE OF INTERSTATE IMPORTS AND EXPORTS (a) — SELECTED DIVISIONS (\$'000)

Division	Description	Imports			Exports		
		1984-85	1985-86	1986-87	1984-85	1985-86	1986-87
00	Live animals, chiefly for food	9,299	7,050	6,273	5,933	2,900	7,688
01	Meat and meat preparations	30,471	41,573	44,455	10,527	10,259	12,010
02	Dairy products and birds' eggs	37,905	43,889	56,345	n.p.	n.p.	n.p.
03	Fish, crustaceans and molluscs, and preparations thereof	6,990	10,160	13,180	16,391	28,348	51,841
04	Cereal grains and cereal preparations	54,770	64,148	66,001	2,004	2,364	3,465
05	Vegetables and fruit	90,730	94,827	105,334	6,124	7,928	8,775
06	Sugar, sugar preparations and honey	29,105	33,173	45,623	n.p.	n.p.	n.p.
07	Coffee, tea, cocoa, spices and manufactures thereof	55,731	65,407	80,431	753	967	n.p.
08	Feeding stuff for animals (excluding unmilled cereals)	23,214	28,090	31,939	n.p.	n.p.	n.p.
11	Beverages	67,413	78,836	104,919	n.p.	n.p.	n.p.
12	Tobacco and tobacco manufactures	123,211	140,661	152,853	—	—	n.p.
24	Cork and wood	6,024	6,039	5,897	n.p.	n.p.	n.p.
28	Metalliferous ores and metal scrap	—	n.p.	—	257,314	251,354	225,802
51	Organic chemicals	14,550	13,483	14,692	n.p.	n.p.	n.p.
52	Inorganic chemicals	22,341	27,533	29,281	n.p.	n.p.	n.p.
53	Dyeing, tanning and colouring materials	27,476	32,584	35,917	n.p.	1,886	n.p.
54	Medicinal and pharmaceutical products	77,237	87,655	110,516	n.p.	n.p.	n.p.
55	Essential oils and perfume materials; toilet, polishing and cleansing preparations	98,676	116,906	127,908	104	134	157
58	Artificial resins and plastic materials, and cellulose esters and ethers	68,475	97,197	86,798	4,056	4,862	7,006
62	Rubber manufactures, n.e.s.	49,731	36,041	43,672	4,053	3,885	5,152
63	Cork and wood manufactures (excluding furniture)	15,045	15,310	14,893	n.p.	n.p.	n.p.
64	Paper, paperboard, and articles of paper pulp, of paper or of paperboard	107,611	130,445	156,023	16,062	18,368	21,716
65	Textile yarn, fabrics, made-up articles n.e.s. and related products	137,260	153,600	150,993	n.p.	n.p.	22,284
66	Non-metallic mineral manufactures, n.e.s.	48,081	60,576	66,784	15,283	16,606	18,969
67	Iron and steel	229,800	293,811	290,827	26,042	26,287	25,647
68	Non-ferrous metals	53,314	61,803	67,287	10,170	13,813	15,794
71	Power generating machinery and equipment	44,580	39,769	44,723	6,446	6,810	9,366
72	Machinery specialised for particular industries	140,235	143,507	158,580	68,073	47,326	41,803
73	Metalworking machinery	10,198	9,713	11,081	4,603	4,658	6,553
74	General industrial machinery and equipment, n.e.s. and machine parts n.e.s.	166,972	189,730	211,250	22,135	30,664	45,074
75	Office machines and automatic data processing equipment	118,888	123,176	131,467	2,347	4,898	6,306
76	Telecommunications and sound recording and reproducing apparatus and equipment	102,510	98,804	162,662	3,343	2,960	9,231
77	Electrical machinery, apparatus and appliances, n.e.s. and electrical parts thereof	199,858	225,502	270,910	5,821	7,851	8,036
78	Road vehicles (including air cushion vehicles)	584,214	606,560	579,322	9,292	13,188	17,107
81	Sanitary, plumbing, heating and lighting fixtures and fittings, n.e.s.	17,798	18,639	25,090	n.p.	n.p.	1,927
82	Furniture and parts thereof	22,962	23,069	28,529	56,288	47,069	40,628
84	Articles of apparel and clothing accessories	178,261	189,118	253,345	54,575	64,243	43,499
85	Footwear	52,138	67,102	70,471	1,530	2,136	2,681
87	Professional, scientific and controlling instruments and apparatus, n.e.s.	55,816	70,002	98,752	1,930	2,846	3,334
88	Photographic apparatus, equipment and supplies and optical goods, n.e.s., watches and clocks	42,701	48,037	51,072	877	1,657	2,014
<b>Total (a) (b)</b>		<b>4,291,229</b>	<b>4,816,921</b>	<b>5,071,476</b>	<b>1,507,370</b>	<b>1,623,017</b>	<b>1,805,667</b>

(a) Excludes the value of horses. Also excludes the value of interstate ships' stores. (b) Includes details not available for publication and divisions not shown separately.

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## Chapter 21

### EMPLOYMENT AND INDUSTRIAL CONDITIONS

In addition to the employment data appearing in this Chapter, references to the number of persons engaged in particular activities are to be found elsewhere in the Year Book. Chapter 10, for example, shows numbers engaged in teaching and Chapter 8 contains details of hospital staff. Employment in building appears in Chapter 18. Chapter 14 provides information on employment in mining, and Chapter 16 includes tables relating wholly, or in part, to employment in factories. Chapter 17 gives numbers employed in retail establishments.

#### THE LABOUR FORCE

Fundamental to the measurement of employment is the concept of the labour force. The labour force is defined broadly as those persons aged 15 and over who, during a particular week, are either employed or unemployed. The labour force represents the total official supply of labour available to the labour market during a given week. Estimates of the labour force are obtained through the Population Survey, which is conducted monthly by means of personal interviews at a sample of households throughout Australia. The survey provides particulars of the demographic and labour force characteristics of the population.

**TABLE 21.1 – LABOUR FORCE STATUS**  
(’000 persons)

<i>Labour force status</i>	<i>August</i>	
	<i>1983</i>	<i>1988</i>
<b>MALES</b>		
Employed	358.7	432.1
Unemployed	38.4	28.8
Not in labour force	112.8	134.2
<b>Total</b>	<b>510.0</b>	<b>595.0</b>
<b>FEMALES</b>		
Employed	215.7	280.2
Unemployed	21.8	21.9
Not in labour force	271.1	290.5
<b>Total</b>	<b>508.6</b>	<b>592.6</b>

Detailed estimates of employees by industry are also collected from employers through a quarterly

Survey of Employment and Earnings. All wage and salary earners are represented in the survey except employees of enterprises mainly engaged in agriculture, forestry, fishing and hunting; employees in private households employing staff; employees of foreign embassies and members of defence forces.

One of the most important labour force measurements is the participation rate, which represents the proportion of the working age population who are in the labour force. Analysis of the participation rates provides the basis for monitoring changes in the size and composition of labour supply, particularly in terms of age, sex and marital status.

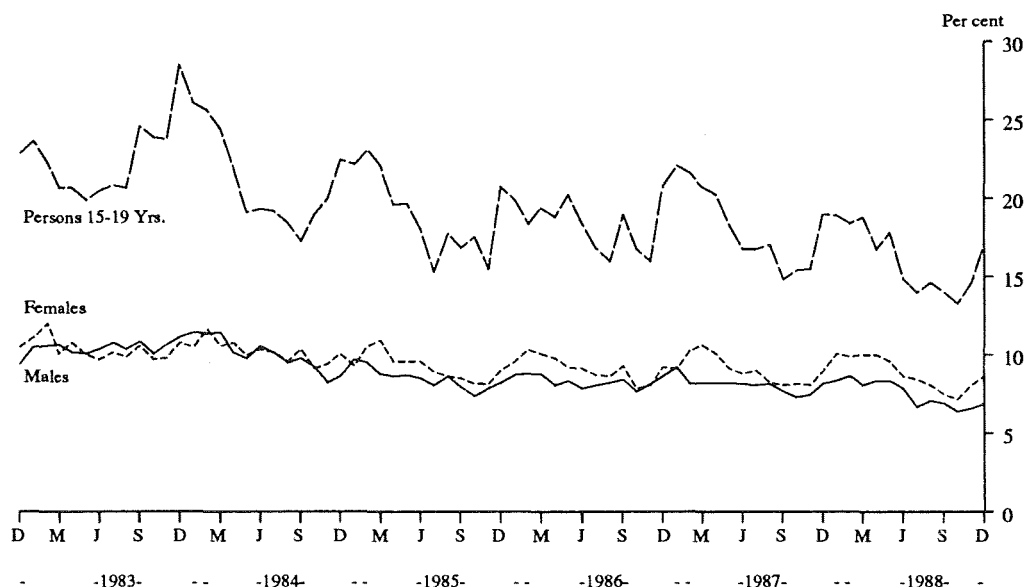
Between August 1983 and August 1988 male labour force participation rates decreased in the age groups 20–24, 35–44, 45–54 and 55–64. Female labour force participation rates, however, increased over all age groups in the same period, except the 15–19 years group, which recorded a decrease of 4.7 per cent.

**TABLE 21.2 – LABOUR FORCE PARTICIPATION RATES**  
(per cent)

<i>Age group</i>	<i>August</i>	
	<i>1983</i>	<i>1988</i>
<b>MALES</b>		
15 – 19	60.2	61.3
20 – 24	88.8	88.1
25 – 34	94.8	95.9
35 – 44	96.0	95.9
45 – 54	91.6	90.7
55 – 64	64.7	60.1
65 +	8.3	8.9
<b>Total</b>	<b>77.9</b>	<b>77.5</b>
<b>FEMALES</b>		
15 – 19	62.4	57.7
20 – 24	66.6	71.0
25 – 34	53.6	62.4
35 – 44	59.7	67.7
45 – 54	52.0	59.2
55 – 64	22.0	22.1
65 +	*1.8	3.1
<b>Total</b>	<b>46.7</b>	<b>51.0</b>

\* Subject to sampling variability too high for most practical purposes.

**DIAGRAM 21.1**  
**UNEMPLOYMENT RATES : WESTERN AUSTRALIA**  
 (The unemployed in each group as a percentage of the civilian labour force in the same group)



Another valuable insight into the labour market derived from the Labour Force Survey relates to employment status. Details are shown in Table 21.3 with additional information relating to the marital status of females in the labour force.

**TABLE 21.3 - LABOUR FORCE—EMPLOYMENT STATUS**  
 ('000 persons)

Employment status	August			
	1983		1988	
	Married females	Persons	Married females	Persons
Employer	10.4	35.9	11.9	41.1
Self-employed	18.3	66.4	23.3	89.5
Wage or salary earner	108.6	469.9	137.9	573.6
Helper, unpaid	*0.7	2.3	3.6	8.1
Unemployed	8.2	60.3	7.2	50.7
Not in labour force	174.9	383.9	177.9	424.6
<b>Total</b>	<b>321.1</b>	<b>1,018.6</b>	<b>361.8</b>	<b>1,187.6</b>

\* Subject to sampling variability too high for most practical purposes.

The composition of the employed labour force remained relatively constant when comparing August 1983 and August 1988. The number of employers increased from 35,900 (6.2 per cent) to 41,100 (5.8 per cent); self employed persons from

66,400 (11.6 per cent) to 89,500 (12.6 per cent) and wage and salary earners (including unpaid helpers) from 472,200 (82.2 per cent) to 581,700 (81.7 per cent).

In the same period total employment increased by 137,800 persons from 574,500 to 712,300 and unemployment decreased from 60,300 persons to 50,700 persons. This represented a decrease in the unemployment rate of 2.9 per cent—from 9.5 per cent to 6.6 per cent.

The employment of married females increased from 137,900 to 176,700 which represented a proportional increase of 2.8 per cent. The number of unemployed married females decreased from 8,200 to 7,200, a decrease of 1.7 per cent in the unemployment rate over the period.

In the five years between August 1983 and August 1988 the pattern of employment between industries varied only slightly. Almost 50 per cent of employed persons worked in one of the three major industries: Wholesale and retail trade, Community services or Manufacturing. Other industries which employed in excess of 5 per cent of the labour force were Agriculture, forestry, fishing and hunting; Construction; Transport and

storage; Finance, property and business services; and Recreation, personal and other services.

**TABLE 21.4 – EMPLOYED PERSONS BY INDUSTRY**  
(‘000 persons)

Industry division	August	
	1983	1988
Agriculture, forestry, fishing and hunting	51.6	57.3
Mining	23.8	26.3
Manufacturing	70.0	87.0
Electricity, gas and water	12.7	10.0
Construction	37.6	59.0
Wholesale and retail trade	111.3	143.2
Transport and storage	36.9	35.8
Communication	9.6	10.2
Finance, property and business services	52.3	77.5
Public administration and defence	21.3	29.2
Community services	111.3	122.8
Recreation, personal and other services	36.0	53.8
<b>Total all industries</b>	<b>574.5</b>	<b>712.3</b>

In this period teenage unemployment rates, that is for persons aged from 15 to 19 years, were between 6% and 18% higher than unemployment rates for all males and all females. Teenage unemployment peaked at 28.4% in December 1983. All male and all female unemployment rates for the same period were 10.5% and 10.1% respectively. Teenage unemployment was at its lowest in October 1988 at a rate of 12.7%.

All female unemployment peaked at 11.4% in February 1983 and was at its lowest in October 1988 at 6.4%. Male unemployment was also at its lowest in October 1988 with a rate of 5.6% and at its highest in January and March of 1984 with a rate of 10.8%.

### LABOUR COSTS

**TABLE 21.5 — MAJOR LABOUR COSTS – PRIVATE SECTOR**

Type of Cost	1985–6		1986–7	
	(\$m)	(%)	(\$m)	(%)
Gross wage and salaries	5,594	91.7	6,475	90.6
Other	505	8.3	674	9.4
Payroll tax	182	3.0	237	3.3
Workers compensation	149	2.4	187	2.6
Superannuation	174	2.9	202	2.8
Fringe benefits tax	(a)	(a)	48	0.7
<b>Total</b>	<b>6,100</b>	<b>100.0</b>	<b>7,149</b>	<b>100.0</b>

(a) Fringe benefits tax was introduced on 1 July 1986.

Labour costs are defined as all costs incurred by employers in the employment of labour. The full range of labour costs comprises earnings, payroll tax, workers compensation, superannuation, fringe benefits tax, fringe benefits, welfare services, training and recruitment. It is considered that the

first five categories listed account for over 90 per cent of all labour costs.

The composition of major labour costs remained relatively constant between 1985–86 and 1986–87, although the cost of gross wages and salaries for each employee increased from \$16,340 to \$18,788 (15%). Payroll tax for each employee increased by 29.6%, workers compensation by 23.4% and superannuation by 14.9%.

**TABLE 21.6 MAJOR LABOUR COSTS PER EMPLOYEE**

Type of Cost	Cost per employee			
	1985–6		1986–7	
	(\$)	(%)	(\$)	(%)
Gross wages and salaries	16,340	100.0	18,788	100.0
Other	1,480	9.1	1,955	10.4
Payroll tax	530	3.2	687	3.7
Workers compensation	440	2.7	543	2.9
Superannuation	510	3.1	586	3.1
Fringe benefits tax	(a)	(a)	139	0.7
<b>Total</b>	<b>17,820</b>	<b>–</b>	<b>20,743</b>	<b>–</b>

(a) Fringe benefits tax was introduced on 1 July 1986.

### COMMONWEALTH EMPLOYMENT SERVICE

The main functions of the Commonwealth Employment Service are to assist people seeking employment to obtain positions best suited to their training, experience, abilities and qualifications, and to assist employers seeking labour to obtain employees best suited to the kinds of work being offered. Specialised assistance is provided for young people, the disabled, Aborigines, disadvantaged groups, rural workers and persons with professional and technical qualifications. Professional counselling provided without charge by a staff of qualified psychologists is available to any person, but it is provided particularly for those persons identified by officers of the Commonwealth Employment Service as being disadvantaged or suffering a major handicap relating to employment.

The Commonwealth Employment Service also administers several Departmental labour market programs designed to assist the following groups: industries endeavouring to overcome skill shortages; individuals who, because of inadequate, inappropriate or outdated skills, have been displaced from the workforce; unemployed young people looking for employment; and other disadvantaged groups (including sole supporting parents, long term unemployed and others).

There is a Relocation Assistance Scheme designed to assist eligible job-seekers who are unlikely to

secure continuing employment in their present locality to move and to allow them to take up continuing employment in another locality within Australia. Special assistance programs providing subsidised employment ranging from apprenticeships to formalised training are available for Aboriginal people. Jobstart, an Integrated Wage Subsidy Program for all persons aged 15 years and over provides for on-the-job subsidised work experience to assist trainees to acquire new skills or update their current skills. Financial assistance is provided to disadvantaged job-seekers aged 18 years and over, enabling them to participate in flexible training arrangements leading to identified employment opportunities in the labour market. Other disadvantaged young people can also access this program.

The Australian Traineeship Program is a training program for all 16–18 year olds. In some cases 15 and 19 year olds may also be included. Under this program a traineeship is very similar to a one year apprenticeship where the young person is paid while training both with an employer and at an education institution. During this period trainees receive a wide range of skills which lead to a qualification recognised by employers.

Skillshare, a community based program, enables long term unemployed, particularly those unemployed for 12 months or more, and other disadvantaged unemployed to obtain and retain employment or to proceed to further education or training. This is achieved through the provision of a range of structured skills training, open access services and enterprise activities, by groups in the community with demonstrated capacity to deliver such service.

There is a Commonwealth Rebate for Apprentice Full Time Training applicable to all apprentices who began their training after 14 January 1977 to encourage employers to train apprentices.

## INDUSTRIAL AUTHORITIES

### Federal authorities

**Federal Court of Australia.** The Federal Court of Australia comprises an Industrial Division and a General Division. The Industrial Division deals with all proceedings under the Conciliation and Arbitration Act and related legislation. A single Judge and the Australian Conciliation and Arbitration Commission may refer a question of law for the opinion of the Court. Appeal from a judgement of a Full Court may, in certain circumstances, be made to the High Court of Australia.

**Australian Conciliation and Arbitration Commission.** The Commission has jurisdiction in respect of the prevention and settlement of industrial disputes extending beyond the limits of any one State. The work of the Commission is normally done by individual members; however, certain matters must be determined by a Full Bench of the Commission consisting of at least three members, of whom not less than two are presidential members. A Full Bench of the Commission also deals with appeals and references from single members of the Commission.

### Western Australian authorities

The Western Australian Industrial Relations Commission can inquire into any industrial matter and make an award, order or declaration relating to such matter. 'Industrial Matter' refers generally to any matter affecting or relating to the work, privileges, rights, or duties of employers or employees in any industry and includes any matter relating to the wages, salaries, allowances, or other remuneration of employees or the prices to be paid in respect of their employment; the hours of employment, leave of absence, sex, age, qualification, or status of employees and the mode, terms and conditions of employment including conditions which are to take effect after the termination of employment. The Commission may also make inquiries where industrial action has occurred or is likely to occur.

TABLE 21.7 – INDUSTRIAL AWARDS, EMPLOYEE AND EMPLOYER ORGANISATIONS AND MEMBERS REGISTERED (a) : AT 30 JUNE

	1983	1988
Awards in force	488	610
Employee organisations (a)—		
Number	66	70
Membership	176,065	186,608
Employer organisations (a)—		
Number	14	15
Membership	2,138	2,825

(a) Before 1 March 1985 the term 'union' was used in lieu of 'organisation'.

The Commission in Court Session may make General Orders, hear matters referred by the Commission, and hear appeals from decisions of Boards of Reference.

The Full Bench of the Commission may hear matters on questions of law and appeals from decisions of the Commission and Industrial Magistrates.

An appeal lies to the Western Australian Industrial Appeal Court from decisions of the President of

the Western Australian Industrial Relations Commission, the Full Bench or the Commission in Court Session but only on the ground that the decision is erroneous in law or in excess of jurisdiction.

### EMPLOYER ORGANISATIONS

Both the Confederation of Western Australian Industry (Incorporated) and the Australian Mines and Metals Association (Incorporated) represent employers in all aspects of the negotiation of industrial awards and agreements, in the settlement of industrial disputes, including arbitration, and in direct relationships with employee organisations. Both are members of the Confederation of Australian Industry through which they have overseas affiliation with the International Organisation of Employers.

In addition to its role in industrial affairs, the Confederation also represents employers in the Occupational Health, Safety and Welfare Commission and the Workers Compensation and Rehabilitation Commission.

The Confederation of Western Australian Industry (Incorporated) has approximately 6,000 individual members and 101 affiliated trade, industry and professional associations.

The Australian Mines and Metals Association (Incorporated) is an association of mining and hydrocarbon companies.

### EMPLOYEE ORGANISATIONS

Employee organisations in Western Australia cover all forms of occupations—from the unskilled to the professional worker. Most union organisations are national in character with State branches registered with both the Federal and State industrial authorities.

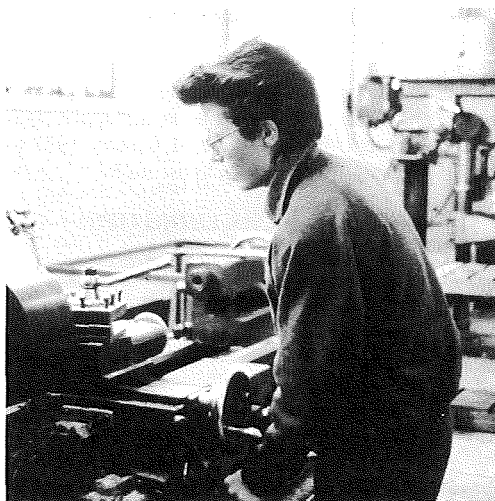
The major organisation in Western Australia is the Trades and Labor Council (TLC). This organisation covers most of the wage and salary earners employed in the private and government sectors of industry and commerce.

The TLC is the State branch of the Australian Council of Trade Unions (ACTU) and at 31 December 1988 it was affiliated with 73 State resident unions having a membership of approximately 200,000.

The TLC frequently acts on behalf of employees—before the Western Australian industrial authorities—in matters such as wages, hours, holidays and long service leave.

### APPRENTICESHIP AND INDUSTRIAL TRAINING

At 30 June 1988 the total number of apprentices registered in a wide variety of trades in this State was 10,603.



Cecelia Chesson (electrical fitter) and Karen Runge (mechanical fitter) were both involved in the Tradeswomen On The Move Project in 1988. The Project aims to encourage women to consider non-traditional trades as a career option.

*Photographs:* Department of Employment and Training.

The Industrial Training Advisory Council is the principal advisory body to the Government on matters relating to industrial training. The Council comprises representatives of the Department of Employment and Training, the Confederation of Western Australian Industry (Incorporated), the Trades and Labor Council of Western Australia, the Office of Technical and Further Education and the Department of Employment, Education and Training. The Council is responsible for the overall coordination of industrial training arrangements in Western Australia.

An industrial training advisory board for each trade or group of trades, prescribed as an apprenticeship trade or an industrial training trade, is appointed to assist the Council. It also deals with apprenticeship matters relevant to the trade it is appointed to review.

An apprenticeship term of indenture may be for three, three-and-a-half, four or five years depending upon the chosen trade and the apprentice's academic achievements. Satisfactory completion of an approved pre-apprenticeship course conducted by the Office of Technical and Further Education may entitle an apprentice to a term of indenture of three years.

**TABLE 21.8 – APPRENTICESHIP—NEW REGISTRATIONS AND NUMBER OF EFFECTIVE REGISTRATIONS TO VARIOUS TRADES**

Trade	Effective registrations at 30 June		Registrations effected during 1987–88
	1983	1988	
Building	1,522	1,352	389
Electrical	1,528	1,264	373
Food	984	1,119	362
Metal	3,421	3,617	1,008
Printing	227	204	63
Vehicle building	505	525	154
Other	1,902	2,522	775
<b>Total</b>	<b>12,089</b>	<b>10,603</b>	<b>3,125</b>

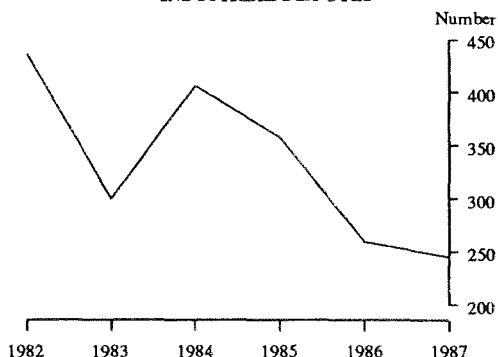
### INDUSTRIAL DISPUTES

Statistics of industrial disputes are compiled by the Australian Statistician from ABS surveys of employers and trade unions concerning individual disputes; reports from government departments and authorities; reports of State and Federal industrial authorities; and information contained in trade journals, employer and trade union publications, and newspaper reports.

The statistics exclude disputes involving stoppages of work of less than ten person-days in the establishment where the stoppage occurred. Effects on the other establishments resulting from

lack of materials, disruption of transport services, power cuts, etc. are not measured by these statistics.

**DIAGRAM 21.2  
INDUSTRIAL DISPUTES**



**TABLE 21.9 – INDUSTRIAL DISPUTES (a)**

	1982	1987
Number of disputes	436	245
Number of workers involved ('000)—		
Directly	61.3	40.4
Indirectly (b)	2.3	2.8
<b>Total</b>	<b>63.6</b>	<b>43.1</b>
Number of working days lost ('000)	158.9	115.3

(a) Excludes disputes involving cessation of work of less than 10 person-days. (b) Persons put out of work at the establishments where the stoppages occurred, but not themselves parties to the dispute.

**DIAGRAM 21.3  
INDUSTRIAL DISPUTES: NUMBERS OF WORKERS INVOLVED AND DAYS LOST**

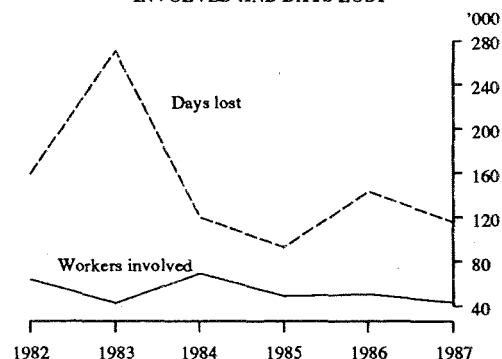
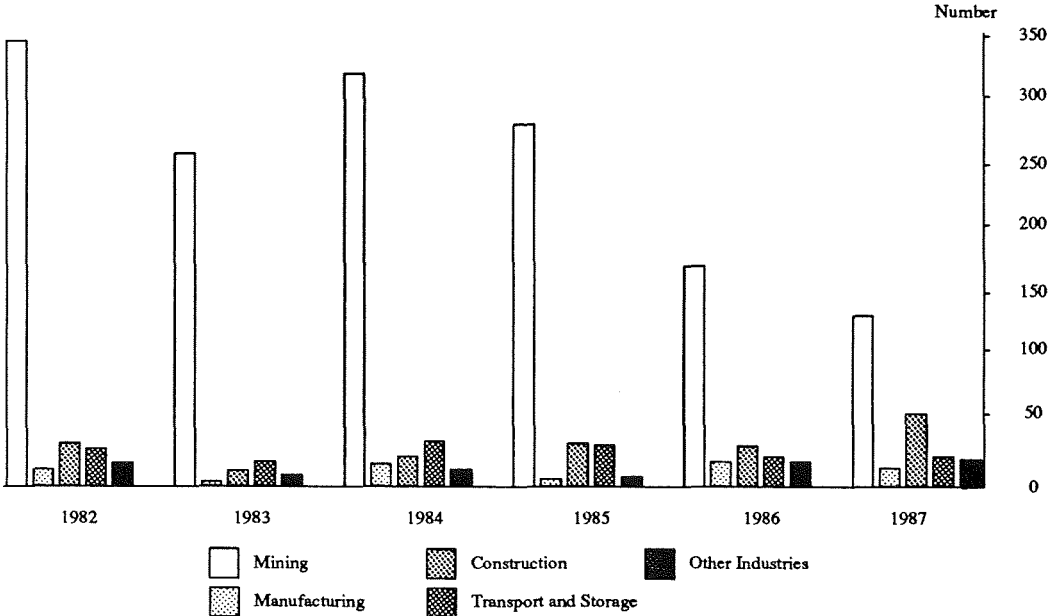




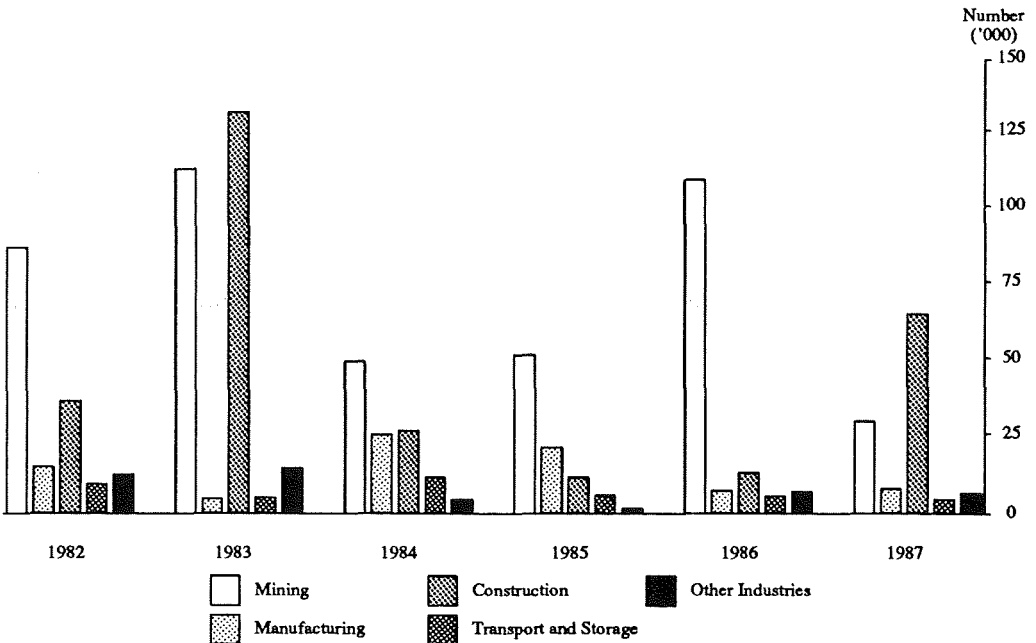
DIAGRAM 21.4 — INDUSTRIAL DISPUTES BY INDUSTRY



All disputes in progress during the year are included in the annual figures, whether the dispute commenced in that year or was in progress at the beginning of the year. Consequently, details of the

'number of disputes' and 'workers involved' in disputes which commenced in any year, and were still in progress during the following year, are included in the figures for both years.

DIAGRAM 21.5 — INDUSTRIAL DISPUTES - DAYS LOST BY INDUSTRY



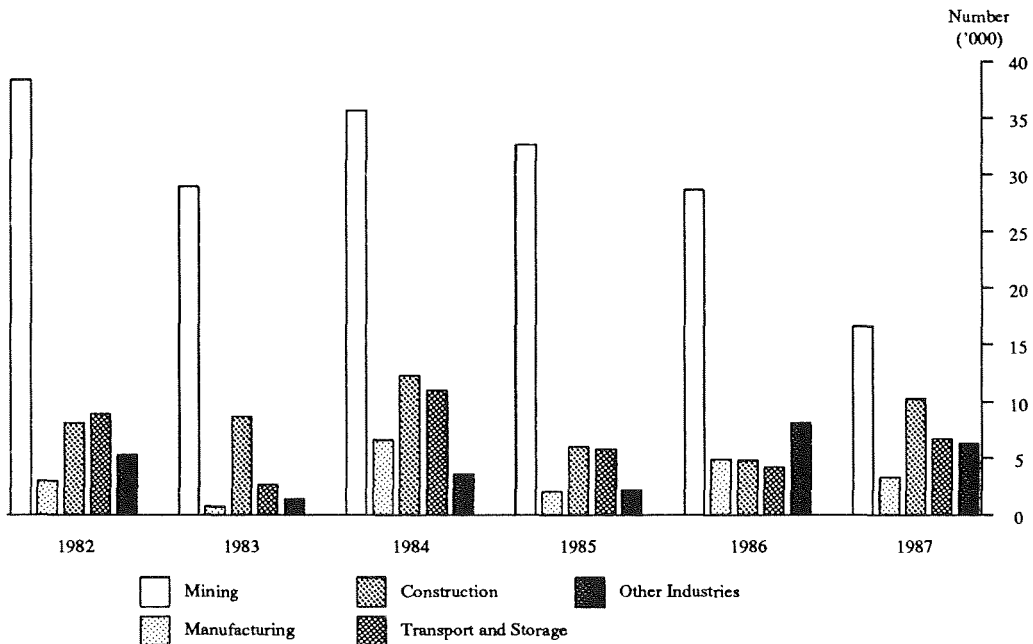
Particulars of some stoppages (e.g. those involving a large number of establishments) may be estimated and the statistics therefore should be regarded as giving a broad measure only of the extent of stoppages of work (as defined).

The number of days lost peaked in 1983 at approximately 270,600, although there were both

less disputes and less workers involved in that year. The construction industry had an increase in days lost of approximately 95,200 for 1983 but a decrease in the number of disputes from 33 to 12. The number of workers involved in disputes in the construction industry remained fairly steady throughout the period.

DIAGRAM 21.6

## INDUSTRIAL DISPUTES: WORKERS INVOLVED BY INDUSTRY



## WAGES AND EARNINGS

## Determination of rates of pay

The awards and determinations of the various Federal and State tribunals prescribe minimum rates of pay, standard hours of work and other conditions of employment for particular occupations. Most awards also prescribe a minimum wage for adults; i.e. the minimum amount which must be paid to an adult employee, regardless of occupation, for working the standard weekly hours of work. The concept of equal pay for the sexes is applicable in most Federal and State awards. In recent years the wage-fixing principles of the Australian Conciliation and Arbitration Commission have generally been followed by State tribunals.

## Award rates of pay

The indexes shown in the following tables refer to Western Australia and relate to full-time adult wage and salary earners whose rates of pay are normally varied in accordance with awards or determinations made by Federal or State authorities or collective agreements registered with them. The indexes are designed to measure trends in rates payable under awards.

In December 1987, the Award Rates of Pay indexes were rebased with June 1985 as the new base. Separate indexes for wage earners and wage and salary earners are not compiled for the new series, due to difficulties in distinguishing wage and salary earners in the award documentation and in the survey from which employment numbers are obtained.

**TABLE 21.10 – INDEXES OF WEEKLY AWARD  
RATES OF PAY**  
(Base: Weighted average minimum weekly award rate,  
June 1985 = (100.0))

Industry	Wage and salary earners	
	June 1985	June 1988
Mining	100.0	112.3
Manufacturing	100.0	114.1
Electricity, gas and water	100.0	110.9
Construction	100.0	114.0
Wholesale trade	100.0	113.1
Retail Trade	100.0	113.0
Transport and storage	100.0	112.3
Communication	100.0	116.5
Finance, property and business services	100.0	111.5
Public administration and defence (a)	100.0	114.2
Community services	100.0	112.4
Recreation, personal and other services	100.0	113.3
All industries (b)	100.0	113.0

(a) Excludes employees in the defence forces. (b) Excludes employees in the defence forces, agriculture, services to agriculture and employees in private households employing staff.

In the three years between June 1985 and June 1988, award rates for adult wage and salary earners increased on average over all industries by 13%. For particular industries the increases ranged from a maximum of 16.5% in the Communications Industry down to a minimum of 10.9% in the Electricity, Gas and Water Industry.

### Average weekly earnings

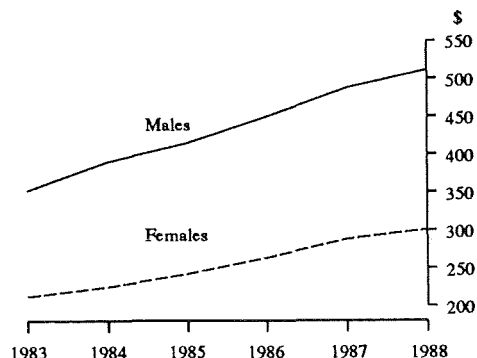
Statistics of average weekly earnings are produced quarterly, and are based on employment and earnings information obtained from a sample survey of employers. They relate to earnings of employees in respect of a single pay period ending on or before a specific date near the middle of the quarter.

*Earnings* are gross earnings in a pay period, before taxation and any other deductions such as superannuation, board and lodging, etc. have been made. Earnings comprise ordinary time earnings, overtime earnings, shift allowances, plus other allowances, payments, commissions, etc.

**TABLE 21.11 – AVERAGE WEEKLY EARNINGS OF  
EMPLOYEES, AUGUST**  
(\$)

Particulars	1983	1988	Percentage change
Males	351.60	510.30	45.1
Females	211.60	299.90	41.7
Persons	290.50	418.40	44.0

**DIAGRAM 21.7  
AVERAGE WEEKLY EARNINGS  
FOR ALL EMPLOYEES: AUGUST**



Male average weekly total earnings in August 1988 were \$510.30, while those for females were \$299.90, a difference of 70.2 per cent. The difference between male and female average weekly total earnings in August 1983 was 66.2 per cent, males earning \$351.60 and females \$211.60.

## HOURS OF WORK AND LEAVE PROVISIONS

### Standard hours of work.

In the fixation of weekly wage rates most industrial tribunals prescribe the number of hours constituting a full week's work for the wages specified.

Since January 1948, practically all employees in Australia have had a standard working week of forty hours or less. However, the number of hours constituting a full week's work (excluding overtime) differs between industries.

**TABLE 21.12 – EMPLOYED PERSONS AVERAGE  
WEEKLY HOURS WORKED (a) BY INDUSTRY:  
NOVEMBER 1988**

Industry	Females			
	Males	Married	Total	Persons
Agriculture, forestry, fishing and hunting	53.3	28.8	29.7	46.3
Agriculture and services to agriculture	54.5	29.2	30.1	47.0
Forestry and logging, fishing and hunting	37.5	19.0	18.5	33.9
Mining	42.0	30.4	35.5	41.2

**TABLE 21.12 - EMPLOYED PERSONS AVERAGE WEEKLY HOURS WORKED (a) BY INDUSTRY: NOVEMBER 1988 (continued)**

Industry	Females			
	Males	Married	Total	Persons
Manufacturing	43.2	30.3	31.3	40.7
Food, beverage and tobacco	43.7	31.0	28.4	38.4
Metal products	42.8	25.2	35.4	42.1
Other manufacturing	43.3	30.6	31.7	40.8
Electricity, gas and water	35.3	29.6	33.8	35.0
Construction	42.2	18.3	21.3	39.4
Wholesale and retail trade	41.0	28.3	27.4	34.6
Wholesale trade	41.8	30.1	30.3	38.6
Retail trade	40.5	27.8	26.7	32.8
Transport and storage	42.8	30.2	32.7	40.6
Communication	37.6	27.6	28.5	35.1
Finance, property and business services	42.6	27.8	30.5	37.0
Public administration and defence	37.2	34.6	34.3	36.2
Community services	39.7	26.8	28.6	32.4
Recreation, personal and other services	40.2	28.1	28.0	33.2
All industries	42.4	27.8	28.9	37.0

(a) The estimates refer to actual hours worked, not hours paid for.

The average weekly hours worked by employees over all industries in November 1988 was 37.0 hours per week. For particular industries the average per employee ranged from a minimum of 32.4 hours per week in the Community services industry to a maximum of 47.0 hours per week in the Agriculture and services to agriculture industry.

### Annual leave and long service leave.

As from 1 January 1973, employees of the Commonwealth Government and the State Government were granted four weeks paid annual leave, together with an annual leave loading of 17.5 per cent of their weekly salary, up to a specified maximum amount. Subsequently, these entitlements were extended to most awards and agreements so that most employees now receive at least four weeks paid annual leave and an annual leave loading payment.

The *Long Service Leave Act 1958* (State) confers entitlement to long service leave with pay on employees for whom such leave is not otherwise provided. Entitlement accrues only in relation to continuous service with one employer, but continuity of service is not affected by the transfer of a business from one employer to another. Leave of thirteen weeks on ordinary pay is granted for the first fifteen years of service. For each subsequent ten years the entitlement is eight and

two-thirds weeks, with *pro rata* conditions applying in the case of termination of employment for any reason other than serious misconduct.

The *Long Service Leave Act Amendment Act 1973*, which came into operation on 1 March 1974, provides that the 'standard' period of thirteen weeks leave after fifteen years service may be varied as the result of an agreement between The Confederation of Western Australian Industry (Incorporated) and the Trades and Labor Council of Western Australia or by a determination of The Western Australian Industrial Commission in Court Session.

### WORKERS' COMPENSATION AND ASSISTANCE

The *Workers' Compensation and Assistance Act 1981-1987* provides compensation for personal injury arising out of or in the course of employment, for death resulting from such injury, and for disease or the recurrence of a pre-existing disease where employment was a contributing factor. The provisions of the Act do not extend to employees of the Commonwealth Government for whom compensation is provided by the *Commonwealth Employees Rehabilitation and Compensation Act 1988*.

Every employer, other than a self insurer, is required to effect insurance with an approved insurer for the full amount of his liability to pay compensation under the Act to all workers in his employment.

The Workers' Compensation Board, constituted under the Act, has exclusive jurisdiction to examine, hear and determine all matters and questions arising out of claims for compensation under the Act and all questions as to the right or amount of indemnity. The Board's determinations are final and conclusive except that a party to any proceedings before the Board who is dissatisfied with a determination may appeal to the Full Court of the Supreme Court. Additionally, when a question of law arises in any proceedings before the Board, the Board may refer the question for the decision of the Full Court of the Supreme Court.

The functions of the Workers' Assistance Commission constituted under the Act include: participation in research into the causes, incidence and methods of prevention of accidents, injuries and diseases for which compensation may be payable; encouragement of the prevention or minimisation of accidents, injuries and diseases; coordination of rehabilitative, occupational or vocational training or remedial treatment for

workers suffering injuries or disease; formulating recommendations and preparing estimates for submission to Parliament of the cost of providing facilities for rehabilitation and re-employment of workers sustaining permanent or temporary disablement from a compensable disability and making recommendations to the Minister on applications by insurers and employers to function as approved insurers or self-insurers under the Act.

The payments, allowances and benefits under the Act are calculated by reference to a 'prescribed amount' which is partially indexed annually on 1 July by the weighted average minimum award rate for adult males under Western Australian State Awards. At 1 July 1988 the prescribed amount was \$78,731.

The total liability of the employer weekly and lump sum payments is limited to \$78,731 except where the Board determines that a disability to a worker has resulted in his permanent total or permanent partial incapacity for work.

Additional monies are payable up to a maximum of 20 per cent of the prescribed amount, i.e. \$15,746 (or more, if the Board finds that in particular circumstances this sum is inadequate) for expenses incurred for first aid and ambulance services, medicines, medical or surgical attendance, hospital treatment and the like. In the event of the death of the worker, payable funeral expenses are compensable up to a maximum of \$1,100.

Where death results from the disability and the worker leaves any adult dependants who are wholly dependant on the worker's earnings, a sum equal to 85 per cent of his residual entitlement is payable. However, payments to a wholly dependant mother or spouse are subject to a guaranteed minimum sum. A child's allowance is payable weekly up to the age of sixteen years (or twenty-one years in the case of a full-time student) in respect of any wholly dependant child.

Provisions also exist for partial dependants to receive compensation in proportion to the loss of necessary financial support suffered by such dependants.

### INDUSTRIAL ACCIDENTS

The statistics shown in Table 21.12 represent all industrial accidents occurring during the year ended 30 June 1988 involving time lost from work

of one day or more and are presented according to broad industry groups. For a particular year of record ended 30 June, reports of finalised cases are received progressively from insurers up to the end of September after which time reports are provided for unfinalised cases.

The figures do not represent all industrial accidents which actually occurred in Western Australia during the year because:

- (i) in the case of non-fatal accidents, they include only those which resulted in absence from work for one day or more;
- (ii) only accidents coming within scope of the *Workers' Compensation and Assistance Act 1981* are included in the statistics, which therefore exclude industrial accidents resulting in the death of or injury to, self-employed persons and persons employed by the Commonwealth Government;
- (iii) the statistics include only accidents occurring at the work site or accidents occurring in the course of the worker's normal duties, and therefore do not include 'journey' cases or 'recess' cases (i.e. accidents which occur when travelling between place of residence and workplace and, cases which occur during work breaks). During the year ended 30 June 1988, there were 1,575 claims for 'journey' cases and 63 claims for 'recess' cases;
- (iv) industrial disease cases are not included.

**TABLE 21.12 - TOTAL ACCIDENTS—INDUSTRY DIVISION, TIME LOST AND COST OF CLAIMS 1987-88**

Industry	Number of		Total cost of claims (\$'000)(a)
	Accidents	Weeks lost(a)(b)	
Agriculture, forestry, fishing and hunting	1,343	6,551	4,852
Mining	2,718	12,884	11,986
Manufacturing	8,026	26,738	23,127
Electricity, gas and water	891	5,902	5,625
Construction	3,422	14,956	14,391
Wholesale and retail trade	4,212	13,193	11,236
Transport and storage	1,801	8,544	7,025
Finance, property and business services	1,115	4,362	3,690
Public administration and defence	1,503	7,830	6,096
Community services	4,556	28,958	23,118
Recreation, personal and other services	1,356	6,898	5,363
<b>Total</b>	<b>30,943</b>	<b>136,815</b>	<b>116,509</b>

(a) Includes estimates for cases not finalised by October 1986. (b) Claims relating to fatal accidents do not have time lost.

**REFERENCES****ABS publications**

*Labour Statistics* (6101.0)

*A Guide to Labour Statistics* (6102.0)

*The Labour Force, Australia* (6202.0 and 6203.0)

*Employed Wage and Salary Earners, Australia*  
(6248.0)

*Average Weekly Earnings, States and Australia*  
(6302.0)

*Average Earnings and Hours of Employees, Australia* (6304.0)

*Distribution and Composition of Earnings and Hours of Employees, Australia* (6306.0)

*Award Rates of Pay Indexes, Australia* (6312.0)

*Industrial Disputes, Australia* (6321.0)

*Trade Union Statistics, Australia* (6323.0)

*Industrial Accidents, Western Australia* (6301.5)

**Other publications**

Department of Employment and Training, *Annual Report 1985–86*

Western Australian Industrial Relations Commission, *Annual Report 1987*.

## Chapter 22

### PRICES AND HOUSEHOLD EXPENDITURE

'Average prices' of a limited range of commodities are recorded in the Blue Books of Western Australia from the early colonial years and in the Western Australian Year Book (Old Series) from 1886. Retail prices of food and groceries and average rentals of houses for years extending back to 1901 have been collected by the Australian Statistician but it was not until 1911 that a systematic collection of retail price statistics was begun.

#### RETAIL PRICES AND PRICE INDEXES

Information concerning the development of price indexes in Australia is given in *Year Book Australia* (Catalogue No. 1301.0) and *Labour Report* No. 58—1973 (Reference No. 6.7).

TABLE 22.1 — AVERAGE RETAIL PRICES OF  
SELECTED ITEMS : PERTH  
(cents)

		December quarter		
Item	Unit	1986	1987	1988
<i>Dairy produce—</i>				
Milk, carton, supermarket sales	1 litre	79	83	87
Milk, powdered, full cream	1 kg can	451	522	529
Cheese, processed, sliced, wrapped	500g	236	252	279
Butter	500g	162	154	167
<i>Cereal products—</i>				
Bread, white loaf, sliced, supermarket sales	680g	101	115	120
Biscuits, dry	250g	96	101	110
Breakfast cereal, corn based	500g	185	210	219
Flour, self-raising	2 kg	162	162	176
Rice, medium grain	1 kg	94	97	102
<i>Meat and seafoods—</i>				
<i>Beef</i>				
Rib, without bone	1 kg	496	510	575
Rump steak	1 kg	849	818	906
T-bone steak, with fillet	1 kg	809	764	857
Chuck steak	1 kg	521	533	592
Silverside, corned	1 kg	542	532	595
Sausages	1 kg	276	270	336
<i>Lamb</i>				
Leg	1 kg	441	494	551
Loin chops	1 kg	569	570	661
Forequarter chops	1 kg	430	453	512
<i>Pork</i>				
Leg	1 kg	527	514	560
Loin chops	1 kg	614	597	649
Chicken, frozen	1 kg	266	311	323
Bacon, middle rashers	250g pkt	213	216	252
Beef, corned	340g can	189	210	228
Salmon, pink	210g can	209	243	316

TABLE 22.1 — AVERAGE RETAIL PRICES OF  
SELECTED ITEMS : PERTH  
(cents) (continued)

Item	Unit	1986	1987	1988
<i>Fresh fruit and vegetables—</i>				
Oranges	1 kg	136	134	150
Bananas	1 kg	173	129	184
Potatoes	1 kg	83	84	124
Tomatoes	1 kg	297	273	234
Carrots	1 kg	74	76	109
Onions	1 kg	111	100	159
<i>Processed fruit and vegetables—</i>				
Peaches	825g can	144	154	170
Pineapple, sliced	450g can	77	80	80
Peas, frozen	500g pkt	86	92	110
<i>Confectionery—</i>				
Chocolate, milk, block	200 g	163	166	187
<i>Other food—</i>				
Eggs	55g 1 dozen	168	168	181
Sugar, white	2 kg	153	163	178
Jam, strawberry	500g jar	160	171	182
Tea	250g	142	141	144
Coffee, instant	150g jar	538	464	475
Tomato sauce	600 ml	117	133	147
Margarine, poly-unsaturated	500 g	123	128	130
Baked beans, in tomato sauce	440 g	70	73	80
Baby food	125g can	33	36	37
<i>Household supplies and services—</i>				
Laundry detergent	1 kg	326	359	371
Dishwashing detergent	1 litre	337	354	380
Facial tissues	pkt of 224	159	165	183
Toilet paper (a)	4 x 300 sheet rolls	268	283	304
Pet food	415g	79	80	88
<i>Private motoring—</i>				
Petrol, super grade	1 litre	57.3	57.8	5,306
<i>Alcoholic beverages—</i>				
Beer, full strength, unchilled	12 x 750 ml bottles	1,642	1,869	1,866
Draught beer, full strength, public bar	285 ml glass	130	140	139
Scotch, nip, public bar	30 ml	179	192	197
<i>Personal care products—</i>				
Toilet soap	2 x 125g	115	129	139
Toothpaste	140g	177	189	214

(a) Prior to December quarter 1988 price relates to 6 x 500 sheet rolls.

## The Consumer Price Index

The Consumer Price Index (CPI) measures quarterly price changes of a 'basket' of goods and services which represent a high proportion of expenditure by metropolitan wage and salary earner households. This 'basket' covers a wide range of goods and services, arranged in eight groups: Food; Clothing; Housing; Household equipment and operation; Transportation; Tobacco and alcohol; Health and personal care; and Recreation and education.

Index numbers are published for each of the eight capital cities at the group level. Indexes at the sub-group level and for selected expenditure classes are available on request.

**Index Population.** Because the spending patterns of various groups in the population differ somewhat, the pattern of one large group, fairly homogenous in its spending habits, is chosen for calculating the CPI. This population group is, in concept, *metropolitan employee households*. Employee households are defined as those households which obtain at least three-quarters of their total income from wages and salaries, but excluding the top ten per cent (in terms of income) of such households. 'Metropolitan' means the six State capital cities, Canberra and Darwin.

**Weighting pattern.** The composition and weighting pattern of the items in the CPI 'basket' reflect the expenditure pattern of the CPI population group, as derived from Household

Expenditure Surveys and other supplementary data collected by the Australian Bureau of Statistics (ABS).

**Periodic Reviews.** Changes in the weighting pattern have been made at approximately five-yearly intervals to take account of changes in household spending patterns.

The eleventh series of the CPI began with the release of the March quarter 1987 CPI and incorporated the following changes: expenditure on the purchase of dwellings was replaced by expenditure on mortgage interest charges; interest on charges for consumer credit used for household purposes other than dwelling purchase was included; expenditure on optical services, veterinary services and watches and clocks was included; and the range of fresh fruit and vegetables included in the index was expanded.

**Price Collection.** Information about prices is collected in the kinds of retail outlets or other establishments where metropolitan employee households would normally purchase goods and services. This involves collecting prices from many sources, including supermarkets, garages, dental surgeries, hairdressers and appropriate government authorities.

Prices are generally collected quarterly. However, some important items are collected more frequently (eg bread, fresh fish, fresh meat, fruit and vegetables) and a small number annually (eg seasonal clothing, local government rates and charges).

DIAGRAM 22.1  
CPI GROUPS WEIGHTING PATTERN : PERTH  
(Percentage contribution CPI All Groups December Quarter 1986.)

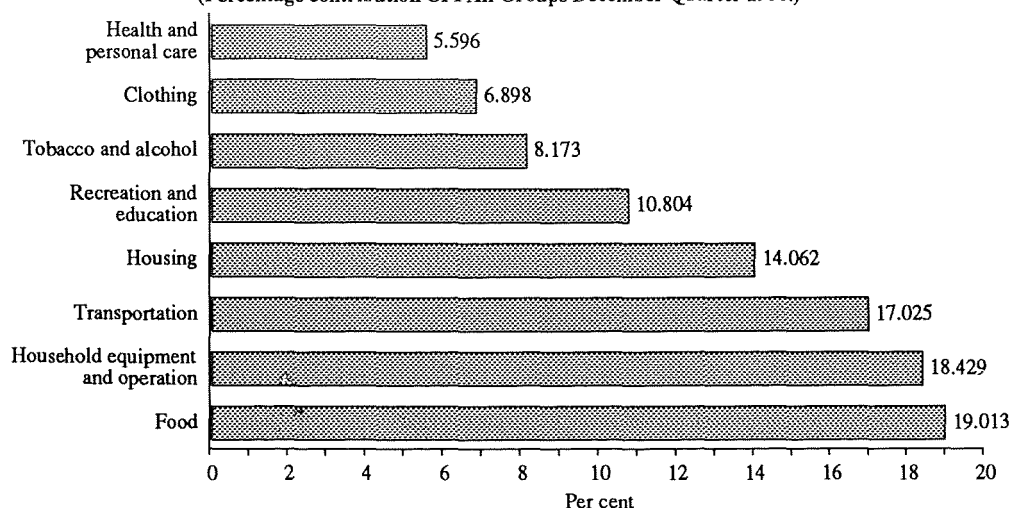




TABLE 22.2 — CONSUMER PRICE INDEX : PERTH  
(Base year 1980-81 = 100)

	Food	Clothing	Housing	Household equipment and operation	Trans- portation	Tobacco and alcohol	Health and personal care	Recreation and education (a)	All groups
1985-86	146.3	140.2	141.7	145.7	153.7	168.7	135.9	123.9	147.1
1986-87	157.1	154.4	154.7	159.0	172.3	188.1	156.0	135.7	161.8
1987-88	166.3	165.8	163.6	170.3	184.5	203.0	175.1	146.4	173.3
Quarter—									
1985-86									
September	142.0	134.0	136.5	141.2	152.5	161.7	132.1	120.9	142.9
December	145.7	139.3	140.8	144.7	152.1	167.4	134.8	123.1	146.1
March	147.1	140.5	143.1	146.5	156.3	171.3	137.5	125.2	148.5
June	150.5	147.2	146.2	150.2	153.8	174.5	139.1	126.5	150.8
1986-87									
September	153.7	147.2	149.5	154.8	163.0	181.4	148.0	131.2	155.9
December	156.8	153.8	153.3	157.7	172.5	185.5	152.9	133.9	160.7
March	158.3	156.1	156.5	160.4	175.6	190.9	158.4	137.7	163.8
June	159.6	160.6	159.4	163.2	178.0	194.7	164.8	140.0	166.6
1987-88									
September	161.2	160.7	161.2	166.2	180.8	198.0	168.5	143.1	169.1
December	163.6	165.3	163.5	169.3	183.7	201.3	171.0	144.1	171.8
March	168.3	165.4	163.5	171.2	185.7	204.5	179.2	148.6	174.6
June	172.0	171.9	166.0	174.6	187.9	208.0	181.8	150.0	177.7

(a) New group index replacing former 'Recreation' group. Base: March quarter 1982 = 100.

### WHOLESALE PRICES OF MATERIALS USED IN BUILDING

The Price Index of Materials used in House Building measures changes in prices of selected materials used in the construction of houses. For this index the weights reflect the usage of materials in detached single dwelling units constructed in the Perth Statistical Division.

TABLE 22.3 — PRICE INDEX OF MATERIALS USED IN  
HOUSE BUILDING — ALL GROUPS : PERTH  
(Base year 1985-86 = 100)

Year	Index number
1985-86	100.0
1986-87	106.7
1987-88	114.2

The Price Index of Materials used in Building other than House Building measures monthly changes in prices of selected materials used in the construction of buildings other than houses. The weights used in this index reflect the usage of materials in the construction of buildings commenced in the six State capital cities in the three years ended June 1977. The same weighting pattern is used for each of the six capital cities.

For both of these indexes, prices are collected at the mid-point of each month from representative

suppliers. In general the point of pricing is *delivered on site*, but in some cases it may be necessary to accept other pricing points, eg *supplied and fixed*.

TABLE 22.4 — PRICE INDEX OF MATERIALS USED IN  
BUILDING OTHER THAN HOUSE BUILDING : PERTH  
(Base year 1979-80 = 100)

Materials	Index number		
	1985-86	1986-87	1987-88
Selected major building materials—			
Structural timber	180.5	187.9	189.8
Clay bricks	159.4	170.5	188.5
Ready mixed concrete	163.9	165.4	182.5
Precast concrete products	159.4	170.8	182.6
Galvanised steel decking, cladding, etc	163.8	173.7	185.2
Structural steel	180.8	203.1	221.0
Reinforcing steel bar, fabric and mesh	154.9	168.2	183.8
Aluminium windows	158.5	195.4	216.8
Steel windows, doors, louvres, etc	167.1	186.4	202.2
Builders' hardware	181.5	196.4	208.7
Sand, aggregate and filling	183.1	184.5	200.0
Carpet	171.7	195.0	213.3
Paint	160.4	169.4	190.9
Non-ferrous pipes	137.1	144.3	189.1
Special combinations of building materials—			
All electrical materials	179.6	201.6	238.1
All mechanical services	177.0	197.3	214.3
All plumbing materials	162.2	175.0	191.0
<b>All groups</b>	<b>168.1</b>	<b>183.9</b>	<b>201.5</b>

TABLE 22.5 — HOUSEHOLD EXPENDITURE BY REGIONS :1984

<i>Particulars</i>	<i>Perth</i>	<i>Urban regions (a)</i>	<i>Rural regions (b)</i>	<i>Western Australia</i>
AVERAGE WEEKLY HOUSEHOLD EXPENDITURE (\$)				
Commodity or service—				
Current housing costs (selected dwelling) (c)	47.03	26.37	18.28	41.50
Fuel and power	10.61	10.26	7.79	10.37
Food and non-alcoholic beverages	69.07	71.39	64.00	69.18
Alcoholic beverages	12.51	16.78	11.79	13.24
Tobacco	5.78	8.12	6.73	6.27
Clothing and footwear	21.67	18.59	15.35	20.72
Household furnishings and footwea	28.46	32.15	18.90	28.54
Household services and operation	15.88	14.87	16.57	15.74
Medical care and health expenses	12.76	12.59	12.65	12.72
Transport	62.28	57.41	79.83	62.47
Recreation	45.79	52.74	36.70	46.50
Personal care	6.61	5.48	3.94	6.24
Miscellaneous commodities and services	25.25	31.61	27.10	26.52
<b>Total commodity or service expenditure</b>	<b>363.70</b>	<b>358.37</b>	<b>319.61</b>	<b>360.01</b>
Selected other payments—				
Income tax	83.17	86.16	52.50	81.82
Mortgage payments—principal (selected dwelling)	8.20	3.48	*	7.09
Other capital housing costs	24.67	*	*	21.44
Superannuation and life insurance	12.07	10.57	6.76	11.47
HOUSEHOLD CHARACTERISTICS				
Average weekly household income (\$) (d)	452.08	470.24	411.29	452.87
Proportion of total income being(per cent)—				
Wages and salaries	73.4	69.5	55.8	71.7
Own business	6.8	13.8	21.3	8.9
Government pensions and benefits	11.0	11.3	9.4	11.0
Other	8.8	*5.4	*	8.4
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
Average age of household head (years)	45.31	45.32	45.61	45.33
Average number of persons per household—				
Under 18 years	0.85	0.89	0.98	0.87
18 to 64 years	1.71	1.67	1.87	1.71
65 years and over	0.24	0.28	*0.19	0.24
<b>Total</b>	<b>2.79</b>	<b>2.83</b>	<b>3.04</b>	<b>2.82</b>
Proportion of households with nature of housing occupancy being (per cent)—				
Owned outright	31.7	33.5	47.3	33.0
Being bought	41.8	17.6	7.8	35.3
Renting—government	5.1	*15.4	*	6.9
Renting—private	17.9	26.2	*28.1	20.1
Occupied rent-free	3.4	*7.2	*	4.7
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
Average number of employed persons in household	1.21	1.21	1.57	1.23
Proportion of households with family composition of the household being (per cent)—				
Married couple—				
Only	25.3	27.7	30.4	26.0
With dependent children only	28.7	31.3	23.1	28.9
Other	13.2	12.1	*23.1	13.6
Single parent one family household only	4.6	*4.4	*	4.3
Single person household	19.1	18.5	*15.8	18.8
Other (e)	9.2	*6.0	*	8.5
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
Number of households in sample	892	140	52	1,084
<b>Estimated total number in population ('000)—</b>				
<b>Households</b>	<b>341.1</b>	<b>82.0</b>	<b>27.8</b>	<b>450.9</b>
<b>Persons</b>	<b>952.8</b>	<b>232.4</b>	<b>84.5</b>	<b>1,269.7</b>

(a) All towns and urban centres with a population of 500 persons or more (excluding the Perth Statistical Division). (b) All localities with a population of less than 500 persons. Remote areas with less than 0.06 dwellings per square kilometre were excluded from the survey. (c) Includes the interest component only of any housing loan repayments. Excluded are outright purchase, or deposit on, dwellings or land, and other payments of a capital nature. (d) Household income is the sum of the gross weekly income of all household members. (e) Includes married couple and single parent families living in multiple family households.

## OTHER PRICE INDEXES

In addition to the indexes already described, the ABS compiles prices indexes related to the prices of selected import and export commodities, copper materials, materials used in manufacturing industries and articles produced by manufacturing industries. The Import Price Index is released on a quarterly basis while the other indexes are released monthly. These indexes are published on a national basis only. For further reference to these indexes see the *Year Book Australia* (ABS Catalogue No. 1301.0) and other references listed at the end of this Chapter.

## HOUSEHOLD EXPENDITURE SURVEYS

During 1974–75 and 1975–76, the ABS conducted two surveys in order to obtain information about the expenditure patterns of private households. The 1974–75 survey was confined to a sample of households in the six State capital cities and Canberra, while the coverage of the 1975–76 survey was extended to include other urban and rural regions. Apart from limited attempts in 1910–11 and 1913 to assess the spending patterns of Australian households, these surveys were the first official collections of household expenditure statistics conducted in this country.

Further household expenditure surveys were conducted by the ABS in 1984 and 1988–89. Coverage of these surveys, as in 1975–76, included households in urban and rural areas, except remote and sparsely settled areas. Table 22.5 shows household expenditure by regions based on the 1984 Household Expenditure Survey. Data from the 1988–89 survey are yet not available.

In obtaining statistics on the consumption expenditure of households the surveys have facilitated:

- analysis of household expenditure and income patterns;

- updating of the weighting patterns used to compile the Consumer Price Index;

- examination of the effect of changes in the structure of pensions, benefits and taxes on the patterns of household consumption expenditure and the distribution of household income;

- development of government policy and planning in respect of specific components of expenditure (e.g. housing, health, transport);

- planning of private enterprise marketing development;

- improvement of estimates of private final consumption expenditure used in the National Accounts;

- updating expenditure data used in economic models such as IMPACT.

## REFERENCES

### ABS Publications

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*Consumer Price Index* (6401.0)

*Export Price Index* (6405.0)

*A Guide to the Consumer Price Index: Eleventh Series* (6440.0)

*Import Price Index* (6414.0)

*Labour Report No. 58, 1973*

*Price Index of Materials Used in House Building* (6408.0)

*Price Index of Materials Used in Other than House Building* (6407.0)

*Price Indexes of Articles Produced by Manufacturing Industries* (6412.0)

*Price Indexes of Copper Materials* (6410.0)

*Price Indexes of Materials Used in Manufacturing Industries* (6411.0)

*Review of the Consumer Price Index: Information Paper* (6450.0)

*Information Paper: 1984 Household Expenditure Survey* (6527.0)

*1984 Household Expenditure Survey, Australia: Summary of Results* (6530.0)

*1984 Household Expenditure Survey, Australia: Household Characteristics* (6531.0)

*1984 Household Expenditure Survey, Australia: Specific Commodities* (6532.0)

*1984 Household Expenditure Survey, Australia: Household Expenditure by States and Territories* (6533.0)

*1984 Household Expenditure Survey, Australia: The Impact of Government Taxation and Expenditure on Household Income* (6537.0).

## Chapter 23

### PUBLIC FINANCE

This chapter deals mainly with the financial activities of State and local government authorities in Western Australia. Particular emphasis has been given to Commonwealth-State financial relations, including details of Commonwealth cash benefits to persons in Western Australia.

In 1986-87 total current and capital outlays of State authorities was \$5,237.9m, 12.2 per cent above that of the previous year with grants of \$7,367.8m received from the Commonwealth, an increase of 7.9 per cent over the previous year.

Total payments for goods, services and land by local authorities were \$14.3m in 1986-87, an increase of 9 per cent, with government grants of \$160.7m received, an increase of 9.9 per cent over the previous year.

#### COMMONWEALTH-STATE FINANCIAL RELATIONS

For a historical description of Commonwealth-State financial relations, refer to Chapter 24 of the *Western Australian Year Book*, No. 24—1986.

#### Management of Commonwealth-State funding

The major institutions assisting in the management of Commonwealth funding to States and Northern Territory governments are: the Premiers' Conference; the Commonwealth Grants Commission; and the Australian Loan Council.

**Premiers' Conference.** The annual Premiers' Conference determines the total amount of general revenue assistance and the shares of each State and the Northern Territory. Although these payments are at the Commonwealth's discretion, they are subject to negotiation between the Commonwealth and States at the Conference.

**Commonwealth Grants Commission.** The Commonwealth Grants Commission was established in 1933 to recommend on applications made by States, under section 96 of the Constitution, for special financial assistance grants. Since 1982, as a result of arrangements agreed at Premiers' Conferences, no State has sought such a grant.

Since 1978, under the *States (Personal Income Tax Sharing) Act 1976*, a special division of the Commission has also been responsible for

recommending the per capita relativities to be used for the allocation of general revenue grants among the States.

**Australian Loan Council.** The Loan Council was established under the Financial Agreement Act of 1928 with responsibility for determining the annual borrowing programs of the Commonwealth and State Governments, and the terms and conditions of loans to finance these programs. In 1936, the Gentlemen's Agreement extended the Loan Council's authority to include approval of semi-government and local authorities' borrowings.

By the early 1980s the Loan Council had begun to exercise increasingly less influence under the Gentlemen's Agreement over total authority borrowings. Greater use of non-conventional financing techniques, such as finance leasing and similar forms of borrowing, were being employed, which were outside the scope of the Agreement. These developments culminated in the Gentlemen's Agreement being suspended at the June 1984 Loan Council meeting, and the Global Approach was adopted on a trial basis in 1984-85. The objective of the Global Approach was to broaden the scope of Loan Council oversight of authority borrowings by bringing within voluntarily agreed limits all forms of borrowings by Commonwealth, State and Local Authorities.

#### Commonwealth financial assistance

Commonwealth Government payments to the States and Northern Territory Governments may

be classified under two major headings: general purpose payments and specific purpose payments, which may be further classified into those provided for recurrent outlays and those provided for capital outlays. Payments are made in the form of grants (non-repayable) or loans (repayable).

General purpose payments provide general budgetary assistance and the States and Northern Territory are free to determine the spending of these monies according to their own budgetary priorities. Specific purpose payments, however, are generally a means of meeting the objectives and priorities of Commonwealth Budget programs. They are, therefore, provided subject to certain conditions, for example, the Commonwealth specifying the purpose for which the funds may be spent; the States being required to contribute some specified amount of their own funds to the program to qualify for the assistance.

**TABLE 23.1 — COMMONWEALTH GENERAL AND SPECIFIC PURPOSE PAYMENTS FOR WESTERN AUSTRALIA AND AUSTRALIA: 1986-87(a)**  
(\$ million)  
(Source: Commonwealth Budget Paper No. 4.)

<i>Payments</i>	<i>Western Australia</i>	<i>Australia</i>
General purpose payments—		
Revenue	1,464.9	13,216.0
Capital	111.4	1,336.0
<i>Total</i>	<i>1,576.4</i>	<i>14,551.9</i>
Specific purpose payments—		
Revenue	580.2	6,026.6
Capital	299.9	2,790.6
<i>Total</i>	<i>880.2</i>	<i>8,817.3</i>
<b>Total payments</b>	<b>2,456.5</b>	<b>23,369.2</b>
General and specific purpose payments classified according to—		
Grants	2,384.5	22,478.4
Advances (loans)	72.0	890.8

(a) Excludes direct Commonwealth payments to local authorities.

**General purpose revenue payments.** General purpose revenue is paid in the form of grants. The arrangements for determining the level and distribution of these grants among the States and Northern Territory, in the triennium 1985-86 to 1987-88, were agreed to at the May 1985 Premiers' Conference. The main features of the arrangements are: the replacement of tax sharing grants with new financial assistance grants to the States, to apply for the three years ending 1987-88; the levels of these grants to be adjusted for movements in prices and a real growth factor, and distributed on the basis of per capita relativities recommended by the Commonwealth Grants Commission; and the continued provision of

separate, identified health grants, adjusted on the same basis as the financial grants, with an expectation that these grants would be absorbed into the financial assistance grants from 1988-89.

The following table shows the main components of the general purpose revenue assistance for Western Australia and Australia for the three years 1984-85 to 1986-87.

**TABLE 23.2 — GENERAL PURPOSE REVENUE ASSISTANCE (a)**  
(\$ million)  
(Source: Commonwealth Budget Paper No. 4)

<i>Year</i>	<i>Western Australia</i>	<i>Australia</i>
<b>FINANCIAL ASSISTANCE GRANTS</b>		
1984-85	1,042.3	9,529.7
1985-86	1,123.0	10,343.0
1986-87	1,263.8	11,517.8
<b>IDENTIFIED HEALTH GRANTS</b>		
1984-85	162.0	1,400.8
1985-86	176.3	1,483.3
1986-87	198.6	1,651.3
<b>SPECIAL REVENUE ASSISTANCE</b>		
1984-85	20.3	51.3
1985-86	—	87.2
1986-87	2.5	46.9
<b>OTHER GRANTS AND ENTITLEMENTS</b>		
1984-85	—	-3.0
1985-86	—	6.4
1986-87	—	11.1
<b>TOTAL GENERAL REVENUE ASSISTANCE</b>		
1984-85	1,224.6	10,978.9
1985-86	1,299.3	11,919.9
1986-87	1,464.9	13,227.1

(a) Excludes direct Commonwealth payments to local authorities

**General purpose capital payments.** For 1986-87, the Loan Council approved a borrowing program of General Purpose Capital Funds for the States and Northern Territory of \$1,336m, of which \$860m comprised borrowings and \$476m capital grants. Western Australia's share amounted to \$111.4m, comprising \$39.7m in capital grants and \$71.7m in borrowings. Western Australia opted, under Loan Council provisions, to allocate the \$71.7m loan to public housing, thereby attaining a concessional interest rate.

**Specific purpose payments.** Specific purpose recurrent payments to Western Australia for 1986-87 amounted to \$580.3m. The major payments were for: schools \$119.8m; colleges of advanced education \$97.0m; universities \$97.8m; and Medicare \$92.8m. Specific purpose capital payments to Western Australia in 1986-87

amounted to \$299.9m; with the largest amounts allocated to the Australian Land Transport Program \$99.2m; the Australian Bicentennial Roads Development \$55.1m; and public housing \$49.2m.

**Grants and advances.** General and specific purpose payments are made in the form of grants or advances (loans). Tables 23.3 and 23.4 show grants and advances classified according to the Government Purpose Classification.

**TABLE 23.3 — COMMONWEALTH GOVERNMENT GRANTS TO WESTERN AUSTRALIA BY GOVERNMENT PURPOSE CLASSIFICATION**  
(\$ million)

<i>Item</i>	<i>1984-85</i>	<i>1985-86</i>	<i>1986-87p</i>
<b>CURRENT GRANTS</b>			
General public services, defence, public order and safety	7.3	8.6	7.6
Education—			
Primary and secondary	103.6	113.9	122.4
Tertiary education—			
University education	85.2	93.9	96.8
Other higher education	85.3	95.1	100.2
Technical and further education	15.8	16.1	16.6
Pre-school education	4.9	2.4	—
Other education	2.9	3.0	2.9
Health—			
Hospitals and other institutional services and benefits	87.9	89.1	93.0
Clinic and other non-institutional services and benefits	1.3	1.5	4.1
Public health	8.5	9.8	9.0
Social security and welfare—			
Welfare services —			
Family and child welfare	1.3	1.3	1.3
Aged and handicapped welfare	3.0	3.7	10.4
Welfare services n.e.c.	3.6	5.8	5.4
Social security and welfare n.e.c.	2.0	2.1	4.2
Housing and community amenities—			
Housing	0.6	0.6	0.6
Community development	0.8	1.2	1.3
Community amenities	—	—	0.2
Recreation and culture	4.3	1.8	6.0
Fuel and energy	0.9	0.7	0.7
Agriculture, forestry, fishing and hunting—			
Agricultural land management	3.1	3.3	6.9
Other agriculture	-0.6	7.4	11.8
Transport and communications	—	—	0.1
Other economic affairs	32.0	23.2	19.1
Other purposes—			
General purpose inter-government transactions	1,275.7	1,354.1	1,521.3
Natural disaster relief	—	0.1	—
<b>Total current grants</b>	<b>1,730.6</b>	<b>1,838.6</b>	<b>2,041.8</b>
<b>CAPITAL GRANTS</b>			
Education—			
Primary and secondary	22.1	22.2	17.5
Tertiary education—			
University education	5.4	6.7	11.4
Other higher education	3.6	5.4	13.5
Technical and further education	15.7	16.1	14.4
Other education	0.1	0.1	0.1
Health—			
Hospitals and other institutional services and benefits	—	4.3	4.3
Clinic and other non-institutional services and benefits	0.1	0.3	0.5
Public health	0.1	—	—
Social security and welfare—			
Welfare services—			
Family and child welfare	2.7	2.0	2.5
Aged and handicapped welfare	0.9	0.4	1.3
Housing and community amenities—			
Housing	57.7	60.2	63.4
Community development	3.8	4.0	7.0
Community amenities	6.8	0.4	0.6

**TABLE 23.3 — COMMONWEALTH GOVERNMENT GRANTS TO WESTERN AUSTRALIA BY GOVERNMENT PURPOSE CLASSIFICATION (continued)**  
(\$ million)

<i>Item</i>	<i>1984-85</i>	<i>1985-86</i>	<i>1986-87p</i>
<b>CAPITAL GRANTS (continued)</b>			
Housing and community amenities (continued)—			
Recreation and culture	1.0	18.8	3.2
Agriculture, forestry, fishing and hunting—			
Agricultural water resources management	3.0	2.5	1.2
Other agriculture	6.1	—	—
Transport and communications—			
Road transport	154.0	158.1	154.3
Other transport and communications	—	9.8	—
Other purposes—			
General purpose inter-government transactions	48.3	51.6	39.7
Natural disaster relief	—	0.3	—
<b>Total capital grants</b>	<b>331.4</b>	<b>367.5</b>	<b>334.9</b>

**TABLE 23.4 — COMMONWEALTH GOVERNMENT ADVANCES TO WESTERN AUSTRALIA CLASSIFIED BY GOVERNMENT PURPOSE CLASSIFICATION**  
(\$ million)

<i>Item</i>	<i>1984-85</i>	<i>1985-86</i>	<i>1986-87p</i>
Net advances (a)—			
Defence	-0.1	—	—
Housing and community amenities—			
Housing	92.5	88.5	66.4
Community development	-11.0	-7.0	-4.0
Water supply	-0.8	-0.1	-0.8
Sanitation and protection of the environment	-0.2	-0.2	-0.2
Recreation and culture	—	-0.2	-0.2
Agriculture, forestry, fishing and hunting—			
Agricultural water resources management	-0.2	-0.2	—
Agricultural support schemes	1.8	-0.8	-2.3
Forestry, fishing and hunting	-0.1	-0.2	-0.2
Transport and communications	-3.1	-3.3	-3.4
Other purposes—			
General purpose inter-government transactions	-23.6	-18.3	-18.3
Natural disaster relief	-6.6	-6.5	-7.0
<b>Total net advances</b>	<b>48.6</b>	<b>51.8</b>	<b>30.1</b>

(a) Gross advances less repayments.

### COMMONWEALTH CASH BENEFITS TO PERSONS IN WESTERN AUSTRALIA

Commonwealth cash benefits to persons are paid from the National Welfare Fund which was established in 1943 by the National Welfare Fund Act. The main components of cash benefits are hospital, medical, pharmaceutical, sickness and unemployment benefits; family allowance; and sole parent, widows, age, invalid and repatriation

pensions. Other cash benefits include scholarships and payments to trainee teachers.

Cash benefits to or for persons in Western Australia increased from \$1,740.3m to \$2,060.7m over the period. In 1986-87, social security and welfare amounted to \$1,627.0m or 79.0 per cent of the total cash benefits, followed by health with \$355.2m or 17.2 per cent.

**TABLE 23.5 — COMMONWEALTH GOVERNMENT CASH BENEFITS TO OR FOR PERSONS IN WESTERN AUSTRALIA CLASSIFIED BY GOVERNMENT PURPOSE CLASSIFICATION (a)**  
(\$ million)

<i>Item</i>	<i>1984-85</i>	<i>1985-86</i>	<i>1986-87p</i>
<b>Education—</b>			
Primary and secondary education	17.5	19.1	22.2
Tertiary education—			
University education	12.3	13.4	13.6
Other higher education	12.9	14.1	14.3
Technical and further education	5.9	6.6	6.7
Other tertiary education	4.7	5.8	6.8
Other education (including pre-school)	0.5	0.5	0.4
<i>Total education</i>	<i>53.8</i>	<i>59.5</i>	<i>64.0</i>
<b>Health—</b>			
Hospital and institutional services and benefits—			
Nursing home benefits	49.7	60.0	63.5
Hospital benefits re-insurance	2.0	0.6	0.7
Clinical and non-institutional services and benefits—			
Medical benefits	171.0	194.1	228.9
Other	2.6	2.8	3.0
Public health benefits	2.6	4.0	3.2
Pharmaceutical benefits	49.2	53.9	55.9
<i>Total health</i>	<i>277.1</i>	<i>315.4</i>	<i>355.2</i>
<b>Social security and welfare—</b>			
Benefits to ex-servicemen and their dependents	186.2	211.7	228.0
Invalid and other permanent disabled benefits—			
Invalid pensions	133.7	155.5	177.0
Other	5.9	11.7	11.7
Old age pensions	428.5	450.2	478.3
Widows, deserted wives, divorcees and orphans benefits	69.6	72.9	76.1
Unemployed benefits	289.4	294.2	328.3
Sickness benefits	21.1	23.3	28.8
Sole parent benefits	114.4	134.0	146.9
Family and child benefits n.e.c.	142.2	147.5	135.8
Other social security and welfare benefits	18.4	15.5	16.1
<i>Total social security and welfare</i>	<i>1,409.4</i>	<i>1,516.5</i>	<i>1,627.0</i>
Other purposes	—	—	14.5
<b>Total all cash benefits</b>	<b>1,740.3</b>	<b>1,891.4</b>	<b>2,060.7</b>

(a) For conditions and rates applying see Chapter 7. Western Australia's allocation of some benefits have been estimated.

## STATE GOVERNMENT FINANCE

The data in Tables 23.6 to 23.10 relate to the financial activities of the Government of Western Australia, statutory authorities, boards, commissions and corporations, and incorporated bodies (other than financial enterprises) in which the State Government or its agencies have a controlling interest.

The revised series is designed to provide, for the public sector, statistics which complement the accounts for individual sectors provided in the Australian National Accounts. These statistics are intended to consolidate the transactions of the various public authorities and present them so that their economic impact may be assessed; to show the purposes that are being served by government expenditures; and to show the roles of the various levels of government in the undertaking and financing of these expenditures.

Basic principles which have been followed in developing the data for the economic accounts for the public sector are that all public authorities should be included; all funds under the control of those authorities should be analysed; and transfers between funds, accounts and authorities should be eliminated to present tables on a consolidated basis.

In this section of the Year Book the public sector has been taken to comprise general government bodies (excluding local government authorities) and public trading enterprises. Public financial enterprises have been omitted from the consolidated accounts presented here, largely on the ground that combining the income and outlay and capital financing transactions of publicly-owned trading and savings banks, government insurance offices and other public financial institutions with the equivalent transactions of public trading enterprises and general government



seems to provide a less meaningful account of public sector activity.

**General government bodies** are government departments, offices, agencies and authorities engaged in providing services free of charge or at prices significantly below their cost of production.

**Public trading enterprises** are government undertakings which aim at covering the bulk of their expenses by revenue from sales of goods and services.

Over recent years a range of new and revised classifications has been developed for use in the compilation and presentation of government

finance statistics. For details of the new classifications refer to the *Classification Manual of Government Finance Statistics* (Catalogue No. 1217.0). Two of the main classifications shown in that publication are the Economic Transactions Framework and the Government Purpose Classification.

The Economic Transactions Framework, in broad terms, is designed to categorise transactions between public authorities and the private sector, and between public authorities where sub-sectors of the public sector have been identified, in a way which facilitates a study of the impact of government transactions on the economy.

TABLE 23.6 — STATE AUTHORITIES—RECEIPTS AND FINANCING TRANSACTIONS  
CLASSIFIED BY ECONOMIC TRANSACTIONS FRAMEWORK  
(\$ million)

Item	1984–85r	1985–86	1986–87p
Revenue and grants received—			
Taxes, fees, fines	869.8	932.0	1160.8
Net operating surpluses of public trading enterprises	300.9	400.7	518.3
Property income—			
Income from public financial enterprises	11.7	26.9	24.8
Interest received	127.0	168.4	189.5
Other property income	178.3	217.1	203.6
Other revenue	53.5	58.9	67.1
Grants received from the Commonwealth—			
Current grants	1,728.0	1,841.9	2,041.9
Capital grants	331.4	361.3	334.9
<i>Total revenue and grants received</i>	<i>3,600.4</i>	<i>4,007.1</i>	<i>4,540.8</i>
Financing transactions—			
Advances received	54.9	48.1	24.9
Net borrowing—			
General government	257.5	247.6	410.4
Public trading enterprises	299.9	357.9	299.3
Deposits received (net)—			
Increase in cash balance of private trust funds	–40.8	–41.0	3.8
Decrease in investments	–9.4	1.7	9.3
Decrease in currency and deposits	–161.1	–61.8	–123.5
Increase in provisions—			
For depreciation	112.5	109.3	128.8
Other	42.6	72.5	55.9
Other funds available (net) including errors and omissions	29.5	–74.8	–111.8
<i>Total financing transactions</i>	<i>585.6</i>	<i>659.4</i>	<i>697.1</i>
<b>Total funds available</b>	<b>4,186.0</b>	<b>4,666.5</b>	<b>5,237.9</b>

The Government Purpose Classification scheme is the medium by which outlays with similar objectives are brought together to reveal more fully the broad purposes of public sector spending, and to provide a framework for developing means of assessment of the effectiveness of outlays in achieving government policies. With the

classification of outlays by economic type, the purpose classification also facilitates the assessment of the economic impact of identified programs of expenditure.

Table 23.6 shows that the main components of the receipts of Western Australian State authorities are

taxation, grants from the Commonwealth Government, and financing transactions. Further details of taxation collections by State authorities and local government authorities are given later in this Chapter.

Figures for some items published in the public authority finance series may differ from issue to issue as a consequence of reclassification of items and other improvements made in the course of developing the most appropriate presentation of the financial transactions of public authorities.

**Financing transactions** are the means by which governments finance their deficits or invest their

surpluses, which include transactions in securities of all types, borrowing, trade credit of public trading enterprises, and changes in bank balances. Financing transactions represent the difference between total revenue and grants received and total outlays.

Table 23.7 shows current and capital outlays by Western Australian State authorities classified by Economic Transaction Framework. The principal components, for current outlays, are general government final consumption expenditure and current transfer payments; and for capital outlays, capital expenditure on goods, capital transfer payments, and net advances.

**TABLE 23.7 — STATE AUTHORITIES—OUTLAYS**  
**CLASSIFIED BY ECONOMIC TRANSACTIONS FRAMEWORK**  
(\$ million)

<i>Item</i>	<i>1984–85r</i>	<i>1985–86</i>	<i>1986–87p</i>
Current outlays—			
General government final consumption expenditure	2,138.6	2,384.3	2,609.1
Transfers payments—			
Interest paid—			
On Commonwealth advances	203.5	210.6	215.0
Other	385.8	472.8	593.4
Subsidies paid—			
To public trading enterprises	147.9	180.4	180.2
Other enterprises	16.9	22.7	32.0
Personal benefit payments	28.0	33.9	47.3
Grants—			
To non-profit institutions	146.8	159.3	172.4
To local government authorities	73.2	76.3	75.9
<i>Total current transfer payments</i>	<i>1,002.1</i>	<i>1,156.1</i>	<i>1,316.2</i>
<b>Total current outlays</b>	<b>3,140.7</b>	<b>3,540.4</b>	<b>3,925.3</b>
Capital outlays—			
Gross fixed capital expenditure—			
On new fixed assets	974.3	1,030.7	1,101.5
On secondhand fixed assets (net)	-33.2	-39.2	36.0
Increase in stocks	-3.1	25.4	44.2
Expenditure on land and intangible assets (net)	20.3	-32.9	-31.0
<i>Total capital expenditure</i>	<i>958.3</i>	<i>984.0</i>	<i>1,150.7</i>
Transfer payments—			
Grants—			
To private sector and public financial enterprises	10.9	6.4	12.6
To local government authorities	52.9	57.7	62.0
Other	—	—	—
<i>Total capital transfer payments</i>	<i>63.8</i>	<i>64.1</i>	<i>74.6</i>
Net advances paid—			
To public financial enterprises	-0.4	-11.6	17.5
To private sector	23.7	89.6	64.8
To local government authorities	—	—	5.0
<i>Total net advances paid</i>	<i>23.2</i>	<i>78.0</i>	<i>87.3</i>
<b>Total capital outlays</b>	<b>1,045.3</b>	<b>1,126.1</b>	<b>1,312.6</b>
<b>TOTAL OUTLAYS</b>	<b>4,186.0</b>	<b>4,666.5</b>	<b>5,237.9</b>

*General government final consumption expenditure* refers to expenditure by general government bodies which does not result in the

creation of fixed tangible assets or in the acquisition of land, buildings or secondhand goods. It comprises expenditure on wages, salaries

and supplements, and on goods and services other than fixed assets or stock. Fees, etc. charged by general government bodies for goods sold and services rendered are offset against purchases. Net expenditure overseas by general government bodies and purchases from public enterprises are included. All expenditure on defence is classified as general government final consumption expenditure.

*Current transfer payments* include such items as interest payments on public loans, personal benefit payments (e.g. age pensions), subsidies paid by public to enterprises, and grants, for non-capital purposes, to local authorities and private non-profit organisations (e.g. charitable organisations).

*Capital expenditure* refers to expenditure on new fixed assets whether for additions or replacements, including wages and salaries paid in connection with capital works. The acquisition and disposal of secondhand fixed assets, land and intangible assets and changes in the balance of stock accounts are included. Expenditure on new fixed assets for defence purposes is excluded. Prior to 1985-86, it was not possible to make a satisfactory dissection for expenditure on roads. Because of this, all road expenditure was classified as capital. From 1985-86 onwards road expenditure has been dissected into maintenance and capital.

*Capital transfer payments* consist mainly of grants to local governments, to public and private enterprises and persons for the purpose of acquiring capital assets.

*Net advances.* Advances are the creation of financial assets with the aim of funding particular enterprises, households or government activities. Repayments are offset against gross advances to give net advances. These advances are included in outlays, rather than financing transactions (refer to the definition on page 249) in order to bring together all the methods governments use to achieve expenditure policies. For example, advances are made to fund State housing projects.

### LOCAL GOVERNMENT FINANCE

The financial powers of local government authorities in Western Australia are derived principally from the *Local Government Act 1960*, the main provisions of which are outlined in Chapter 5 — *Constitution and Government*.

#### Receipts and Payments

Table 23.8 summarises the receipts and payments (including loan transactions) of local government authorities for the financial years 1984-85 to 1986-87. Amounts have been shown on a gross basis wherever practicable.

TABLE 23.8 — SUMMARY OF LOCAL GOVERNMENT RECEIPTS AND PAYMENTS  
(\$ million)

Item	1984-85	1985-86	1986-87p
<b>Receipts—</b>			
Rates (including penalties and ex gratia receipts)	188.3	208.5	230.6
Fees and fines	6.1	6.8	8.2
Household garbage charges	20.7	23.8	27.5
Government grants—			
General purpose grants	46.7	51.4	55.6
Specific purpose grants	93.2	94.8	105.1
Reimbursements received—			
Roads and bridges (a)	11.1	10.1	12.2
Other reimbursements	9.3	15.1	17.0
Other revenue (b)	91.7	118.8	134.8
<b>Total receipts</b>	<b>467.0</b>	<b>529.3</b>	<b>591.0</b>
Loans raised during the year	47.4	41.4	32.4
<b>Payments—</b>			
Payments for goods, services and land—			
General public services	52.1	56.2	59.9
Public order and safety	5.3	6.2	7.1
Education	0.3	0.3	0.5
Health	9.4	10.3	11.5
Welfare	10.4	11.9	16.3
Housing and community amenities—			
Household and other garbage	33.0	40.0	40.6
Community and regional development	7.4	10.8	24.4
Other housing and community amenities	19.1	24.5	24.1
Recreation and culture—			
Public halls, civic centres	7.9	10.6	12.1
Recreation and sport	75.2	85.7	82.3
Libraries and other culture	17.4	19.4	21.4

**TABLE 23.8 — SUMMARY OF LOCAL GOVERNMENT RECEIPTS AND PAYMENTS (continued)**  
(\$ million)

<i>Item</i>	<i>1984-85</i>	<i>1985-86</i>	<i>1986-87p</i>
Payments (continued)—			
Payments for goods, services and land (cont.)—			
Economic services—			
Transport—			
Construction, maintenance of roads and bridges	126.0	130.7	144.2
Road plant purchases	17.7	18.6	19.2
Other transport	14.3	15.7	18.7
Other economic services	6.1	6.2	7.8
Other payments for goods, services and land	12.6	24.6	24.2
<b>Total payments for goods, services and land</b>	<b>414.2</b>	<b>471.8</b>	<b>514.3</b>
Comprising—			
Recurrent payments	243.4	278.7	297.9
Capital payments	170.8	193.1	216.5
Other payments from revenue—Debt charges (c)	68.9	76.8	81.3

(a) Mainly reimbursements from the Main Roads Department for work performed on its behalf and from private developers for sub-divisional roads. (b) Includes debt charges in respect of loans raised on behalf of State Government authorities (c) Repayment of all loans.

### Loan Transactions

Under the provisions of local government legislation, local government authorities are constituted as corporate bodies and are authorised to raise loans for works and undertakings and for the liquidation of existing loan debts. The conditions imposed by the *Local Government Act 1960* in relation to loan raising, the levying of loan rates, the expenditure of loan monies and the repayment of loans are summarised in the section *The Local Government System* in Chapter 5 under the heading *Financial Provisions*.

Loans are raised mainly from banks, insurance companies and superannuation funds. The State Government exercises a measure of supervision over the loan transactions of local government authorities and, where a loan is repayable in full at maturity, maintains the necessary sinking fund at the Treasury.

Table 23.9 shows the aggregate debt outstanding at 30 June of each year from 1985 to 1987 for all local authorities constituted under the Local Government Act. Figures are on a gross borrowing basis as they include all transactions associated

with borrowing by one level of government on behalf of another, and borrowing between levels of government.

**TABLE 23.9 — LOCAL AUTHORITIES: DEBT**  
AT 30 JUNE  
(\$ million)

<i>Item</i>	<i>1985</i>	<i>1986</i>	<i>1987</i>
Advances from public authorities	0.2	0.2	0.2
Loans	315.6	324.0	317.5
Other indebtedness	0.1	—	—
<b>Debt outstanding</b>	<b>316.0</b>	<b>324.3</b>	<b>317.8</b>

### STATE GOVERNMENT AND LOCAL AUTHORITY TAXATION

The principal sources of State Government and local authority taxes, fees and fines in 1986-87 were: employers' payroll taxes 22.1 per cent, municipal rates 16.2 per cent, stamp duties 13.7 per cent and petroleum products franchise taxes 7.0 per cent. The following tables shows, for the three years 1984-85 to 1986-87, taxes, fees and fines collected by State Government and local authorities.

**TABLE 23.10 — STATE AND LOCAL AUTHORITIES: TAXES, FEES AND FINES BY TYPE**  
(\$ million)

<i>Item</i>	<i>1984-85</i>	<i>1985-86</i>	<i>1986-87</i>
Taxes, fees and fines—			
Employers' payroll taxes	r231.5	246.8	310.5
Taxes on property—			
Taxes on immovable property—			
Land taxes	49.6	51.7	58.6
Municipal rates	186.1	206.3	228.3
Metropolitan improvement rates	7.9	7.8	8.8
Taxes on immovable property n.e.c.	0.4	0.4	0.4

**TABLE 23.10 — STATE AND LOCAL AUTHORITIES: TAXES, FEES AND FINES BY TYPE**  
(continued)  
(\$ million)

<i>Item</i>	<i>1984-85</i>	<i>1985-86</i>	<i>1986-87</i>
Taxes, fees and fines (continued)—			
Taxes on property (continued)—			
Estate inheritance and gift duty	0.1	—	—
Taxes on financial and capital transactions—			
Stamp duties	131.5	145.2	192.8
Financial institutions' taxes	34.9	27.0	26.4
Taxes on provision of goods and services—			
Excises (levies on statutory corporations)	22.6	28.7	31.0
Taxes on gambling—			
Taxes on government lotteries	24.1	20.5	25.9
Casino taxes	—	4.6	10.8
Race betting taxes	26.6	28.2	28.1
Taxes on gambling n.e.c.	1.0	0.9	0.9
Taxes on insurance—			
Insurance companies' contributions to fire brigades	22.1	23.6	25.8
Third party insurance taxes	4.2	4.5	4.6
Taxes on insurance n.e.c.	23.1	25.8	29.6
Taxes on use of goods and performance of activities—			
Motor vehicle taxes—			
Vehicle registration fees and taxes	78.4	84.3	93.2
Stamp duty on vehicle registration	44.5	48.9	50.1
Drivers' licences	15.2	13.9	14.7
Road transport and maintenance taxes	2.6	2.6	2.6
Franchise taxes—			
Petroleum products franchise taxes	44.0	46.0	98.2
Tobacco franchise taxes	49.6	57.0	61.9
Liquor franchise taxes	24.3	28.6	43.1
Fees and fines—			
Fees from regulatory services	17.3	20.7	35.3
Fines	20.5	21.0	24.9
<b>Total taxes, fees and fines</b>	<b>1,062.0</b>	<b>1,145.0</b>	<b>1,406.5</b>

## REFERENCES

### ABS publications

*Classification Manual of Government Finance Statistics* (1217.0)

*Local Government, Western Australia* (1303.5)

*Government Financial Estimates, Australia* (5501.0)

*Commonwealth Government Finance* (5502.0)

*State and Local Government Finance, Australia* (5504.0)

*Taxation Revenue, Australia* (5506.0)

*Expenditure on Education, Australia* (5510.0)

## Chapter 24

### PRIVATE FINANCE

**The operations of the financial sector in Western Australia are controlled by both Commonwealth and Western Australian legislation.**

The principal Australian legislation comprises the *Banking Act 1959*, *Reserve Bank Act 1959*, *Commonwealth Banks Act 1959*, *Life Insurance Act 1945* and the *Insurance Act 1973*. More detailed descriptions of the background and purpose of these Acts may be found in the *Year Book Australia*, No. 71—1988 from page 812 (Catalogue no. 1300.0).

In addition, the Financial Corporations Act was introduced in 1974 as a result of the increasing significance of the non-bank financial institutions in the early 1970s. The Government's aim in introducing this legislation was to regulate the activities of these non-bank institutions in order to achieve economic stability, maintenance of full employment, the efficient allocation of productive resources and to ensure adequate levels of finance for housing.

Recent Australian Governments, however, have sought to decrease the degree of regulation previously imposed on the financial sector and on banking activity in particular. As a result, controls on most bank interest and foreign exchange have been relaxed and new private banks (including overseas banks) have been permitted to commence operations.

State legislation exists to regulate the activities and monitor the solvency of particular types of financial institutions, which operate on a co-operative basis and lend predominantly to members or consumers. In general, these institutions are permanent building societies, co-operative housing societies and credit unions. In some States, including Western Australia, there is also legislation for State Government bodies to operate as banks or insurance offices.

#### CURRENCY

Australia has a decimal system of currency, the unit being the dollar which is divided into 100 cents. Australian notes are issued in the

denominations of 5, 10, 20, 50 and 100 dollars and coins in the denominations of 1, 2, 5, 10, 20, 50 cents, and 1 and 2 dollars. The 2 dollar note was replaced by a 2 dollar coin in 1988.

#### BANKING

The banking system in Western Australia includes the Commonwealth banking institutions, The Rural and Industries Bank of Western Australia and the private trading and savings banks, summary details of which are given below.

#### Trading Banks

Commercial banking is conducted by trading banks and in Western Australia twenty such banks had outstanding advances at 30 June 1988.

**TABLE 24.1 – TRADING BANKS AT JUNE 1988**  
(\$'000)

Name	Deposits repayable in	Loans, advances and bills discounted (a)
	Australia (a)	
Australian and New Zealand Banking Group Limited	814,575	627,657
Bank of America Australia Limited	2,377	10,591
Bank of New Zealand	48,488	45,603
Bank of Singapore (Australia) Limited	—	1,633
Bankers Trust Australia Limited	8,881	—
Banque Nationale de Paris	27,162	20,710
Barclays Bank Australia Limited	—	6,456
Chase A.M.P. Bank Limited	15,429	1,978
Citibank Limited	91	18,124
Commonwealth Bank of Australia	687,355	829,648
Hong Kong Bank of Australia	13,960	60,341
I.B.J. Australia Bank Limited	17,731	67,732
Lloyds Bank N.Z.A. Limited	1,152	3,660
National Australia Bank Limited	719,304	771,982
National Mutual Royal Bank Limited	543	38
Nat West Australia Bank Limited	64,482	121,426
Primary Industry Bank of Australia	1,775	61,873
Standard Chartered Bank Australia Limited	63,421	43,540
The Rural and Industries Bank of Western Australia (General Banking Division)	2,470,030	2,323,509
Westpac Banking Corporation	1,153,881	964,559
<b>Total</b>	<b>6,110,598</b>	<b>5,981,061</b>

(a) Average of weekly balances for June 1988.

**TABLE 24.2 – TRADING BANKS—MONTHLY AVERAGES OF DEPOSITORS' BALANCES AND BANK ADVANCES (a)**  
(\$'000)

	June 1986	June 1987	June 1988
Depositors balances—			
Commonwealth and State Government—			
Fixed	31,058	36,662	98,101
Current—			
Bearing interest	2,307	3,321	2,065
Not bearing interest	2,628	2,208	243
Other than Commonwealth and State Government—			
Fixed	3,471,737	3,878,293	4,258,371
Current—			
Bearing interest	221,943	392,873	483,301
Not bearing interest	1,026,185	1,051,465	1,268,518
<b>Total</b>	<b>4,755,859</b>	<b>5,364,822</b>	<b>6,110,598</b>
Loans, advances and bills discounted (b)	4,176,940	4,950,644	5,981,061
Ratio of loans, advances, etc to total balances (per cent)	87.8	92.3	97.9

(a) Averages based on amounts at close of business each Wednesday. (b) Excludes loans to authorised dealers in the short-term money market.

## Savings Banks

At 30 June 1988 nine savings banks were operating in Western Australia. The value of depositors' balances at the end of June 1988 is shown in Table 24.3, while Table 24.4 shows total transactions classified by transaction type for these banks.

**TABLE 24.3 – SAVINGS BANKS AT 30 JUNE 1988**  
(\$'000)

Name	Depositors balances at end of June
Australia and New Zealand Savings Bank Limited	433,089
Bank of New Zealand Savings Bank Limited	1,459
Challenge Bank Limited	1,604,898
Citibank Savings Limited	15,575
Commonwealth Savings Bank of Australia	1,075,189
National Australia Savings Bank Limited	414,483
National Mutual Royal Savings Bank Limited	7,081
The Rural and Industries Bank of Western Australia (Savings Division)	1,131,161
Westpac Banking Corporation Savings Bank Limited	759,212
<b>Total</b>	<b>5,442,147</b>

**TABLE 24.4 – SAVINGS BANK TRANSACTIONS**

	Unit	1985–86	1986–87(a)	1987–88
Deposits (b)	\$'000	9,133,303	11,454,629	(c)32,698,598
Withdrawals (b)	\$'000	9,095,499	11,383,020	(c)31,649,040
Excess of deposits over withdrawals	\$'000	37,804	71,609	1,049,558
Interest added to accounts	\$'000	209,311	271,822	417,356
Accounts open at end of year (d)	No.	2,153,457	2,618,596	2,638,557
Depositors' balances at end of year—				
Total	\$'000	2,649,943	3,975,333	5,442,147
Average per operative account	\$	1,231	1,518	2,063
Average per head of estimated resident population	\$	1,864	2,725	3,638

(a) Includes figures for the Challenge Bank Ltd which commenced operations as a bank in April 1987. (b) Includes inter-branch transfers. (c) Increased transaction activity mainly due to extended bank deregulation – full cheque facilities etc now available. (d) Excludes inoperative accounts (ie accounts of less than \$2 which have not been operated on for more than two years).

## State Bank

The Rural and Industries Bank of Western Australia is owned by the Western Australian government. The bank has an office in Sydney, which handles wholesale business, branches in London and the Cayman Islands, and a representative office in Tokyo. It is also authorised to deal in foreign exchange under the Banking (foreign exchange) Regulations and to operate a full foreign exchange dealing room in Perth.

## Other Banks (excluding merchant banks)

Other banks operating in Western Australia comprise the Commonwealth Development Bank

of Australia, which provides finance for the purpose of primary production, and for the establishment or development of small business undertakings where finance is not otherwise available on reasonable and suitable terms and conditions; the Australian Resources Development Bank Limited, which assists Australian enterprises to participate in the development of Australia's natural resources; and the Primary Industry Bank of Australia Limited, which provides loans to primary producers for longer terms than are otherwise generally available but which is restricted to refinancing loans made by banks and other financial institutions.

## BUILDING SOCIETIES

Building societies in Western Australia are registered under the provisions of the *Building Societies Act 1976*, primarily for the purpose of raising funds to assist members by granting loans, secured on mortgage, to build or acquire homes.

As shown by Table 24.5 permanent building societies obtain the majority of their funds from the public, while terminating societies derive funds primarily from government and banks. The Commonwealth Government contributes to these funds under the *Housing Assistance Act 1984*.

TABLE 24.5 – BUILDING SOCIETIES

	1984–85	1985–86	1986–87
PERMANENT SOCIETIES			
Number of societies	8	8	8
	\$'000	\$'000	\$'000
Liabilities—			
Withdrawable shares	1,463,808	1,534,979	1,685,300
Borrowings (a)	908,036	1,058,426	1,104,696
Other	96,826	109,383	123,563
<b>Total liabilities</b>	<b>2,468,670</b>	<b>2,702,788</b>	<b>2,913,559</b>
Assets—			
Amount owing on loans	1,807,865	1,977,938	2,056,374
Placements and deposits	177,213	162,470	115,467
Other	483,592	562,380	741,718
<b>Total assets</b>	<b>2,468,670</b>	<b>2,702,788</b>	<b>2,913,559</b>
Expenditure	299,846	364,896	430,701
Income	318,007	376,585	444,956
TERMINATING SOCIETIES			
Number of societies	215	203	210
	\$'000	\$'000	\$'000
Liabilities—			
Loans—			
Banks	36,809	41,195	42,423
Government	131,878	147,993	158,819
Other	24,128	28,466	29,541
Other	3,646	4,376	4,588
<b>Total liabilities</b>	<b>196,460</b>	<b>222,031</b>	<b>235,370</b>
Assets—			
Amount owing on loans	167,042	190,233	200,183
Other	29,417	31,797	35,188
<b>Total assets</b>	<b>196,460</b>	<b>222,031</b>	<b>235,370</b>
Expenditure	16,623	19,931	22,800
Income	17,090	20,627	23,446

(a) Previously known as deposits.

## CREDIT UNIONS

Credit unions are registered in Western Australia under the *Credit Union Act 1979*. They operate on a co-operative basis by predominantly borrowing from and providing finance to their own members.

TABLE 24.6 – CREDIT UNIONS

	1983–84	1984–85	1985–86
Credit unions on register (a)	33	31	26
Number of members	173,123	194,819	201,669
	\$'000	\$'000	\$'000
Income—			
Interest on loans		76,949	118,449
Income from placements and other deposits (b)	{ 58,050 }	7,017	9,817
Income from securities	1,848	3,957	3,791
Other income	4,920	5,888	6,183
<b>Total</b>	<b>64,818</b>	<b>93,810</b>	<b>138,241</b>
Expenditure—			
Interest on borrowings	40,535	61,301	98,311
Wages, salaries, etc	9,065	10,387	13,362
Other administrative expenses (c)	7,933	11,555	13,065
Other expenditure	4,853	6,079	6,841
<b>Total</b>	<b>62,384</b>	<b>89,322</b>	<b>131,581</b>
Liabilities—			
Members' funds—			
Share capital	1,329	1,474	1,551
Deposits	448,433	668,130	900,045
Other	25,096	36,432	52,909
<b>Total</b>	<b>474,857</b>	<b>706,035</b>	<b>954,505</b>
Assets—			
Loans to members	362,926	581,218	788,827
Other	111,931	124,818	165,677
<b>Total</b>	<b>474,857</b>	<b>706,035</b>	<b>954,505</b>

(a) At 30 June. (b) Includes interest on deposits with banks. (c) Includes bad debts written off and allowances for doubtful debts.

## FINANCE COMPANIES

Finance companies are defined as incorporated companies mainly engaged in providing to the general public (business as well as persons) any of the following types of credit facilities: instalment credit for retail sales; personal loans; wholesale finance; factoring; other consumer and commercial loans; finance leasing of business plant and equipment and bills of exchange transactions.

TABLE 24.7 – FINANCE COMPANIES  
FINANCE LEASE RECEIVABLES AND LOAN  
OUTSTANDINGS AT 30 JUNE  
(\$ million)

	1986	1987	1988
Finance lease receivables (a)	664.9	668.5	637.7
Loans outstanding—			
Individuals for housing	129.4	98.6	79.0
Individuals for other uses	663.2	624.6	561.1
Other loans and advances (b)	996.4	930.7	998.1

(a) Excludes leveraged lease receivables. (b) Excludes related corporations.

## OTHER FINANCIAL INSTITUTIONS

Financial institutions registered under the *Financial Corporations Act 1974* and not





contained in the tables above comprise authorised money market dealers, money market corporations, general financiers, pastoral finance companies, intra-group financiers and other financial corporations. These institutions together with public unit trusts, cash management trusts, insurance companies and private and public superannuation funds also contribute to financial dealings in Western Australia. Statistical data for these institutions are generally available only on an Australian basis.

### LENDING BY FINANCIAL INSTITUTIONS

New monthly statistical series were introduced in January 1985 to show a measure of the lending activity of significant lenders in fields of personal, commercial and lease finance. These were in addition to statistics already published on secured housing finance commitments to individuals for owner occupation.

#### Personal Finance Commitments

Personal finance commitments comprise those commitments made by significant lenders to individuals for their own personal (non-business) use. A lender is considered to be significant if it is a bank, a life insurance company or a corporation registered under the *Financial Corporations Act 1974* and, during 1982-83, it committed funds exceeding \$4 million to individuals for their own use.

**TABLE 24.8 - PERSONAL FINANCE COMMITMENTS**  
(\$ million)

	1986-87	1987-88
Total fixed loan commitments during period (including Personal investment loans)	997.0	1,218.6
Commitments under revolving credit facilities (including credit card facilities)—		
New and increased credit limits	394.0	612.1
Cancellations and reduction of credit limits during period	180.3	303.0
Credit limits at end of period—		
Total	1,222.5	1,552.1
Commitments used	534.7	558.3

#### Commercial Finance

Commercial finance commitments comprise those made by significant lenders to government, private and public enterprises, non-profit organisations, or individuals (for investment and business purposes). A lender is considered to be significant if it is a bank, a corporation registered under the *Financial Corporation Act 1974*, or an insurance

company and if it committed funds exceeding \$40.1 million for business purposes (excluding leasing of goods) during 1982-83.

**TABLE 24.9 - COMMERCIAL FINANCE COMMITMENTS**  
(\$ million)

	1986-87	1987-88
Fixed loan facilities (excluding some personal investment loans) by purpose of commitment—		
Construction finance for—		
Erection of—		
Dwellings for rental/resale	69.8	115.4
Non-residential buildings	106.2	232.7
Non-building structures	3.5	5.3
Alterations and additions	14.0	17.1
Purchase of real property—		
Dwellings for rental/resale	57.1	165.9
Non-residential buildings	175.6	280.0
Rural property	65.4	138.8
Residential block development	38.9	92.4
Other land	46.7	88.8
Wholesale finance	64.9	93.3
Purchase of plant and equipment—		
Motor vehicles	82.0	114.8
Other transport equipment	19.6	78.9
Other	85.7	131.3
Re-financing	293.8	396.4
Other (including factoring)	969.7	938.1
<b>Total fixed loan commitments</b>	<b>2,092.9</b>	<b>2,889.2</b>
Commitments not drawn at end of year	381.3	445.7
Revolving credit facilities—		
Total credit limits at end of year	6,052.2	6,381.9
Used credit at end of year	3,305.6	4,710.9

#### Lease Finance Commitments

Lease finance commitments comprise those made by significant lenders to trading and financial enterprises, non-profit organisations, governments, public authorities and individuals.

**TABLE 24.10 - LEASE FINANCE COMMITMENTS**  
(\$ million)

	1986-87	1987-88
Value of goods under new finance lease commitments (a)—		
Motor vehicles	175.2	202.5
Other transport equipment	9.6	19.3
Construction and earthmoving equipment	49.6	50.6
Agricultural machinery and equipment	13.6	22.4
Automatic data processing equipment and office machines	76.0	54.7
Shop and office furniture, fittings and equipment	51.3	49.1
Other	44.0	87.7
<b>Total finance lease commitments</b>	<b>419.3</b>	<b>486.3</b>

(a) Excludes leveraged leases.

A lender is considered to be significant if it is a trading bank or a corporation registered under the

*Financial Corporations Act 1974* and categorised as a money market corporation or a finance company or a general financier and if it committed funds exceeding \$13 million during 1982–83.

Housing Finance for Owner Occupation

TABLE 24.11 – HOUSING FINANCE FOR OWNER OCCUPATION (\$ million)

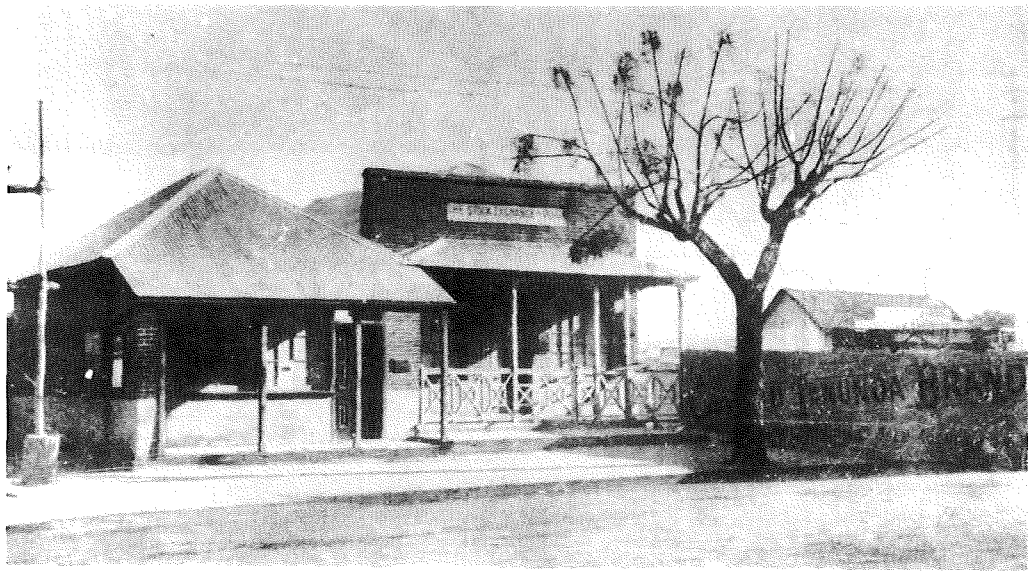
	1985–86	1986–87	1987–88
Secured housing finance commitments to individuals—			
Construction of dwellings—			
Houses	260.8	280.7	450.9
Other dwellings	4.7	6.8	10.9

TABLE 24.11 – HOUSING FINANCE FOR OWNER OCCUPATION (continued) (\$ million)

	1985–86	1986–87	1987–88
Purchase of newly erected dwellings—			
Houses	26.9	46.8	74.7
Other dwellings	8.1	8.7	21.3
Purchase of established dwellings—			
Houses	586.1	842.0	1306.0
Other dwellings	47.3	57.3	114.9
Alterations and additions	30.4	33.6	57.1
Total commitments	964.2	1,275.9	2035.7

Housing finance commitments comprise secured commitments to individuals for construction or purchase of dwellings for owner occupation.

AUSTRALIAN STOCK EXCHANGE (PERTH) LIMITED



The Stock Exchange Building in St George's Terrace, adjacent to the WA Turf Club Office in the 1890s.  
 Photograph: Bell Publishing and Dr Tom Stannage, UWA.

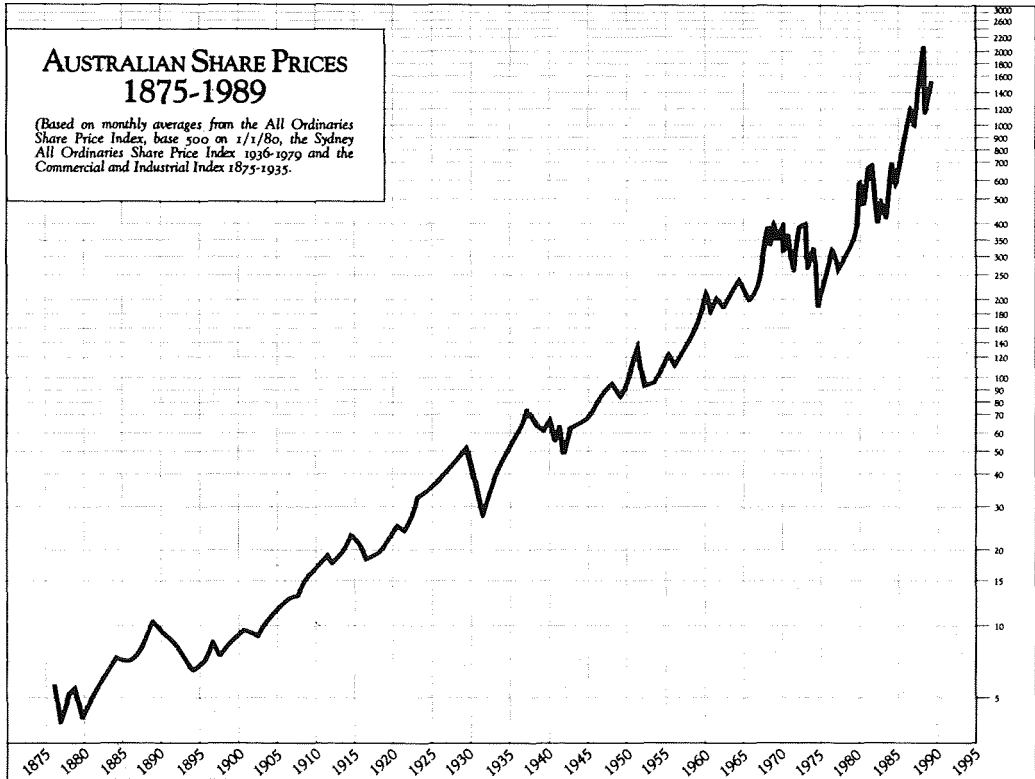
In 1989 the Australian Stock Exchange (Perth) Limited celebrates its Centenary. In August 1888, nine people met at the United Services Hotel in St George's Terrace to discuss the idea of a local exchange. The Perth Stock Exchange opened for trading on October 1st. A few months later a rebel group formed a second organisation, the Stock

Exchange of Perth, which began trading on July 22, 1889.  
 By 1890 the two groups had merged and the new Stock Exchange of Perth with its first Chairman, Sir Cornthwaite Rason, held its first annual meeting. There were forty-one members, each of

whom had paid an entry fee of £50 and 25 listed stocks.

From the turbulent days of the 1890s when gold fever hit Kalgoorlie, through several major wars, a depression and a succession of bull and bear markets the Perth Exchange has helped shape the State's economy and provided a firm foundation for the Western Australian business community.

The Perth Exchange established Australia's first Second Board Market on 29 June 1984. The Second Board provides a new method of capital raising for relatively small companies which do not qualify for the main trading board. A Second Board company requires only a spread of 100 shareholders and \$100,000 issued capital. Listing fees are substantially lower than those for the main board. At June 30 1988, 140 companies were listed on the Second Board.



Graph: Australian Stock Exchange (Perth)Limited

#### SELECTED SIGNIFICANT DATES IN THE HISTORY OF THE PERTH STOCK EXCHANGE

1891	Exchange distributes first printed list of companies; election of first State Parliament.	1953	Oil discovered at Rough Range; oil and uranium boom.
1893	Paddy Hannan discovers gold in Kalgoorlie.	1969	Poseidon shares rise from \$1.75 to \$200 in three months; turnovers in Australian market exceed Wall Street
1899	Tax introduced on gold dividends.	1974	Australia in recession; oil crisis; collapse of major companies; runs on building societies in Queensland and South Australia; Australian dollar devalued; Trade Practices Commission formed.
1903	Rail, water and telegraph links completed between Perth and the Goldfields; record gold output of 2.1 million ounces.	1986	Record turnover of \$1,116 million; Perth becomes the second largest 'home' Exchange for listed companies in Australia.
1929	Great Depression.	1987	October Crash; electronic trading introduced; Exchange becomes a subsidiary of Australian Stock Exchange Limited.
1932	Western Mining floated.		
1937	Association of Australian Stock Exchange (AASE) formed.		
1940	Wartime property tax introduced.		

**TABLE 24.12 – THE STOCK EXCHANGE OF PERTH LIMITED: TURNOVER OF STOCKS AND SHARES**  
(Source: The Stock Exchange of Perth Limited)  
(\$'000)

Particulars	1985–86	1986–87	1987–88
Shares—			
Ordinary—			
Industrial	705,136	1,205,620	799,282
Oil	62,340	150,540	59,300
Mining	344,174	1,613,081	1,188,929
Preference	1,047	850	478
<b>Total</b>	<b>1,112,697</b>	<b>2,970,091</b>	<b>2,047,993</b>
Commonwealth and semi-government loans	639	651	62
Debentures, unsecured notes, etc	326	662	3
<b>Total</b>	<b>965</b>	<b>1,313</b>	<b>65</b>
<b>Total value of turnover</b>	<b>1,113,662</b>	<b>2,971,404</b>	<b>2,048,058</b>

### NEW CAPITAL EXPENDITURE

New capital expenditure is expenditure on new fixed tangible assets including major improvements, and alterations and additions. In general this is expenditure charged to fixed tangible assets accounts excluding expenditure on second hand assets unless these are imported from overseas for the first time.

Data is collected by quarterly sample survey of all private sector enterprises except those enterprises primarily engaged in the agriculture, construction and community services industries. Prior to December 1978 data was only available at the national level but state dissections have been produced since then. Quarterly estimates of private new capital expenditure are available in *Private New Capital Expenditure, Australia* (Catalogue No. 5626.0) and *State Estimates of Private New Capital Expenditure* (Catalogue No. 5646.0).

**TABLE 24.13 – PRIVATE NEW CAPITAL EXPENDITURE BY SELECTED INDUSTRIES AND TYPE OF ASSET**  
(\$ million)

Selected industry and type of asset	1985–86	1986–87	1987–88
Finance, property and business services	498	643	432
Mining	1,326	1,949	2,211
Manufacturing	323	500	658
Other selected industries	598	538	618
New capital expenditure—			
New buildings and structures	1,310	1,576	1,418
Equipment, plant and machinery	1,434	2,055	2,501
<b>Total</b>	<b>2,744</b>	<b>3,630</b>	<b>3,919</b>

In original current price terms expenditure has increased by 89 per cent over the three years.

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*Savings Banks, Australia* (5602.0)

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*Reserve Bank Bulletin, September 1986*

*Personal Investment Monthly, June 1987.*

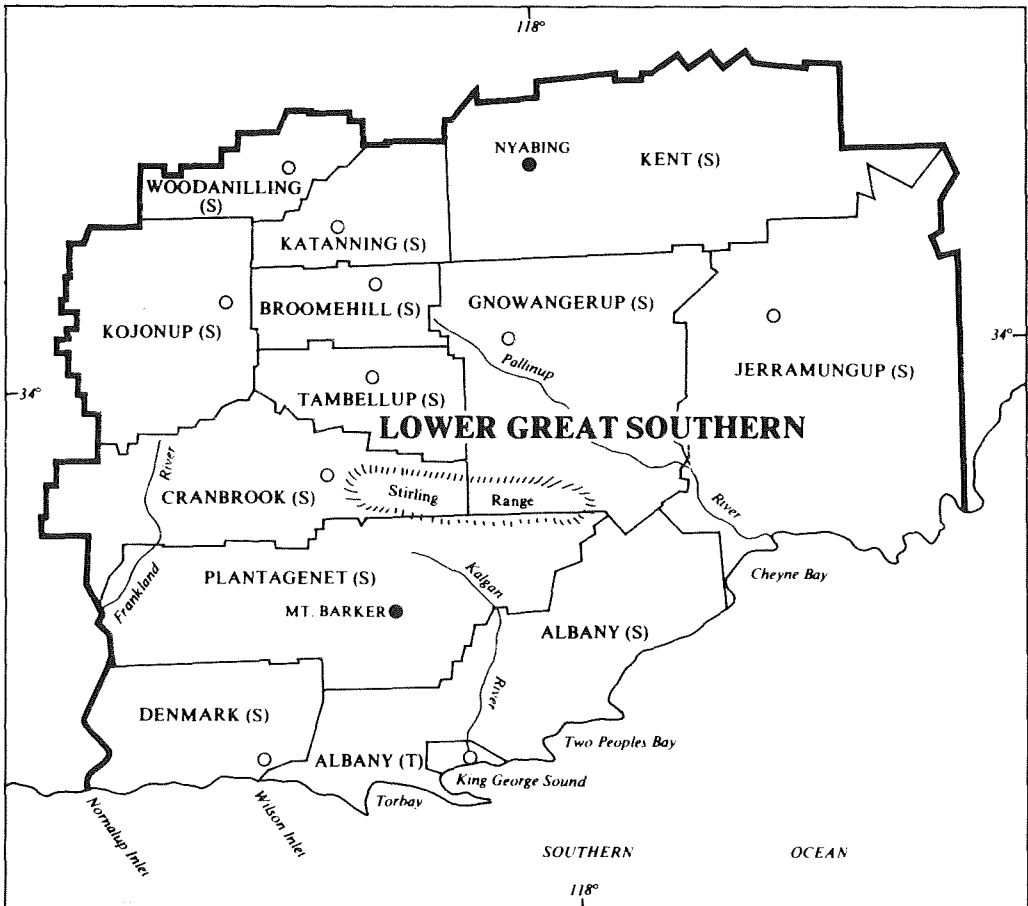
## Chapter 25

### LOWER GREAT SOUTHERN STATISTICAL DIVISION PROFILE

The Lower Great Southern Statistical Division, or Great Southern Region, covers an area of some 40,000 square kilometres extending along the south coast of Western Australia from Bremer Bay to Denmark and approximately 200 kilometres to the north. It comprises 13 local governments: Albany Town and the Shires of Albany, Broomehill, Cranbrook, Denmark, Gnowangerup, Jerramungup, Katanning, Kent, Kojonup, Plantagenet, Tambellup and Woodanilling.

Albany is the Great Southern's port, largest town and an important commercial, administrative and cultural centre. Katanning, 180 kilometres to the north, is the largest of the other towns which service the Region's people and industries.

DIAGRAM 25.1 – LOWER GREAT SOUTHERN STATISTICAL DIVISION



## NATURAL FEATURES

### Geology

The geology of the Great Southern is made up of two major rock types. The Precambrian granites of the Yilgarn Block comprise the northern two thirds of the Region, while the southern third consists of Eocene sediments known as the Pallinup siltstones.

The impressive Stirling Ranges are roughly on the border of the granites and sediments and are of Proterozoic sedimentary origins.

### Landforms

The Stirling and Porongurup Ranges are the most outstanding features of the Region's ancient, deeply weathered surface. An undulating landscape in the west is contrasted to the east by a more gentle rolling landscape. Lateritic gravels cap many hilltops.

Several rivers drain the southern portion of the Region, emptying into the Southern Ocean via estuaries. The coastline provides spectacular scenery, consisting largely of extensive beaches, granite headlands and limestone cliffs.

### Soils

Soil developments on the granites and sediments commenced 25 million years ago (Early Tertiary times). Further recession of the sea level in Late Tertiary times (15 million years ago) has produced an array of very sandy surfaced soils on the sedimentary rocks, while gravels and sandy loams predominate on the granite rocks.

### Vegetation

The Great Southern Region is located in the South West Botanical Province. The vegetation is

extremely varied and is influenced by both rainfall and soil.

There are karri forests in the high-rainfall extreme south-west corner of the Region, replaced to the north by jarrah forest then eucalyptus woodland. The eastern part of the Region is characterised by mallee to the north of the Stirling Ranges and mallee heathland to the south.

Farming activity has led to widespread clearing of native vegetation and its replacement by introduced crops and pastures. However, there are considerable areas of State Forest and vacant Crown Land with substantially unmodified vegetation, as well as several National Parks and Reserves.

## CLIMATE

The Great Southern Region shares the typical mediterranean climate of the south-west corner of Western Australia, characterised by warm dry summers and cool wet winters.

There is a wide range of average annual rainfall, from more than 1,000 mm in the south-west corner of the Region to less than 400 mm in the north-east.

The probability of receiving effective rainfall to start and maintain plant growth in summer is quite low and the break of the growing season may vary more than two months from year to year in some areas. In general, the reliability of the opening rains decreases eastwards and northwards. The length of the growing season also decreases in a north-east pattern, ranging from ten months in the south-west corner to five months in the north-east.

Owing to the ocean's moderating effect coastal temperatures are generally cooler than those in inland areas in summer and warmer in winter.

**TABLE 25.1 – TEMPERATURE AND RAINFALL**  
(Source: Bureau of Meteorology)

Reporting station and characteristics	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Albany—													
Temperature—													
Mean max. °C	25.3	25.1	24.2	21.5	18.6	16.6	15.8	16.0	17.3	18.9	20.8	23.5	..
Mean min. °C	13.5	14.3	13.1	11.5	9.7	8.1	7.5	7.4	7.8	9.0	10.6	12.3	..
Rainfall—													
Average (mm)	22	24	27	69	96	105	124	105	81	83	46	26	808
Wet days—													
Average number	8	9	11	14	18	19	21	21	18	15	12	10	176

**TABLE 25.1 – TEMPERATURE AND RAINFALL** (*continued*)  
(Source: Bureau of Meteorology)

Reporting station and characteristics	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Denmark—													
Temperature—													
Mean max. °C	25.5	25.3	24.5	21.8	19.2	16.9	16.2	16.5	17.5	19.3	21.1	23.8	..
Mean min. °C	13.2	13.6	12.2	10.8	9.1	7.9	7.3	7.1	7.7	8.9	10.8	12.1	..
Rainfall—													
Average (mm)	23	27	38	82	125	143	159	128	99	92	53	32	1,001
Wet days—													
Average number	7	8	10	15	19	22	23	22	20	17	13	10	186
Katanning—													
Temperature—													
Mean max. °C	30.3	29.4	26.7	22.6	18.3	15.4	14.4	15.4	17.7	20.6	25.0	28.4	..
Mean min. °C	13.6	13.7	12.5	10.2	7.9	6.5	5.4	5.5	6.4	7.6	10.0	12.1	..
Rainfall—													
Average (mm)	13	17	23	31	61	80	77	63	46	38	21	16	486
Wet days—													
Average number	3	4	5	7	13	17	18	16	13	10	6	4	116
Ongerup—													
Temperature—													
Mean max. °C	29.0	28.0	25.8	22.3	18.5	15.8	14.9	15.5	17.7	21.1	24.1	27.6	..
Mean min. °C	13.8	14.3	12.9	10.8	8.3	6.6	5.8	5.7	6.3	8.0	10.5	12.4	..
Rainfall—													
Average (mm)	17	19	21	26	44	52	50	42	38	34	24	14	381
Wet days—													
Average number	3	4	5	6	10	13	14	13	11	8	6	4	97

## HISTORY

The Great Southern's earliest inhabitants were Aborigines of the Mineng and Goreng groups; signs of this occupation remain in place names and at various sites throughout the Region.

Permanent European settlement began in 1826 with a settlement at Frederickstown (renamed Albany five years later) to preclude French claims to Western Australia. This settlement followed centuries of coastal exploration by Dutch, French, British and colonial explorers.

Military outposts established at Kojonup and Mt Barker were to become the hinterland's first towns, while grazing and farming gradually spread throughout the Region.

For many years Albany was the colony's major port. Its importance for exports of wool, sandalwood, whale oil and timber grew with the completion of the Great Southern Railway in 1889 and the growth of settlement and farming which followed.

At the turn of the century Albany lost shipping to the newly completed Fremantle Harbour and suffered a decline. Generally slow growth in the

first half of the twentieth century accelerated with the 1950s wool boom, reflecting the significance of agricultural commodity prices to the Region's economy.

The last few decades have seen generally steady growth and recognition of the need to diversify from overdependence on agriculture. The emergence of several small-to-medium sized manufacturing establishments which add value to the Region's raw materials, and the growth experienced in the tourism industry, are positive signs that the Great Southern has a sound base for future development.

## POPULATION

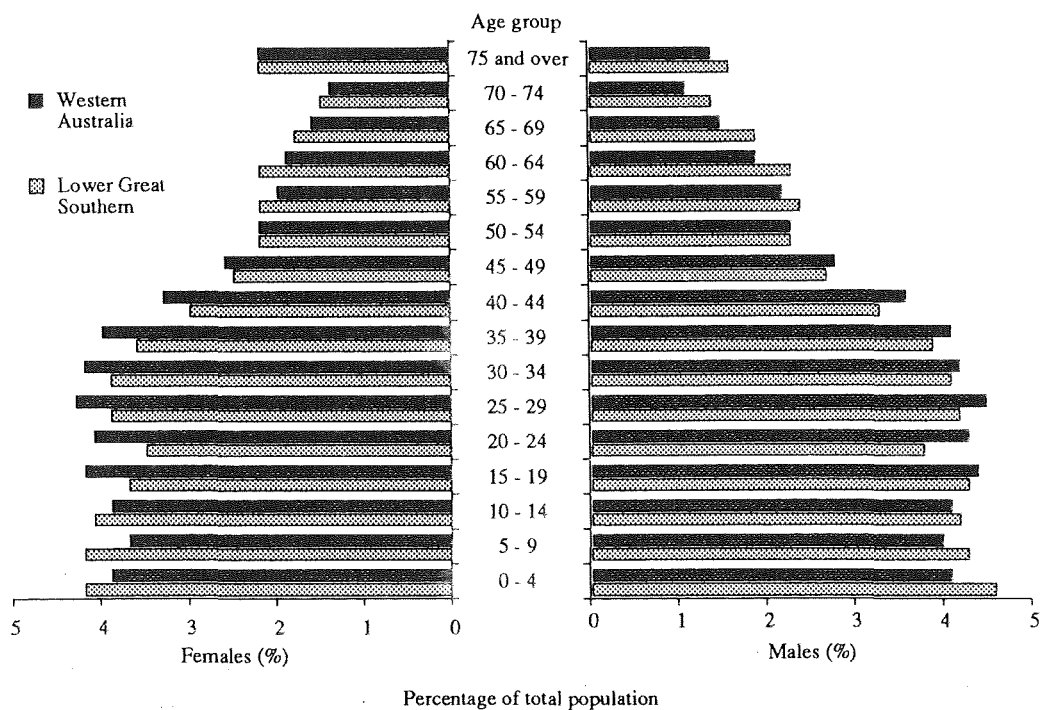
The estimated resident population of the Great Southern Region at 30 June 1988, was 45,596, or 3 per cent of the total population of Western Australia.

Half of the Region's population lives in Albany Town and Albany Shire.

There has been strong population growth in the Shire of Albany (2.4 per cent increase from 1987 to 1988) and in the Shire of Denmark (2.9 per cent increase).

TABLE 25.2 - ESTIMATED RESIDENT POPULATION,  
LOWER GREAT SOUTHERN STATISTICAL DIVISION

Statistical local area	1983	1984	1985	1986	1987	1988 <sup>p</sup>
Albany (T)	14,135	14,286	14,440	14,651	14,755	14,783
Albany (S)	8,297	8,398	8,445	8,579	8,750	8,961
Broomehill (S)	620	616	611	608	593	587
Cranbrook (S)	1,318	1,293	1,267	1,265	1,256	1,251
Denmark (S)	2,556	2,604	2,651	2,757	2,887	2,971
Gnowangerup (S)	2,330	2,291	2,250	2,197	2,180	2,082
Jerramungup (S)	1,435	1,417	1,389	1,356	1,345	1,347
Katanning (S)	5,179	5,080	4,989	4,884	4,852	4,842
Kent (S)	1,023	1,005	986	981	977	971
Kojonup (S)	2,680	2,621	2,551	2,479	2,439	2,403
Plantagenet (S)	4,247	4,212	4,165	4,201	4,161	4,168
Tambellup (S)	944	912	879	849	827	820
Woodanilling (S)	455	448	441	435	433	430
<b>Total division</b>	<b>45,219</b>	<b>45,183</b>	<b>45,064</b>	<b>45,242</b>	<b>45,455</b>	<b>45,596</b>

DIAGRAM 25.2 - ESTIMATED RESIDENT POPULATION - LOWER GREAT SOUTHERN STATISTICAL DIVISION  
AND WESTERN AUSTRALIA: AGE AND SEX, 30 JUNE 1986



## EMPLOYMENT

TABLE 25.3 – EMPLOYED POPULATION BY INDUSTRY – LOWER GREAT SOUTHERN STATISTICAL DIVISION, CENSUSES 1976, 1981 AND 1986

Industry	1976	1981	1986(a)
Agriculture	6,100	6,338	5,769
Mining	8	20	35
Manufacturing	1,580	1,182	1,143
Electricity, gas and water	192	302	257
Construction	1,239	1,170	992
Wholesale and retail trade	2,655	2,959	2,998
Transport and storage	721	790	690
Communications	331	318	314
Finance	589	697	791
Public administration, defence	429	564	632
Community services	1,713	2,257	2,492
Entertainment and recreation	739	788	848
Other and not stated	1,121	1,351	513
<b>Total</b>	<b>17,418</b>	<b>18,736</b>	<b>17,474</b>

(a) In 1986, for the first time, the Census count was conducted during Western Australia's school holiday period, when many households were away from their usual places of residence.

The importance of agriculture to the Region is well illustrated by the fact that one third of the workforce is employed in that industry, which also includes forestry and fishing.

Wholesale and retail trade is the next largest employer, followed by community services.

The highest employment growth in the last ten years has been in community services such as

health, education, welfare, cultural, police and prison services. There has been a reduction in the percentage of the workforce employed in manufacturing, in common with the rest of Western Australia.

## AGRICULTURE

The gross value of agricultural production in the Region was \$471.9 million in 1987–88, or 15.8 per cent of the value of production in Western Australia.

Although the traditional rural products of wool, meat and grain are by far the most significant income earners, the Region's agricultural base is becoming more diversified, for example into viticulture and high value horticultural crops.

DIAGRAM 25.3 – GROSS VALUE OF AGRICULTURAL COMMODITIES PRODUCED – LOWER GREAT SOUTHERN STATISTICAL DIVISION

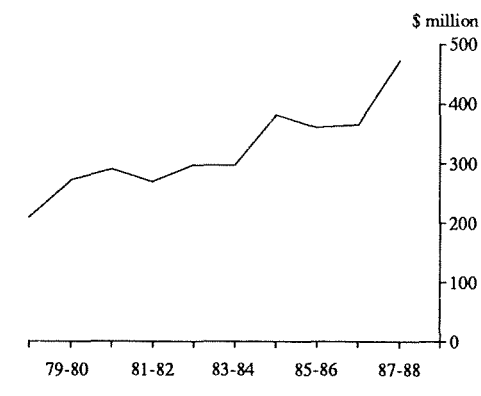


TABLE 25.4 – GROSS VALUE OF AGRICULTURAL COMMODITIES PRODUCED (a) LOWER GREAT SOUTHERN STATISTICAL DIVISION, 1987–88 (\$'000)

Statistical local area	Crops and pastures			Livestock slaughtering and other disposals	Livestock products			Total agriculture
	Wheat	Other	Total		Wool	Other	Total	
Albany (S) and (T)	62	7,621	7,683	14,368	29,980	1,125	31,105	53,156
Broomehill (S)	1,834	1,662	3,495	1,742	11,696	1	11,696	16,934
Cranbrook (S)	417	3,834	4,251	5,650	33,363	107	33,470	43,371
Denmark (S)	138	1,775	1,913	4,325	2,707	753	3,460	9,697
Gnowangerup (S)	10,842	7,194	18,037	4,243	31,246	83	31,330	53,610
Jerramungup (S)	6,887	9,739	16,626	4,828	32,638	6	32,644	54,098
Katanning (S)	3,394	2,555	5,950	1,898	12,177	29	12,205	20,053
Kent (S)	16,934	5,844	22,778	4,822	22,503	138	22,641	50,240
Kojonup (S)	339	5,548	5,888	7,823	51,470	44	51,514	65,225
Plantagenet (S)	215	6,911	7,126	12,459	49,879	428	50,307	69,892
Tambellup (S)	1,398	1,749	3,148	3,102	12,533	130	12,663	18,912
Woodanilling (S)	1,942	2,344	4,286	1,603	10,852	19	10,871	16,759
<b>Total division</b>	<b>44,402</b>	<b>56,778</b>	<b>101,181</b>	<b>66,861</b>	<b>301,043</b>	<b>2,861</b>	<b>303,905</b>	<b>471,947</b>

(a) Excludes beekeeping.

## Land use

Eighty-six per cent of farmland in the Region is cleared, of which twenty-one per cent was cropped in the 1987-88 season.

The Great Southern is experiencing the trend towards fewer, larger farms which is common to Western Australia as a whole.

TABLE 25.5 - AGRICULTURAL LAND USE, LOWER GREAT SOUTHERN STATISTICAL DIVISION, SEASON 1987-88

Statistical local area	Area of -					Total area of establishments ('000 ha)
	Establishments (a)(b) (Number)	Cleared land ('000 ha)	Crops (c) ('000 ha)	Sown pastures(d) ('000 ha)	Lucerne(all purposes) ('000 ha)	
Albany (S) and (T)	396	198.5	13.8	183.8	0.3	241.0
Broomehill (S)	81	101.5	22.7	77.9	-	110.4
Cranbrook (S)	193	192.8	23.4	174.8	-	244.9
Denmark (S)	122	27.7	1.3	25.0	0.1	37.4
Gnowangerup (S)	206	371.8	109.3	259.4	0.1	412.1
Jerramungup (S)	197	334.4	76.5	280.0	0.2	394.8
Katanning (S)	103	129.6	34.7	72.0	-	142.7
Kent (S)	180	349.9	122.7	222.4	-	390.8
Kojonup (S)	271	258.0	32.1	214.9	-	300.2
Plantagenet (S)	449	258.2	25.8	225.1	0.1	313.6
Tambellup (S)	89	111.3	26.0	76.3	-	132.8
Woodanilling (S)	75	87.4	20.7	62.2	-	102.1
<b>Total division</b>	<b>2,362</b>	<b>2,421.1</b>	<b>509.0</b>	<b>1,873.7</b>	<b>0.8</b>	<b>2,823.0</b>

(a) Excludes establishments with an estimated value of agricultural operations less than \$20,000. (b) Includes beekeepers without land. (c) Excludes area of sown pastures and of lucerne cut for hay or harvested for seed. (d) Includes sown grasses and clovers.

## Livestock

selling centres of stud and commercial Merino sheep.

The Great Southern Region is the major sheep and wool producer in the State. In 1987-88 the number of sheep shorn was in excess of 9.3 million and the wool clip was 39,301 tonnes. Both figures represent around twenty-five per cent of the State's production.

Dairy and, to a lesser extent, beef production in the Region is best suited to the higher rainfall southern areas. In 1987-88, eighty-two per cent of the Region's beef cattle and ninety-five per cent of dairy cattle were in the Shires of Albany, Denmark and Plantagenet.

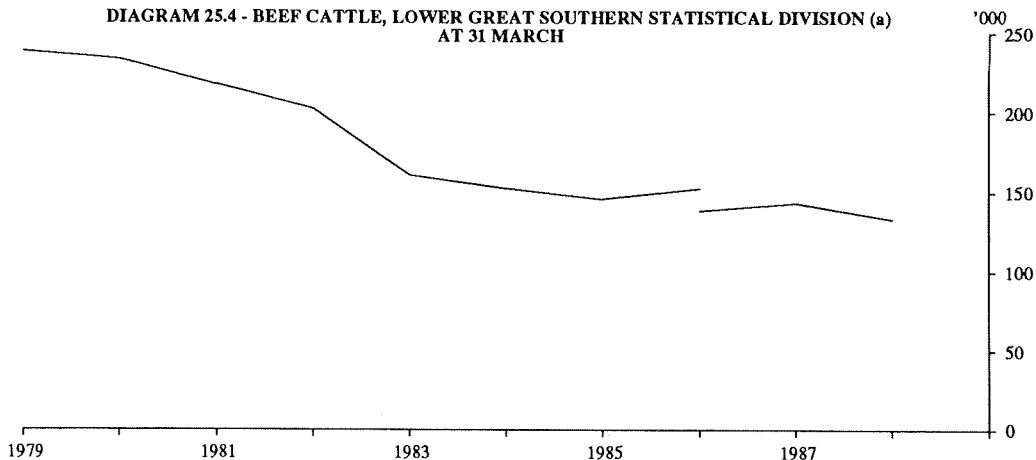
The Region is well known both for the high quality of its wool and because Katanning is acknowledged as one of the world's foremost

Pig production is less dependent on climatic conditions and therefore distributed more evenly throughout the Region.

TABLE 25.6 - SHEEP AND LAMBS SHORN AND WOOL CLIP, LOWER GREAT SOUTHERN STATISTICAL DIVISION YEAR ENDED 31 MARCH 1988

Statistical local area	Sheep and lambs shorn			Woolclip			Average weight of wool shorn		
	Sheep ('000)	Lambs ('000)	Total ('000)	Sheep ('000kg)	Lambs ('000kg)	Total ('000kg)	Sheep (kg)	Lambs (kg)	Total (kg)
Albany (S) and (T)	731.5	157.6	889.0	3,691.4	215.8	3,907.2	5.05	1.37	4.39
Broomehill (S)	324.1	93.5	417.6	1,402.6	119.6	1,522.2	4.33	1.28	3.65
Cranbrook (S)	842.2	185.5	1,027.7	4,092.5	268.7	4,361.3	4.86	1.45	4.24
Denmark (S)	72.9	12.5	85.4	327.8	21.9	349.7	4.49	1.76	4.09
Gnowangerup (S)	722.5	208.4	930.9	3,812.2	271.1	4,083.3	5.28	1.30	4.39
Jerramungup (S)	762.5	203.7	966.2	3,950.2	319.7	4,269.8	5.18	1.57	4.42
Katanning (S)	326.2	97.9	424.1	1,472.8	115.8	1,588.6	4.51	1.18	3.75
Kent (S)	546.6	156.9	703.5	2,713.0	228.3	2,941.3	4.96	1.46	4.18
Kojonup (S)	1,308.3	338.4	1,646.8	6,249.3	473.2	6,722.5	4.78	1.40	4.08
Plantagenet (S)	1,203.0	246.9	1,449.9	6,153.0	357.0	6,510.0	5.11	1.45	4.49
Tambellup (S)	324.9	97.4	422.3	1,485.9	143.1	1,629.1	4.57	1.47	3.86
Woodanilling (S)	279.8	72.7	352.6	1,320.3	95.9	1,416.2	4.72	1.32	4.02
<b>Total division</b>	<b>7,444.6</b>	<b>1,871.3</b>	<b>9,315.8</b>	<b>36,671.0</b>	<b>2,630.3</b>	<b>39,301.4</b>	<b>4.93</b>	<b>1.41</b>	<b>4.22</b>

**DIAGRAM 25.4 - BEEF CATTLE, LOWER GREAT SOUTHERN STATISTICAL DIVISION (a)  
AT 31 MARCH**



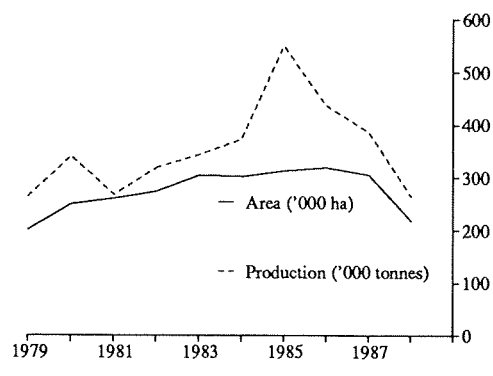
(a) From 1986, excludes establishments with an estimated value of agricultural operations (EVAO) less than \$20,000. Prior to 1986, includes establishments with EVAO greater than \$2,500

**TABLE 25.7 - CATTLE, SHEEP AND PIG NUMBERS  
LOWER GREAT SOUTHERN STATISTICAL DIVISION  
31 MARCH 1988  
(<sup>'000</sup>)**

Statistical local area	Meat cattle	Milk cattle	Sheep	Pigs
Albany (S) and (T)	56.8	2.0	780.3	4.6
Broomehill (S)	0.7	—	294.7	0.7
Cranbrook (S)	6.2	—	839.4	2.5
Denmark (S)	18.6	1.4	70.2	3.4
Gnowangerup (S)	2.2	—	709.5	2.5
Jerramungup (S)	5.9	—	838.7	0.5
Katanning (S)	0.5	—	338.8	1.6
Kent (S)	1.2	—	600.7	9.2
Kojonup (S)	6.7	0.1	1,265.5	3.7
Plantagenet (S)	33.8	0.7	1,189.4	2.7
Tambellup (S)	0.4	—	291.7	7.7
Woodanilling (S)	0.3	—	276.4	1.6
<b>Total division</b>	<b>133.3</b>	<b>4.3</b>	<b>7,495.3</b>	<b>40.1</b>

production in 1987–88 was severely affected by drought, particularly wheat which was down by forty–six per cent on the previous season.

**DIAGRAM 25.5 - WHEAT: AREA AND PRODUCTION  
LOWER GREAT SOUTHERN STATISTICAL DIVISION  
Year ended 31 March**



## Crops

Wheat is the major grain crop of the Region, followed by barley, oats then lupins. Grain

**TABLE 25.8 — GRAIN PRODUCTION, LOWER GREAT SOUTHERN  
STATISTICAL DIVISION, SEASON 1987–88  
(<sup>'000</sup> tonnes)**

Statistical local area	Barley				Oats	Lupins
	Wheat	Two–row	Six–row	Total		
Albany	0.4	7.8	0.1	8.0	2.2	2.1
Broomehill (S)	11.0	3.8	0.1	3.9	5.5	0.6
Cranbrook (S)	2.5	6.6	0.1	6.7	16.5	1.4
Denmark (S)	0.8	0.1	—	0.1	0.1	0.3
Gnowangerup (S)	64.8	29.4	1.1	30.6	7.5	7.0
Jerramungup (S)	41.1	46.9	0.2	47.1	7.6	6.7
Katanning (S)	20.3	5.4	0.1	5.5	8.6	2.5
Kent (S)	101.1	19.2	0.5	19.8	6.9	7.6

**TABLE 25.8 — GRAIN PRODUCTION, LOWER GREAT SOUTHERN  
STATISTICAL DIVISION, SEASON 1987-88 (continued)**  
(\*000 tonnes)

Statistical local area	Barley				Oats	Lupins
	Wheat	Two-row	Six-row	Total		
Kojonup (S)	2.0	6.2	0.2	6.5	25.7	0.8
Plantagenet (S)	1.3	10.9	0.2	11.0	11.7	2.5
Tambellup (S)	8.4	6.4	—	6.4	4.1	0.9
Woodanilling (S)	11.6	4.1	—	4.1	8.4	1.0
<b>Total division</b>	<b>265.2</b>	<b>146.9</b>	<b>2.8</b>	<b>149.7</b>	<b>104.8</b>	<b>33.2</b>

### Fruit and Vegetables

The Great Southern Region produces a variety of fruit and vegetable crops, primarily in the Shires of Albany, Denmark and Plantagenet.

The most significant contribution to Western Australia's vegetable production comes from peas and beans (which are processed locally), potatoes, asparagus and cauliflowers. The south coast of the Region is also a major source of seed potatoes.

Two-thirds of the State's processing peas and nearly half of its asparagus was produced in the Region in 1987-88.

**TABLE 25.9 — SELECTED VEGETABLE PRODUCTION  
LOWER GREAT SOUTHERN STATISTICAL DIVISION  
SEASON 1987-88**

	Lower Great Southern	Western Australia	Lower Great Southern as % of W.A.
Asparagus—			
Area (ha)	11.8	36.2	
Production (tonnes)	28.0	57.8	48.5
Beans (French processing)—			
Area (ha)	6.1	96.9	
Production (tonnes)	27.4	630.4	4.3
Cauliflowers—			
Area (ha)	18.0	671	
Production (tonnes)	465	14,363	3.2
Peas (processing)—			
Area (ha)	595.0	724.8	
Production (tonnes)	1,360.2	2,022.7	67.2
Potatoes (excluding seed)—			
Area (ha)	292	2,034	
Production (tonnes)	6,707	72,290	9.3

A decline in the number of orchard fruit trees such as apples, pears and stone fruits has in recent years been offset by the introduction of high value crops such as avocados, kiwi fruit, passionfruit and tamarillos.

In the 1987-88 season the State's entire passionfruit crop and about one-third of the cherry crop was produced in the Great Southern Region.

**TABLE 25.10 — SELECTED FRUIT PRODUCTION  
LOWER GREAT SOUTHERN STATISTICAL DIVISION  
SEASON 1987-88**

	Lower Great Southern	Western Australia	Lower Great Southern as % of W.A.
Cherries—			
Trees—			
Under 6 years	820	15,751	
6 years and over	1,734	4,864	
Production (tonnes)	15.5	45.1	34.4
Kiwi Fruit—			
Area not bearing (ha)	1.5	7.4	
Area bearing (ha)	1.0	16.1	
Production (tonnes)	6.0	89.9	6.7
Passionfruit—			
Area not bearing (ha)	1.5	1.5	
Area bearing (ha)	1.3	1.3	
Production (tonnes)	5.6	5.6	100.0
Strawberries—			
Area not bearing (ha)	1.5	16.0	
Area bearing (ha)	2.5	49.2	
Production (tonnes)	65.0	870.0	7.5

### Viticulture

The relatively cool summers experienced in the southern portion of the Great Southern Region are ideally suited for the production of high quality wine grapes.

Since the first experimental plantings in 1967 the Region has been developing a reputation for premium red and white varietal wines.

There are now more than thirty vineyards totalling 227 hectares in the Mt Barker, Frankland, Porongurup, Denmark and Albany areas. Two major projects just commenced west of Mt Barker will, on completion, increase the present total area under vines by about sixty per cent.

**TABLE 25.11 – VINEYARDS: VARIETY OF VINE, AREA AND PRODUCTION  
LOWER GREAT SOUTHERN STATISTICAL DIVISION, 1987–88**

Grape variety	Area under vines			Grapes sold or used on the holding (tonnes)	Beverage wine made	
	Not yet bearing (hectares)	Bearing (hectares)	Total (hectares)		Unfortified (kilolitres)	Fortified (kilolitres)
Cabernet Sauvignon	0.5	63.0	63.5	194.9	n.a.	n.a.
Rhine Riesling	2.2	63.5	65.7	336.6	n.a.	n.a.
Shiraz	2.0	27.6	29.6	97.1	n.a.	n.a.
Other	20.0	47.8	67.8	185.3	n.a.	n.a.
<b>Total</b>	<b>24.7</b>	<b>201.9</b>	<b>226.6</b>	<b>813.9</b>	<b>343.9</b>	<b>6.2</b>

### FORESTRY

The timber resource of the Great Southern is comprised mainly of hardwoods in State Forest, vacant Crown Land and private property in the western area of the Region.

The Department of Conservation and Land Management (CALM) estimates that State Forests provide mills within the Albany and South Coastal area with sawlogs for which the value of the sawn product is in excess of \$6 million annually.

The native timber resource is being augmented by CALM sharefarming schemes operating within the 600 mm rainfall isohyet.

The softwood sharefarming scheme, commenced in 1987, aims to plant 1,000 hectares per annum over fifteen years, so that there is sufficient resource to stimulate a pine sawmilling industry in the Region.

The hardwood scheme also has a target of 1,000 hectares per annum, commencing in the winter of 1989. With this scheme the aim is to provide plantations of *Eucalyptus globulus* for export woodchips, and, in doing so, to assist afforestation of farms and reversal of the eutrophication trend in south coast estuaries.

### FISHING

Professional fishermen along the Region's south coast catch about half the total State fish catch (excluding crustaceans and molluscs).

The main commercial species are pilchards, Australian salmon, Australian herring, southern bluefin tuna, cobbler and shark. For each of these species, except sharks, more than three quarters of the total State catch is from the Great Southern Region.

Processing of pilchards occurs in Albany and Bremer Bay, and of salmon and tuna in Albany.

**TABLE 25.12 – FISH CATCH BY FISHING LOCALITY  
LOWER GREAT SOUTHERN STATISTICAL DIVISION  
1986–87 (PRELIMINARY)  
(TONNES)**

Locality	Catch	Locality	Catch
Doubtful Island	400.4	Torbay	298.9
Bremer Bay	597.1	Wilson's Inlet	74.0
Pallinup Estuary	7.7	Parry's Inlet	0.9
Cheyne Beach	395.2	Irwin Inlet	20.6
Betty's Bay	186.8	Normalup	139.4
Albany	5,647.4	Peaceful Bay	83.4
<b>Total</b>			<b>7,851.8</b>
<b>Percentage of W.A. catch</b>			<b>50.8</b>

**TABLE 25.13 – FISH – SELECTED SPECIES: CATCH, GROSS VALUE, LOWER GREAT SOUTHERN STATISTICAL DIVISION, 1986–87 (PRELIMINARY)**

Species	Tonnes	Gross value (\$)	% of W.A. catch
Cobbler	75	380,980	77
Herring (Australian)	781	648,352	83
Pilchard	4,800	4,031,856	80
Salmon (Australian)	1,288	669,795	86
Shark	272	828,572	21
Tuna (southern bluefin)	361	818,664	38

### MANUFACTURING

The larger manufacturers in the Great Southern are located mainly in Albany and include a woollen mill, vegetable processing plant, fertilizer manufacturer and an export abattoir. Katanning also has a large export abattoir.

Throughout the Region there are over 100 smaller manufacturing establishments processing local raw materials or supplying a range of goods mainly for local agricultural and domestic use.

**TABLE 25.14 – MANUFACTURING ESTABLISHMENTS**  
(a)  
**SELECTED ITEMS OF DATA**  
**LOWER GREAT SOUTHERN STATISTICAL DIVISION**

Item	Unit	1983–84	1984–85	1986–87 (b)
Establishments operating at 30 June.	No.	58	62	72
Persons employed (c)(d)	No.	1,328	1,406	1,091
Wages and salaries	\$m	18.0	20.9	25.1
Turnover	\$m	95.7	111.3	131.3

(a) Excluding single establishment enterprises employing fewer than four persons. (b) No manufacturing census was conducted for 1985–86. (c) Average employment over whole year. Includes working proprietors.

### BUILDING AND CONSTRUCTION

The building and construction industry in the Great Southern is characterised by a large number of small companies employing less than five persons.

**TABLE 25.14 – DWELLING UNIT COMMENCEMENTS, LOWER GREAT SOUTHERN STATISTICAL DIVISION**

Year	Houses	Other residential building	Total
1981–82	198	33	231
1982–83	199	16	215
1983–84	288	31	319
1984–85	298	52	350
1985–86	269	73	342
1986–87	235	25	260
1987–88	244	46	290

Although residential building activity has levelled off in the past two years after record peaks in the

mid 1980s, it is still twenty-five per cent above the levels at the beginning of the decade.

Of the dwelling units commenced in 1987–88, ninety per cent were in Albany Town and Shire and the Shire of Denmark.

The value of non-residential building completed in the Region for the year ended June 1988 was \$3.7 million.

### BUSINESS AND SERVICE SECTOR

Albany is the largest business and service centre in the Great Southern, providing the southern part of the Region with a range of goods and services comparable to those available to city suburbs. Katanning is the next largest centre, servicing the northern part of the Region.

### TOURISM

Tourism is becoming a major industry in the Great Southern Region, now professionally marketed as the Rainbow Coast.

Natural attractions include spectacular coastal scenery and beaches, National Parks including the Stirling and Porongurup Ranges and the Fitzgerald River wilderness area, and abundant wildflowers, many unique to the Region.

Albany in particular has many historical attractions and throughout the Region there are increasing numbers of craft studios, wineries and local museums which welcome tourists.

Tourist accommodation is well catered for by some eighty establishments, whose takings from accommodation amounted to \$6.5 million in 1988.

**TABLE 25.15 – TOURIST ACCOMMODATION,**  
**LOWER GREAT SOUTHERN STATISTICAL DIVISION**

#### HOTELS, MOTELS AND GUEST HOUSES

Year	Establishments (a)	Guest rooms (a)	Room occupancy	Guest arrivals	Takings from accommodation
	No.	No.	Per cent	'000	\$'000
1983	46	917	35	98.4	3,017.5
1984	45	928	34	97.6	3,123.2
1985	43	936	35	102.2	3,562.9
1986	40	925	33	100.5	3,763.0
1987	41	932	33	103.6	3,894.9
1988	42	947	33	107.3	4,117.9

**TABLE 25.15 — TOURIST ACCOMMODATION, LOWER GREAT SOUTHERN STATISTICAL DIVISION** (*continued*)

CARAVAN PARKS					
<i>Year</i>	<i>Establishments (a)</i>	<i>Sites (a)</i>	<i>Site occupancy</i>	<i>Guest arrivals</i>	<i>Takings from accommodation</i>
	No.	No.	Per cent	'000	\$'000
1983	22	1,937	21	83.9	1,094.6
1984	24	2,117	20	76.5	1,127.9
1985	25	2,233	19	85.6	1,327.1
1986	25	2,382	19	86.9	1,292.7
1987	26	2,414	19	102.6	1,541.3
1988	26	2,644	19	90.9	1,693.3

HOLIDAY FLATS AND UNITS					
<i>Year</i>	<i>Letting entities (a)</i>	<i>Units (a)</i>	<i>Unit occupancy</i>	<i>Unit lettings</i>	<i>Takings from accommodation</i>
	No.	No.	Per cent	'000	\$'000
1987 (b)	12	107	38	2.2	253.8
1988	13	125	45	4.8	744.8

(a) At 31 December. (b) The six month period July 1987 to December 1987.

**SERVICES****Education**

At February 1988, the Ministry of Education was responsible for thirty-two schools and two Educational Support Centres in the Lower Great Southern Statistical Division.

In addition there were eight non-government schools and eleven Community Pre-Schools.

**TABLE 25.16 – SCHOOLS AND STUDENTS  
LOWER GREAT SOUTHERN STATISTICAL DIVISION,  
JULY 1988**(Sources: Ministry of Education;  
National Schools Statistics Collection)

	<i>Number</i>
Government schools —	
Campuses	36
Students —	
Primary years	4,566
Secondary years	2,588
Total students	7,154
Non-government schools —	
Campuses	8
Students	
Primary years	869
Secondary years	361
Total students	1,230
All Schools —	
Campuses	44
Students —	
Primary years	5,435
Secondary years	2,949
Total students	8,384

The Great Southern Regional College of Technical and Further Education offers post-secondary education and training at its Albany campus as well as the first year in a number of higher education courses contracted from Perth-based tertiary institutions.

The College also runs courses throughout the Great Southern Region through its nine Regional Agencies.

**Health Services**

A regional hospital is located in Albany and district hospitals at Denmark, Mt Barker, Katanning, Kojonup and Gnowangerup.

Child, school and community health services are based in the larger towns.

Specialist medical services are provided at Albany Regional Hospital by local and visiting specialists. Albany is well supplied with general practitioners; other larger towns in the Region also have their own doctor.

**Transport**

The Great Southern Region is serviced by a road system of highways and sealed main roads and a rail freight service.

There is no rail passenger service but there are daily road passenger services to Perth, both direct and via Bunbury.

Albany Airport has a sealed runway of 1,600 metres and an Albany-Perth passenger service at least twice daily on weekdays.

The Port of Albany is located in Princess Royal Harbour, with three landbacked berths available. Major imports include fertiliser and petroleum products, with grain the major export.

### Communications

All towns in the Great Southern are linked to the national telecommunications and postal networks.

ABC radio and television services are received throughout the Region. Commercial media include three newspapers, two radio stations and the GWN television network. Most towns also have a regular community newsletter.

### Government Services

Access to government services is provided by some forty State and Commonwealth government departments, agencies and authorities which have offices in the Region.

A significant contribution to the Region's economy results from the employment of 17.6 per cent of the Region's workforce by these agencies.

**TABLE - PORT OF ALBANY: TRADE STATISTICS**  
YEAR ENDED 30 JUNE  
(Source: Albany Port Authority)

	Unit	1984	1985	1986	1987	1988
Imports (tonnes) —						
Rock phosphate	tonnes	68,539	88,025	98,061	81,659	121,522
Sulphur	"	8,072	19,016	20,297	16,134	20,668
Potash	"	—	—	3,159	3,511	6,266
Fertiliser	"	13,086	12,066	5,845	7,004	4,208
Petroleum products	"	85,761	74,322	76,021	86,003	86,323
Other cargo	"	447	—	856	2,018	—
<i>Total imports</i>	"	<i>175,905</i>	<i>193,429</i>	<i>204,239</i>	<i>196,329</i>	<i>238,987</i>
Exports (tonnes) —						
Wheat — bulk	"	531,397	900,314	818,598	867,342	683,815
Barley — bulk	"	261,787	478,763	340,223	99,340	108,251
Oats — bulk	"	18,533	34,304	4,726	20,625	17,769
Tallow	"	1,563	2,002	500	—	—
Other cargo	"	—	—	379	—	4,372
<i>Total exports</i>	"	<i>813,280</i>	<i>1,415,383</i>	<i>1,164,426</i>	<i>987,307</i>	<i>814,207</i>
Bunkers — oil	"	846	446	621	1,277	1,109
<i>Total port trade</i>	"	<i>990,031</i>	<i>1,609,258</i>	<i>1,369,286</i>	<i>1,184,913</i>	<i>1,054,303</i>
Shipping—						
No. of vessels entered port	No.	95	122	100	95	89
Gross register tonnage	"	1,264,562	2,121,857	1,674,503	1,670,056	1,753,856

### THE FUTURE

In 1986 the State Government established the Great Southern Development Authority (GSDA) to plan, research, promote and co-ordinate economic and social development in the Great Southern Region.

The GSDA's activities are aimed at providing assistance to growth industries such as tourism which capitalise on the Region's comparative advantages, encouraging the production and use of local products to maximise economic and

employment multiplier effects, attracting new industries and encouraging expansion of existing industry to broaden the Region's economic base, and facilitating the provision of services required by the community.

Broad policy guidelines for the GSDA are set by the Board and implemented by its full-time staff from an office in Albany. An Advisory Committee, appointed to tap the skills and ideas of the whole Region, reports to the Board on development opportunities and community needs throughout the Great Southern.



## Chapter 26

### STATISTICAL SUMMARY

In the following pages, a historical summary of some of the more important statistics relating to Western Australia is shown. This is intended to present a general picture of the development of the State. Naturally the range of statistics available in the early years of the colony is limited. Also it is not always possible to achieve perfect comparability over long periods of time because of changes in definitions, scope of statistical collections etc. While major breaks in series are shown minor changes are not shown and the statistics should be interpreted with this in mind. Generally, the first year shown on each page is the earliest for which any series on that page is available. Because of space constraints, data for earlier years are shown at ten year intervals only. The pages have been arranged in chapter order.

## ESTIMATED POPULATION, NATURAL INCREASE AND MIGRATION (a)

NOTE. Figures above the double lines exclude full-blood Aborigines; those below the double lines refer to total population, i.e. including Aborigines.

Year	Population at 31 December (b)			Population increase (c)				Mean population (b)		Population of Perth Statistical Division (b) (d)
				Recorded natural increase (e)	Estimated net migration (f)	Total increase (g)		Year ended		
						Number	Per cent (h)	30 June	31 December	
	Males	Females	Persons							
('000)										
1829	769	234	1,003	n.a.	n.a.	n.a.	n.a.			
1830	877	295	1,172	n.a.	n.a.	169	16.85		n.a.	
1840	1,434	877	2,311	34	123	157	7.29			
1850	3,576	2,310	5,886	132	1,109	1,241	26.72			n.a.
1860	9,597	5,749	15,346	379	130	509	3.43	n.a.	15,092	
1870	15,511	9,624	25,135	475	7	482	1.96		24,894	
1880	16,985	12,576	29,561	551	-129	422	1.45		29,350	
1890	28,854	19,648	48,502	1,021	1,821	2,842	6.22		47,081	20
1900	110,088	69,879	179,967	3,214	6,495	9,709	5.70		175,113	73
1910	157,971	118,861	276,832	4,845	6,312	11,157	4.20	266,686	271,019	115.7
1920	176,895	154,428	331,323	4,761	-1,298	3,463	1.06	327,152	330,023	167.0
1930	232,868	198,742	431,610	5,426	-453	4,973	1.17	425,785	429,079	235.1
1940	248,734	225,342	474,076	4,598	-2,902	1,696	0.36	472,060	473,397	255.5
1950	294,758	277,891	572,649	9,170	19,295	28,465	5.23	545,134	557,878	351.7
1951	304,454	285,885	590,339	9,506	8,184	17,690	3.09	570,346	580,317	362.8
1952	316,700	296,235	612,935	10,204	12,392	22,596	3.83	589,887	600,615	378.1
1953	326,372	305,371	631,743	10,790	8,018	18,808	3.07	611,191	621,034	390.1
1954	334,342	314,365	648,707	10,564	6,400	16,964	2.69	630,705	639,963	402.2
1955	343,838	324,771	668,609	11,244	8,658	19,902	3.07	648,222	657,323	416.8
1956	350,333	330,935	681,268	11,344	1,315	12,659	1.89	666,898	674,459	427.4
1957	356,195	339,039	695,234	11,627	2,339	13,966	2.05	680,949	687,448	438.9
1958	361,441	345,755	707,196	11,177	785	11,962	1.72	693,568	699,915	449.3
1959	366,253	352,438	718,691	11,614	-119	11,495	1.63	705,869	711,737	459.5
1960	372,665	358,368	731,033	11,229	1,113	12,342	1.72	717,316	722,900	470.3
1961	384,773	370,440	755,213	11,349	2,571	13,920	1.90	729,770	737,596	482.7
1962	395,891	381,357	777,248	11,254	10,499	22,035	2.92	755,770	766,205	500.3
1963	407,024	391,871	798,895	11,314	10,068	21,647	2.79	777,413	788,457	517.8
1964	417,023	401,098	818,121	10,256	8,705	19,226	2.41	798,824	808,300	534.0
1965	427,330	410,918	838,248	9,912	9,963	20,127	2.46	817,157	826,481	550.9
1966	440,913	423,180	864,093	10,292	15,553	25,845	3.08	837,290	849,189	571.8
1967	458,438	438,550	896,988	11,244	21,651	32,895	3.81	863,539	879,815	597.7
1968	479,938	457,862	937,800	12,073	28,739	40,812	4.55	896,761	915,757	629.2
1969	500,378	476,242	976,620	13,404	25,416	38,820	4.14	935,985	955,660	659.7
1970	520,174	493,878	1,014,052	14,075	23,357	37,432	3.83	975,063	994,201	689.6
1971	547,563	522,784	1,070,347	16,433	16,352	33,033	3.26	1,013,455	1,052,785	733.0
1972	558,030	534,574	1,092,604	14,780	7,875	22,257	2.08	1,068,972	1,081,634	753.5
1973	568,500	545,482	1,113,982	12,700	8,910	21,378	1.96	1,091,845	1,101,921	773.6
1974	584,552	561,439	1,145,991	12,506	19,700	32,009	2.87	1,113,723	1,127,887	801.4
1975	594,518	572,885	1,167,403	12,411	9,410	21,412	1.87	1,142,777	1,155,499	822.1
1976	605,932	585,748	1,191,680	12,972	10,921	24,277	2.08	1,166,902	1,178,928	842.5
1977	618,210	599,006	1,217,216	12,815	11,392	25,536	2.14	1,191,588	1,204,454	861.1
1978	627,238	609,163	1,236,401	12,880	4,980	19,185	1.58	1,217,062	1,227,903	875.3
1979	636,442	620,650	1,257,092	12,499	6,847	20,691	1.67	1,237,090	1,246,800	890.6
1980	648,922	634,583	1,283,505	12,505	12,627	26,413	2.10	1,257,214	1,269,270	910.0
1981	667,381	652,840	1,320,221	13,905	20,858	36,716	2.86	1,284,014	1,301,528	r937.7
1982	684,771	670,200	1,354,971	14,060	17,640	34,750	2.63	1,320,278	1,338,681	r965.3
1983	697,570	683,441	1,381,011	14,718	8,126	26,040	1.92	1,354,814	1,368,546	r986.8
1984	708,066	694,966	1,403,032	13,123	5,886	22,021	1.59	1,380,566	1,391,775	r1,005.5
1985	724,952	711,948	1,436,900	14,272	16,304	33,868	2.41	1,404,053	1,419,004	r1,032.9
1986 r	746,560	732,919	1,479,479	14,929	25,569	42,579	2.96	1,437,490	1,458,526	1,066.7
1987 p	767,513	752,405	1,519,918	14,460	25,979	40,439	2.73	1,479,779	1,500,057	1,099.1

(a) Estimates for years prior to 1987 are based on final census results; those for 1987 are subject to revision. (b) Figures for 1971 and later refer to the estimated resident population. (c) Minus sign (—) denotes decrease. Figures prior to 1972 are on a State of registration basis; those for 1972 and later are on the basis of State of usual residence. (d) At 31 December. (e) Excess of births registered over deaths registered, including deaths of defence personnel, whether in Australia or overseas, between September 1939 and June 1947. (f) Interstate and overseas. (g) For the years 1972 to 1986 differences between the sum of natural increase and net migration, and total increase, are due to distribution of intercensal discrepancy. (h) The rates represent total increase in population during the year expressed as a proportion per cent of the population at the end of the previous year.

## VITAL STATISTICS

NOTE. Figures for 1965 and earlier (i.e. those above the double lines) exclude full-blood Aborigines; later figures refer to total population, i.e. including Aborigines.

Year	Marriages registered	Divorces (b)	Live births registered (c)	Deaths registered (c)(d)	Natural increase (c)(e)	Rate per 1,000 of mean population (a)				Infant mortality	
						Marriages	Births	Deaths (c)(d)	Natural increase (c)(e)	Number (c)(f)	Rate (c)(g)
1840	25		54	20	34	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1850	37		186	54	132	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1860	151		588	209	379	10.01	38.96	13.18	25.11	n.a.	n.a.
1870	153		853	378	475	6.15	34.27	15.18	19.08	100	117.23
1880	214		933	382	551	7.29	31.79	13.02	18.77	72	77.17
1890	278		1,561	540	1,021	5.90	33.16	11.47	21.69	140	89.69
1900	1,781		5,454	2,240	3,214	10.17	31.15	12.79	18.35	688	126.15
1910	2,107		7,585	2,740	4,845	7.77	27.99	10.11	17.88	593	78.18
1920	2,932	n.a.	8,149	3,388	4,761	8.88	24.69	10.27	14.42	538	66.02
1930	3,205		9,200	3,774	5,426	7.47	21.44	8.80	12.64	430	46.74
1940	5,234		9,121	4,486	4,635	11.06	19.27	9.48	9.79	403	44.18
1941	5,077		10,118	4,769	5,349	10.71	21.35	10.06	11.29	357	35.28
1942	5,441		9,901	5,076	4,825	11.42	20.77	10.65	10.12	365	36.86
1943	4,528		10,481	4,587	5,894	9.50	21.98	9.62	12.36	342	32.63
1944	4,506		10,870	4,478	6,392	9.36	22.58	9.30	13.28	354	32.57
1945	3,788		10,672	4,712	5,960	7.77	21.89	9.67	12.23	315	29.52
1946	5,171	725	12,105	4,753	7,352	10.49	24.57	9.65	14.92	376	31.06
1947	5,282	807	12,874	4,723	8,151	10.50	25.60	9.39	16.21	398	30.92
1948	5,186	696	12,931	4,685	8,246	10.08	25.13	9.10	16.02	331	25.60
1949	4,951	566	13,511	4,790	8,721	9.30	25.37	8.99	16.37	357	26.42
1950	5,434	720	14,228	5,058	9,170	9.74	25.50	9.07	16.44	386	27.13
1951	5,390	682	14,794	5,288	9,506	9.29	25.49	9.11	16.38	425	28.73
1952	5,389	585	15,413	5,209	10,204	8.97	25.66	8.67	16.99	384	24.98
1953	5,032	535	15,862	5,072	10,790	8.10	25.54	8.17	17.37	378	23.83
1954	5,204	530	15,928	5,364	10,564	8.13	24.89	8.38	16.51	359	22.54
1955	5,145	479	16,623	5,379	11,244	7.83	25.29	8.18	17.11	373	22.44
1956	5,080	544	16,916	5,572	11,344	7.53	25.08	8.26	16.82	384	22.70
1957	4,897	541	16,924	5,297	11,627	7.12	24.62	7.71	16.91	357	21.09
1958	5,038	536	16,731	5,554	11,177	7.20	23.90	7.94	15.97	360	21.52
1959	5,387	584	17,111	5,497	11,614	7.57	24.04	7.72	16.32	345	20.16
1960	5,323	540	16,926	5,697	11,229	7.36	23.41	7.88	15.53	366	21.62
1961	5,150	466	17,078	5,729	11,349	6.98	23.15	7.77	15.39	336	19.67
1962	5,466	582	17,064	5,810	11,254	7.23	22.58	7.69	14.89	380	22.27
1963	5,755	553	17,290	5,976	11,314	7.40	22.23	7.68	14.55	353	20.42
1964	6,023	542	16,685	6,429	10,256	7.55	20.93	8.06	12.86	328	19.66
1965	6,448	604	16,186	6,274	9,912	7.91	19.85	7.70	12.16	351	21.68
1966	7,002	637	17,194	6,902	10,292	8.25	20.25	8.13	12.12	343	19.95
1967	7,430	726	18,023	6,779	11,244	8.44	20.48	7.71	12.78	314	17.42
1968	8,086	812	19,541	7,468	12,073	8.83	21.34	8.16	13.18	398	20.37
1969	8,993	872	20,754	7,350	13,404	9.41	21.72	7.69	14.03	453	21.83
1970	9,227	889	21,618	7,543	14,075	9.28	21.74	7.59	14.16	459	21.23
1971	9,382	1,064	24,239	7,806	16,433	8.91	23.02	7.41	15.61	464	19.14
1972	9,120	1,243	22,177	7,441	14,736	8.43	20.50	6.88	13.62	348	15.69
1973	9,102	1,424	20,510	7,845	12,665	8.26	18.61	7.12	11.49	394	19.21
1974	9,295	1,761	20,207	7,778	12,429	8.24	17.92	6.90	11.02	327	16.18
1975	9,026	2,240	20,338	7,972	12,366	7.81	17.60	6.90	10.70	271	13.32
1976	9,517	4,818	20,670	7,740	12,930	8.07	17.53	6.57	10.97	273	13.21
1977	10,063	3,975	20,651	7,899	12,752	8.35	17.15	6.56	10.59	251	12.15
1978	9,404	3,387	20,611	7,794	12,817	7.66	16.79	6.35	10.44	230	11.16
1979	9,239	3,397	20,469	8,020	12,449	7.41	16.42	6.43	9.98	247	12.07
1980	9,594	3,073	20,607	8,166	12,441	7.56	16.24	6.43	9.80	239	11.60
1981	10,111	3,481	21,877	7,993	13,884	7.77	16.81	6.14	10.67	193	8.82
1982	10,455	3,842	22,236	8,187	14,049	7.81	16.61	6.15	10.49	204	9.17
1983	10,519	3,822	23,087	8,369	14,718	7.69	16.87	6.12	10.75	179	7.75
1984	9,920	4,069	21,625	8,503	13,122	7.13	15.54	6.11	9.43	232	10.72
1985	10,398	4,039	23,109	8,836	14,273	7.33	16.29	6.23	10.06	209	9.04
1986	10,379	4,001	24,236	9,307	14,929	7.12	16.62	6.38	10.24	214	8.83
1987	10,150	4,044	23,332	8,880	14,452	6.77	15.55	5.92	9.63	196	8.40

(a) Rates for 1971 and later are based on the estimated resident population. Rates for years prior to 1982 are based on final census results. (b) Final orders – dissolution of marriages. (c) Births, deaths and natural increase figures for 1982 and earlier years are on a State of registration basis. Figures for 1983 and later are based on State of usual residence. (d) Excludes deaths of defence personnel, whether in Australia or overseas, between September 1939 and June 1947. (e) Excess of live births registered over deaths registered. (f) Deaths under 1 year of age; included in deaths registered. (g) Per 1,000 live births.

## SOCIAL SERVICE BENEFICIARIES AND REPATRIATION PENSIONS: WESTERN AUSTRALIA

Year ended 30 June	Social service benefits												
	Pensioners (a)			Family allowance (a) (b)					Un-employment benefit (h)	Repatriation pensions			
	Age (c)(d)	Invalid (c)(d)	Total Age and Invalid	Widow	Under 16 years of age (e)(f)	Students (g)	Total	Disability		Service			
								Number (a)(i)		Amount paid \$'000	Number (a)(j)	Amount paid \$'000	
1910	2,361	..	2,361						n.a.	n.a.	n.a.	n.a.	
1920	4,791	1,788	6,579						22,311	1,087	n.a.	n.a.	
1930	8,913	3,284	12,197				n.a.		28,407	1,586	n.a.	n.a.	
1940	19,024	3,454	22,478	n.a.	n.a.				21,449	1,370	1,489	103	
1941	19,423	3,425	22,848					n.a.	20,388	1,343	1,545	112	
1942	19,156	3,557	22,713		68,533		68,533		19,757	1,337	1,561	129	
1943	18,575	3,580	22,155	2,596	65,777		65,777		20,245	1,506	1,454	147	
1944	18,109	3,443	21,552	2,796	66,938		66,938		22,511	1,884	1,369	144	
1945	17,713	3,414	21,127	2,894	68,316		68,316		27,686	2,105	1,343	144	
1946	18,797	3,538	22,335	2,870	69,325		69,325	422	37,921	2,530	1,403	173	
1947	21,162	4,002	25,164	2,570	71,968		71,968	1,095	42,127	2,856	1,580	192	
1948	22,210	4,387	26,597	2,719	75,186		75,186	409	44,818	3,000	1,715	290	
1949	23,739	4,340	28,079	2,876	79,693		79,693	126	46,785	3,516	1,832	301	
1950	24,316	4,294	28,610	2,883	133,557	n.a.	133,557	267	48,878	3,776	1,953	331	
1951	24,317	4,184	28,501	2,789	172,186		172,186	60	51,027	4,545	2,022	369	
1952	24,782	3,964	28,746	2,676	183,257		183,257	57	52,071	5,429	2,136	449	
1953	25,679	3,996	29,675	2,686	192,991		192,991	844	52,607	5,843	2,343	556	
1954	27,248	4,101	31,349	2,753	202,098		202,098	427	53,352	6,174	2,468	605	
1955	28,833	4,191	33,024	2,848	212,025		212,025	157	54,117	6,877	2,692	723	
1956	30,244	4,425	34,669	3,015	220,792		220,792	473	54,427	6,902	3,648	964	
1957	32,192	5,039	37,231	3,243	230,922		230,922	1,940	54,987	7,169	4,306	1,095	
1958	33,124	5,519	38,643	3,542	237,732		237,732	2,330	55,251	8,017	4,672	1,395	
1959	34,629	5,941	40,570	3,833	245,090		245,090	2,852	56,008	7,893	5,009	1,552	
1960	36,575	6,152	42,727	4,039	250,449		250,449	2,512	56,644	8,471	5,344	1,751	
1961	37,656	6,945	44,601	4,348	257,037		257,037	2,154	57,123	9,310	6,101	2,102	
1962	39,104	7,826	46,930	4,570	266,067		266,067	2,932	57,947	10,177	7,115	2,687	
1963	40,661	8,170	48,831	4,486	270,736		270,736	2,674	57,580	10,527	7,526	2,927	
1964	41,819	8,306	50,125	4,734	275,910	7,865	283,775	2,677	57,047	11,564	7,754	3,177	
1965	42,706	8,615	51,321	4,926	279,642	8,844	288,486	1,679	55,920	11,447	7,780	3,320	
1966	43,876	8,575	52,451	5,071	286,534	8,769	295,303	785	54,560	12,637	7,757	3,571	
1967	45,741	8,307	54,048	5,228	295,628	10,697	306,325	718	52,967	11,889	7,674	3,612	
1968	48,850	8,310	57,160	5,482	306,492	10,999	317,491	608	51,193	11,934	7,586	3,777	
1969	50,432	8,413	58,845	5,559	318,147	11,446	329,593	524	49,526	13,061	7,298	4,071	
1970	56,017	7,933	63,950	6,086	322,058	11,539	333,597	474	47,993	12,811	7,783	4,491	
1971	58,224	8,155	66,379	6,392	333,848	13,737	347,585	872	46,514	13,140	7,767	4,769	
1972	60,523	8,485	69,008	6,795	343,455	15,452	358,907	2,808	45,079	14,413	7,864	5,298	
1973	68,701	9,518	78,219	7,948	346,769	17,821	364,590	4,960	44,093	15,462	9,599	7,394	
1974	76,124	10,406	86,530	8,763	343,404	17,585	360,989	2,863	42,807	17,363	10,669	10,191	
1975	79,831	10,961	90,792	9,442	349,702	18,924	368,626	9,317	41,747	21,845	11,814	15,149	
1976	84,087	12,265	96,352	10,027	352,998	20,151	373,149	13,598	40,619	23,118	13,472	20,560	
1977	86,470	13,263	99,733	10,691			376,346	15,706	39,459	25,587	15,338	26,933	
1978	94,491	13,653	108,144	11,494			377,545	20,470	38,053	28,728	16,975	33,785	
1979	96,558	15,045	111,603	12,232			371,315 (k)	29,000	36,883	28,183	18,794	38,896	
1980	98,887	15,894	114,781	12,476			375,013 (k)	29,800	35,857	29,097	21,131	45,911	
1981	101,042	16,352	117,394	12,526			377,113	28,638	34,920	33,411	23,704	59,328	
1982	103,397	17,195	120,592	12,654	n.a.	n.a.	385,708	31,636	34,696	35,597	26,121	69,549	
1983	105,784	18,598	124,382	12,830			391,885	50,992	34,726	44,394	29,346	90,417	
1984	103,889	21,124	125,013	12,934			393,952 (k)	59,400	34,808	49,981	32,640	110,663	
1985	102,943	23,889	126,832	12,977			396,851 (k)	57,900	34,952	58,502	34,815	127,841	
1986	103,085	25,769	128,854	12,817			388,251 (k)	54,358	35,223	67,345	36,423	144,009	
1987	103,339	27,886	131,225	12,647			388,360	56,441	31,760	72,596	36,532	155,389	
1988	103,743	28,522	132,265	11,898			367,107	46,091	31,362	80,593	36,798	179,711	

(a) Number at 30 June. (b) Previously child and student endowment. Name of benefit, rates and conditions changed from 15 June 1976. (c) Prior to June 1957 excludes pensioners in benevolent homes. (d) At 30 June 1940 invalid pensioners who qualified were reclassified as age pensioners. (e) Prior to 30 June 1957 excludes endowed children in institutions. (f) Child endowment commenced 1 July 1941 for second and subsequent children. From 20 June 1950 endowment extended to include first or only children. (g) From 14 January 1964 includes students aged 16 and under 21; extended to 25 years in 1976. (h) Average number of persons on benefit at end of each week. (i) Includes pensions paid to incapacitated veterans and to dependants of incapacitated or deceased veterans. (j) Comprises pensions paid to veterans and their dependants. (k) Estimated.

## NATIONAL WELFARE FUND: EXPENDITURE IN WESTERN AUSTRALIA

NOTE: The National Welfare Fund was established, with effect from 1 July 1943, in terms of the *National Welfare Fund Act 1943*. During the first two years of operation, only maternity allowances and funeral benefits were paid from the Fund. Under the provisions of the *National Welfare Fund Act 1945*, effective from 1 July 1945, expenditure on age pensions (introduced in 1909 (invalid pensions (1910), widows' pensions (1942), and child endowment (1941) became a charge on the Fund. Unemployment, sickness, and special benefits came into operation on 1 July 1945. Hospital benefit was first paid in 1945-46 (in respect of public hospitals from 1 January 1946, and private hospitals from 18 February 1946).

The principal expenditures from the Fund are shown separately in the table below.

(\$'000)												
Year ended 30 June	Social services					Health services					Total expend- iture on health services (b)	Total expend- iture from National Welfare Fund (c)
	Pensions		Child endow- ment (a)	Un- employ- ment, sickness, and special benefits	Total expend- iture on social services	Hospital and nursing home benefits	Medical benefits	Pharma- ceutical benefits	Tuber- culosis campaign (a)	Milk for school children		
	Age and invalid	Widows'										
1960	19,833	1,827	9,720	1,504	33,652	3,351	2,241	3,178	1,163	458	10,427	44,079
1961	21,586	2,104	11,402	1,309	37,180	3,817	2,339	3,630	1,111	448	11,386	48,812
1962	24,344	2,371	10,205	1,887	39,575	3,996	2,455	4,809	873	526	12,695	52,270
1963	25,582	2,377	10,485	2,006	41,203	4,189	2,657	5,161	885	584	13,501	54,705
1964	27,373	3,115	12,994	1,978	46,223	4,705	2,808	5,242	839	615	14,238	60,460
1965	29,413	3,463	13,406	1,401	48,450	4,987	3,716	5,294	822	637	15,486	64,635
1966	30,760	3,602	13,624	872	49,648	5,286	4,345	5,870	758	619	16,906	67,316
1967	33,794	4,011	15,498	855	55,001	5,881	4,944	6,719	600	698	18,998	74,666
1968	36,418	4,346	14,845	758	57,295	6,598	5,265	7,117	862	850	20,860	78,894
1969	39,404	4,786	15,540	795	61,729	7,401	5,600	8,702	645	797	23,340	85,828
1970	44,637	5,600	17,894	1,039	70,725	9,153	6,373	9,836	828	797	27,262	98,577
1971	48,979	6,172	16,423	1,699	75,279	10,256	9,782	11,215	800	835	33,246	109,216
1972	57,374	7,180	18,188	4,298	89,623	14,492	13,800	12,418	907	997	43,032	133,770
1973	76,188	10,064	21,407	8,372	119,622	19,062	15,958	13,258	824	1,086	50,827	171,763
1974	98,011	13,409	19,009	8,314	147,040	21,222	16,478	16,153	803	596	56,535	205,778
1975	138,812	18,459	19,085	24,944	213,981	25,758	19,437	19,830	1,023	..	68,542	284,016

(a) Comprises amounts paid to individuals in the form of allowances and to the State Government as reimbursements for expenditure incurred in the provision and maintenance of facilities. (b) Excludes some relatively minor expenditure not allocable among States. (c) See footnote (b).

NOTE: This series has been replaced by 'Commonwealth Government Cash Benefits to or for Persons in Western Australia'.

## COMMONWEALTH GOVERNMENT CASH BENEFITS TO OR FOR PERSONS IN WESTERN AUSTRALIA

NOTE: This series replaced 'National Welfare Fund: Expenditure in Western Australia' (\$'000)

Year ended 30 June	Health services and benefits				Social security and welfare benefits							Total cash benefits
	Hospital and institutional	Clinical and non-institutional and public health	Pharmaceutical	Total	Ex-service men and dependants	Age pensions	Unemployment and sickness benefits	Sole parent, family and child benefits n.e.c.	Other	Total	Other services	
1979	24,290	37,342	18,287	79,919	67,067	238,241	90,042	111,464	94,177	600,991	28,770	709,680
1980	27,771	42,135	18,717	88,623	74,995	258,650	96,078	117,148	108,903	655,774	28,631	773,028
1981	37,095	48,754	22,138	107,987	92,714	290,394	98,604	128,446	126,817	736,975	32,231	877,193
1982	46,954	58,881	28,497	134,332	105,147	334,791	125,389	156,684	146,891	868,902	36,690	1,039,924
1983	54,954	71,699	33,122	159,775	134,811	364,234	224,646	199,396	169,662	1,092,749	42,512	1,295,036
1984	42,164	114,152	35,673	191,989	160,665	400,380	294,750	234,797	192,544	1,283,136	55,175	1,530,300
1985	51,700	176,200	49,200	277,100	186,200	428,500	310,500	256,600	227,600	1,409,400	53,800	1,740,300
1986	60,600	200,900	53,900	315,400	211,700	450,200	317,500	281,500	255,600	1,516,500	59,500	1,891,400
1987	64,200	235,100	55,900	355,200	228,000	478,300	357,100	282,700	280,900	1,627,000	78,500	2,060,700

## LIVESTOCK; WOOL PRODUCTION; AGRICULTURE

Year(a)	Area and production of principal grain crops (b)								
	Livestock (c)			Wool production (d)		Wheat			
				Quantity	Gross value (e)	Area	Production		
	Cattle	Sheep	Pigs				Yield per hectare	Total	Gross value
	'000	'000	'000	tonnes	\$'000	'000 hectares	tonnes	'000 tonnes	\$'000
1829	—	1	—	n.a.	—	n.a.	n.a.	n.a.	—
1830	1	8	—	n.a.	—	—	n.a.	n.a.	—
1840	2	31	2	n.a.	—	1	1.11	1	—
1850	13	128	3	n.a.	—	2	n.a.	n.a.	n.a.
1860	32	260	11	298	n.a.	6	1.00	6	—
1870	45	609	13	811	—	11	0.79	9	—
1880	64	1,232	24	1,970	—	11	0.62	7	—
1890	131	2,525	29	3,161	—	14	0.92	13	—
1900	339	2,434	62	4,323	—	30	0.70	21	310
1910	825	5,159	58	13,210	2,141	236	0.68	161	2,162
1920	850	6,533	61	18,947	4,552	516	0.65	333	11,023
1930	813	9,883	101	32,451	4,829	1,601	0.91	1,456	12,201
1940	789	9,516	218	32,362	7,889	1,062	0.54	573	8,648
1950	865	10,923	79	42,071	47,237	1,171	0.89	1,048	51,339
1951	841	11,362	90	46,680	118,068	1,289	1.05	1,358	65,328
1952	852	12,188	86	52,681	64,027	1,253	0.87	1,089	58,984
1953	846	12,475	76	54,760	75,121	1,214	0.80	965	55,194
1954	830	13,087	101	58,497	82,567	1,168	0.93	1,030	55,423
1955	861	13,411	107	56,324	67,985	1,206	0.77	933	43,655
1956	897	14,128	99	67,932	69,642	1,170	1.24	1,449	68,840
1957	957	14,887	140	67,301	90,283	1,119	0.78	874	44,055
1958	997	15,724	151	68,504	75,228	1,197	0.75	901	45,912
1959	1,000	16,215	115	71,376	59,407	1,332	1.18	1,569	77,639
1960	1,030	16,412	131	72,979	75,302	1,505	1.06	1,597	82,361
1961	1,100	17,151	176	82,652	73,863	1,627	1.07	1,739	92,290
1962	1,218	18,314	174	83,159	79,283	1,773	1.01	1,788	100,023
1963	1,298	18,727	131	80,366	80,071	1,944	1.01	1,973	107,023
1964	1,299	20,165	128	95,053	116,331	1,878	0.76	1,424	74,389
1965	1,258	22,392	137	91,170	93,275	2,085	0.82	1,717	88,557
1966	1,271	24,427	144	108,116	115,183	2,489	1.12	2,780	153,050
1967	1,357	27,370	161	119,681	121,509	2,569	1.09	2,809	153,157
1968	1,427	30,161	183	131,379	116,653	2,690	1.08	2,911	170,102
1969	1,546	32,901	220	164,307	158,264	2,952	1.04	3,060	151,306
1970	1,681	33,634	250	144,527	120,819	2,747	0.66	1,815	90,961
1971	1,781	34,709	278	151,808	92,009	2,361	1.25	2,957	153,227
1972	1,975	34,405	427	170,219	135,137	2,042	1.06	2,165	115,934
1973	2,182	30,919	476	140,649	225,041	2,437	0.82	2,003	109,399
1974	2,330	32,451	344	143,147	251,712	2,978	1.41	4,211	461,049
1975	2,544	34,476	264	172,659	218,859	2,810	1.17	3,277	361,211
1976	2,654	34,771	260	174,807	242,027	3,171	1.30	4,122	427,507
1977	2,464	31,158	242	156,237	291,358	3,314	0.98	3,249	290,489
1978	2,271	29,823	237	143,127	258,034	3,609	0.82	2,945	292,901
1979	2,092	30,265	271	150,284	286,601	3,706	1.19	4,400	546,827
1980	2,065	30,431	293	147,840	348,214	4,121	0.91	3,739	571,158
1981	2,033	30,764	289	160,096	401,030	4,333	0.77	3,315	508,734
1982	1,942	30,268	263	145,126	378,540	4,593	1.05	4,803	762,706
1983	1,754	30,164	300	148,190	392,740	4,865	1.14	5,534	982,505
1984	1,730	29,518	300	138,423	404,251	4,746	0.91	4,316	702,330
1985	1,673	31,574	274	166,559	499,172	4,652	1.41	6,580	1,134,766
1986	1,690	33,213	278	171,640	571,019	4,148	1.05	4,362	736,334
1987	1,660	33,463	295	188,773	716,263	4,260	1.26	5,377	836,016
1988	1,705	33,951	307	188,354	1,252,128	3,312	1.17	3,882	657,691

(a) Figures relate to varying time periods (e.g. year ended 30 June, year ended 31 December, year ended 31 March) due to changes in the method of data collection. (b) From 1944 figures relate to the season ended 31 March. (c) From 1943 figures relate to the season ended 31 March. (d) Comprises shorn, dead and fellmongered wool. Excludes wool exported on skins. For 1947 and earlier, year ended 31 December; for the years 1949 to 1964 figures are for the year ended 31 March. From 1965 figures relate to the year ended 30 June in the following year. (e) Figures for 1949 and 1951 to 1955 exclude distributions of profits under the 1939–1945 War-time Wool Disposals Plan aggregating \$13,869,934. Separate State figures are not available for distributions made from 1956 to 1958 when payments were virtually complete.

## AGRICULTURE (continued)

Year (a)	Area and production of principal grain crops (b)(continued)						Area used for crops (d)	Gross value of primary commodities produced excluding mining (c)	
	Oats		Barley		Hay (all kinds)			Agri- culture	Fisheries (e)
	Area	Produc- tion	Area	Produc- tion	Area	Produc- tion			
	'000 hectares	'000 tonnes	'000 hectares	'000 tonnes	'000 hectares	'000 tonnes	'000 hectares		
1829							n.a.		
1830							n.a.		
1840	n.a.	n.a.	n.a.	n.a.	—	n.a.	1		
1850	n.a.	n.a.	n.a.	n.a.	1	n.a.	3		
1860	—	—	1	1	2	8	10		
1870	1	1	2	2	7	21	22	n.a.	n.a.
1880	—	—	2	2	8	20	26		
1890	1	1	2	2	9	25	28		
1900	2	2	1	1	42	106	81		
1910	25	14	1	1	71	182	346		
1920	78	37	4	3	108	268	730	(f)29,364	n.a.
1930	111	60	7	4	161	500	1,939	(f)38,747	544
1940	174	59	27	16	169	381	1,614	39,520	r562
1950	237	132	28	22	87	276	1,737	141,348	r1,432
1951	237	144	24	21	72	231	1,834	233,827	r1,649
1952	266	140	23	16	70	215	1,824	189,153	r2,505
1953	337	189	43	40	92	295	1,877	201,380	r3,286
1954	297	174	85	62	89	299	1,812	210,428	3,808
1955	354	174	105	64	117	310	2,041	186,361	4,383
1956	442	300	136	106	109	390	2,118	221,435	4,915
1957	425	189	139	85	98	293	2,080	216,295	5,563
1958	467	250	124	81	137	392	2,230	204,911	6,530
1959	538	410	130	123	135	462	2,434	231,149	7,818
1960	502	356	170	161	129	440	2,583	256,002	8,621
1961	538	396	219	193	115	387	2,734	266,972	8,569
1962	498	366	199	165	119	402	2,823	280,475	10,689
1963	476	367	158	137	138	460	2,965	292,615	11,219
1964	455	324	121	92	117	395	2,714	300,766	10,187
1965	466	254	123	84	123	396	2,950	296,147	15,218
1966	502	422	167	147	118	421	3,419	406,097	15,733
1967	487	401	151	152	119	424	3,463	411,084	16,525
1968	469	359	168	159	129	428	3,595	428,258	21,954
1969	442	416	224	208	138	508	3,840	461,479	23,717
1970	461	281	364	273	202	576	3,916	370,557	19,660
1971	520	520	632	769	190	673	3,831	445,390	25,127
1972	454	414	911	1,000	177	653	3,751	461,581	30,817
1973	297	212	744	640	224	664	3,855	574,665	28,158
1974	325	383	510	626	220	734	4,133	1,034,191	30,494
1975	262	250	387	329	164	508	3,758	r845,169	35,130
1976	320	386	419	505	163	536	4,207	996,633	51,079
1977	372	347	452	553	169	560	4,416	959,160	69,094
1978	415	416	614	751	191	597	4,910	993,889	88,340
1979	427	491	616	778	184	586	4,993	1,343,932	96,055
1980	370	399	523	632	208	636	5,280	1,572,744	85,652
1981	382	384	535	504	240	703	5,547	1,678,031	82,764
1982	432	442	580	576	255	711	5,963	1,874,267	99,254
1983	461	534	603	717	252	754	6,379	2,196,230	126,208
1984	448	456	771	797	238	676	6,526	1,940,863	142,658
1985	351	460	965	1,431	226	747	6,723	2,602,205	165,443
1986	288	338	826	1,024	201	633	5,970	r2,213,118	r143,034
1987	302	414	468	601	218	681	5,930	2,554,658	172,356
1988	373	502	461	617	243	778	5,334	2,994,343	n.y.a.

(a) Figures relate to varying time periods (e.g. year ended 30 June, year ended 31 December, year ended 31 March) due to changes in the method of data collection. (b) From 1944 figures relate to the season ended 31 March. (c) Estimated value of recorded production based on wholesale prices realised at principal market. (d) Excludes pasture hay and from 1967 also excludes lucerne. (e) From 1980 excludes pearling and whaling. (f) Includes hunting.

## PRIMARY PRODUCTION—MISCELLANEOUS

Year	Gold production (a) (b)		Coal production (b)		Average values f.o.b. (c)	
	Quantity	Value	Quantity	Value	Wool (greasy) per kg (d)	Wheat per tonne (e)
	'000 grams	\$'000	'000 tonnes	\$'000	cents	\$
1860	—	—	—	—	—	19.83
1870	—	—	—	—	—	..
1880	—	—	—	—	n.a.	18.37
1890	622	171	—	—	—	..
1900	43,980	12,015	120	110	—	5.51
1910	45,753	12,494	266	227	16.20	14.85
1920	19,222	6,951	469	701	28.26	26.33
1930	13,001	3,729	509	770	19.37	16.69
1940	37,044	25,393	548	729	25.68	11.19
1941	34,494	23,703	566	779	28.70	14.49
1942	26,376	17,731	590	923	28.64	15.12
1943	16,982	11,421	541	979	32.19	15.09
1944	14,494	9,800	567	1,166	34.81	17.71
1945	14,588	10,021	552	1,146	34.24	23.30
1946	19,191	13,280	652	1,460	34.92	31.81
1947	21,897	15,151	743	1,680	45.64	48.42
1948	20,684	14,314	745	1,760	76.41	64.33
1949	20,155	15,926	763	1,944	94.20	56.11
1950	18,973	18,933	827	2,575	105.91	57.03
1951	19,533	19,451	862	3,434	263.50	62.25
1952	22,706	23,696	843	4,915	138.10	62.64
1953	25,629	26,598	900	6,146	148.04	63.57
1954	26,469	26,627	1,034	7,178	156.20	60.90
1955	26,189	26,749	919	6,179	135.39	52.22
1956	25,256	26,405	843	5,448	112.66	46.57
1957	27,900	29,102	852	5,105	144.67	48.12
1958	26,967	28,357	885	4,561	130.80	56.35
1959	26,967	28,388	926	4,713	91.87	51.76
1960	26,625	28,140	937	4,878	115.37	49.48
1961	27,122	28,584	778	3,361	99.10	49.91
1962	26,717	28,115	934	3,962	109.80	51.90
1963	24,883	26,375	916	3,970	111.38	52.30
1964	22,177	23,383	1,003	4,679	134.47	52.01
1965	20,497	22,381	1,010	4,410	120.58	51.66
1966	19,564	23,316	1,078	4,562	116.00	51.12
1967	17,916	21,690	1,079	4,765	117.46	54.88
1968	15,925	19,407	1,104	4,817	105.69	51.31
1969	14,961	19,040	1,120	4,853	107.60	51.26
1970	12,310	15,811	1,178	5,407	98.11	47.72
1971	10,736	13,674	1,190	5,653	75.33	48.88
1972	10,848	14,835	1,188	5,855	74.94	49.52
1973	9,264	16,718	1,154	6,422	150.21	49.67
1974	7,173	19,183	1,197	7,237	215.36	98.75
1975	6,305	29,788	1,879	12,511	144.37	126.39
1976	7,644	27,141	2,157	17,613	147.62	116.89
1977	7,619	31,586	2,339	21,896	188.10	105.10
1978	13,653	64,741	2,435	24,846	195.76	92.52
1979	12,231	78,313	2,406	34,484	207.87	116.53
1980	11,598	158,253	3,039	54,464	253.81	146.45
1981	10,532	165,376	3,127	63,100	270.01	160.32
1982	16,135	178,566	3,435	75,132	288.61	155.48
1983	22,992	334,802	3,903	95,529	303.41	168.10
1984	26,183	365,453	3,942	106,325	317.08	173.81
1985	37,425	508,892	3,673	109,120	353.01	187.09
1986	46,072	707,114	3,765	126,841	376.50	185.14
1987	64,911	1,300,079	3,782	n.p.	430.31	144.86
1988	90,546	1,843,770	3,702	n.p.	651.33	146.18

(a) Prior to 1971 comprises gold refined at the Mint and gold contained in gold-bearing materials exported. From 1971 covers gold production as notified by the Department of Mines. (b) From 1969 figures relate to year ended 30 June. (c) From 1978 figures relate to foreign exports only. (d) From 1920 figures relate to year ended 30 June. (e) Prior to 1940 averages generally are based on exports of the previous season's wheat; from 1940 they relate to exports during the year ended 30 June.



## SECONDARY PRODUCTION

Year (a)	Manu- facturing estab- lishments (b)	Persons employed (c)	Wages and salaries (d)	Turn- over (e)	Value added (f)	Production of selected commodities							Timber from local logs (l)
						Bricks (g)	Scoured wool (h)	Bacon and ham (i)	Butter (j)	Flour (plain) (k)	Cheese (k)		
	No.	No.	\$'000	\$'000	\$'000	'000	tonnes	tonnes	tonnes	tonnes	tonnes	'000 cu m	
1900	632	11,166	2,589	n.a.	n.a.	25,234		n.a.	132	11,375		266	
1910	822	14,894	3,532	10,158	5,472	23,162	n.a.	n.a.	291	33,401	n.a.	412	
1920	998	16,942	6,073	26,283	9,708	31,838		850	553	108,976		325	
1930	1,466	19,643	8,310	33,783	14,976	47,720		1,180	2,143	109,402		377	
1940	2,129	22,967	9,150	40,615	18,055	43,786	2,459	2,106	6,351	127,776	382	360	
1950	3,023	40,733	30,586	172,956	522,088	58,943	7,110	3,599	6,878	144,691	712	363	
1951	3,111	43,761	39,316	168,862	68,441	67,312	5,828	3,615	6,906	197,172	760	416	
1952	3,267	45,097	50,769	213,143	85,491	76,884	5,884	3,739	6,813	201,255	634	471	
1953	3,424	45,188	56,687	238,620	98,383	86,043	6,162	3,752	6,584	203,509	909	527	
1954	3,523	47,459	63,181	269,174	110,294	101,240	6,914	3,503	6,241	170,513	1,224	569	
1955	3,727	49,314	69,476	299,169	121,912	115,412	7,226	3,369	7,260	150,381	1,100	593	
1956	3,871	50,108	74,413	350,293	139,466	102,359	9,483	3,283	7,523	162,715	775	578	
1957	3,935	48,748	73,833	375,272	146,884	101,209	11,044	3,103	7,582	153,800	1,201	539	
1958	3,941	48,462	75,870	392,525	150,624	111,082	11,708	2,999	6,916	134,398	1,033	550	
1959	4,125	48,417	77,464	392,405	157,524	101,521	12,791	3,002	6,265	126,736	1,200	561	
1960	4,279	49,651	83,285	431,165	172,747	110,359	15,271	3,228	7,494	136,780	1,466	532	
1961	4,334	50,666	90,255	481,140	193,262	119,998	13,420	3,214	7,784	152,622	1,373	496	
1962	4,418	51,033	92,840	486,988	196,083	119,868	14,459	3,556	7,603	128,007	1,386	505	
1963	4,492	53,435	99,880	517,899	216,422	131,176	13,312	3,899	7,075	123,296	1,462	486	
1964	4,609	55,705	108,515	555,058	230,511	155,792	12,464	3,841	7,026	129,996	1,530	517	
1965	4,734	58,097	119,978	616,422	260,637	146,057	12,040	4,047	7,887	121,906	1,838	550	
1966	4,906	60,282	134,171	678,751	288,803	140,611	12,107	4,357	8,225	103,115	1,230	552	
1967	5,167	63,757	153,597	765,224	335,788	163,166	12,148	4,654	6,529	91,725	1,726	533	
1968	5,404	67,335	175,100	887,372	388,257	207,575	12,662	5,173	6,009	100,418	1,983	557	
1969	2,585	59,853	183,168	919,555	361,473	273,078	14,415	5,591	6,332	96,641	2,022	444	
1970	2,705	62,597	208,410	1,028,778	414,999	288,949	14,940	5,399	5,915	92,635	1,718	450	
1971			(m)			240,323	10,724	4,863	5,425	96,411	1,917	449	
1972	2,727	64,217	255,879	1,240,106	472,013	227,581	17,009	5,116	5,988	84,227	1,979	407	
1973	2,814	64,074	275,455	1,375,859	501,034	278,610	11,987	5,257	5,324	77,680	1,869	405	
1974	2,818	67,884	346,942	1,741,029	658,412	304,178	10,791	5,530	5,223	79,114	1,922	408	
1975	1,974	65,852	434,272	2,032,374	779,842	262,905	11,779	5,294	4,981	84,486	2,291	392	
1976	2,054	65,953	508,931	2,432,654	944,459	328,356	13,969	5,439	4,531	78,447	2,673	388	
1977	2,035	66,750	594,514	2,882,421	1,151,619	385,942	15,818	5,836	3,340		2,074	375	
1978	2,037	65,740	629,095	3,031,505	1,208,749	357,391	13,308	5,666	2,212		1,812	386	
1979	2,202	65,232	670,772	3,498,828	1,321,683	381,092	16,129	5,516	1,373		2,364	341	
1980	2,301	65,987	734,204	4,259,065	1,643,325	404,954	20,128	5,930	995		2,866	349	
1981	2,426	68,870	869,223	4,902,236	1,876,664	381,909	21,645	6,062	834		3,342	347	
1982	2,603	70,799	1,013,397	5,490,999	2,052,683	391,743	19,574	6,074	799	n.a.	3,322	334	
1983	2,499	64,980	1,038,300	5,596,500	2,040,900	279,164	13,747	6,405	914		3,417	257	
1984	2,408	61,997	1,047,393	5,922,692	2,136,745		17,053	6,807	1,269		3,665	265	
1985	2,451	64,242	1,137,558	6,788,471	2,513,218		21,938	7,862	1,582		3,736	305	
1986			(m)			n.p.	22,992	8,174	1,595		r3,400	r329	
1987	2,660	69,327	1,406,965	8,215,095	2,998,694		29,109	8,502	1,400		3,727	317	
1988			n.y.a.				25,820	8,377	1,505		3,772	319	

(a) From 1930 year ended 30 June. (b) For details of breaks in series refer to publications of Censuses of Manufacturing Establishments statistics. (c) Average over whole year including working proprietors. Prior to 1926-27 includes fallers and haulers employed by sawmills. (d) Figures for 1929-30 and later exclude amounts drawn by working proprietors. (e) Selling value 'at the factory'. (f) Value added in course of manufacture, representing sum available for payment of wages, rent, depreciation, other sundry expenses and for interest and profit. (g) For years prior to 1964-65 figures represent clay bricks only (all sizes). (h) Excludes fellmongered, dead or waste wool. (i) From 1977-78 excludes canned bacon and ham. (j) For 1917 and earlier years, includes butter made on farms. Source: from 1977-78 to 1980-81, Western Australian Department of Agriculture; from 1981-82, the Australian Dairy Corporation. (k) Source: 1933-34 to 1967-68, annual manufacturing census; 1968-69 to 1970-71, Commonwealth Dairy Produce Equalisation Committee Limited; from 1971-72 to 1980-81, Western Australian Department of Agriculture; from 1981-82, the Australian Dairy Corporation. (l) Prior to 1968-69, figures also include hewn timber. (m) No census of manufacturing establishments was conducted for this year.

## BUILDING COMPLETED (a)

Year ended 30 June	Houses (b) (c)		Other residential buildings (b) (c)		Alterations and additions (d) to residential buildings	Non-residential building (d)				Total building (e)
	Number (f)	Value (e)	Number of of units	Value (e)	Value (e)	Factories	Offices	Educational	Total	
		\$m		\$m	\$m	\$m	\$m	\$m	\$m	\$m
1947	1,792	3.5	—	—		0.1			0.7	4.2
1948	2,771	5.8	—	—		0.2			0.9	6.7
1949	3,244	7.6	—	—		0.4			1.8	9.4
1950	3,509	9.0	101	0.2		0.4			1.5	10.7
1951	5,160	15.0	305	0.6		0.4	n.a.	n.a.	2.3	17.9
1952	6,577	24.5	215	0.3		1.4			4.1	28.9
1953	7,965	38.0	100	0.3		1.7			7.5	45.8
1954	7,627	39.8	22	0.8		1.7			11.0	51.6
1955	8,792	48.4	316	1.2		6.2			18.6	68.2
1956	7,760	45.1	584	2.6		3.8	0.8	2.2	19.7	67.4
1957	5,030	29.1	365	1.5	(g)	2.2	2.0	1.2	16.3	46.8
1958	6,196	36.5	171	0.7		2.5	3.9	1.1	17.3	54.5
1959	5,846	34.4	212	0.8		2.8	2.4	4.6	25.3	60.5
1960	5,997	35.5	263	1.0		2.4	1.5	5.8	23.8	60.2
1961	5,973	38.1	440	1.6		4.7	4.1	8.0	32.4	72.0
1962	6,082	39.5	265	1.3		3.0	2.9	6.0	27.3	68.1
1963	6,593	45.8	642	3.0		4.9	1.6	7.7	37.7	86.4
1964	7,276	51.8	1,295	5.6		5.4	6.0	6.2	35.5	92.9
1965	7,445	57.2	1,841	9.0		6.8	2.8	8.0	40.8	107.1
1966	7,265	58.1	1,624	9.1		9.6	10.6	8.5	63.0	130.2
1967	8,272	78.1	1,742	9.3		9.8	7.1	10.5	74.7	162.1
1968	9,858	97.4	2,392	12.6		15.1	14.6	12.1	85.5	195.4
1969	12,840	133.3	3,491	22.4		15.8	10.9	14.1	99.2	254.8
1970	13,933	151.3	5,596	40.5		16.6	14.3	13.3	111.6	303.4
1971	11,900	149.3	5,013	40.0	0.4	18.0	39.7	20.6	175.4	365.0
1972	13,209	165.5	1,595	13.9	1.2	21.3	19.4	16.3	150.8	331.4
1973	13,660	163.4	920	7.3	1.8	15.6	21.2	24.8	151.5	324.0
1974	12,517	176.4	3,546	32.8	2.8	23.4	19.0	21.8	139.2	351.2
1975	10,994	198.6	3,300	38.9	4.4	18.2	18.4	40.0	170.1	412.0
1976	12,080	253.8	2,948	44.0	8.7	22.4	45.7	58.3	227.3	533.8
1977	15,155	395.0	6,152	113.9	15.4	26.6	43.5	29.5	226.4	750.7
1978	12,685	378.8	4,681	98.9	21.5	34.6	18.2	46.1	234.1	733.3
1979	11,148	349.1	3,507	74.9	30.5	44.0	33.2	56.3	339.3	793.8
1980	11,648	380.9	4,156	93.2	33.3	51.5	49.9	33.2	301.9	809.4
1981	10,120	375.5	4,531	108.0	37.5	37.0	75.0	29.6	308.8	829.7
1982	9,440	398.5	5,255	165.0	51.9	52.6	131.5	39.9	495.6	1,111.0
1983	9,070	372.5	4,020	143.4	47.4	45.2	152.1	37.7	464.3	1,027.5
1984	10,340	407.4	2,124	75.9	41.0	19.0	75.0	45.1	351.0	875.4
1985	14,000	583.9	3,735	115.3	51.9	27.9	55.6	30.7	357.5	1,108.6
1986	12,620	615.7	4,217	158.1	60.5	91.5	149.9	65.3	630.8	1,465.1
1987	12,330	651.5	3,619	144.3	70.4	39.0	155.8	99.2	795.0	1,661.2
1988	12,390	694.4	3,518	140.6	80.2	63.4	208.1	120.9	884.5	1,799.7

(a) From 1981 figures are not strictly comparable with those for earlier periods. For details see Chapter 18. (b) Prior to 1970-71 figures include alterations and additions to dwellings. Data for 1970-71 and later years relate to new dwellings only. (c) From July 1973 changes in the classification of residential buildings mean that figures for earlier years are not comparable. (d) Valued at \$10,000 and over. For non-residential building valued at \$10,000 prior to 30 June 1985. From 1 July 1985 this value increased to \$30,000 and over. (e) Excludes the value of land. (f) From 1981 numbers of new houses are rounded to nearest ten units. (g) Not available separately; included with Houses and Other residential buildings as appropriate.

## TRANSPORT; CUSTOMS AND EXCISE

Year	State Government railways (a)		Private railways	Air passenger movements Perth Airport		Customs and excise gross revenue (b)		
	Route kilometres at end of year (c)	Paying goods and livestock carried (d)	Route kilometres at end of year (e) (f)	Internal (g)	Inter-national	Customs	Excise	Total
		\$'000		'000	'000	\$'000	\$'000	\$'000
1870	—	—	—	..	..	81	—	81
1880	55	2	61	..	..	186	—	186
1890	303	62	620	..	..	356	—	356
1900	2,181	1,406	1,003	..	..	1,889	63	1,952
1910	3,452	2,278	1,452	..	..	1,543	213	1,756
1920	5,695	2,656	1,477	..	..	1,311	799	2,110
1930	6,616	3,587	1,363	..	..	3,882	1,527	5,409
1940	7,051	2,702	1,337	..	..	3,769	2,395	6,164
1950	6,843	2,889	1,246	..	..	10,166	10,943	21,109
1951	6,804	3,082	1,210	..	..	10,839	11,973	22,812
1952	6,619	3,112	1,210	..	..	14,045	16,312	30,357
1953	6,611	2,661	1,165	..	..	9,908	18,395	28,303
1954	6,616	3,257	1,220	..	..	12,241	19,447	31,688
1955	6,616	3,461	1,204	n.a.	n.a.	12,196	21,812	34,008
1956	6,629	3,854	1,168	..	..	8,473	24,092	32,565
1957	6,626	4,291	1,136	..	..	5,504	30,078	35,582
1958	6,626	3,647	925	..	..	5,476	32,547	38,023
1959	6,626	3,976	925	..	..	4,800	32,398	37,198
1960	6,630	4,605	832	..	..	5,614	33,634	39,248
1961	6,635	4,911	755	..	..	7,470	33,835	41,305
1962	(g)6,198	5,428	(h)898	..	..	7,156	35,705	42,861
1963	(g)6,111	4,870	888	..	..	8,996	35,944	44,940
1964	(g)5,918	5,271	665	..	..	10,369	37,839	48,208
1965	6,008	5,133	(i)34	..	..	10,692	43,349	54,041
1966	6,030	6,486	(j)460	270	26	15,251	53,536	68,787
1967	6,140	7,999	455	294	36	13,569	58,176	71,745
1968	6,140	9,053	455	340	49	19,468	62,903	82,371
1969	6,157	9,078	(k)882	382	54	21,202	69,289	90,490
1970	6,161	10,837	884	467	69	24,649	76,637	101,286
1971	6,175	13,457	884	541	84	32,262	88,978	121,240
1972	6,116	13,867	884	524	105	30,072	101,883	131,955
1973	6,168	13,706	(l)1,220	596	117	25,714	106,054	131,768
1974	6,192	15,059	1,222	668	139	30,612	138,197	168,809
1975	6,075	16,348	(m)1,181	681	165	44,114	148,310	192,424
1976	6,163	17,812	1,179	658	197	46,767	183,838	230,605
1977	6,165	19,003	1,155	746	206	63,037	203,852	266,889
1978	5,764	18,625	1,150	815	225	68,118	216,929	285,047
1979	5,764	19,288	1,155	879	261	71,704	256,486	328,190
1980	5,773	21,388	1,159	928	325	83,620	260,299	343,919
1981	5,773	20,271	1,160	960	377	110,939	283,499	394,438
1982	5,609	19,776	1,181	1,027	434	128,866	198,397	327,263
1983	5,610	19,791	1,177	1,005	414	130,752	379,889	510,641
1984	5,623	19,870	1,177	1,075	455	133,088	492,117	625,205
1985	5,563	22,085	1,285	1,195	502	176,416	496,172	672,588
1986	5,553	20,877	1,185	1,264	569	196,027	444,311	640,338
1987	5,553	21,264	1,185	1,432	649	209,998	145,028	355,026
1988	5,553	21,946	1,193	..	..	n.y.a.	..	..

(a) From 1900, year ended 30 June. (b) From 1915, year ended 30 June. (c) Open for general and passenger traffic. (d) From 1942 includes operations of Railway Road Services, which began in November 1941. (e) From 1900 to 1964 includes 446 kilometres of line open for general and passenger traffic. (f) Interstate and intrastate. (g) Decrease due to proclamations of closure issued by authority of the *Railways (Cue-Big Bell and other Railways) Discontinuance Act 1960*. (h) Increase due to the transfer of all government-operated timber railways to private control. (i) Decrease due to transfer of Midland Railway Company to Western Australian Government Railways and to closure of timber and mining railways. (j) Increase due to opening of Goldsworthy-Port Hedland, Tom Price-Dampier and Westmine-Tilley iron ore railways. (k) Increase due to opening of Newman-Port Hedland iron ore railway. (l) Increase due to opening of Pannawonica-Cape Lambert iron ore railway and extensions to Goldsworthy and Tom Price railways. (m) Decrease due to closure of Westmine-Tilley iron ore railway and timber railways.

## MOTOR VEHICLE REGISTRATIONS; EXPORTS OF CATTLE AND SHEEP

Year	New motor vehicles registered (a)				Motor vehicles on register (b)				Exports of—	
	Motor cars (d)	Utilities, panel vans, trucks and buses	Motor cycles (e)	Total	Motor cars (f)	Utilities, panel vans, trucks and buses	Motor cycles (e)	Total	Cattle	Sheep (c)
									Value \$'000	Value \$'000
1860									—	4
1870									—	—
1880									—	—
1890	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1	2
1900									—	2
1910									16	9
1920					3,404			73	28	
1930					31,130	11,358	7,707	50,195	1	46
1940	2,871	1,517	399	4,787	38,907	25,026	6,789	70,222	—	65
1941	1,015	632	200	1,847	36,995	24,788	6,704	68,487	2	112
1942	250	353	74	677	29,022	21,625	4,057	54,704	1	97
1943	218	151	57	426	29,750	21,189	3,935	54,874	1	—
1944	19	1,102	109	1,230	30,295	22,459	4,324	57,078	27	—
1945	40	597	192	829	30,635	23,943	4,501	59,079	2	1
1946	101	456	271	828	31,408	28,904	6,799	67,111	2	91
1947	1,354	1,126	678	3,158	32,879	32,097	8,199	73,175	27	362
1948	2,963	1,975	1,059	5,997	35,596	35,285	8,877	79,758	10	347
1949	4,684	3,122	1,769	9,575	40,199	38,901	10,974	89,994	11	374
1950	8,926	4,707	2,346	15,979	48,632	43,206	12,897	104,735	5	426
1951	8,201	6,610	2,802	17,613	56,235	47,908	14,535	118,678	9	616
1952	8,836	5,750	2,740	17,326	64,277	52,627	16,047	132,951	23	631
1953	6,879	4,881	1,416	13,176	69,917	56,445	15,565	141,927	23	501
1954	9,926	5,601	1,258	16,785	78,312	60,362	15,243	153,917	29	568
1955	12,394	5,993	1,202	19,589	90,255	63,870	14,662	168,787	68	612
1956	10,100	5,203	1,089	16,392	99,206	62,809	12,959	174,974	177	625
1957	9,321	4,418	1,192	14,931	104,506	63,315	12,731	180,552	243	923
1958	10,140	5,562	1,702	17,404	111,825	63,598	12,631	188,054	308	841
1959	10,389	5,140	2,071	17,600	119,957	65,588	12,814	198,359	396	764
1960	13,492	5,695	1,949	21,136	130,476	68,702	12,876	212,054	325	845
1961	15,161	5,542	1,080	21,783	141,612	70,974	12,589	225,175	318	881
1962	17,082	5,833	902	23,817	155,447	74,224	12,390	242,061	55	1,254
1963	23,175	6,367	754	30,296	169,800	75,500	11,500	256,800	160	1,495
1964	24,958	7,013	628	32,599	186,200	77,700	10,200	274,100	331	1,433
1965	23,304	6,897	553	30,754	197,800	78,500	8,900	285,200	427	1,376
1966	23,418	9,170	706	33,294	212,600	83,300	8,400	304,300	283	1,633
1967	27,922	9,404	1,158	38,484	231,200	86,300	8,400	325,900	381	1,771
1968	33,368	10,448	1,525	45,341	252,300	90,800	8,900	352,000	1,229	2,191
1969	35,379	11,018	1,539	47,936	275,300	94,500	9,600	379,400	972	2,943
1970	37,764	11,138	1,945	50,847	301,000	99,900	10,800	411,700	760	2,876
1971	37,769	10,872	2,718	51,359	328,500	104,900	12,200	445,600	1,159	2,710
1972	37,274	9,819	3,985	51,078	346,300	104,600	14,200	465,100	1,865	3,871
1973	36,904	11,425	4,914	53,243	364,400	107,400	16,800	488,600	1,661	7,959
1974	40,302	12,241	7,062	59,605	389,300	112,700	21,000	523,000	2,111	12,539
1975	41,474	13,693	6,613	61,780	414,800	125,000	24,600	564,400	1,498	12,862
1976	40,338	15,863	5,731	61,932	437,200	140,000	27,600	604,800	1,464	14,436
1977	44,363	17,362	3,887	65,612	473,731	153,174	28,022	654,927	2,533	(g)34,905
1978	40,990	16,538	3,339	60,867	500,365	167,107	28,051	695,523	3,071	35,985
1979	40,882	14,025	2,713	57,620	518,705	174,064	26,916	719,685	3,182	45,915
1980	40,232	13,716	4,600	58,548	535,613	179,844	29,531	744,988	1,748	91,763
1981	41,660	15,223	6,088	62,971	552,552	187,599	33,009	773,160	2,899	100,340
1982	42,329	16,079	5,835	64,243	573,400	197,344	35,213	805,957	3,039	94,825
1983	38,812	15,043	5,147	59,002	576,893	196,539	35,852	809,284	5,476	94,630
1984	39,737	15,199	3,969	58,905	592,495	201,754	35,770	830,019	5,824	92,700
1985	46,070	17,956	4,310	68,336	615,442	214,649	36,229	866,320	3,432	82,430
1986	42,645	13,676	3,350	59,671	632,182	218,851	36,324	887,357	5,339	84,317
1987	33,642	10,198	2,305	46,145	647,734	223,030	35,287	906,051	4,969	105,015
1988	36,040	10,617	2,215	48,872	670,158	230,161	35,442	935,761	n.y.a.	n.y.a.

(a) Year ended 30 June. (b) From 1929, at 30 June; for earlier years, at various dates. For years before 1946, excludes Commonwealth Government-owned vehicles; from 1946, includes Commonwealth Government-owned vehicles other than those of defence services. From 1956 to 1976, series based on the results of the periodic census of motor vehicles. Improvements in the methodology used to produce statistics of motor vehicles on register have resulted in a break in the continuity of the series from 30 June 1983. (c) Includes sheep for breeding purposes. (d) From 1959, includes station wagons previously included with commercial vehicles. (e) Including motor scooters. (f) From June 1956, includes station wagons previously included with commercial vehicles. (g) Excludes interstate exports. Details are not available for publication.

## EXPORTS OF CERTAIN COMMODITIES (a)

Year (b)	<i>Meats—Fresh, chilled or frozen</i>									
	<i>Beef and veal</i>		<i>Mutton and lamb</i>		<i>Pigmeat</i>		<i>Rock lobsters (c)</i>		<i>Wheat exports (d)</i>	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	tonnes	\$'000	tonnes	\$'000	tonnes	\$'000	tonnes	\$'000	tonnes	\$'000
1840	—	—	—	—	—	—	—	—	—	—
1850	—	—	—	—	—	—	—	—	1	—
1860	—	—	—	—	—	—	—	—	—	—
1870	—	—	—	—	—	—	—	—	408	8
1880	—	—	—	—	—	—	—	—	—	—
1890	—	—	—	—	—	—	—	—	27	—
1900	(e)						—	—	54,839	813
1910	—	—	—	—	—	—	—	—	249,049	5,083
1920	300	33	—	—	—	—	—	—	679,109	12,258
1930	5,162	272	—	—	—	—	—	—	—	—
1940	4,826	329	4,665	533	2,263	324	—	—	417,214	4,669
1941	5,583	407	4,396	496	6,015	851	—	—	404,314	5,858
1942	3,576	327	3,684	435	4,670	682	—	—	266,005	4,021
1943	—	—	3,985	458	1,053	155	—	—	139,833	2,111
1944	1,445	190	6,664	763	1,568	238	—	—	328,138	5,813
1945	1,202	168	4,002	410	1,697	254	—	—	642,015	14,955
1946	4,317	558	2,269	275	3,401	545	—	—	367,682	11,696
1947	6,358	691	4,081	409	1,306	248	—	—	185,102	8,964
1948	6,353	604	5,079	584	303	53	—	—	525,857	33,809
1949	8,056	840	4,607	608	624	179	n.a.	(f)500	500,793	28,100
1950	8,625	1,183	2,392	485	163	59	518	463	585,406	33,384
1951	7,699	1,221	939	217	279	113	1,436	1,517	830,346	51,688
1952	6,028	1,135	1,044	301	424	232	1,311	1,861	730,002	45,728
1953	5,016	1,437	6,589	1,463	463	303	1,329	2,085	634,639	40,347
1954	6,148	1,748	3,309	875	215	152	1,461	2,342	185,066	11,272
1955	6,776	2,038	3,225	1,328	1,049	532	1,532	2,490	526,212	27,478
1956	7,601	2,343	6,602	2,156	743	482	1,601	3,022	619,779	28,860
1957	4,127	1,221	5,788	1,741	733	588	1,618	3,514	1,273,578	61,291
1958	11,025	3,302	5,083	1,900	2,324	1,462	2,136	3,965	725,131	40,861
1959	10,535	4,342	9,944	3,177	1,983	1,178	2,715	5,281	639,647	33,113
1960	13,597	6,742	8,735	2,378	1,188	953	2,996	6,499	999,164	49,442
1961	12,413	6,141	11,367	3,901	1,894	1,501	2,316	5,881	1,428,272	71,280
1962	12,544	6,299	8,468	2,436	3,151	2,025	3,607	9,778	2,010,766	104,356
1963	17,268	9,382	7,428	2,401	2,061	1,404	3,490	8,910	1,380,372	72,197
1964	20,528	11,497	5,385	1,895	861	718	3,416	9,211	1,497,453	77,881
1965	19,360	11,730	5,040	1,981	571	516	2,672	10,592	1,102,420	56,955
1966	18,115	12,108	10,319	4,357	420	376	3,193	13,821	1,887,996	96,515
1967	16,912	11,987	9,652	3,723	565	470	3,643	13,873	2,312,777	126,918
1968	16,821	12,995	13,153	4,745	547	474	3,919	17,989	2,373,195	121,764
1969	20,210	16,939	21,523	7,218	642	564	3,038	17,133	1,521,376	77,987
1970	23,645	21,508	29,661	11,271	1,437	1,175	2,976	15,695	1,814,787	86,593
1971	20,257	17,626	24,244	9,396	1,126	895	3,155	19,413	2,670,890	130,564
1972	24,435	22,528	42,994	17,645	2,503	1,995	3,425	24,626	2,587,504	128,132
1973	33,325	36,614	39,853	26,103	7,630	6,382	3,171	20,919	2,249,934	111,744
1974	34,778	43,039	27,189	23,682	5,939	5,772	2,656	18,511	2,139,973	211,333
1975	31,083	25,993	33,240	22,107	2,283	3,037	3,328	25,258	3,241,895	409,758
1976	35,732	32,693	52,120	34,009	2,451	3,696	3,128	27,777	3,215,792	375,897
1977	53,051	53,291	60,373	48,913	1,292	1,968	4,071	47,061	3,009,101	316,258
1978	57,827	64,896	42,532	40,885	620	984	3,902	48,043	3,795,969	351,190
1979	51,932	90,216	26,250	31,059	382	693	4,170	51,064	2,208,985	257,414
1980	41,372	93,547	44,699	51,230	204	460	3,626	50,448	4,205,774	615,944
1981	40,672	87,669	44,142	57,515	144	334	2,858	42,480	2,634,951	422,433
1982	38,399	73,673	25,367	37,057	225	446	r4,849	77,930	3,826,760	594,992
1983	41,659	88,972	29,073	43,133	99	344	r5,424	88,175	5,031,977	845,855
1984	32,492	80,442	r26,000	39,114	r282	829	r6,506	111,954	3,637,624	632,247
1985	30,327	77,403	21,329	33,808	150	567	r4,778	126,644	4,543,782	850,090
1986	28,012	76,709	27,055	41,766	122	373	r4,267	114,568	5,342,611	989,144
1987	r29,928	88,348	r31,010	50,305	r481	1,542	r4,884	r143,665	r4,872,265	697,557

(a) From 1980 figures relate to foreign exports only. (b) From 1920, year ended 30 June. (c) For years 1950 to 1952, foreign exports only. Figures relate to rock lobster tails only until 1982. From 1982 figures include whole rock lobsters and tails. (d) From 1920, year ended 30 June; from 1978, excludes interstate exports. (e) Separate details not available. Total exports of fresh meats were 84 tonnes valued at \$9,164. (f) Estimated.

## EXPORTS OF CERTAIN COMMODITIES (a)

Year (b)	Flour (c)		Potatoes		Fresh fruit (d)	Hides and skins	Timber (e)		Wool (f)	
	Quantity	Value	Quantity	Value	Value	Value	Quantity	Value	Quantity	Value
	tonnes	\$'000	tonnes	\$'000	\$'000	\$'000	'000 cu m	\$'000	tonnes	\$'000
1860	11	—	71	1	—	1	—	2	141	31
1870	—	—	26	—	—	—	2	10	298	99
1880	n.a.	2	—	—	—	—	6	35	811	179
1890	—	—	—	—	—	8	19	133	1,970	543
1900	47	1	113	1	1	49	33	164	3,161	523
1910	2,559	49	18	—	11	150	162	916	4,125	541
1920	117,254	5,045	1,637	54	300	482	342	1,945	11,883	1,934
1930	62,659	1,540	5,037	151	312	1,246	143	931	27,034	7,875
1940	83,159	1,301	11,953	214	740	745	143	1,251	28,487	5,558
1941	107,588	2,185	18,501	373	282	580	172	1,546	10,334	3,119
1942	77,087	1,681	10,452	213	114	772	148	1,369	36,590	10,866
1943	70,412	1,581	6,410	139	139	348	100	1,189	14,173	4,757
1944	96,941	2,344	772	22	96	680	103	1,216	33,240	11,759
1945	92,438	2,505	17,939	581	132	537	81	1,131	25,829	9,107
1946	106,088	4,667	13,219	446	488	1,274	96	1,429	54,398	19,914
1947	117,661	7,628	12,939	484	1,445	2,131	98	1,719	42,022	20,521
1948	127,002	11,326	18,623	681	1,688	2,048	102	2,230	43,671	33,244
1949	119,025	10,516	13,723	431	1,452	2,134	91	1,986	45,135	43,069
1950	105,065	8,335	10,090	384	1,780	2,329	81	1,949	45,766	50,923
1951	144,914	11,774	11,181	506	2,295	5,294	66	1,783	41,633	112,559
1952	146,584	13,669	13,514	733	2,853	3,194	68	2,075	46,633	67,680
1953	159,883	15,090	12,860	750	4,556	3,942	112	4,147	51,489	79,122
1954	134,126	11,704	16,026	1,300	3,300	3,295	109	4,480	51,083	82,260
1955	109,172	7,219	9,020	512	3,845	2,921	99	3,847	49,811	70,563
1956	117,409	7,766	2,275	171	3,393	3,274	129	5,598	58,982	70,313
1957	115,658	7,474	7,728	736	4,598	4,650	132	6,215	57,755	87,510
1958	101,448	6,907	13,998	832	3,725	3,898	158	7,496	52,167	72,686
1959	94,854	6,337	8,577	368	3,609	3,489	183	8,415	60,280	58,537
1960	79,697	5,100	9,612	436	2,437	4,767	174	7,760	62,838	77,957
1961	122,839	7,840	7,821	437	4,636	3,828	157	7,175	71,681	74,842
1962	88,889	5,891	10,328	632	2,818	4,580	161	7,528	73,584	83,865
1963	67,652	4,645	18,032	810	4,982	4,339	155	7,241	71,058	82,107
1964	62,677	4,396	9,925	353	4,016	4,966	149	6,813	82,628	114,239
1965	83,826	5,926	12,935	841	5,165	4,177	133	6,279	79,106	98,294
1966	49,130	3,378	21,362	1,393	4,838	5,447	69	3,687	97,698	115,128
1967	34,804	2,507	17,478	692	5,704	5,377	139	7,475	106,886	126,995
1968	41,918	2,944	13,142	622	4,068	4,699	85	4,947	124,708	126,417
1969	35,100	2,433	21,944	1,149	6,552	6,013	88	5,068	144,388	157,950
1970	31,173	2,257	19,888	831	6,054	7,968	96	5,666	132,778	134,796
1971	26,670	1,958	9,390	510	7,208	5,395	79	4,808	128,388	98,289
1972	18,882	1,345	8,600	371	5,245	5,356	101	6,440	159,284	120,460
1973	9,798	859	(g)4,911	(g)334	6,135	13,945	113	7,087	146,456	220,719
1974	11,232	1,380	(g)9,576	(g)1,113	5,835	13,536	100	7,407	121,113	263,330
1975	19,281	3,439	8,527	1,217	7,547	11,195	109	9,252	114,069	167,631
1976	11,658	2,022	12,196	1,636	6,047	13,728	94	9,823	153,248	231,301
1977	11,355	2,051	7,190	1,127	5,285	24,708	78	10,152	169,674	331,164
1978	8,291	1,481	5,853	390	5,976	21,147	59	8,885	123,071	251,321
1979	7,872	1,660	2,735	373	8,703	29,280	66	10,508	150,185	326,466
1980	(h)4,342	(h)1,055	(h)5,292	(h)616	(h)10,314	(h)34,716	72	12,226	141,262	378,557
1981	4,952	1,279	3,824	585	9,506	17,467	32	7,050	135,529	398,051
1982	1,578	594	5,466	947	10,783	16,736	25	5,830	127,308	394,367
1983	1,086	343	7,274	1,278	12,655	18,783	18	4,813	123,953	392,144
1984	3,127	833	2,806	756	10,013	23,998	20	5,251	121,511	406,207
1985	3,140	876	5,084	946	10,220	27,629	22	7,173	140,675	523,304
1986	1,750	550	2,338	511	12,573	13,979	22	7,330	153,987	614,202
1987	r1,879	r528	r2,311	570	r13,879	40,292	10	4,199	r161,085	731,352

(a) From 1981 figures relate to foreign exports only. (b) From 1920, year ended 30 June. (c) From 1973, figures include meal and flour of wheat or meslin; from 1978, figures include meal and flour of all cereal grains. (d) Includes tomatoes for 1933 and earlier years. (e) Excludes plywood and veneers and small quantities of timber for which details are not recorded. (f) Includes greasy and degreased wool. (g) Some interstate details for 1973 included in 1974. (h) Figures represent foreign exports only.

## EXPORTS OF CERTAIN COMMODITIES (a)

Year (b)	Iron ore and concentrates		Lead and zinc ores (c) (d)	Tin ore and concentrates	Ilmenite concentrate (including leucoxene) (e)		Iron and steel (f)	Gold mint bullion (g)	
	Quantity	Value	Value	Value	Quantity	Value	Value	Quantity	Value (h)
	'000 tonnes	'\$'000	\$'000	\$'000	'000 tonnes	\$'000	\$'000	kg	\$'000
1850	—	—	—	—	—	—	—	—	—
1860	—	—	2	—	—	—	—	—	—
1870	—	—	29	—	—	—	—	—	—
1880	—	—	31	—	—	—	—	—	—
1890	—	—	4	11	—	—	—	715	173
1900	—	—	—	76	—	—	7	31,103	7,589
1910	—	—	4	93	—	—	5	10,389	2,835
1920	—	—	102	129	—	—	16	1,275	452
1930	—	—	19	29	—	—	3	4	1
1940	—	—	2	14	—	—	31	36,329	24,056
1941	—	—	2	12	—	—	35	37,386	25,096
1942	—	—	2	6	—	—	19	30,326	20,590
1943	—	—	1	5	—	—	5	23,514	15,744
1944	—	—	1	6	—	—	23	10,855	7,250
1945	—	—	1	5	—	—	100	—	—
1946	—	—	—	8	—	—	9	—	—
1947	—	—	5	12	—	—	99	—	—
1948	—	—	146	17	—	—	89	11,073	7,656
1949	—	—	235	31	—	—	59	—	—
1950	—	—	272	49	—	—	95	2	2
1951	—	—	263	62	—	—	83	—	—
1952	53	102	1,369	107	—	—	58	12,286	13,143
1953	553	1,079	1,681	153	—	—	357	23,608	24,798
1954	592	1,157	270	97	—	—	279	13,001	13,280
1955	589	1,149	108	146	—	—	602	19,222	19,338
1956	480	936	888	322	—	—	530	12,752	12,842
1957	334	649	960	293	—	—	1,174	23,950	24,119
1958	446	870	410	166	89	1,011	2,470	6,470	6,511
1959	598	1,169	238	304	66	648	4,218	4,106	4,118
1960	809	1,601	229	415	90	713	11,198	18,662	18,738
1961	1,035	2,101	83	325	132	1,198	12,781	78,754	79,271
1962	1,069	2,209	45	563	159	1,441	13,826	14,090	12,195
1963	1,495	2,898	33	532	183	1,717	15,107	12,970	13,048
1964	1,381	2,743	18	1,080	263	2,571	15,029	11,975	12,045
1965	1,562	3,040	662	1,229	330	3,194	17,933	15,956	16,127
1966	2,657	6,967	124	1,521	430	4,181	14,458	25,909	26,147
1967	8,530	50,890	177	2,214	443	4,440	15,658	14,930	15,107
1968	14,563	104,506	58	2,330	462	4,645	11,442	11,602	11,816
1969	19,898	151,797	161	1,843	557	5,751	27,002	11,228	12,701
1970	31,542	233,580	41	1,386	573	6,068	34,306	12,037	13,874
1971	46,273	341,702	—	1,511	563	6,631	34,571	14,665	15,760
1972	48,658	347,500	—	2,043	580	7,416	36,415	17,646	21,950
1973	66,036	420,255	6	2,277	595	7,696	36,529	16,314	30,193
1974	79,286	488,239	15	2,732	728	9,774	60,811	10,093	27,393
1975	88,070	699,843	—	3,019	672	9,893	71,493	9,263	36,666
1976	83,090	772,199	—	2,538	647	9,995	60,765	13,659	50,527
1977	84,939	900,987	—	3,939	1,184	20,155	74,508	9,980	36,863
1978	80,128	935,018	—	4,947	986	17,653	50,285	10,344	50,906
1979	84,016	978,315	—	5,074	883	17,475	72,591	n.a.	(i)99,708
1980	76,725	1,025,660	220	5,841	1,119	25,433	83,447	n.a.	(i)56,317
1981	72,756	1,069,087	—	2,469	929	23,726	42,423	1,279	22,024
1982	72,532	1,195,486	11,285	1,057	890	25,003	6,645	5,054	72,060
1983	64,551	1,405,840	14,925	1,234	780	21,986	2,959	9,536	141,340
1984	80,942	1,551,299	18,420	127	1,068	35,176	2,473	21,312	308,580
1985	87,670	1,796,578	17,407	—	1,009	36,473	741	23,036	308,424
1986	80,309	1,861,779	6,040	—	999	45,149	747	28,483	458,728
1987	r74,321	1,701,851	—	—	864	55,398	916	23,247	479,790

(a) From 1980, figures relate to foreign exports only. (b) From 1920, year ended 30 June. (c) Includes silver-lead and silver-lead-zinc ores and concentrates. (d) From 1971, the value of foreign exports of lead has been nil. From 1973, figures exclude interstate exports of lead ores and concentrates, and from 1978 interstate exports of zinc ores and concentrates. (e) From 1972, figures exclude foreign exports of beneficiated ilmenite; from 1978, figures also exclude interstate exports of all ilmenite and leucoxene. (f) Principally pig-iron, cast iron and basic shapes and sections of iron and steel. (g) Gold sold abroad before consignment is not recorded as an export until actually shipped. (h) Includes additional premiums on sales of industrial gold. (i) Includes all processed gold, but excludes gold ores and concentrates.

EXTERNAL TRADE  
(\$'000)

Year (a)	Imports (b)			Exports (b) (c)			Excess of—		Ships' stores
	Foreign	Interstate	Total	Foreign	Interstate	Total	Imports	Exports	
1850	n.a.	n.a.	125	n.a.	n.a.	44	80	..	n.a.
1860	318	20	338	160	16	175	163	..	3
1870	260	167	427	348	46	394	33	..	8
1880	349	358	707	736	252	988	..	280	11
1890	1,025	724	1,749	961	369	1,330	419	..	14
1900	6,574	5,350	11,924	11,246	2,250	13,496	..	1,572	208
1910	8,750	7,067	15,817	11,679	4,627	16,306	..	489	294
1920	9,918	14,819	24,737	28,918	2,392	31,311	..	6,574	827
1930	17,758	19,805	37,563	32,009	2,213	34,223	3,341	..	1,316
1940	12,568	27,450	40,017	19,256	28,518	47,774	..	7,756	1,380
1941	9,710	27,519	37,229	16,900	30,808	47,708	..	10,479	1,971
1942	10,391	26,110	36,501	23,157	25,241	48,398	..	11,897	2,305
1943	7,383	24,803	32,186	10,625	20,117	30,741	1,445	..	1,983
1944	7,770	26,628	34,399	22,845	13,472	36,317	..	1,919	2,747
1945	9,215	26,863	36,079	24,765	11,533	36,298	..	219	2,508
1946	11,018	32,238	43,256	38,917	11,662	50,579	..	7,322	2,511
1947	18,929	42,253	61,182	46,015	11,459	57,474	3,708	..	1,966
1948	34,311	51,329	85,640	97,389	11,599	108,989	..	23,349	2,474
1949	44,075	61,182	105,258	96,982	9,495	106,477	..	1,220	4,710
1950	68,844	70,044	138,887	106,590	12,421	119,011	19,876	..	4,720
1951	80,517	95,828	176,345	197,686	18,780	216,466	..	40,122	7,249
1952	120,474	124,209	244,683	151,562	35,404	186,966	57,717	..	8,419
1953	59,748	137,213	196,961	166,286	49,659	215,945	..	18,984	10,321
1954	85,051	165,374	250,425	136,849	39,190	176,039	74,386	..	7,266
1955	101,295	182,110	283,405	137,013	47,310	184,323	99,082	..	7,865
1956	92,963	177,952	270,915	152,286	68,466	220,752	50,164	..	10,592
1957	80,423	188,680	269,103	216,599	81,545	298,144	..	29,041	12,902
1958	91,775	195,103	286,879	179,516	79,836	259,352	27,527	..	11,602
1959	89,972	202,430	292,402	174,585	68,919	243,504	48,898	..	9,482
1960	92,363	246,696	339,059	231,766	77,278	309,043	30,016	..	8,954
1961	110,531	245,474	356,005	309,332	89,922	399,254	..	43,249	10,285
1962	100,178	245,208	345,386	287,619	84,626	372,245	..	26,859	9,379
1963	112,640	313,712	426,351	246,823	91,636	338,459	87,892	..	7,904
1964	121,677	323,176	444,854	286,132	101,811	387,943	56,911	..	9,733
1965	153,540	343,899	497,439	243,078	119,954	363,033	134,407	..	9,009
1966	175,690	403,054	578,744	314,404	119,619	434,023	144,721	..	10,058
1967	159,390	474,852	634,242	421,325	116,030	537,355	96,887	..	10,936
1968	206,980	527,052	734,031	475,260	124,505	599,765	134,266	..	14,824
1969	203,533	562,312	765,846	546,366	149,892	696,258	69,588	..	14,327
1970	242,299	640,189	882,487	675,027	149,861	824,888	57,600	..	15,092
1971	278,344	726,778	1,005,122	862,421	163,812	1,026,233	..	21,111	20,561
1972	283,263	787,788	1,071,051	946,504	156,303	1,102,807	..	31,756	22,477
1973	227,305	786,177	1,013,483	1,154,359	173,839	1,328,198	..	314,715	17,542
1974	368,910	939,361	1,308,272	1,414,968	222,208	1,637,176	..	328,904	29,224
1975	577,416	1,134,510	1,711,926	1,880,082	253,424	2,133,506	..	421,580	50,157
1976	637,439	1,418,726	2,056,165	2,117,898	290,733	2,408,631	..	352,466	46,638
1977	829,411	1,641,545	2,470,955	2,596,107	305,836	2,901,943	..	430,987	64,141
1978	937,350	1,828,510	2,765,860	2,588,954	355,151	2,944,105	..	178,245	71,009
1979	1,161,164	2,044,447	3,205,611	2,820,134	446,208	3,266,343	..	60,732	72,611
1980	1,449,694	2,337,808	3,787,502	3,854,047	635,388	4,489,434	..	701,933	126,176
1981	1,663,378	2,841,110	4,504,488	3,595,048	812,996	4,408,044	96,444	..	144,285
1982	2,535,112	3,141,096	5,676,208	3,907,623	888,540	4,796,163	880,045	..	134,198
1983	2,523,046	3,160,789	5,683,835	4,797,766	1,155,698	5,953,464	..	269,129	129,484
1984	1,935,552	3,638,883	5,574,436	5,062,112	1,410,145	6,466,257	..	891,822	110,706
1985	2,155,270	4,291,229	6,446,499	6,028,430	1,507,370	7,535,850	..	1,089,351	123,237
1986 r	2,202,948	4,783,474	6,986,422	6,529,348	1,623,017	8,152,365	..	1,165,943	87,674
1987	2,768,663	5,071,476	7,840,139	6,911,427	1,805,667	8,717,094	..	876,955	84,476

(a) From 1920, year ended 30 June. (b) From 1976, excludes interstate value of horses. Details are not available for publication. (c) Excludes ships' stores up to and including 1982. Ships' and aircraft stores for foreign owned vessels and aircraft are included in foreign and total exports from 1983 onwards. From 1982, excludes value of re-exports.



## INDUSTRIAL DISPUTES; WAGE RATES; UNEMPLOYMENT BENEFIT

Year	Industrial disputes (a)				Award rates of pay		Unemployment
	Number of disputes	Workers involved (f)	Working days lost		index numbers (b)		benefit( c)
			Number	Average per worker involved	Adult male wage and salary earners (d)(e)		Persons on benefit (g)
					Weekly	Hourly	
		'000	'000	No.			
1920	45	12.0	166.6	13.87	n.a.	n.a.	
1930	2	0.5	27.1	57.85	n.a.	n.a.	
1940	4	3.0	7.4	2.44	36.8	33.1	
1941	3	0.3	0.8	2.79	39.0	35.4	n.a.
1942	8	1.8	8.9	4.89	41.5	37.6	
1943	10	2.5	38.4	15.11	42.8	38.8	
1944	30	11.0	90.0	8.16	42.6	38.6	
1945	16	3.8	32.5	8.55	42.6	38.7	
1946	11	6.4	69.6	10.94	43.6	39.5	422
1947	7	1.8	6.1	3.44	48.4	44.1	1,095
1948	9	2.4	7.8	3.33	53.9	53.9	409
1949	16	5.7	26.3	4.64	59.6	59.7	126
1950	15	2.0	5.7	2.93	71.0	71.7	267
1951	10	4.2	5.1	1.22	85.5	85.7	60
1952	21	19.2	127.8	6.67	97.5	97.7	57
1953	11	3.7	5.0	1.36	100.4	100.7	844
1954	15	5.5	21.7	3.94	101.7	101.9	427
1955	16	9.8	9.6	0.97	106.3	106.6	157
1956	14	11.1	31.9	2.87	110.8	111.0	473
1957	14	5.4	3.1	0.57	113.9	114.1	1,940
1958	20	11.0	3.0	0.27	114.7	114.9	2,330
1959	20	11.2	11.2	1.00	120.7	120.8	2,852
1960	43	25.7	27.3	1.06	126.8	127.1	2,512
1961	22	9.7	23.2	2.40	128.8	129.0	2,154
1962	28	8.4	6.3	0.75	129.5	129.7	2,932
1963	28	42.6	32.0	0.75	132.8	133.0	2,674
1964	26	6.2	7.1	1.16	137.5	137.6	2,677
1965	33	12.6	10.0	0.79	143.5	143.5	1,679
1966	25	2.9	6.2	2.17	153.6	153.8	785
1967	26	5.1	6.0	1.18	159.6	159.9	718
1968	70	18.7	21.8	1.16	169.0	168.7	608
1969	104	59.1	101.4	1.72	179.5	179.3	524
1970	125	46.5	141.1	3.03	198.2	198.0	474
1971	132	35.8	69.4	1.94	219.5	219.4	872
1972	105	28.3	94.6	3.34	234.2	232.5	2,808
1973	160	37.6	117.3	3.12	267.9	266.3	4,960
1974	257	188.1	256.9	1.37	357.7	356.5	2,863
1975	236	53.8	100.7	1.87	401.2	398.5	9,317
1976	250	100.7	252.1	2.50	104.8	104.8	13,598
1977	229	54.9	220.5	4.02	116.0	116.0	15,706
1978	306	76.1	197.9	2.60	125.3	125.3	20,470
1979	252	169.5	348.1	2.06	131.7	131.7	(h)29,000
1980	368	69.4	191.0	2.75	145.7	145.8	(h)29,800
1981	364	72.9	244.0	r3.35	166.1	166.2	28,638
1982	436	63.6	r158.9	r2.50	187.6	190.3	31,636
1983	300	42.3	270.6	6.40	197.2	200.9	50,992
1984	406	69.2	119.2	1.72	205.9	210.7	(h)57,514
1985	358	48.7	92.9	1.91	103.8	103.8	(h)54,028
1986	259	50.6	143.1	r2.83	106.3	106.5	55,089
1987	245	43.1	115.3	2.68	110.0	110.3	52,755

(a) Excludes disputes involving cessation of work of less than 10 man-days. Details of the number of disputes and workers involved in disputes which commenced in any year and were still in progress during the following year are included in the figures for both years. (b) End of December. Prior to 1976 – Base: weighted average wage rate for Australia, 1954 = 100. From 1976 to June 1985 – Base: weighted average wage rate for Australia, June 1976 = 100. From June 1985 – Base: weighted average wage rate for Australia, June 1985 = 100. (c) Payment commenced 1 July 1945. (d) Excludes workers in rural industry. (e) Prior to June 1985 index related to wage earners only. From June 1985 relates to wage and salary earners. (f) Includes workers indirectly involved, i.e. those put out of work at an establishment where a stoppage occurred but not themselves parties to the dispute. (g) Year ended 30 June; average number of persons on benefit at end of each week. (h) Estimated.

## CONSUMER PRICE INDEX (a)

Year ended 30 June	Group index numbers—Perth								Weighted average of eight capital cities (b)	
	Food	Clothing	Housing	Household equipment and operation	Transportation	Tobacco and alcohol	Health and personal care	Recreation and education (c)	All groups	All groups
1949	12.1	15.9	11.4						14.1	14.0
1950	13.4	18.3	12.1						15.4	15.2
1960	26.0	28.8	24.3						27.1	27.3
1961	27.3	29.5	25.8	n.a.	n.a.	n.a.	n.a.		28.1	28.4
1962	27.2	29.7	26.6						28.2	28.5
1963	27.3	29.8	27.5						28.4	28.6
1964	27.6	30.1	28.4						28.7	28.8
1965	28.7	30.4	29.1						29.6	29.9
1966	30.0	30.8	30.1						30.7	31.0
1967	31.5	31.4	31.6	35.5	32.5	31.5			32.0	31.8
1968	32.5	32.1	33.4	36.1	33.6	32.3			32.9	32.9
1969	33.0	32.8	35.6	36.8	34.2	33.0			33.7	33.7
1970	34.1	33.9	37.9	37.4	35.9	33.3	26.7	n.a.	35.0	34.8
1971	35.5	35.3	39.7	38.9	37.3	35.7	27.1		36.5	36.5
1972	36.7	37.3	42.2	41.3	39.1	38.7	30.1		38.6	39.0
1973	39.3	39.6	44.2	43.2	40.1	41.3	31.9		40.7	41.3
1974	44.7	45.0	47.1	46.4	43.1	43.8	36.6		45.0	46.6
1975	50.8	54.7	55.0	54.9	51.4	52.8	47.2		53.1	54.5
1976	56.8	63.5	66.2	65.4	60.1	65.0	39.2		60.6	61.5
1977	64.8	73.1	77.2	70.7	67.0	71.3	77.3		70.2	70.0
1978	74.4	81.2	85.1	77.4	73.1	74.8	91.7		77.8	76.7
1979	82.1	87.0	89.2	83.0	81.1	87.3	84.5		84.0	83.0
1980	91.7	92.9	92.5	89.4	90.6	94.4	96.6		91.9	91.4
1981	100.0	100.0	100.0	100.0	100.0	100.0	100.0		100.0	(b)100.0
1982	110.2	107.2	109.0	109.5	111.9	109.1	130.9		111.2	110.4
1983	119.8	114.0	118.6	120.4	123.5	122.9	159.8	(c)105.8	122.5	123.1
1984	128.9	120.9	124.1	129.1	133.9	141.0	156.9	111.8	131.0	131.6
1985	136.2	128.8	131.6	134.7	142.8	153.2	125.7	115.1	136.1	137.2
1986	146.3	140.2	141.7	145.7	153.7	168.7	135.9	123.9	147.1	148.7
1987	157.1	154.4	154.7	159.0	172.3	188.1	156.0	135.7	161.8	162.6
1988	166.3	165.8	163.6	170.3	184.5	203.0	175.1	146.5	173.3	174.5

(a) The base of each index is Year 1980–81 = 100 unless otherwise noted. (b) Prior to 1980–81, weighted average of six State capital cities. (c) Base of index is March quarter 1982 = 100.

## STATE AND LOCAL AUTHORITIES: RECEIPTS AND OUTLAY

NOTE. This series replaces 'Public Revenue and Expenditure: Consolidated Revenue Fund' and 'Net Expenditure from Loan Funds; Public Debt' on later pages.

(\$ million)

Year ended 30 June	Receipts and financing transactions					Outlay				
	Taxes, fees, fines	Net operating surpluses public trading enterprises	Property and other income	Grants from the Commonwealth Government	Financing transactions	Total funds available	Final consumption expenditure	Capital expenditure on goods(a)	Transfer payments	Net advances paid
1976	322.1	66.2	98.9	772.5	52.8	1,312.5	728.5	435.1	131.2	17.8
1977	371.0	36.9	119.9	844.6	155.3	1,527.6	870.7	482.6	157.1	17.2
1978	423.2	80.3	167.9	974.5	258.8	1,904.6	1,004.7	550.6	330.3	18.8
1979	466.3	90.0	172.1	1,056.2	315.3	2,100.0	1,112.7	608.5	363.4	15.5
1980	518.6	97.7	184.7	1,168.1	352.0	2,321.0	1,267.0	645.6	408.8	-0.4
1981	589.9	130.2	212.4	1,307.0	280.8	2,520.4	1,425.1	627.4	465.5	2.4
1982	690.3	154.7	249.1	1,430.1	316.4	2,840.5	1,608.9	716.7	516.2	-1.3
1983	771.7	193.5	316.3	1,612.3	363.0	3,156.8	1,863.6	1,196.3	677.0	19.9
1984	923.5	274.0	355.2	1,868.2	480.8	3,667.7	2,096.1	1,252.3	850.3	63.1
1985	1,062.0	300.9	394.5	2,067.3	587.9	4,112.5	2,314.9	1,102.2	973.5	21.9
1986	1,145.0	400.7	510.1	2,214.2	652.8	4,922.8	2,576.5	1,147.2	1,122.7	76.4
1987	1,397.2	518.3	529.2	2,387.2	684.4	5,516.4	2,815.9	1,328.4	1,291.2	80.9

(a) Includes gross fixed capital expenditure, increase in stocks and expenditure on land and intangible assets (net).

**PUBLIC REVENUE AND EXPENDITURE: CONSOLIDATED REVENUE FUND**  
(\$'000)

Year (a)	Revenue						Expenditure					
	Common-wealth funds	Public utilities	Departmental (b)	Taxation	Territorial (c)	Total revenue	Public utilities	Interest and sinking fund	Departmental			Total expenditure
									Educational	Health	Other	
1840					5	34		n.a.	n.a.			30
1850					4	38		n.a.	n.a.			33
1860					35	140		n.a.	3			123
1870	n.a.	n.a.	n.a.	n.a.	40	196	n.a.	n.a.	7	n.a.	n.a.	226
1880					72	360		40	19			409
1890					217	829		144	23			803
1900			182	244	380	5,751	1,863	880	138	198	2,049	5,231
1910	1,407	3,916	551	673	649	7,315	2,440	2,006	367	328	1,533	6,895
1920	1,197	6,364	1,188	1,688	818	11,727	5,156	4,124	829	642	1,931	13,063
1930	1,547	10,596	3,134	2,906	950	19,501	8,073	6,891	1,385	649	2,872	20,537
1931	1,547	9,228	3,279	2,269	678	17,374	6,654	7,243	1,346	486	3,950	20,215
1932	1,547	8,818	2,766	2,014	585	16,071	5,724	7,015	1,098	328	4,543	19,186
1933	1,947	8,873	2,701	2,257	558	16,664	5,682	7,009	1,108	333	3,761	18,392
1934	2,147	8,867	2,240	2,737	626	16,963	5,870	7,095	1,153	309	3,560	18,541
1935	2,413	9,837	1,562	3,804	812	18,663	6,391	7,100	1,225	326	3,342	18,997
1936	2,617	10,366	1,677	4,372	767	20,067	6,756	7,135	1,331	341	3,595	19,891
1937	2,013	10,633	1,727	4,807	773	20,371	7,247	7,237	1,432	381	4,024	21,113
1938	2,097	11,148	1,980	5,190	749	21,638	7,249	7,579	1,474	380	4,158	21,659
1939	2,087	11,159	1,786	5,728	634	21,899	7,857	7,779	1,514	401	3,992	22,340
1940	2,137	11,102	1,942	5,992	632	22,240	7,662	8,021	1,545	416	4,070	22,534
1941	2,247	11,366	1,916	6,255	638	22,864	7,534	8,114	1,568	421	4,262	22,842
1942	2,207	12,133	2,204	6,222	620	23,880	8,282	8,204	1,662	436	4,293	23,877
1943	7,852	13,518	2,497	1,330	634	26,303	9,377	8,183	1,627	458	5,564	26,254
1944	7,935	13,626	2,868	1,553	700	27,178	9,870	8,185	1,747	506	5,780	27,102
1945	8,044	13,618	3,402	1,715	697	27,908	10,064	8,251	1,778	485	6,261	27,899
1946	9,960	13,303	2,519	1,936	709	28,815	10,825	8,168	2,005	1,010	5,621	28,815
1947	11,461	11,769	3,105	2,138	1,053	29,962	10,866	8,012	2,447	1,369	5,910	30,057
1948	14,515	13,242	3,575	2,354	1,202	35,421	13,996	8,089	3,298	1,841	7,280	36,125
1949	17,136	15,032	4,564	2,683	1,106	41,121	16,720	8,215	3,519	2,613	9,942	42,756
1950	22,975	17,792	5,733	3,240	1,225	51,622	20,237	8,508	4,160	3,633	13,096	51,574
1951	25,343	19,085	5,911	3,912	1,230	56,312	21,974	8,994	5,269	4,465	13,180	55,994
1952	29,923	24,335	6,863	4,633	1,300	67,910	27,490	9,741	7,262	6,269	15,696	69,094
1953	39,056	22,385	8,557	5,247	1,513	77,768	32,044	10,611	8,686	6,926	17,639	78,784
1954	38,342	29,860	8,378	6,468	1,929	86,292	35,234	12,147	9,503	7,675	18,797	86,497
1955	38,759	32,645	9,433	7,258	2,014	91,440	36,089	13,857	11,217	8,026	19,838	92,408
1956	43,373	33,969	9,779	8,036	2,498	99,225	39,184	15,451	12,482	9,344	21,501	102,886
1957	46,759	37,133	12,548	9,027	2,433	108,662	42,022	17,043	13,636	10,067	33,645	112,487
1958	51,808	34,525	13,640	10,729	2,516	114,108	40,103	19,303	15,172	11,026	25,572	116,355
1959	55,496	36,080	14,522	10,368	2,783	120,136	40,317	20,844	15,819	11,967	29,244	123,506
1960	58,871	38,575	15,696	11,834	2,878	128,776	42,418	23,053	17,282	13,565	29,861	131,587
1961	65,519	40,830	16,372	12,079	2,797	138,665	41,072	24,628	19,541	15,018	35,160	141,075
1962	73,430	42,456	16,549	12,926	3,283	149,852	42,097	27,250	21,417	14,935	40,131	151,780
1963	75,847	43,559	18,134	14,762	3,501	157,182	42,267	29,980	22,850	16,073	41,254	158,687
1964	78,988	45,376	20,948	17,604	3,751	167,888	44,247	31,771	25,880	18,705	43,430	170,681
1965	88,565	39,778	26,712	19,512	4,107	180,143	43,360	34,669	29,133	21,160	49,401	184,840
1966	103,459	45,683	28,753	22,574	4,598	206,655	47,106	37,926	34,016	23,086	56,869	206,665
1967	106,748	52,787	31,461	27,536	7,655	228,146	53,182	41,662	36,746	26,429	61,512	228,174
1968	112,617	56,226	33,135	34,916	11,845	250,738	60,728	43,864	41,224	29,294	65,362	249,909
1969	126,621	54,407	33,035	41,602	17,301	275,081	64,016	47,083	46,441	33,613	74,822	276,135
1970	141,326	62,921	36,905	50,865	23,633	318,189	71,166	51,427	55,839	41,343	87,660	318,901
1971	170,396	68,350	45,583	48,434	32,187	367,252	79,717	54,178	66,341	52,575	107,129	371,620
1972	180,132	73,446	54,131	78,490	34,992	423,999	82,410	62,029	82,472	59,862	125,260	424,890
1973	200,633	69,158	66,711	97,141	37,162	473,840	88,372	65,280	94,547	71,866	144,005	477,330
1974	232,111	85,291	76,306	126,929	43,346	567,683	104,178	69,200	115,982	100,841	168,122	573,414
1975	313,846	108,921	96,930	160,307	49,010	734,240	121,494	75,300	165,705	148,161	213,042	743,373

(a) From 1900, year ended 30 June. (b) Reimbursements, fees, etc. (c) Revenue from sales, leases, licences and royalties relating to land, mining and timber.

NOTE. This table has been replaced by a new series 'State and Local Authorities: Receipts and Outlays' on previous page.

NET EXPENDITURE FROM LOAN FUNDS; PUBLIC DEBT  
(\$'000)

Year (a)	Net expenditure from loan funds on public works and services (b)						Public debt (at end of year)		
	Railways, tramways and buses	Electricity supply	Harbours, rivers, light- houses, etc.	Water supplies sewerage, drainage and irrigation	Public buildings	Other	Total	Gross amount out- standing	Sinking fund
1860	—	—	—	—	—	—	—	4	—
1870	—	—	—	—	—	—	—	—	—
1880	(c)549	(d)38	—	—	—	n.a.	(d)802	722	n.a.
1890	3	6	2	(e)76	n.a.	32	2,735	170	170
1900	302	395	949	—	110	1,757	23,349	754	754
1910	908	174	199	152	626	2,058	46,575	5,139	5,139
1920	242	204	94	21	4,765	5,327	93,644	13,656	13,656
1930	1,819	529	610	108	4,226	7,291	142,389	2,081	2,081
1931	878	257	420	—	1,457	3,012	153,130	2,621	2,621
1932	263	155	1,152	—	1,055	2,624	159,416	2,618	2,618
1933	374	485	1,355	69	1,838	4,121	167,029	2,693	2,693
1934	659	492	1,606	196	2,344	5,297	171,696	743	743
1935	997	610	2,155	213	1,103	5,076	177,180	1,048	1,048
1936	946	602	2,487	169	700	4,903	180,688	1,138	1,138
1937	491	352	2,303	178	741	4,064	184,666	1,292	1,292
1938	950	201	1,843	183	1,144	4,321	187,424	614	614
1939	441	184	1,777	230	640	3,272	190,945	719	719
1940	200	104	1,615	732	974	3,624	192,461	608	608
1941	214	18	152	1,649	306	480	2,819	195,583	1,147
1942	110	25	111	605	70	437	1,359	194,718	535
1943	157	92	133	100	55	217	754	193,976	347
1944	49	31	Cr. 143	75	166	34	212	192,957	140
1945	140	11	61	150	241	492	1,094	191,790	254
1946	142	208	75	473	451	276	1,625	193,852	1,008
1947	535	332	173	1,453	772	821	4,087	198,005	1,091
1948	676	1,471	316	1,388	1,097	125	5,074	200,549	309
1949	913	2,131	449	1,626	1,099	942	7,161	207,377	126
1950	4,496	4,691	804	2,002	1,357	2,859	16,209	219,100	142
1951	3,723	6,591	1,164	4,091	2,003	3,081	20,653	246,374	17
1952	15,198	6,684	2,694	4,803	2,729	3,409	35,517	276,577	647
1953	13,533	179	2,422	4,858	5,432	8,787	35,213	306,144	1,861
1954	11,295	1,406	2,328	3,939	3,144	6,276	28,388	331,565	822
1955	9,752	1,410	1,920	5,661	3,993	6,726	29,462	355,763	442
1956	6,139	2,049	1,638	5,516	4,187	7,098	26,629	377,465	245
1957	5,519	4,200	950	7,119	5,599	9,169	32,556	410,290	112
1958	4,209	2,480	1,398	7,694	5,891	6,599	28,272	436,857	147
1959	5,711	2,200	1,428	8,395	7,410	7,199	32,342	464,237	173
1960	4,953	1,553	1,373	9,547	8,723	6,355	32,504	493,575	171
1961	4,221	400	1,966	10,314	10,479	8,037	35,418	523,070	94
1962	5,432	300	2,587	10,952	12,032	6,449	37,751	555,130	222
1963	6,204	500	2,438	10,770	13,420	5,563	38,894	587,336	485
1964	7,496	—	3,028	10,537	15,630	6,409	43,100	626,045	442
1965	6,800	794	2,822	10,957	19,948	5,457	46,779	665,620	473
1966	7,628	1,434	2,583	12,667	19,908	3,580	47,800	705,514	267
1967	9,068	2,427	1,746	13,642	18,230	5,902	51,015	748,601	216
1968	7,750	4,542	2,402	14,552	18,816	5,115	53,177	792,969	408
1969	10,547	5,679	1,190	12,560	20,116	4,765	54,859	840,343	3,015
1970	6,331	4,566	2,055	13,330	24,627	8,594	59,504	886,778	182
1971	7,194	27	2,202	15,176	25,549	13,492	63,640	924,111	582
1972	5,919	3,666	1,902	18,369	23,994	32,606	86,456	975,958	1,216
1973	4,179	4,104	2,371	23,598	32,872	21,882	89,006	1,030,060	265
1974	5,569	3,467	2,505	26,708	34,324	3,291	75,863	1,074,111	4,899
1975	6,185	4,069	3,728	24,487	45,262	6,140	89,871	1,120,313	1,037

(a) From 1900, year ended 30 June. Sinking fund at 31 March from 1900 to 1928. (b) From 1928 includes expenditure from Loan Suspense Account. (c) Total amount for the years 1877 to 1881. (d) Total amount for the years 1872 to 1881. (e) Includes expenditure prior to 1890.

NOTE: This table has been replaced by a new series 'State and Local Authorities: Receipts and Outlay' on an earlier page.

## BANKING AND PERMANENT BUILDING SOCIETIES

Year	Trading banks			Savings banks (a)		Permanent building societies (b)			
	Depositors' balances (c)	Loans advances and bills discounted (c)	Weekly debits to customers' accounts (d)	Operative accounts at end of year	Depositors' balances at end of year	Liabilities		Assets	
						With-drawable shares	Deposits	Amount owing on loans	Total
	\$'000	\$'000	\$m		\$'000	\$'000	\$'000	\$'000	\$'000
1870	n.a.	n.a.		895	27				
1880	n.a.	n.a.		1,299	45				
1890	1,904	2,809		3,014	69				
1900	8,781	5,514	n.a.	33,646	2,598				
1910	12,627	12,228		84,262	6,955				
1920	24,742	21,594		211,415	14,516				
1930	25,524	41,773		367,665	23,457				
1940	42,219	47,529		233,649	23,720				
1950	116,458	55,301	27.4	378,670	79,225				
1951	149,244	66,680	38.6	392,790	89,345				
1952	170,923	83,353	43.6	403,678	94,342				
1953	170,234	87,353	44.2	414,288	99,589				
1954	181,863	106,429	50.8	422,480	105,229				
1955	180,895	137,830	52.4	426,637	107,258				
1956	174,070	142,156	53.9	446,419	115,868				
1957	185,576	135,074	57.1	473,548	125,386				
1958	186,478	141,198	60.4	497,690	131,896				
1959	180,300	147,106	61.5	527,079	142,998				
1960	192,076	142,064	69.7	550,966	157,246	n.a.	n.a.	n.a.	n.a.
1961	190,094	146,244	75.7	577,619	161,424				
1962	209,274	139,204	80.4	625,070	181,056				
1963	219,952	153,528	88.2	683,417	208,812				
1964	242,268	164,878	96.4	736,009	239,766				
1965	272,430	186,000	106.3	786,340	261,654				
1966	310,432	195,190	122.4	848,562	292,871				
1967	355,899	212,023	138.6	905,349	330,807				
1968	398,837	252,627	169.1	970,120	373,602				
1969	462,559	280,147	209.0	1,036,180	412,984				
1970	558,017	323,824	246.4	1,096,466	431,877				
1971	544,732	351,110	295.3	1,153,420	464,611				
1972	552,546	357,410	318.4	1,205,448	511,457				
1973	693,456	443,330	355.9	1,250,576	608,133				
1974	829,002	604,460	439.4	1,327,699	684,974				
1975	906,589	673,526	515.9	1,401,485	779,427				
1976	1,092,350	791,376	680.0	1,443,883	897,693	522,517	286,320	632,929	849,182
1977	1,376,813	927,709	814.4	1,466,200	960,548	646,176	383,451	851,896	1,078,720
1978	1,448,206	1,163,207	975.9	1,511,092	1,048,510	747,307	508,710	1,046,718	1,308,935
1979	1,621,852	1,368,657	1,173.7	1,539,416	1,133,627	858,380	681,851	1,270,625	1,601,527
1980	1,742,801	1,678,121	1,463.3	1,579,722	1,216,182	966,319	812,817	1,491,983	1,849,490
1981	2,026,507	1,943,299	1,826.3	1,647,837	1,360,315	1,020,465	994,100	1,650,304	2,100,204
1982	2,521,072	2,288,020	2,283.4	1,741,114	1,514,207	1,129,730	1,030,780	1,793,793	2,261,263
1983	2,877,685	2,571,177	2,651.2	1,835,917	1,910,538	1,265,212	948,426	1,743,068	2,312,162
1984	3,004,651	2,874,000	3,043.7	1,961,811	2,214,373	1,374,872	861,647	1,664,158	2,345,479
1985	3,622,307	3,342,663	3,857.6	2,051,681	2,402,828	1,463,808	908,036	1,807,865	2,468,670
1986	4,653,781	4,032,226	4,846.9	2,153,457	2,649,943	1,534,979	1,058,426	1,977,938	2,702,788
1987	5,143,047	4,652,428	5,133.2	2,618,596	3,975,333	n.y.a.	n.y.a.	n.y.a.	n.y.a.

(a) From 1900, year ended 30 June. (b) At 30 June. (c) Average based on amounts as at close of business each week. From 1927, year ended 30 June. (d) Weekly average for year ended 30 June. Excludes debits to Commonwealth Government accounts at city branches. From 1946-47 includes The Rural and Industries Bank of Western Australia (General Banking Department).

## WESTERN AUSTRALIA IN RELATION TO AUSTRALIA

	Unit	Date or period	Western Australia	Australia	Percentage
Area	sq km	..	2,525,500	7,682,300	32.9
Proportion of area having rainfall —					
Under 250 mm	per cent	..	58.0	39.0	..
250 mm and under 500 mm	per cent	..	29.2	31.8	..
500 mm and over	per cent	..	12.8	29.2	..
Population (a) (b)	number	30 June 1988	1,544,806	16,538,153	9.3
Population increase	number	1987–1988	44,299	274,834	16.1
Rate of population increase	per cent	1987–1988	2.9	1.7	..
Births registered (b)	number	1987	23,332	243,959	9.6
Deaths registered (b)	number	1987	8,880	117,321	7.6
Marriages registered	number	1987	10,150	114,113	8.9
Divorce – Dissolutions granted	number	1987	4,044	39,725	10.2
Employed labour force (c)	'000	November 1988	729.1	7,508.7	9.7
Average weekly earnings – all male employees (d)	\$	August	510.3	486.2	..
Unemployed on benefit	number	30 June 1988	43,061	475,070	9.1
Industrial disputes – Working days lost	'000	1987	115.3	1,390.7	10.3
Area under crop	'000 hectares	1987–88	5,334	18,356	29.1
Area under sown pasture	'000 hectares	1987–88	7,561	28,649	26.4
Area of —					
Wheat for grain	'000 hectares	1987–88	3,312	9,004	36.8
Oats for grain	'000 hectares	1987–88	373	1,276	29.2
Barley for grain	'000 hectares	1987–88	461	2,625	17.6
Hay	'000 hectares	1987–88	243	1,180	20.6
Fruit and vineyards	'000 hectares	1987–88	8	166	4.8
Livestock —					
Sheep	'000	31 March 1988	33,951	151,808	22.4
Cattle	'000	31 March 1988	1,705	21,850	7.8
Pigs	'000	31 March 1988	307	2,706	11.3
Production —					
Wheat for grain	'000 tonnes	1987–88	3,882	11,769	33.0
Wool (e)	'000 tonnes	1987–88	188.4	914.1	20.6
Meat (f)	'000 tonnes	1987–88	237.7	2,830.0	8.4
Whole milk (g)	mil. litres	1987–88	251	6,129	4.1
Butter (g)	tonnes	1987–88	1,505	94,241	1.6
Value of agricultural commodities produced	\$m	1987–88	2,994	19,990	15.0
Mining establishments – Value added	\$m	1986–87	(h)3,469	13,152	26.4
Iron ore production	'000 tonnes	1986–87	92,468	97,354	95.0
Coal production	'000 tonnes	1986–87	(i)3,782	148,724	2.5
Crude oil production (j)	megalitres	1987–88	3,100	31,264	9.9
Manufacturing establishments (k) —					
Number	..	1986–87	2,660	28,846	9.2
Employment – Average over whole year	'000	1986–87	69.3	1,015.0	6.8
Wages and salaries paid	\$m	1986–87	1,407.0	21,514.1	6.5
Value added	\$m	1986–87	2,998.7	45,684.8	6.6
New dwelling units commenced (l)	number	1987–88	18,730	135,810	13.8
Value of all building commenced	\$m	1987–88	2,085.5	21,293.6	9.8
Foreign imports	\$m f.o.b.	1987–88	3,152.0	40,590.8	7.8
Foreign exports	\$m f.o.b.	1987–88	7,350.4	40,945.6	17.9
Motor vehicles on register	'000	30 June 1988	935.8	9,544.4	9.8
New motor vehicles registered	'000				
Road traffic accidents – Persons killed	number	1988	229	2,886	7.9
Retail turnover (excluding motor vehicles, etc.)	\$m	1988–89	6,749.1	76,842.2	8.8
Savings bank deposits per head	\$	30 June 1988	3,638	3,736	..
Household income per head	\$	1987–88	13,513	14,440	..
Age and invalid pensions (including wives and spouse/carers pensions)	number	30 June 1988	143,455	1,742,990	8.2
Disability and service pensions (including dependants)	number	30 June 1988	68,160	770,544	8.8
Education Institutions—					
Government schools	number	1987	733	7,575	9.7
Non-government schools	number	1987	237	2,504	9.5
Universities	number	30 April 1988	3	20	15.0
Colleges of Advanced Education	number	30 April 1988	1	43	2.2
Student enrolment —					
Government schools	number	1987	208,078	2,196,742	9.5
Non-government schools	number	1987	62,662	808,141	7.8
Universities	number	30 April 1988	29,469	208,257	14.8
Colleges of Advanced Education	number	30 April 1988	12,243	201,009	6.1

(a) Based on Estimated Resident Population. (b) Based on State of usual residence. (c) In civilian employment. Excludes defence forces and employees in agriculture and private domestic service, and trainee teachers. (d) Not comparable with 'Average weekly earnings per employed male unit' previously published. (e) In terms of greasy wool. Comprises shorn wool, dead wool, fellmongered wool and wool exported on skins. (f) Comprises sheep, cattle, pig and poultry meat. Dressed carcass weight. Excludes offal. (g) Source: Australian Dairy Corporation. (h) Excludes establishments predominantly engaged in quarrying sand and gravel. (i) Source: Joint Coal Board. (j) Source: Department of Primary Industries and Energy. (k) Excludes details for single establishments employing less than four persons. Excludes electricity and gas establishments. (l) Number of new dwelling units has been rounded to nearest ten.

## APPENDIX

### Articles Published in Previous Issues (a)

In cases where an article has been published in more than one previous issue, the reference to its last appearance only is given.

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Aboriginal population, history of	1984, pp. 1–8
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Albany, Port of	1971, pp. 449–51
ANZAAS Congress: Perth, 1973	1973, pp. 562–4
Basic wage, historical summary –	
Commonwealth	1968, pp. 396–401
State	1968, pp. 403–5
Captain Fremantle's Report of Arrival of First Settlers, text of	1976, pp. 541–2
Captain Stirling's 'Narrative of Operations', text of...	1974, pp. 533–41
Census of Wholesale Establishments, 1968–69	1976, pp. 434–7
Censuses of population and housing, 1911 to 1966	1972, pp. 547–70
Centenary of the discovery of the Collie coalfields	1983, pp. 393–7
Community Welfare, Department for, history of	1981, pp. 135–9
Computer Service Centre, Perth	1969, p. 504
Conservation of the fauna	1976, pp. 93–5
Conservation of the flora	1975, pp. 78–80
Crown Law Department, history of	1983, pp. 129–31
Education Department, history of	1972, pp. 117–21
Electoral Divisions (Commonwealth)	1971, pp. 97–8
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Esperance, Port of	1973, pp. 444–6
Exploration in Western Australia	1975, pp. 9–28
Export price index	1970, p. 507
Fisheries and Wildlife, Department of, history of	1984, pp. 121–4
Flag of Western Australia, history	1984, p. 120
Flora of Western Australia –	
Acacia	1965, pp. 59–60
'Christmas tree' ( <i>Nuytsia floribunda</i> )	1962, p. 51
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Fremantle, Port of	1970, pp. 441–3
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Governor Darling's letter to the Earl of Bathurst, text of	1974, pp. 541–2
Governors and Acting Governors of Western Australia	1982, pp. 121–2
Governor Stirling's Commission dated 4 March 1931, text of	1979, pp. 12–16
Historical review — chronological notes from 1829	1967, pp. 2–33
Historical survey of Western Australia	1973, pp. 1–15
Housing and Construction, historical review	1986, pp. 367–9
Hydrocarbon Exploration on the North–West Shelf	1976, pp. 37–9

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In cases where an article has been published in more than one previous issue, the reference to its last appearance only is given.

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Land settlement schemes, government	1976, pp. 328-9
Land tenure system, origin and development of	1960, pp. 198-9
Lands and Surveys Department, history of	1980, pp. 128-31
Linseed, area and production	1973, pp. 349-50
Local government in Western Australia, development of...	1971, pp. 565-70
McNess Housing Trust	1969, p. 205
Major Lockyer's letter to Colonial Secretary MacLeay, text of	1977, pp. 553-7
Maritime Museum, Western Australian	1986, pp. 237-8
Meteorites, Western Australian	1973, pp. 34-5
Meteorological services -	
History of	1960, pp. 34-5
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In cases where an article has been published in more than one previous issue, the reference to its last appearance only is given.

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Wheat, development of production ....	1968, p. 270

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Comprehensive Agricultural Areas Water Supply Scheme	1985, p. 258
Electoral Divisions (Commonwealth)	1971, <i>between</i> p. 96 and p. 97
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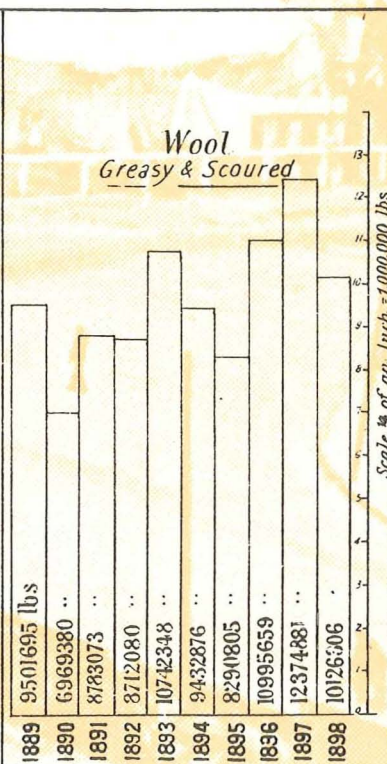
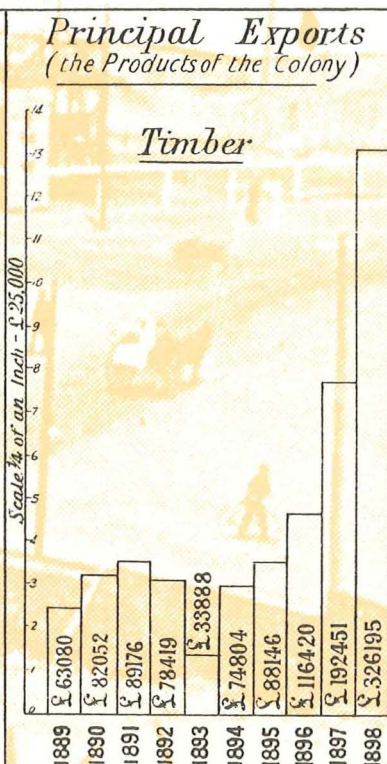
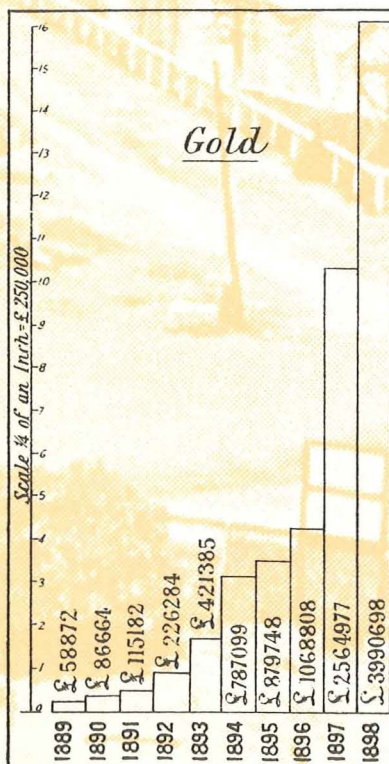
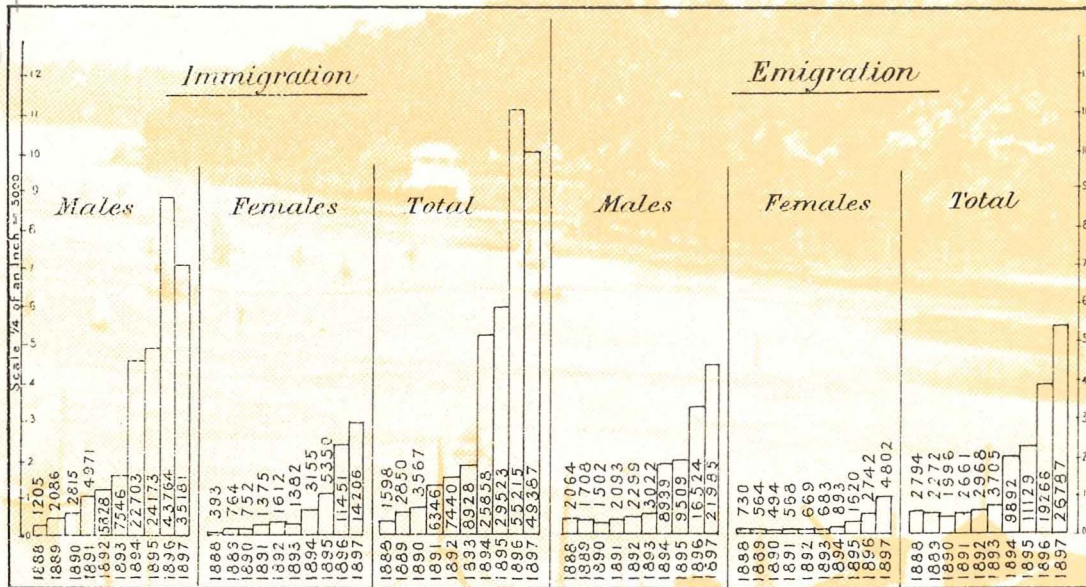
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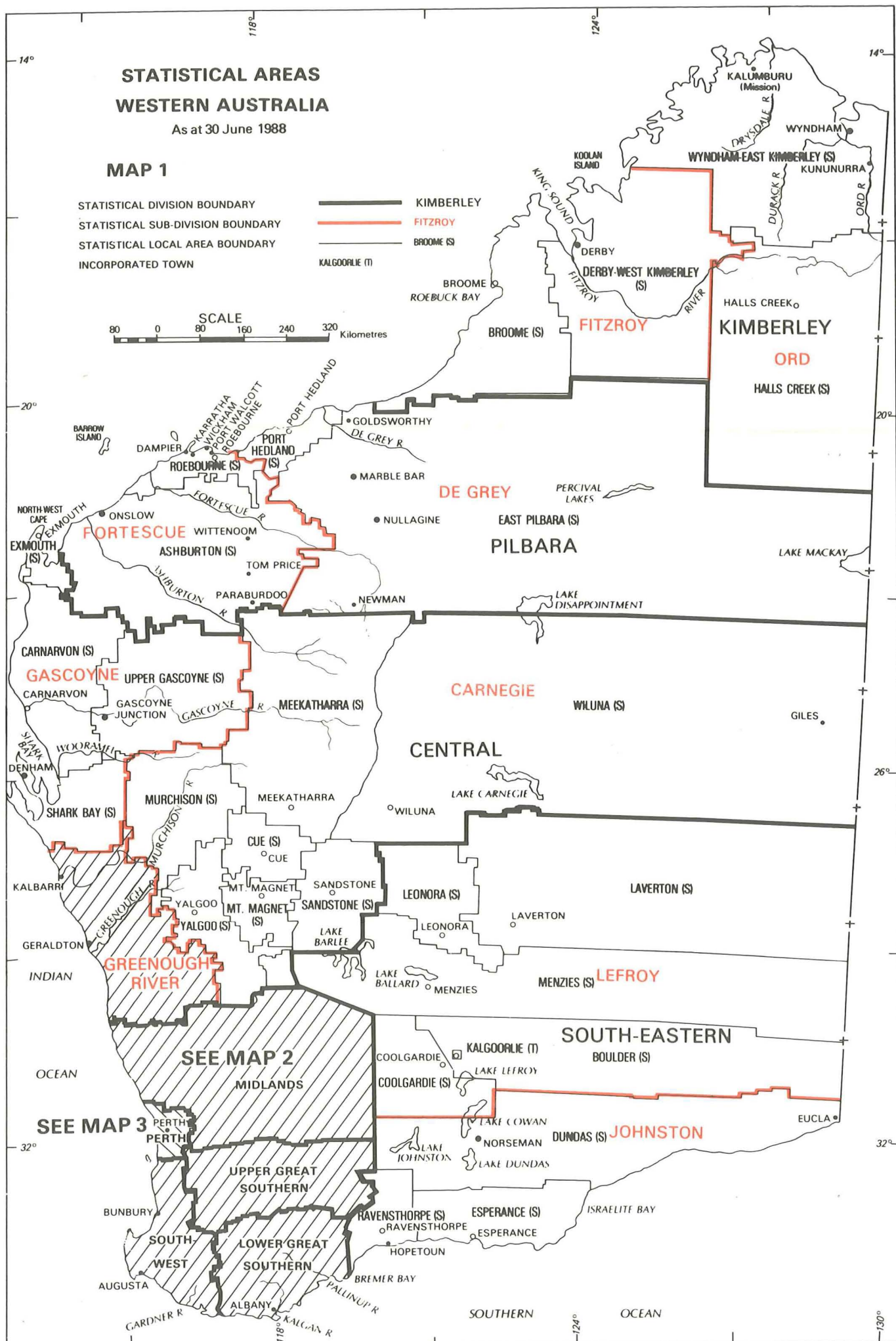
P-  
319.41  
WEST  
[C]





## As at 30 June 1988

STATISTICAL DIVISION BOUNDARY  
STATISTICAL SUB-DIVISION BOUNDARY  
STATISTICAL LOCAL AREA BOUNDARY  
INCORPORATED TOWN



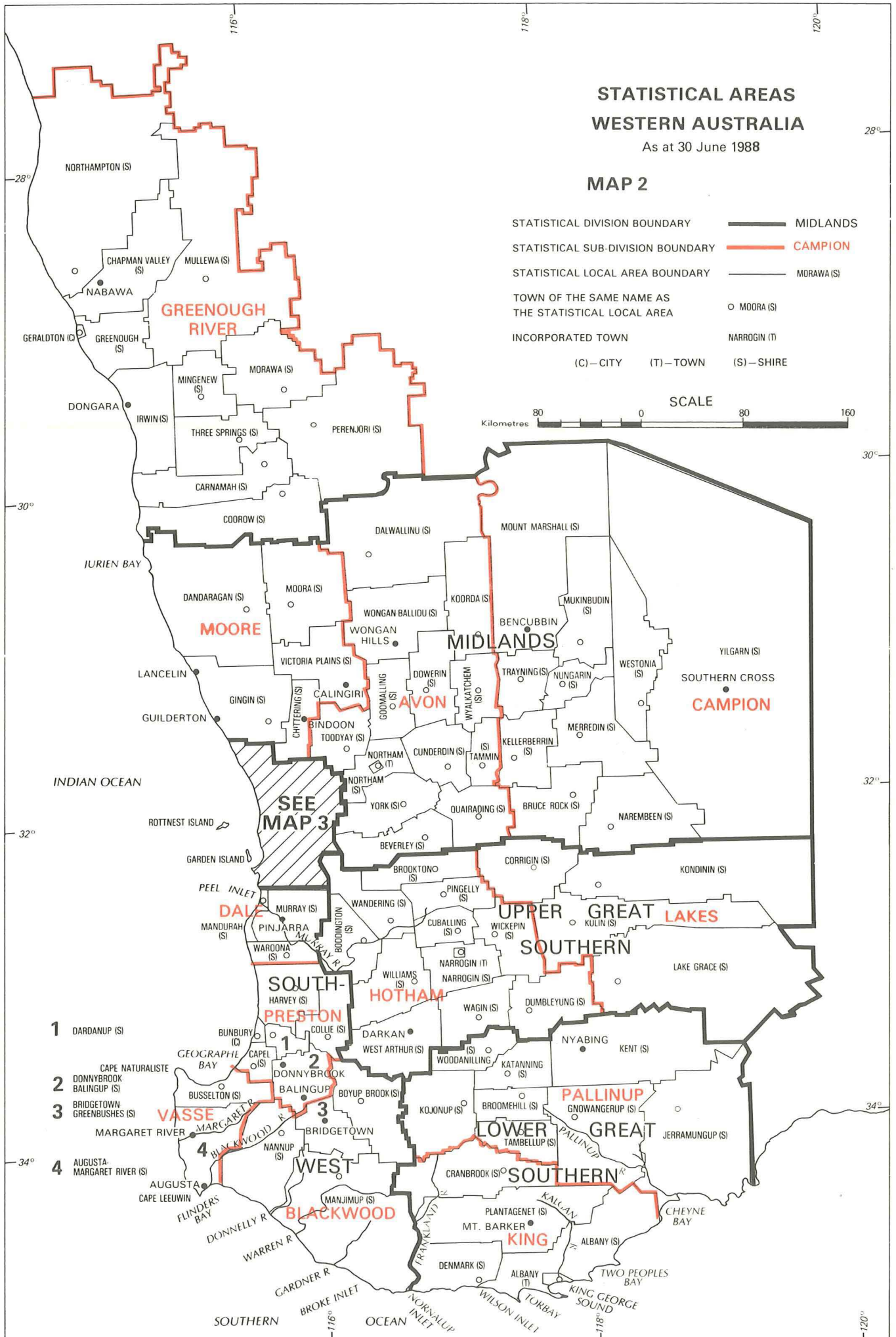
# STATISTICAL AREAS WESTERN AUSTRALIA

As at 30 June 1988

MAP 2

- |  |            |              |
|--|------------|--------------|
| STATISTICAL DIVISION BOUNDARY                          | —          | MIDLANDS     |
| STATISTICAL SUB-DIVISION BOUNDARY                      | —          | CAMPION      |
| STATISTICAL LOCAL AREA BOUNDARY                        | —          | MORAWA (S)   |
| TOWN OF THE SAME NAME AS<br>THE STATISTICAL LOCAL AREA | ○          | MOORA (S)    |
| INCORPORATED TOWN                                      |            | NARROGIN (T) |
| (C) — CITY   | (T) — TOWN | (S) — SHIRE  |

SCALE  
Kilometres 80 0 80 160



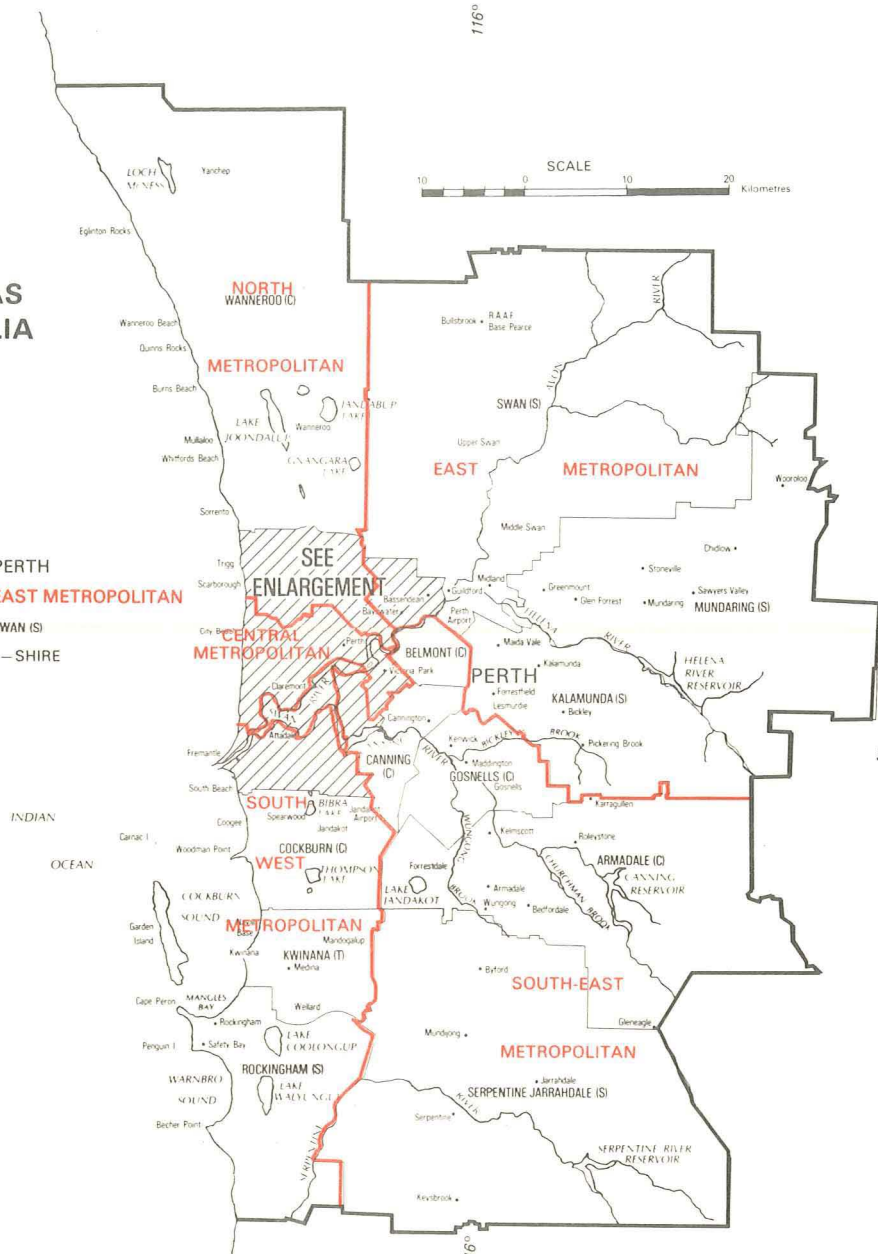


# STATISTICAL AREAS WESTERN AUSTRALIA

As at 30 June 1988

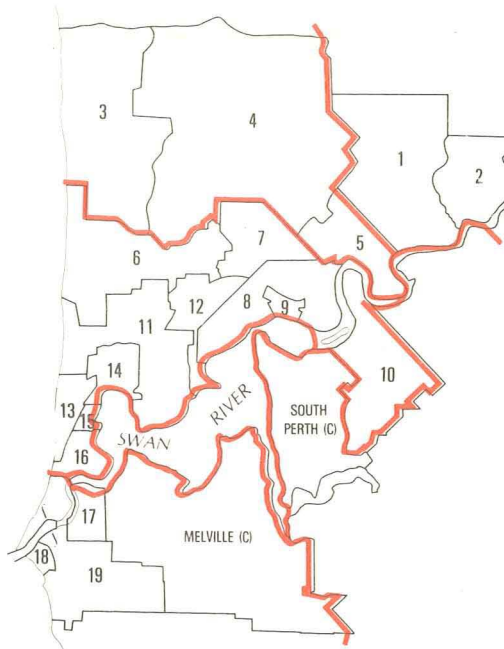
MAP 3

STATISTICAL DIVISION BOUNDARY ——— PERTH  
STATISTICAL SUB-DIVISION BOUNDARY ——— EAST METROPOLITAN  
STATISTICAL LOCAL AREA BOUNDARY ——— SWAN (S)  
(C) — CITY (T) — TOWN (S) — SHIRE



## ENLARGEMENT

1. BAYSWATER (C)
2. BASSENDEAN (T)
3. STIRLING (C) — WEST
4. STIRLING (C) — CENTRAL
5. STIRLING (C) — SOUTH-EASTERN
6. PERTH (C) — WEMBLEY — COASTAL
7. PERTH (C) — NORTH
8. PERTH (C) — OUTER
9. PERTH (C) — INNER
10. PERTH (C) — SOUTH
11. NEDLANDS (C)
12. SUBIACO (C)
13. COTTESLOE (T)
14. CLAREMONT (T)
15. PEPPERMINT GROVE (S)
16. MOSMAN PARK (T)
17. EAST FREMANTLE (T)
18. FREMANTLE (C) — INNER
19. FREMANTLE (C) — REMAINDER





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