

**WESTERN AUSTRALIAN  
YEAR BOOK**

**1986**

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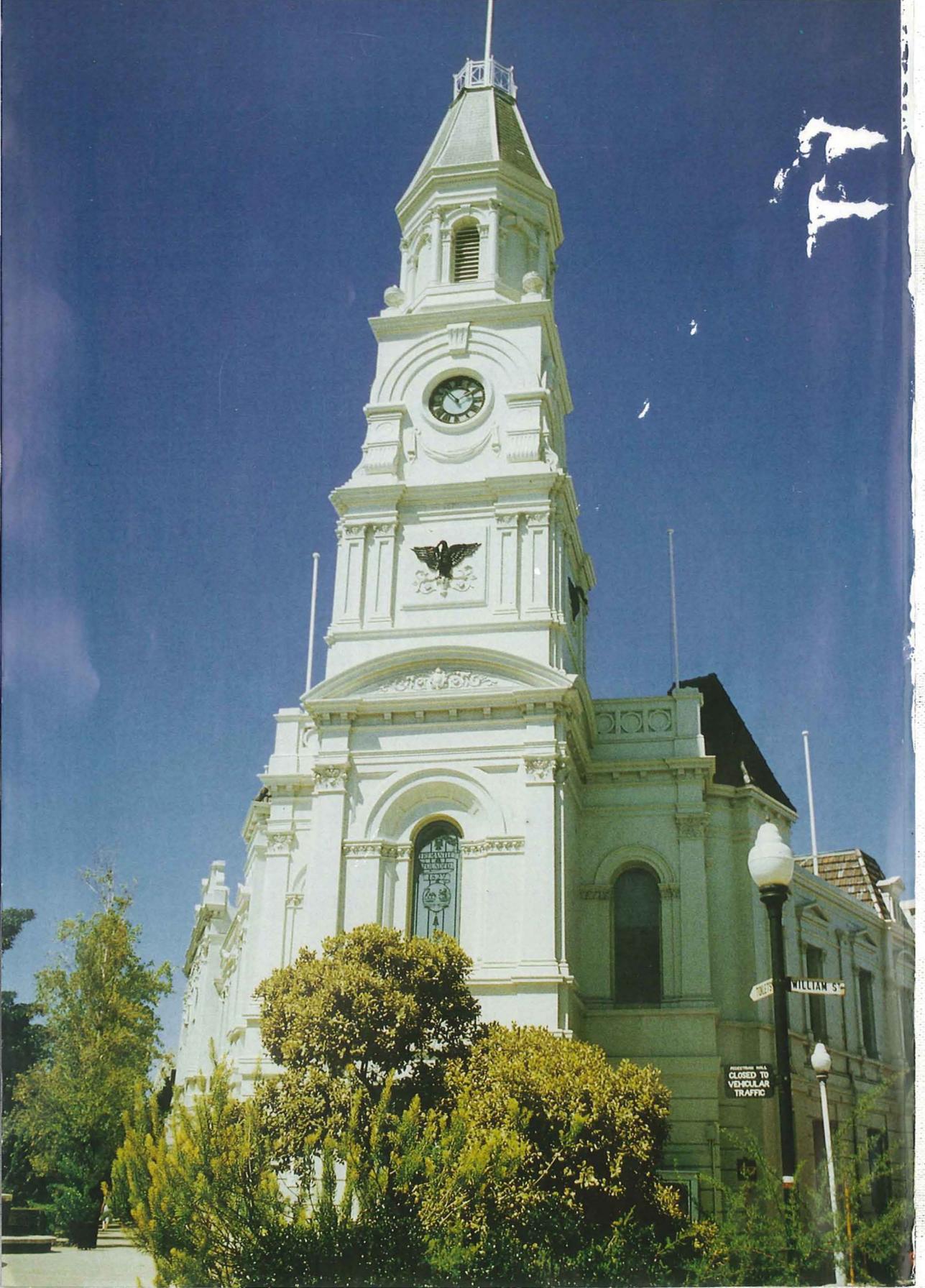
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WESTERN AUSTRALIAN YEAR BOOK

The opening of the Fremantle Town Hall on 22nd June, 1887 coincided with Queen Victoria's Golden Jubilee. A \$3.3 million project to restore the building is expected to be completed by late 1986.  
*photograph: Ian Johnson; Western Australian Tourism Commission*



REGISTRATION HALL  
CLOSED TO  
VEHICULAR  
TRAFFIC

REGISTRATION HALL  
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TRAFFIC

WILLIAM ST

# WESTERN AUSTRALIAN YEAR BOOK

No. 24 — 1986

W. M. BARTLETT

DEPUTY COMMONWEALTH STATISTICIAN AND GOVERNMENT STATISTICIAN

AUSTRALIAN BUREAU OF STATISTICS

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## FOREWORD

The reprinting of the first *Western Australian Yearbook* (inside the front cover) is a useful contribution to the resources for the study of Western Australian history. It contains information and comparative statistics for the seven year period 1880-86 and it reveals the commencement of a more prosperous era for the Colony. The Kimberley goldfield had recently been discovered, the construction of the Great Southern and the Midland Railways had commenced and large areas of pastoral lands were being opened up for leasehold in the North and Eucla districts.

The Yearbook provides an authentic picture of the 1880s and is a recommended source for anyone studying the local scene at that period. In addition to the coverage already mentioned researchers will find information on the administration of justice, the education system, a summary of the Land Regulations, the financial and trade situation, vital statistics, etc.

Statistics for the Colony had been kept from the early years of settlement and provided to the Colonial Office in London in the form of *Blue Books*. These books for the years 1834-36 exist in the Public Record Office in England and microfilm copies only are available in Australia (Colonial Office series 22/pieces 10-12). The manner in which these returns were completed was considered to be unsatisfactory and on 26 January 1837 the Secretary of State for the Colonies sent a despatch to Governor Stirling (COD 33 of 1837) informing him that a triplicate copy of the annual *Blue Book* was to be laid before the Legislative Council of Western Australia. The original and duplicate copies were to be sent to the Colonial Office. These triplicate copies from 1837-69 are now in the Battye Library. The volumes are bound and consist of standard printed forms which had been completed by officers of the Colony.

From 1870-1905 the *Blue Book* was issued in printed format by the Government Printer. The information which appeared there up to 1895 covers the same areas as in the manuscript volumes. In 1896 a change occurred in that the volume was split so that the *Blue Book* from that date onwards consists solely of a listing of the civil establishment and the statistical information was issued in a new series called the *Statistical Register*. The *Public Service List* commenced annual publication in 1909.

The *Western Australian Yearbook*, as evidenced here, commenced publication by the Government Printer for the year 1886 and this series continued until 1905. The official Year Book of Western Australia recommenced publication for the year 1957. A pocket Year Book is also published; it commenced for the year 1919 and is still being issued. It should be noted that a commercial publication bearing the same title was published from 1889-1917, first by Sands & McDougall and from 1899 by E. S. Wigg & Son, Perth. This is less a statistical publication and more a discursive work including handy information.

The Preface to the official 1886 Yearbook states that this new publication is being issued in a form more convenient than the *Blue Books* or the *Votes and Proceedings* of the Council, in which hitherto the statistics of the Colony had been published. The reference to the *Votes and Proceedings* is apparently to the reports of various Government agencies which were tabled in the Legislative Council and ordered to be printed. Some of these contained considerable detail concerning statistics relative to the subject under report. The *Blue Book* was also a Paper presented to the Legislative Council but was printed separately, not as part of the *Votes and Proceedings*.

From the 1840s until 1897 the Registrar General was the officer responsible for carrying out the statistical duties of the Colony. At that date a separate statistical staff was appointed. Hence that 1886 Yearbook bears the name of the Registrar General, Godfrey Charles Knight, as the author.

G. C. Knight was appointed Acting Secretary to the Central Board of Education in 1878 and in 1879 Clerk to the Legislative Council and Registrar of the Supreme Court. In 1886 he succeeded his father-in-law, C. H. Clifton, as Registrar General, a position at one time held by his own father, William Knight. He died in 1890 after a long illness, during which time W. A. Gale was acting for him in the position.

The Yearbook for 1886 is similar in format to three pamphlets written by John Forrest titled *Notes on Western Australia with Statistics for the year 1883*, similarly for 1884 and 1885. These were also published by the Government Printer. The *Western Australian Yearbook* for 1886 is longer and contains more statistical tables than the earlier pamphlets. However, its publication elicited a letter to the *Inquirer* newspaper of 3 August, 1887, drawing attention to the similarity of the recent Yearbook to the previous pamphlets by Forrest. The writer questions whether perhaps the material was handed to the Government Printer by Forrest before he took his departure from Albany as the Western Australian representative to attend the Imperial Conference in London.

Whatever the authorship, the contents of the volume are of undeniable research value and I commend the Government Statistician on his initiative in reprinting this slender but useful item.

MARGARET MEDCALF  
State Archivist  
14 April 1986

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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	figure or series revised since previous issue
..	not applicable
—	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.

*Citation of Acts.* Acts of the Parliament of Western Australia are cited in italics throughout. The date indicates the year of original enactment; all subsequent amendments are inferred.

Acts of the Parliament of the Commonwealth of Australia are cited in italics with the year of original enactment in roman type; all subsequent amendments are inferred.

### Availability of ABS publications

Information regarding the availability of ABS publications can be obtained from the Information Services Section, Australian Bureau of Statistics, Merlin Centre, 30 Terrace Road, Perth, W.A. 6000, or from other ABS Offices.

All publications produced by the Western Australian Office of the ABS are described in *List of Publications* (Catalogue No. 1101.5) which is available free of charge from this Office.

The *Catalogue of Publications* issued by Central Office provides a comprehensive list of all statistical publications issued by the ABS. This is available free of charge from any ABS Office.

In many subject areas there is a considerable amount of unpublished statistical information which is available on request. Inquiries should be made to the Information Service at this Office.

## 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 government, geography and climate, vegetation and fauna. The descriptive text and statistical tables are supplemented, where appropriate, by maps, diagrams and illustrations. Each chapter contains the latest information available at the time of manuscript preparation.

Because of the time required for editing and printing the Year Book, later or more detailed data on a particular topic will often be available in specific subject publications issued by the Bureau. More detailed statistics on matters treated generally in the Year Book are available in other publications. The reader is referred to the complete list of publications of the Western Australian Office which is provided in the Appendix.

This is the twenty-fourth issue of the present series of the Year Book. The old series, originally published for the year 1886 and discontinued in 1905, developed from the Blue Books of the Colonial Office, London, which contained the earlier statistical records of Western Australia. A feature of this issue is the reprint of the original 1886 Year Book, included inside the front cover. The State Archivist, Margaret Medcalf, has provided a brief history of the Year Book in her foreword.

The reader's attention is drawn to the information service and library facilities provided by this Office, where all the publications of the Australian Bureau of Statistics are available for reference. Businessmen, manufacturers, primary producers, government authorities and the public generally are invited to make full use of these services.

I express my appreciation to the many external contributors for their part in the preparation of material for the Year Book. Special thanks are due to the Editor of Publications (G. B. McLennan, B.Ec., B.Com.), other officers of the Bureau, and Advance Press Pty. Ltd., the Government Printer and Printers Trade Services and their staffs for their role in the Year Book project.

W. M. BARTLETT  
Deputy Commonwealth Statistician  
and  
Government Statistician

June 1986

## Chapter 1

# WESTERN AUSTRALIA: A HISTORY

Contributed by

C. T. Stannage, M.A., Ph.D.

(Associate Professor of History, University of Western Australia)

Australia has always been a maritime nation; and Western Australia has always been a maritime State. The first Australians were not men out of Europe but peoples from South-East Asia who 40,000 years ago, when the seas were low, wound their way from island to island until they landed in the north-west and north of Australia. Europeans would call these people the Aborigines. Their wood and bark canoes and coracles bear testimony to their sea and river faring skills. They were a people of great technical ingenuity and enterprise. There were 300,000 of them in Australia when Europeans first made a permanent settlement, at Sydney in 1788. By 1900, through slaughter, disease and epidemic the Aborigines had been reduced in numbers to less than 100,000. In recent years there has been a resurgence of Aboriginality and many of the skills of Aborigines have been revived. European Australians now have an increased awareness and understanding of Aboriginal life and culture, of what has been described as 'the Triumph of the Nomads'.

But even as the Aborigines used sea and river craft to settle the continent of Australia, Europeans, perhaps 2,000 years ago, believed that there existed a great South Land, equal to the North Land known to the Greeks and Romans. This Unknown South Land they described as Terra Australis Incognita. They believed that it was a paradise and a place of great antipodean wealth. Some men, particularly the Spanish in the 15th and 16th centuries, even thought that it was Ophir, the ancient civilisation which had provided gold for King Solomon. And it was thought that Marco Polo had described it, using the words 'One then reaches a continental province called Locac which is very large and rich'. The myth that Western Australia, when found, would be a southern paradise, is seen in Gabriel de Foigny's 1676 description 'the southland is a truly blissful place. Its climate is temperate; it never experiences rain storms or gales, and it is only rarely that there are light snow falls. In a word it is a country which encompasses all the delights which are absent in the other parts of the world'. Many present day West Australians, and generations of visitors, would agree with de Foigny. By 1700 southern Western Australia was described by an employee of the Dutch East India Company at Batavia as being in 'Climate 5', the southern equal of the most beautiful and bountiful climate of the northern hemisphere which included Persia and the Mediterranean.

Thus all the seafaring nations of the world were interested in Australia. The Chinese sent a sailor south in the 15th century, and in 1601 a Dutch ship the *Duyfken* came on Cape York Peninsula. Then in 1616 Dirk Hartog landed at Shark Bay on the north-west of Western Australia. Under the command of Francis Pelsart the *Batavia* in 1629 was wrecked on one of the Aboelhos islands. The ship was lost but most crew and passengers escaped to shore. While Pelsart sailed on in an open boat to Batavia, some of his stranded crew mutinied and murdered many passengers. They themselves were executed when Pelsart returned. Other ships, including the fabulous *Gilt Dragon* (rediscovered in 1963), were also wrecked. Thus the hopes of many visiting seamen were dashed in Western Australia!! In 1658 Volckersen described the coastline near Rottneest Island and where Fremantle now stands. For him it looked less a paradise than a barren, wild and waterless place. In 1696 and 1697 William Vlamingh even explored the Swan River, but he too was unimpressed. An English adventurer, William Dampier, was even more critical. He liked the wildflowers, which have remained

of enduring fascination to all who come to Western Australia, but he reported in his *Voyage to New Holland in the Year 1699* that there was nothing to attract a European settlement and that the Aborigines were hostile.

While French maritime explorers like d'Entrecasteaux (1792), Nicholas Baudin (1801), and d'Urville (1826) reached southern Western Australia, it was left to another English seaman, James Stirling, imbued with Romanticism and the literature of Swan River being an earthly paradise, to describe southern Western Australia in such glowing terms (as rich as the Plains of Lombardy or Virginia in America) that he persuaded the British Government to found a settlement there in 1828. Thus on 1 June 1829 the greatest naval and trading power in Europe 'invaded' Western Australia and established the country as a British settlement.

The British settlement of Swan River Colony, later to be called Western Australia, was founded by a hard-driving entrepreneur in Captain James Stirling. He and his fellow investing colonists were given Crown land proportionate to the amount of capital and labour they brought with them. Many of them came from the lesser gentry class of Britain. And their servants and indentured labourers came from rural poorhouses in the old country. Some of the gentry failed to 'make a go of it' in Western Australia because they lacked the mental toughness and farming skills needed to prosper in a land where the seasons were upside down and the trappings of civilisation few. Some of the servants and labourers did better than their masters, thus providing the origins of the myth that in Western Australia *anyone* who was shrewd and who worked hard and kept sober could acquire wealth and a colonial reputation. This belief, which Americans call the 'success ethic', undergirded the careers of Alan Bond in the 1970s, no less than that of Walter Padbury, a shepherd's boy, one hundred and twenty years before him. The law and politics in Western Australia were arranged so that money could beget money. The gentry made it hard for the rest because they believed that there should always be masters and servants, but some poor men broke through and won for themselves power and high status. Overall the colony battled to survive. With a minuscule population of 1,875 in 1831, it had only 5,900 in 1850. It was dependent on the sea for news, trade and protection. The colonists bought foodstuffs and goods from Tasmanian ships, but until the rich farmlands of York, ninety-five kilometres inland from Perth, were opened up, they had little to sell in return. In the 1840s they not only sold some wool to England, but they also engaged in the Far Eastern trade, selling large quantities of sandalwood to the Chinese who liked its scent. They built little vessels for trading purposes, and large merchants like George Shenton owned ships. Even the government owned a ship called *The Champion* which traded in eastern waters and even brought in coolie labourers as migrants. Perth, sixteen kilometres up the Swan, on a broad expanse of water, had been established as the Colony's capital, while Fremantle at the mouth of the Swan River was the major port.

While some had prospered in the first two decades, others had lost respectability and comfort. Some affluent men, seeking to turn Western Australia into the *el dorado* of legend, sought to bring in a large and cheap labour force which would ensure their futures. George Shenton, the merchant, William Burges, the farmer, the Samson family of Fremantle, and James Stokes, the biggest brewer in Perth, won government support, and in June 1850 the first boatload of British convicts arrived in Western Australia. In the next eighteen years nearly 10,000 more convicts would follow, and the Western Australian population at the end of the convict era (1870) had reached 25,000 in all, still not large, but large enough to ensure the prosperity and future of the colony.

The convict years were bitter ones for Western Australia. One person had written:

'The Convicts are coming — what capital sport,  
The road to the gallows made easy and short,  
And long will the Swanites remember the day,  
When the convicts were sent to their shores by Earl Grey'.

The poet was right. Western Australians have tried to forget about convictism, for it was thought to be a dreadful blot on the Colony's history. But the convict legacy is everywhere. Today a walk down the city's premier street, Saint George's Terrace, shows the remains of the barracks of the convict guard; a school (the Cloisters) built by convict workmen; and Government House (1864). And from the Terrace one can see the old convict-built Town Hall, the tower of which is characterised by bizarre convict-derived markings. Across the city is the beautiful Western Australian Museum, part of which was a gaol in convict times, indeed the hanging place for several of the more desperate convict bushrangers. The free people of Perth and Fremantle learnt to live with the brutalising presence of the male convicts (no female convicts were sent to Western Australia), though many carried guns by day and few ventured far afield at night: 'the unfortunate constable was found lying speechless and senseless . . . a long jagged wound on the crown of his head'; and women feared for themselves and their children.

One of the most dramatic events of these years was the escape of some Irish Fenian convicts in an American whaling boat, the *Catalpa*, in April 1876. Americans had killed whales off the Western Australian coast for fifty years and were well known visitors to our ports. They were incredible and audacious seamen. The *Catalpa* expedition was organised from Boston. The boat withstood a charge from the British naval vessel at Fremantle, the *Georgette*, and made off with the escapees. Earlier, another Irishman, John Boyle O'Reilly, had escaped to America where he became editor of the *Boston Pilot* and a poet and novelist. Within a month of the *Catalpa* escape a song was written about it, which was also sung in America. Part of it goes:

'A noble whaleship and commander,  
Called the Catalpa they say,  
Sailed out to Western Australia,  
And took six poor fenians away.  
  
Come all you screw warders and jailers,  
Remember Perth Regatta Day,  
Take care of the rest of your fenians,  
Or the Yankees will steal them away'.

By one of history's ironies Perth was proclaimed a City by Queen Victoria at the height of convictism (1856). Western Australia was now a well-established part, even if not yet a jewel, in the British Empire. From the 1860s a pastoral industry of significant proportions had developed in the north-west, along the De Grey, Ashburton and Fortescue Rivers, which a hundred years later would become famous as the Pilbara iron ore country. Local men and capital had been joined by eastern colonial and British investors. In the south-west the old families held sway in agricultural and political matters, but there was also now a flourishing timber industry; the jarrah wood was becoming so famous for its tough qualities that it was used in India and in London for road and bridge construction. Western Australia was still under Imperial tutelage, with a small Legislative Council. Government House was the centre-piece of social life:

'a bow from his Excellency, or a word from the Governor's  
Lady, stamps the happy recipient as one of the elite'.

Yachting on the Swan River had become a popular sport for the more prosperous people of Perth.

In the 1850s, when Victoria and New South Wales had goldrushes, some Western Australians had written that 'The discovery of gold would prove the greatest evil that could possibly befall us for it would excite passions and habits of excess', as had happened in California. But another wrote in the late 1870s 'Gold, if really found in paying quantities, would be a panacea for all evils in the colony'. And gold was found, in huge quantities from the mid 1880s through to the present day. So the prophecies of the ancients about Ophir and the fabulous wealth of a country in the '5th Climate'

did come to pass, if too late for many of the struggling pioneers. Between 1890, when Western Australia became self-governing, as the Americans had done 115 years before, and 1912 the population of Western Australia increased from about 48,000 to 305,000. Perth was no longer the smallest Australian capital city. The great P & O ships, which since the 1850s had called at the southern port of Albany, now called at Fremantle which had become the first port in Australia for all international maritime activity. It was to remain so for most of the twentieth century.

Gold had brought thousands of people from all over the world. Americans were present aplenty, including a young mining engineer called Herbert Hoover, later to be President of the United States of America. American sportsmen also came West, including boxing troupes. In this period of unprecedented growth, the faces of the cities of Fremantle and Perth were transformed. Old cottages, warehouses, hotels and stores were pulled down and replaced with larger, more elaborate structures, which still give Fremantle its character today, although in Perth the 1890s and 1900s buildings are dwarfed by the sky-scrapers of the 1960s and 1970s, the years of the second great mineral boom.

These years before the Great War of 1914-18 were frenzied ones for Western Australia. One observer wrote 'the air in Perth is full of the yellow fever. Its germs, in the shape of talk of reefs, leases, claims, yields, trial crushings, syndicates, stocks and Company flotations, are as thick as a London fog ... every businessman in the city is bound, body and soul, to the new industry'. Entrepreneurs abounded. The greatest was William G. Brookman. Bankrupt in South Australia in 1892 he was a prosperous goldmine owner in Western Australia by 1895. His Great Boulder Mine was fabulously rich. By the late 1890s Brookman owned huge slabs of Perth real estate, a vast house called 'Great Boulder', a country and seaside estates, even a motor car. He also had a splendid yacht for sailing on the beautiful Swan River and across to Rottnest. In 1900 he became Mayor of the City of Perth, having declared that he would 'make this city a fairer Athens and a freer Rome'. Alas, by 1904 he was bankrupt again. But in his time he had established over fifty mines, with an investment value of £35 million. Brookman was the prince of entrepreneurs, but there were plenty of knights and barons.

Among them were members of the old families, including John and Alexander Forrest, perhaps the most famous sons of Western Australia. As young men the Forrests were intrepid explorers of the Westralian outback and the Kimberley region, now known for its diamonds, but then to become the centre of a great cattle industry. Later, both men were tough entrepreneurs, with pastoral land in the north, urban real estate and considerable political power. John became Premier of Western Australia in 1890 and resigned only in 1901 when he was elected to the new Federal Parliament (Western Australia joined the other colonies in a Federation in 1901). Alexander was Mayor of Perth several times. There are statues of both men in Perth and in Kings Park overlooking the city. The Forrests and other pioneer families did not simply survive the goldrushes; rather they directed and contained the anarchic energy of the period. Western Australia experienced great changes in the mid twentieth century, but the Forrests continued to embody 'the spirit of place' — that men of energy and vision and patriotism would be rewarded in Western Australia.

During the Great War in Europe between 1914 and 1918 Western Australian soldiers, sailors, airmen and nurses served with gallantry in all theatres of war. So enthusiastically did the families of the State commit their people to the war effort, that the Western Australian quota was exceeded by nearly four times. One local poet, 'Dryblower' Murphy, wrote:

'And into that mounded country  
Where the work of war was done,  
Where the blood-red trenches blur and blend,  
With no wav'ring, weak'ning,  
    sigh I send,  
    My son,  
    My son'.

Wherever they served, in the dry hills of Gallipoli or in the mud of France, the Westralian troops served with great distinction. They were so brave that they were often used as shock-troops — and they suffered the highest casualty rate of all the soldiers of the Empire. Many a grieving Perth mother cradled a damaged watch, a few coins, and maybe a photo of a son who had died 'For Freedom and Honour'. In time the people of Perth would erect in their honour a monument on the most prominent point of Kings Park, overlooking the city. The names of still others would be recorded on plaques pinned to the gum trees planted along the drives of the beautiful park, something which never fails to move visitors who see them. 'The Park' became a sacred place as well as a place of visual beauty and enjoyment.

Between 1920 and 1957 the population of Western Australia doubled to reach 695,000. In that time vast tracts of farming land north-east, east and south of Perth were opened up. Indeed it was claimed in the mid 1950s that Eric Smart owned the largest wheat farm in the world. The value of wheat exported increased from £2½ million in 1920 to £30 million by 1957. And the value of wool exports grew from £4 million in 1920 to £43¼ million in 1957. Gold exports fluctuated wildly, but in 1957 reached £12 million, with a (till then) all-time peak of £39 million in 1961. These growth figures disguise the effect of the Great Depression of the 1930s, which saw exports plummet, building activity at a standstill and nearly one-third of the workforce unemployed. Even today there are families in Western Australia still scarred by the depression years. Many men who had taken up farming under soldier-settlement schemes had to walk off their hard-won properties in the 1930s. The land, as always in Western Australian history, was less Eden-like than envisaged; and it was always hard to make a living from it. There was the constant menace of droughts, floods and fire. The Australian environment bred a tough countryman.

The Second World War (1939-45) also took its toll. This time Fremantle served as a submarine and refitting base for the American Navy and American servicemen enjoyed the hospitality of the Westralian people as they were to do again in the 1980s. After the War, Western Australia received many European refugees who contributed greatly to the life of the community. The 1950s are sometimes described as the 'age of affluence', but as ever there were those families for whom 'watching the pennies' was a way of life.

In 1962 Perth was host to the Empire Games. In some ways the Games were an affirmation of the old Imperial connection, as were the Royal visits and the holiday on the Queen's birthday. But the Empire Games had a greater significance than this. Perth had won the right to hold the Games and Western Australia had become a jewel in the British Empire. And her athletes, like the sprinter-hurdler Shirley Strickland and the great miler, Herb Elliott, were of world renown. So too were her yachtsmen, for Rolly Tasker had won a silver medal in the Olympic Games in 1956.

All this seemed to presage the massive industrial and commercial boom which occurred in Western Australia from the mid 1960s. The fabulous nickel and iron ore discoveries sent share markets soaring. Investment in mineral development also led to the rebuilding of central Perth and, as population increased rapidly, to a surge of real estate development in the city and the new suburbs. By the late 1970s, the population exceeded one million people and by 1983 Western Australia had overhauled its old rival South Australia in population. The vigour and purpose of Western Australia in these years was embodied in the person of Sir Charles Court, Premier from 1974 to 1982, and before that Minister for Industrial Development in the Brand Government. In 1979 Court presided over the 150th anniversary celebrations of the foundation of the State of Western Australia. He, like the Forrests and Stirling before him, embodied 'the spirit of place'. He began his career as an accountant. Other powerful men who emerged in this period like Lang Hancock, Garrick Agnew and Robert Holmes a Court; and many 'lesser millionaires', had equally spectacular careers. But Alan Bond, the America's Cup hero of 1983, had the most spectacular career of all. An English migrant signwriter in Fremantle in the late 1950s, to multi-millionaire by the 1970s, he seemed to be an affirmation of the ancient belief that in the '5th Climate' anything was possible. And if anyone any longer doubted that Western Australia was indeed an Ophir — what with gold, iron ore, nickel, uranium and diamonds — they held their peace.

In the 1960s and 1970s the Americans came to Western Australia to invest in new farming lands, to develop the mineral industries, and to invest in city real estate. They came too in numbers to the Stirling Naval Base on 'rest and recreation', sometimes in nuclear-powered vessels. And they will return in the mid 1980s in sailing vessels to attempt to wrest from the West Australians the cup they like to call The America's Cup. And with the Americans coming, Alan Bond and his tough entrepreneur and sailing colleagues will have to draw on the reserves of Western Australian pioneering experience or else in the words of the *Catalpa* song of 1876:

'Now all the Perth boats were a-racing,  
Making hard tacks for the spot,  
But the Yankee tacked into Fremantle,  
And took the best prize of the lot'.

## Chapter 2

# PHYSICAL FEATURES AND GEOLOGY

### AREA AND COASTLINE OF AUSTRALIA

The area of the States and Territories and the length of the coastline of Australia were determined in 1973 by the Division of National Mapping of the Department of National Resources by manually digitising these features from the 1 : 250,000 map series of Australia. Consequently, only features of measurable size at this scale were considered. About 60,000 points were digitised at an approximate spacing of 0.5 kilometres and these points were joined by chords as the basis for calculation of areas and coastline lengths by computer.

The approximate high water mark coastline was digitised and included all bays, ports and estuaries which are open to the sea. In these cases, the shoreline was assumed to be where the seaward boundary of the title of ownership would be. Rivers were considered along similar lines but the decisions were rather more subjective, the digitised line being across the river where it appeared to take its true form. In mangroves, the shoreline was assumed to be on the landward side.

Areas and lengths of coastline determined by the foregoing methods are given in the following table. The Division of National Mapping is also progressively revising areas of local government authorities but has not yet completed this work. For this reason, areas given for statistical divisions do not add to the total area shown for the State.

State or Territory	Present area	Percentage of total area	Length of coastline (a)
	sq km		kilometres
New South Wales	801,600	10.43	1,900
Victoria	227,600	2.96	1,800
Queensland	1,727,200	22.48	7,400
South Australia	984,000	12.81	3,700
Western Australia	2,525,500	32.87	12,500
Tasmania	67,800	0.88	3,200
Northern Territory	1,346,200	17.52	6,200
Australian Capital Territory	2,400	0.03	(b)
AUSTRALIA	7,682,300	100.00	36,800

(a) These measurements are broadly on a 'direct' basis but, even so, they must be regarded as approximate only. (b) Australian Capital Territory, Jervis Bay area included in New South Wales.

## Physical Features and Geology

*Contributed by*

*Rex T. Prider, B.Sc., Ph.D., F.G.S.*

*(Emeritus Professor of Geology, University of Western Australia)*

The development of any country depends on its natural resources and the industry of its people, and there can be few more important investigations for any country than those dealing with the productive capacity of its territory. Natural resources — be they power, mineral, or soil resources — are dependent entirely on the climate, physical features and geology. Looking at the pattern of development of Western Australia we see that for nearly seventy years after the foundation of the Swan River Colony in 1829 agricultural production barely kept pace with the requirements of the small population. The gold discoveries in the 1890s, however, led to a period of rapid expansion

and Western Australia became one of the major gold-producing areas of the world, and with this increase in mining production there was a corresponding expansion of the agricultural and pastoral industries. We are now experiencing an expansion of our secondary industries. Today, with the realisation of the base metal mineral potential of Western Australia — the proven deposits of iron ore, nickel, bauxite and black sands — and the exploitation of the oil and natural gas energy resources, the development of our mining-based industries continues to increase. Mineral discoveries of the past decade in Western Australia stimulated the mining industry not only in Western Australia but throughout the whole of Australia. The Western Australian mineral discoveries of the late 1960s were accompanied by a corresponding increase in our secondary industries and the opening up of formerly sparsely populated areas, particularly in the Pilbara. Western Australia has, to date, been deficient in power resources, but this deficiency has been remedied by the development of large natural gas reserves discovered near the southern margin of the North-West Shelf. In each of these phases of development we can see the dominating influence of the geological environment so that geology, from being relatively unknown and the Cinderella of the sciences, has now become known to all.

The nature of the rocks underlying any region is one of the major factors controlling topography, soil, and mineral resources. The latter is self-evident. The soil, on which we are so dependent, was formed by the weathering of the underlying rocks and many of its characters are due to the parent rock material. Much research has been carried out into trace element deficiencies in soils and the application of the new knowledge has produced astounding results as far as land utilisation is concerned. At first it would seem fantastic to think of the underlying rocks being in any way responsible for malnutrition of stock, but when it is demonstrated that the malnutrition is due to the lack of some minor element in the fodder which is due to its deficiency in the soil, a deficiency which, in its turn, is due to the absence or relative absence of such elements from the parent rocks from which the soil was derived, the significance of the geological environment becomes evident. Topography which is important in connection with land utilisation, water conservation, power (hydro-electric) resources, and in affecting climate, soil erosion, coastal erosion, transport routes, harbours, and so on is also dependent to a great extent on the nature and structure of the underlying rocks.

It is appropriate therefore that we should consider here the physical features and geology of Western Australia since they, together with the climate, are the primary controls of our soil, mineral, water and power resources, on which our existence and future development are entirely dependent.

### PHYSICAL FEATURES

In the broadest way this State can be divided into two physical regions: (i) a tableland (the *Great Plateau*) in various stages of dissection occupying the whole of the interior of the State; (ii) a low-lying narrow strip (the *Coastal Plains*) running almost continuously along the coast from near Albany to Broome. A third physical region, the *Scarplands*, separating the Coastal Plains from the Great Plateau, may be distinguished. This, although only a narrow belt, is a significant one in the southern part of the State because of its importance in connection with the water conservation schemes on which the metropolitan area, the mining fields in the vicinity of Kalgoorlie, the intervening agricultural and pastoral districts, the irrigation areas on the coastal plains south of Perth, and the wheat belt along the Great Southern Railway, are largely dependent.

#### The Great Plateau

The Great Plateau which occupies more than 90 per cent of the area of the State varies considerably in elevation. In its highest parts (in the north-west) it attains a height of approximately 1,200 metres above sea-level. The greater part is, however, below the 600-metre contour and its average elevation is of the order of 300 to 450 metres above sea-level. Although there is this considerable variation in level the changes are so gradual that the plateau character of the country is not obscured and for the most part it may be regarded as having a vast, gently undulating surface. Occasional hills (monadnocks, which are remnants of a previous cycle of erosion) rise above the general surface of the plateau.

The Great Plateau may be conveniently subdivided into an area of exterior drainage (where there are definite rivers which flow to the sea), an area of interior drainage (where such water as flows passes into inland basins), and two areas of no surface drainage but which, if they had drainage, would belong to the exterior drainage system. The area of exterior drainage can be marked out by connecting the source of the streams which flow to the sea and if this is done it will be seen that the width of the exterior drainage belt varies considerably. Thus in the Kimberley and North-West Divisions some of the rivers are hundreds of kilometres long, but in the south-west part of the State many of them are comparatively short. The areas of no surface drainage are in the north of the North-West Division along the Eighty Mile Beach from the mouth of the De Grey River to the north of Broome, and on the Nullarbor Plain in the south-eastern corner of the State. The remainder of the country forms the interior drainage area.

In the area of exterior drainage the dominant feature of the extreme south-west and the northern part of the plateau is a reticulate pattern of rather deeply-incised watercourses. In the southern part of the State these deeply-incised watercourses where they pass from the plateau to the coastal plains are of great significance (as has already been mentioned) in connection with water supply schemes. Elsewhere in the State the marginal portion of the Plateau is drained by rivers that flow to the sea only at times of exceptional rainfall and, speaking in the most general way, have courses at right angles to the coast.

The area of interior drainage is arid and practically riverless. Small creeks run from the higher parts of the country but they either disappear on the extensive flats or reach the shallow basins which are termed salt or 'dry' lakes, the term 'dry' being used since these so-called lakes are free from water except after fairly heavy or long-continued rain. These 'lakes' are generally elongated, narrow, and often winding salt-encrusted flats arranged in long, more or less connected streams. After heavy rain they are covered with a thin layer of water and, after unusually heavy rain, water has been known to flow southwards from one to another of the 'lakes' of a string, except towards the western margin of the plateau where the drainage is to the west. It is evident that these elongated 'lakes' are the remnants of an old river system developed during a more humid period. The salt lakes are of some economic significance since, on the evaporation of the water, common salt and other substances such as gypsum have been deposited on the floor of the lake. The gypsum, which crystallises earlier than the common salt, is generally blown from the damp surface of the dried-up lake and deposited as dunes of 'seed gypsum' on the leeward (eastern) side of the lake. These dunes are utilised, for example at Lake Seabrook north of Yellowdine, as a source of gypsum for plasters. Common salt, which separates later, forms a crust on the floor of the lake when it has been completely dried up and such salt deposits have been exploited, for example at Lake Lefroy near Widgiemooltha. In a few of the Western Australian salt lakes, such as Lake Champion, significant deposits of alunitic clay (a potential source of potash) have been discovered. More important potash deposits occur in some coastal lakes, such as Lake MacLeod, north of Carnarvon.

Over a large portion of the interior drainage part of the Great Plateau there are extensive sand-plain soils overlying a hard laterite ('ironstone') layer, which is of the order of up to four and a half metres in thickness, below which lies an intensely weathered zone from which most of the nutrient elements so important for plant growth have been leached. These more recent geological formations will be discussed in the section of this Chapter dealing with geology, but we may note here the significance of this lateritic profile (sandy soils near the surface, 'ironstone' about a metre below, and completely kaolinised rocks still deeper) so far as soil fertility is concerned. This lateritic profile is the result of long-continued weathering processes which have resulted in almost complete leaching of the valuable nutrients and as a result soils developed in any part of this profile are generally very poor in character. It is only where erosion has cut through the lateritic profile and still younger soils have been formed by weathering of the underlying rocks that the better soils are found. Recent studies of trace element deficiencies indicate, however, that much can be done with these 'light' soils by the addition of small quantities of suitable trace elements such as copper and molybdenum.

The areas of no surface drainage include the Eucla Division and portions of the Eastern Division of the State. This area is occupied largely by flat-bedded, nearly horizontal limestones of the Nullarbor Plain and the drainage here is sub-surface in character by subterranean streams through caverns in the limestone. The Nullarbor Plain is an extensive monotonously level plain standing about 180 metres above sea-level. The Western Australian part of the Nullarbor Plain is bordered to the south by a narrow coastal plain but further east, at the head of the Great Australian Bight, in South Australia, this coastal plain is absent and the southern edge of the Plain is truncated by cliffs which rise almost sheer for sixty to 120 metres above sea-level.

The hills of the Great Plateau are of two kinds, ridged and table-topped. In the southern half of the State the ridged hills, a few of which rise as much as 450 metres above their surroundings, are generally elongated in a NNW direction, reflecting in their trend the structure of the underlying rocks. The table-topped hills are seldom more than sixty metres above the general level. They are capped with a sub-horizontal layer of laterite ('ironstone') and bounded by low cliffs, in many places undercut, which are known in Western Australia as 'breakaways'. The table-topped hills are relics of erosion of a former laterite-covered peneplain (the *Darling Peneplain*) which was uplifted in Pliocene times to form the Darling Plateau and has subsequently been subjected to erosion under semi-arid conditions. The ridged hills on the other hand are elongated monadnocks which, being cored by resistant rocks such as jasper bars, withstood erosion and so rise above the general level of the remnants of the laterite-covered Darling Plateau.

The Great Plateau slopes down very gradually to the south and west. The downward slope to the south is interrupted by a narrow broken chain of rugged hills, the Stirling and Mount Barren Ranges which rise to heights of from 300 to 1,100 metres above sea-level. The western margin of the Plateau is, in the south, formed by the 'Darling Range' which, being merely the dissected margin of the Plateau, is much better called the *Darling Scarp*. This Darling Scarp is clearly defined between latitudes 31° 30' S and 33° 30' S, *i.e.* between Moora and Donnybrook, but it is difficult to recognise farther north or south. In the Kimberley Division the mountain ranges are the relics of erosion between the deeply-incised rivers and in this region the highlands of the Plateau terminate abruptly along a steep, deeply-indented coastline.

### The Coastal Plains

Bordering the Great Plateau are the Coastal Plains which vary in width. The *Swan Coastal Plain* which extends from the neighbourhood of Perth to near Busselton averages about twenty-four kilometres in width and is divisible into the following belts: a narrow band of moving sand dunes along the coast; a zone, averaging five or six kilometres wide, of sandy limestone which rises in places to heights of thirty to sixty metres above sea-level; a zone five or six kilometres wide of loose sand fixed by vegetation; and, abutting against the Scarp which forms the western margin of the Plateau, a zone of clayey soils of about the same width. A strip of low plain extends along the coast at intervals as far north as King Sound and coastal plains of some width occur near Port Hedland and Exmouth Gulf. A narrow plain fronts the cliffs of the Great Australian Bight for some distance and also occurs in other places along the south coast.

The coastline of Western Australia, some 12,500 kilometres in length, is broken by capes between Wyndham and Broome, between Port Hedland and Shark Bay, and between Cape Naturaliste and Israelite Bay. The intervening parts are comparatively featureless.

It has only been possible here to briefly outline the principal physical features of Western Australia and for a fuller description of the physiography of this State the reader should consult J. T. Jutson's 'Physiography (Geomorphology) of Western Australia' (*Geol. Surv. West. Aust. Bull.* 95) and Gentilli's 'Western Landscapes' (*Univ. W. Aust. Press*, Sesquicentenary Series).

### GEOLOGY

About two-thirds of Western Australia is occupied by the ancient Australian Precambrian Shield which is composed of a complex of igneous, metamorphic and sedimentary rocks formed more than 600 million years ago. Most of our mineral deposits of economic importance, except diamonds,

coal, oil, natural gas, water and superficial deposits such as lateritic iron ore and bauxite deposits and black sand and other alluvial accumulations, occur in these Precambrian rocks. The remainder of the State is occupied by sedimentary basins in which Palaeozoic and later sediments are developed. It is in these younger sedimentary basins that artesian water, coal, oil and natural gas are likely to occur. Finally there are still younger superficial deposits—laterites, salt-lake deposits, shallow groundwater, and soils on which much of the economy of this country depends. It will be convenient therefore, in outlining the geology of the State, to consider it under the three main headings:

- (a) The Precambrian basement;
- (b) The sedimentary basins;
- (c) The superficial deposits;

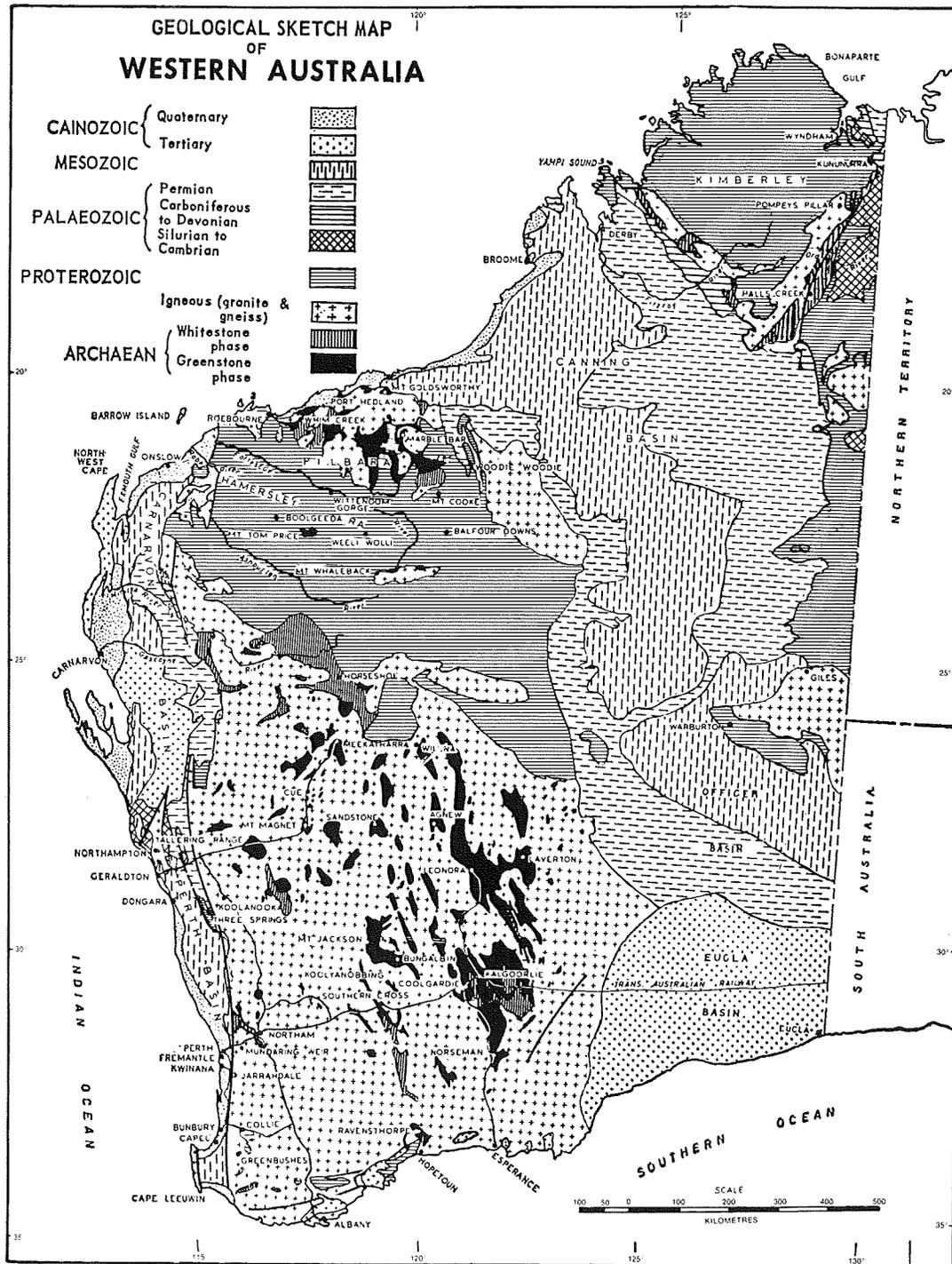
The distribution of the solid rocks (omitting superficial deposits) is shown in the following map.

### **The Precambrian Basement**

This includes the Archaean and Proterozoic rocks. The Archaean is a complex of crystalline igneous and metamorphic rocks, dominantly granites and gneisses with minor amounts of schistose metamorphosed acid and basic volcanics and sedimentary formations. In places, particularly in the North-West and Kimberley Divisions, this Archaean complex is overlain unconformably by sedimentary and volcanic rocks of Proterozoic age which generally do not exhibit the extensive metamorphism so characteristic of the older Archaean complex. The time-boundary between the younger Precambrian (Proterozoic) and older Precambrian (Archaean) is approximately 2,200 million years ago. Within the different areas (the Yilgarn, Pilbara and Kimberley Blocks) occupied by the Precambrian rocks the same generalised sequence can be distinguished.

In the Kimberley the oldest rocks are metamorphosed igneous and sedimentary rocks intruded by granite and carrying in places auriferous and base metal ore deposits, and these are overlain by un-metamorphosed sediments with basic igneous intrusives. The Precambrian age of all these rocks is evidenced by the fact that in the east Kimberley they are overlain by sedimentary rocks containing fossils of Cambrian age. This is the only area in Western Australia where the Precambrian age of the rocks of this crystalline complex can definitely be proved on stratigraphical evidence alone. In the southern part of the State we find a similar sequence of crystalline schists with intrusive granites and by lithological correlation (which is not a very sound method) we assume that they are Precambrian although they cannot actually be traced through from the Kimberley. We do know that in the Carnarvon Basin these gneisses, schists and granites are older than the Devonian, which unconformably overlies them, and in the Perth Basin they are older than the Permian. The Precambrian age of these rocks has been confirmed by actual age determinations based on the decay of radioactive elements which occur in them. This work indicates that the bulk of the massive granitic intrusions of the southern part of the State and in the Pilbara crystallised from a molten state some 2,700 million years ago. Some, however, such as those in the vicinity of Albany and along the south coast, are much younger, being emplaced approximately 1,100 million years ago.

The Precambrian sequence in the North-West appears to be the most complete that is present in Western Australia. This region consists of the Pilbara Block to the north and the Median Belt to the south, separating the Pilbara Block from the Yilgarn Block. The Pilbara Block consists mainly of Archaean igneous and metamorphic rocks with small areas of unconformably overlying Proterozoic sedimentary rocks. The Median Belt on the other hand is made up mainly of Proterozoic sedimentary rocks, with a few comparatively small inliers ('islands') of Archaean rocks. This Median Belt consists, structurally, of two large Lower Proterozoic sedimentary basins: the Hamersley Basin overlapping the Pilbara Block to the north and the Nabberu Basin overlapping the Yilgarn Block to the south. The central part of this Median Belt is occupied by Middle to Upper Proterozoic sediments, which overlie the Lower Proterozoic sedimentary rocks of the Hamersley Basin to the north and the Nabberu Basin to the south.



**GEOLOGICAL MAP OF WESTERN AUSTRALIA**  
(from Clarke, Prider and Teichert, 'Elements of Geology for Western Australian Students', by courtesy of University of Western Australia Press)

The Precambrian sequence in the Pilbara Block and Median Belt, from oldest to youngest, is as follows.

The *Warrawoona Group*, which consists mainly of greenstones and green schists which, prior to intense folding and metamorphism after their deposition, were submarine basaltic lavas and tuffs extruded between 3,300 and 3,500 million years ago, with thin interbedded chemically deposited sedimentary rocks (chert, jaspilite and banded iron formations). Conformably overlying the basaltic volcanics is a sedimentary succession (the *Gorge Creek Group*) of banded iron formation and clastic sediments (sandstone, shale and conglomerate). The banded iron formation of this group is the parent material of important iron ore deposits such as those of Mount Goldsworthy. Clastic sedimentary rocks unconformably overlying the Warrawoona volcanics in the eastern Pilbara form the *Mosquito Creek Beds*. These are thought to probably correlate with the Gorge Creek Group further west. The sedimentary assemblage of the Gorge Creek Group is unconformably overlain by acid volcanics (part of the *Whim Creek Group*) which, at Whim Creek, are the host rocks of the copper-lead-zinc deposits. All of these rocks have been intruded by granitic igneous rocks, the older gneissic granitic rocks being formed about 3,100 million years ago, and the younger massive granites approximately 2,700 million years ago. The older volcanic and sedimentary successions carry auriferous ore-bodies, possibly genetically related to the younger intrusive granites. End-stage products of these younger granites are the very coarse-grained pegmatites which are important carriers of tantalum (in tantalite), beryllium (in beryl), lithium (in spodumene and lepidolite), and tin (in cassiterite). All of these rocks in the North-West — the Warrawoona and Mosquito Creek Successions and the granites intrusive into them — are therefore of Archaean age and have been called the *Pilbara System*. These Archaean rocks have been intruded by north-south trending basic dykes emplaced approximately 2,300 million years ago. These dykes do not penetrate the overlying Lower Proterozoic sediments, but may be feeders of some of the basic volcanics of the lower part of the Lower Proterozoic sequence. Still younger sedimentary rocks such as conglomerates, sandstones, shales and banded iron formations with interbedded basic igneous rocks, were deposited unconformably on the highly-folded, granite-intruded Pilbara System. This thick succession consists of a number of distinct groups. The three lower groups (the *Fortescue*, *Hamersley* and *Wyloo Groups*) are of Lower Proterozoic age as the youngest (the Wyloo Group) is intruded by granite aged approximately 1,700 million years. The two upper groups (the *Breshnahan* and *Bangemall Groups*) are of Middle and Upper Proterozoic age, respectively. Of these Proterozoic rocks the Hamersley Group is most important economically since most of the iron-ore deposits of the Hamersley and Ophthalmia Ranges such as those of Mount Tom Price, Mount Newman and Paraburdoo occur within, or have been derived from, the thick jaspilites (banded iron formations) within this group. Except in occasional narrow belts marginal to the Archaean blocks, the Proterozoic rocks have not suffered the intense folding that affected the older rocks and consequently they are generally flat-dipping to horizontally bedded un-metamorphosed sediments. Such sediments cover very extensive areas in the North-West (see Geological Map of Western Australia on previous page) and they are similar in many respects to the flat-dipping Proterozoic sediments which cover the plateau country of the north Kimberley.

Coming to the southern half of the State we find a similar sequence to that in the North-West. In the part of the Precambrian Shield extending south of latitude 26° S (the Yilgarn Block) the oldest rocks that are recognised are the greenstones of the various gold-mining fields which occur in comparatively narrow belts elongated in a general NNW direction (see following map). These greenstones are, for the most part, metamorphosed basaltic lavas extruded about 3,000 million years ago (3,000 million years in the Murchison and Southern Cross provinces and 2,800 million years in the Eastern Goldfields province). They contain interbedded ultrabasic lavas and jaspilites and are overlain by metamorphosed sedimentary rocks which contain accessory zircon (with radiogenic ages approximating 3,300 million years) derived from pre-existing rocks. About 2,700 million years ago, these greenstones and metasedimentary rocks were intensely compressed into tightly closed folds with NNW-trending axes. During this period of intense earth-movement, granitic magma

concordantly intruded these older rocks or alkaline solutions permeated them, converting them into granitic gneisses which occupy most of the southern half of Western Australia. This System of rocks has been called the *Kalgoorlie-Yilgarn System*. From the mining point of view, the greenstone and metasedimentary parts of this System are most important since the auriferous ore deposits of the main mining fields are confined to it, as are the known nickel deposits. It also contains, in the jaspilites, important iron-ore deposits such as those of Koolyanobbing in the Yilgarn. Subsequently, at about 2,700 million years ago, granite magma was again intruded as in the North-West, so the Kalgoorlie-Yilgarn System in the southern half (the Yilgarn Block) of the State appears to be the equivalent of the Pilbara System of the Pilbara Block. This completes the Archaean sequence. The Proterozoic is represented by a narrow strip of slightly altered, steeply-dipping sedimentary rocks along the Darling Scarp and flat-dipping sediments on top of the older crystalline rocks of the western part of the Yilgarn Block as at Watheroo, Yandanooka and the Billeranga Hills near Morawa. Proterozoic igneous activity is represented by Early Proterozoic layered complexes and Late Proterozoic basic dykes. The former (probably comparable to the north-south suite of the Pilbara Block), aged 2,420 million years, take the form of basic-ultrabasic layered complexes, such as the large east-west dykes of the Norseman-Laverton greenstone belt which have some prospects for the occurrence of nickel and chrome deposits. The latter are dolerite dykes which intruded all of the Precambrian rocks about 550 million years ago. They occur throughout the Precambrian Shield but are most abundant near its western margin where some are quarried and crushed for road metal and concrete aggregate.

The strip of country south of, and including, the Stirling Range, and extending in an east-north-easterly direction to the Fraser Range (east of Norseman) and thence in a north-easterly direction into Central Australia, differs from the previously described Yilgarn Block. In it the regional trend is east-west compared with the north-north-westerly trend of the Yilgarn Block. It consists of a belt of crystalline schists and gneisses (exposed along the south coast) intruded by granite (as at Albany and Esperance). These crystalline rocks are very similar to the granitic gneisses of the Yilgarn Block, but the massive granites were intruded much later — approximately 1,100 million years ago, compared with the 2,700 million years age of the late-Archaean granite intrusives of the Yilgarn Block. These crystalline rocks are overlain unconformably by still younger low-grade metasedimentary phyllites and quartzites (originally mudstones and sandstones) comprising the *Stirling Range Beds*. Both the granite-intruded basement and the *Stirling Range Beds* are intruded by dolerite dykes, similar to those of the Yilgarn Block. Although the granites of this South Coast Province are much younger than those of the Yilgarn Block, it is thought that the *Stirling Range Beds* and the intrusive dolerite dykes are comparable with the Proterozoic sediments and dolerites of the Yilgarn Block.

There is a comparatively narrow strip of crystalline metamorphic rocks along the western margin of the Perth Basin and wrapping around the northern margin of the Yilgarn Block. The southern part extending from Cape Leeuwin to Cape Naturaliste is a belt about twenty kilometres wide of isoclinally folded gneisses, with a regional NW trend, which have a radiogenic age of 650 million years, while the part extending northerly from Geraldton through the Northampton Mineral Field consists of NW-striking metasedimentary granulites and gneisses containing segregation pegmatites aged about 1,000 million years and intruded by basic dykes comparable to the Late Proterozoic dykes of the main part of the Shield. Recent work by the Geological Survey of Western Australia indicates that metamorphic rocks along the northern margin of the Yilgarn Block are most probably metamorphosed Bangemall (*i.e.* Upper Proterozoic) sediments. It is evident, therefore, that the main Yilgarn Archaean Block is almost completely ringed with metamorphosed Proterozoic rocks.

Putting together the information available throughout the State, we conclude that the oldest rocks found in Western Australia belong to the older part of the Archaeozoic Era. It is a great succession of rocks, generally much metamorphosed, which is called the Kalgoorlie-Yilgarn System in the southern part of the State and the Pilbara System in the north-west region. In the early part of Kalgoorlie-Yilgarn (Pilbaran) times there was much volcanic activity which took the form of eruptions of ultrabasic, basic and intermediate lavas, tuffs, and breccias. Many of the basic lavas,

as judged from the pillow structures they contain, were submarine extrusions. These volcanic rocks were penetrated, shortly after their extrusion, by intrusions from the same magma. Similar events must be occurring now in the interior of great volcanic masses like Etna or Hawaii. In later Kalgoorlie-Yilgarn times, the dominant process was sedimentation, so that the earlier volcanic rocks, with the minor associated bands of sediment, became overlain by a great thickness of sandy and clayey sediments. These sediments must have been derived from some land mass composed of rocks of pre-Kalgoorlie-Yilgarn (pre-Pilbaran) age but this, possibly the oldest of all rock assemblages, has apparently not yet been found in Australia or indeed, in any other part of the World.

After the accumulation of these older Archaean lavas and sediments came a period of intense earth-movement during which the rocks were, in most places, tightly folded and regionally metamorphosed. The folding (about 3,200 million years ago) was accompanied by widespread granitic intrusions, some of which consolidated into primary gneisses whereas others soaked into the pre-existing rocks, penetrating them along bedding planes, joints, and other fractures, and so forming hybrid granitic gneisses by granitisation.

Where they were not affected by this First Granite Invasion, the volcanic rocks of the Kalgoorlie-Yilgarn and Pilbara Systems were regionally metamorphosed, in some places very strongly into dark-coloured schists, in others only very slightly. Similarly, the sedimentary rocks of the Kalgoorlie-Yilgarn and Pilbara Systems, where they have escaped granitisation, are in some places only slightly regionally metamorphosed slates and phyllites, in others they are highly metamorphosed and converted into various types of schist and quartzite.

All the Archaean rocks described above were invaded by the 'Younger' Granite, which, unlike the 'Older' Granite, formed well-defined intrusions many of which are stocks, though smaller offshoots from the same magma, in the form of 'porphyry dykes', occur at nearly every mining centre. These events occurred after the folding but before Proterozoic times. Any of the Archaean rocks in Western Australia may contain ore-bodies yielding gold and other minerals of economic value containing metals of economic value such as tin, tantalum and tungsten. It seems likely that many of these ore-deposits were formed at the time of the Second Granite Invasion which, from radioactive age determination studies, occurred about 2,700 million years ago. Important iron-ore deposits also occur in the Archaean rocks at many localities, for example at Mount Goldsworthy in the Pilbara, Tallering Peak in the Yalgoo Goldfield, and Koolyanobbing, Bungalbin and many other localities in the North Yilgarn. These are all sedimentary banded ironstone deposits which are interbedded with the basaltic lavas and sedimentary rocks of early Archaean age. In many places there are important manganese deposits associated with these banded iron formations. A rich nickel deposit discovered in ultrabasic Archaean rocks at Kambalda near Kalgoorlie in 1966, has now become an important source of nickel. Base metal ore deposits, such as nickel, cobalt and chromium, are generally associated with ultrabasic igneous rocks. Ultrabasic rocks are intrusive into or interbedded with the older Archaean volcanic and metasedimentary rocks of the Kalgoorlie-Yilgarn System in the country between Norseman and Laverton, and important nickel deposits have been discovered, evaluated, and are now being exploited at localities such as Kambalda, Mount Windarra near Laverton and Agnew. Between 2,300 and 2,400 million years ago basic dykes (N-S in the Pilbara Block and E-W in the Yilgarn Block) were intruded.

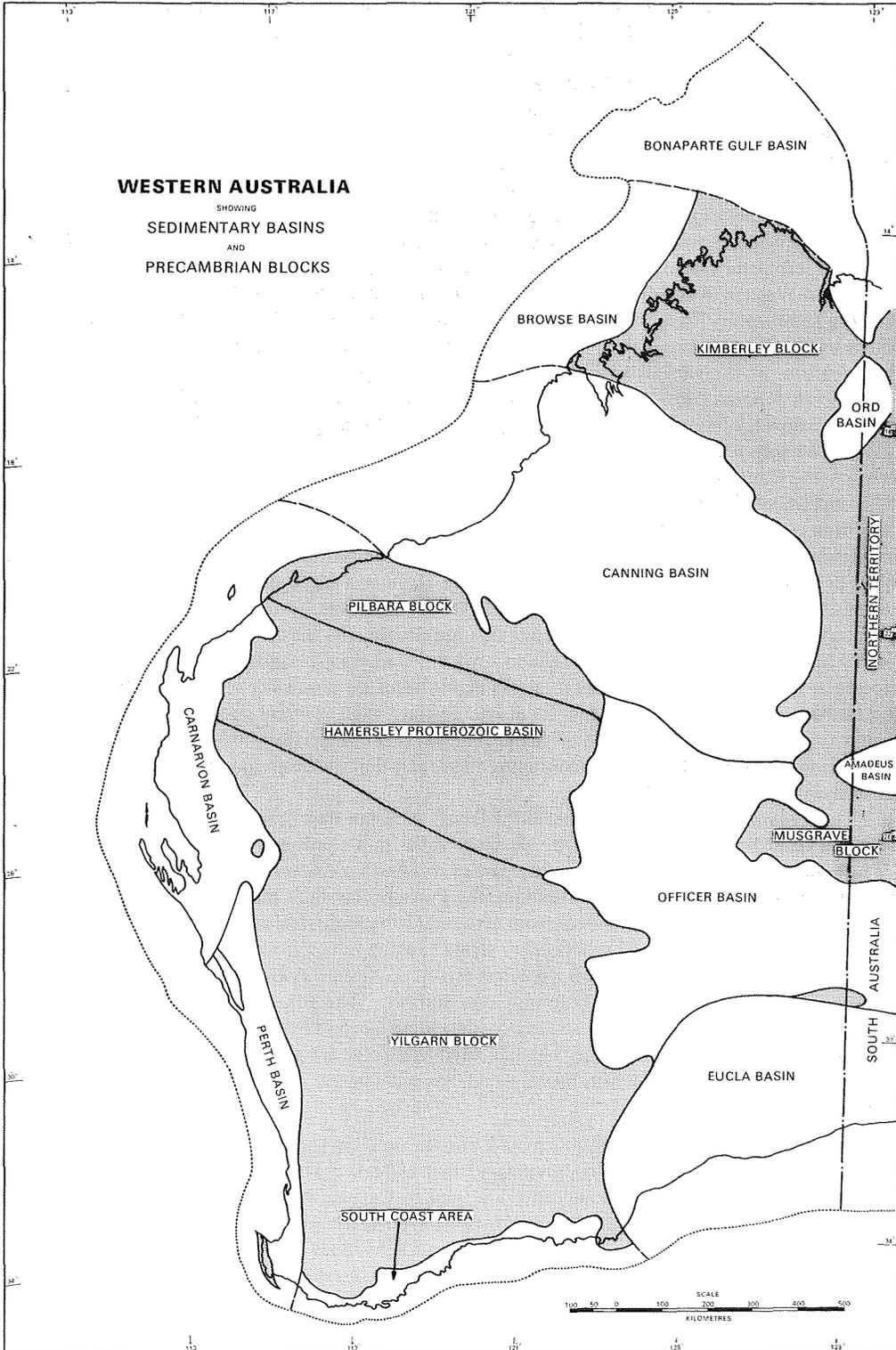
Finally, in Proterozoic times we had the deposition, under shallow-water conditions, of conglomerates, sandstones, shales and banded iron formations, another period of volcanic activity yielding basaltic lava flows and three periods of granite intrusion (at 1,700 million years ago in the Pilbara, 1,100 million years ago along the south coast and 600 million years ago in the Paterson Range, east of the Pilbara Block). Other than in a few narrow belts and a peripheral belt around the Yilgarn Block, these rocks have not suffered the intense earth movements which affected the older rocks, and so are practically un-metamorphosed. Important blue asbestos deposits in these rocks have been exploited at Wittenoom Gorge in the Hamersley Range of the West Pilbara. The asbestos deposits occur in banded ironstone formations which also contain large iron-ore deposits. The well-known iron-ore deposits of Cockatoo and Koolan Islands in Yampi Sound,

exploited from 1951 to 1983, are metasedimentary deposits of Late Proterozoic age. Although the Proterozoic rocks cover extensive areas in the northern parts of the State they have largely been stripped off the southern half by erosion. The final episode in the Precambrian history of this State was the widespread intrusion of dolerite dykes approximately 550 million years ago. Small lead and copper deposits are closely associated with these dolerite intrusions in the Northampton Mining Field, where the discovery of a lead deposit at Geraldine in 1848 led, in 1852, to the first commercial metal mining operations in Western Australia.

### The Sedimentary Basins

There are five major post-Proterozoic sedimentary basins in Western Australia and the adjoining continental shelf as shown in the following map — the *Bonaparte Gulf Basin* in the north-east part of the Kimberley Division extending into the Northern Territory, the *Canning Basin* of the west Kimberley, the *Carnarvon Basin* of the North-West, the *Perth Basin* extending from lat. 29° S to lat. 33° S and the *Eucla Basin* occupied by the Nullarbor Plain. All of these basins have offshore extensions as shown in the following map. Large areas of the Central Division are covered by sediments of the *Amadeus Basin* of Central Australia and the shallow *Officer Basin*. In the east Kimberley, the *Ord Basin*, with a sequence beginning with basaltic volcanics of Cambrian age, extends into the Northern Territory. In addition to these major basins there are smaller basins such as that at Collie and scattered areas where sediments, which are dominantly lacustrine in nature, have been deposited. In these sedimentary areas we find sediments ranging from Lower Palaeozoic to Pleistocene in age. These sediments of Palaeozoic and later age are, as a rule, less disturbed than those of Precambrian times and many are abundantly fossiliferous. Therefore, there is a sure means of correlating formations even in widely separated places, and so our knowledge of the history of these sedimentary areas is more detailed than that of the much altered, highly folded, un-fossiliferous Precambrian rocks of the basement.

Apart from the superficial deposits the economic significance of these basins is confined to their possibilities for the occurrence of artesian water, coal, oil and natural gas. A prime requisite for the occurrence of artesian and sub-artesian water is the occurrence of interbedded strata of varying porosity and permeability. These conditions are met in a number of the sedimentary basins in Western Australia and the development of the pastoral industry in the arid or semi-arid parts of these basins has been largely dependent on the occurrence of artesian water. In the metropolitan area, artesian bores are an important source of water supplies, although these deep, pressure-water bores have become, of recent years, of secondary importance to the shallow groundwater of the Wanneroo and Jandakot Mounds. Coal deposits are also confined to areas of sedimentary rocks and occur in the Permian rocks of several of the minor basins, namely the *Collie*, *Wilga* and *Irwin River Basins*, and in the Lower Jurassic sediments of the Perth Basin (at Eneabba, where a seam thirty metres thick has been found at a depth of 1,800 metres in a borehole sunk in search of oil, and is indicated in shallow shot-holes in the Hill River area). Low grade Tertiary brown coal deposits occur in the shallow sediments of the *Bremer Basin* along the south coast. Up to 1966 the coal deposits of the lacustrine Permian beds of the Collie Basin constituted the only power source in Western Australia, since oil of commercial significance had only then been proved and the gently undulating topography combined with low rainfall make the hydro-electric resources insignificant. The first occurrence of flow oil in Australia was encountered in Rough Range Bore No. 1, in the Carnarvon Basin, late in 1953, which discovery resulted in an increase in the rate of geological exploration of all the major sedimentary basins. The results of extensive geological mapping, geophysical surveys and exploratory drilling for oil have to date been rather disappointing. However, a commercial field was proved at Barrow Island off the north-west coast in 1966. Other oil occurrences have been located at various localities in the Perth Basin, e.g. in the vicinity of Dongara and this indicates the presence of suitable source material and conditions for oil formation and preservation. In 1982 flow oil was also discovered at Blina in the Canning Basin. Moreover, oil search drilling operations have located some widely-spaced important finds of natural gas at Dongara and Gingin in the Perth Basin, and North Rankin and Goodwyn in the offshore part of the northern Carnarvon Basin. These gasfields



POST-PROTEROZOIC SEDIMENTARY BASINS AND PRECAMBRIAN BLOCKS OF WESTERN AUSTRALIA  
(PRECAMBRIAN AREAS STIPPLED)

are now being exploited for the metropolitan area of Perth and the industrial areas further south. The Harriet oilfield in the offshore Carnarvon Basin near Barrow Island is currently being developed. The possibilities of locating other commercial oilfields and gasfields in the Carnarvon, Canning and Perth Basins are by no means exhausted and the search is being actively continued both on land and offshore in the continental shelf area. The gas pipe-line from the North West Shelf has been completed and gas for the Metropolitan and Kwinana areas came on stream in 1984. Further intensive construction works, both marine and land based, concerned with the exploitation of the offshore gasfields of the North West Shelf are at present under way.

A detailed description of the sedimentary formations of different ages, from the Cambrian to the Recent, in the various sedimentary basins has been set down in 'The Stratigraphy of Western Australia' (*Journal Geological Society of Australia*, volume 4, part 2, pp. 1-161, 1958) and 'The Geology of Western Australia' (*Geol. Surv. West. Aust. Mem. No. 2*, 1975). Geological mapping of these sedimentary basins by the Geological Survey Branch of the Mines Department and by petroleum exploration companies is being continued and it is proposed here merely to indicate the main features of the various basins.

The *Bonaparte Gulf Basin*, in the east Kimberley, extends into the Northern Territory and offshore below the Timor Sea. As already mentioned, this and the nearby *Ord Basin* are the only basins in Western Australia where rocks of proved Cambrian age are exposed. On Western Australian territory the Cambrian rocks extend as a narrow belt along the interstate border between lat. 16° 15' S and lat. 18° 30' S, reaching westward from the border for twenty-four to 120 kilometres. The Cambrian consists of basalts at the base of the sequence, overlain by Middle Cambrian fossiliferous limestones, shales and sandstones. There is a small development of sandstones which are considered to be of Lower Ordovician age, following which there is a big time gap and the next youngest formations are sandstones and limestones of Upper Devonian and Lower Carboniferous age. Upper Carboniferous and Lower Permian formations are absent, the next marine transgression being in the Middle Permian when a thick sequence of conglomerates, sandstones, and limestones was deposited. The only other sedimentary rocks in this basin are freshwater sediments (siltstones, marls and cherts containing freshwater fossils) of late Tertiary age. Several gas and oil discoveries have been made in the offshore part of this basin, but none is commercially viable at present. However, exploration has been sufficiently encouraging to suggest that the basin has reasonable prospects for commercial discoveries in the future.

The *Canning Basin* (formerly named the Desert Artesian Basin), in the west Kimberley, extends from the coast between Derby and the De Grey River in a south-easterly direction almost to the 128° meridian. The north-east or Fitzroy part of this basin consists of a comparatively narrow and shallow section (the Lennard Shelf) flanking the Precambrian land mass to the north, and a deep trough (the Fitzroy Trough) estimated, from aeromagnetic geophysical surveys, to contain a thickness of the order of 6,000 metres of sedimentary strata ranging in age from Ordovician to Triassic. It was in this area that bores seeking oil were first drilled in Western Australia, following the discovery in 1919 of traces of oil in a water bore on Gogo Station. The larger Canning Desert portion, the South Canning Basin, is covered by a relatively thin Mesozoic and Permian sequence, but geophysical work followed by some deep drilling has indicated that there are deep depressions in this area, the deepest of which is the Kidson Sub-basin, which has a basement approximately 6,000 metres below the surface.

The oldest Palaeozoic sediments in the Fitzroy portion of the basin are richly fossiliferous limestones of Ordovician age outcropping near Price's Creek. These are overlain by Devonian reef limestones, sandstones and conglomerates, followed by Carboniferous sandy limestones. These in turn are followed by a thick Permian sequence of sandstones (of marine glacial origin deposited from floating ice), fossiliferous calcareous shales and limestones, and Upper Permian fossiliferous ferruginous siltstones and sandstones. All of these formations dip gently in a general south-westerly direction towards the centre of the basin but these regional dips are interrupted by local folding. Shale and sandstone beds of Triassic age occur in the Fitzroy Trough section of the basin. The youngest

rocks in this area are igneous extrusive lava flows and intrusive sheets, dykes, and volcanic necks which have been found intruding all rocks of the sequence from the Precambrian granitic basement to the youngest sediments (Triassic) present. These igneous rocks, from direct geological evidence, are of post-Triassic age, and radioactive age determinations made in 1959 indicate that they were intruded 180 million years ago (*i.e.* in Jurassic times) although more recent dating studies indicate they were emplaced in Early Miocene times (approximately 20 million years ago). This is one of three areas in the whole of Western Australia where post-Cambrian igneous activity is known. It is interesting to note the occurrence of a small lead deposit in Devonian limestone at Narlarla in the Napier Range. This is the *only* primary metallic ore deposit of post-Proterozoic age known in Western Australia and it was thought earlier that it may have been genetically related to this igneous activity. However, it is now considered to have been formed by circulating brine solutions which have leached the lead from the Devonian limestone reefs and deposited it in fractures in the limestone after its formation. The igneous rocks, of very unusual chemical and mineralogical character, rich in potash and magnesia, are known as lamproites. In 1978, diamonds were found in 'kimberlitic' plugs related to these lamproites. One such pipe (AK1) in the eastern Kimberley has been proved to be sufficiently rich in diamonds to be commercial and is now being exploited. Evaluation of other diamondiferous pipes in the West Kimberley is now under way to determine their economic viability.

In the Canning Desert section of the basin the Palaeozoic rocks are not well exposed and the greater part of this portion of the basin (where not obscured by superficial unconsolidated sands) is occupied by Mesozoic sediments ranging in age from Lower Jurassic to Lower Cretaceous. The deep depressions in the floor of the South Canning Basin are filled with Palaeozoic sediments as proved by the first deep oil test well (Kidson No. 1) which was abandoned at 4,431 metres in Lower Ordovician limestone. There is no evidence in the entire basin of any marine transgression after Lower Cretaceous times.

The basin extends some 320 kilometres offshore to the coral islands of the Rowley shoals where some wells have been sunk in the search for oil. Drilling in search of oil and gas both onshore and offshore has to date proved disappointing and, with the exception of the Blina and Sundown wells, no commercial discoveries have yet been made. The Blina Oilfield, which occurs in buried Devonian reefs, commenced production in 1983. These Devonian reef complexes which outcrop in spectacular gorges along the basin's northern margin have long been the major exploratory objective in the basin. However, the discovery of oil in the Sundown area in the north-east part of the basin established the Permo-Carboniferous clastic section of the sequence as another exploration target which has been overlooked for many years.

The *Browse Basin*, a wholly offshore basin, is situated offshore from the North Kimberley Precambrian Block. It contains a thick sequence (at least 12,000 metres) of Carboniferous to Tertiary sediments. The first well drilled in this basin was in 1971, when Scott Reef No. 1 (drilled in an atoll rising from the continental slope about 400 kilometres north-west of Derby) made a major gas/condensate discovery at depths between 4,296 and 4,389 metres. Other wells, drilled to date, on the continental shelf part of the basin have been dry.

The *Carnarvon Basin* (formerly called the North-West Artesian Basin) has been the most intensively studied of the major sedimentary basins in Western Australia. It extends along the west coast from near Dampier as far south as the mouth of the Murchison River, the maximum width of the basin being 200 kilometres at the latitude of Carnarvon. In this basin the eastern portion up to eighty kilometres wide is occupied by a thick sequence of marine Palaeozoic sedimentary rocks ranging in age from Middle Devonian to upper Middle Permian, all of which have a westerly regional dip. This Palaeozoic sequence which consists of fossiliferous Devonian limestones and sandstones, Carboniferous limestones and Permian marine glacial beds, limestones, sandstones, and shales, is almost entirely marine in origin. In the Carnarvon Basin we have the only wholly marine Permian sequence in Australia, and without doubt one of the thickest marine Permian sequences in the world.

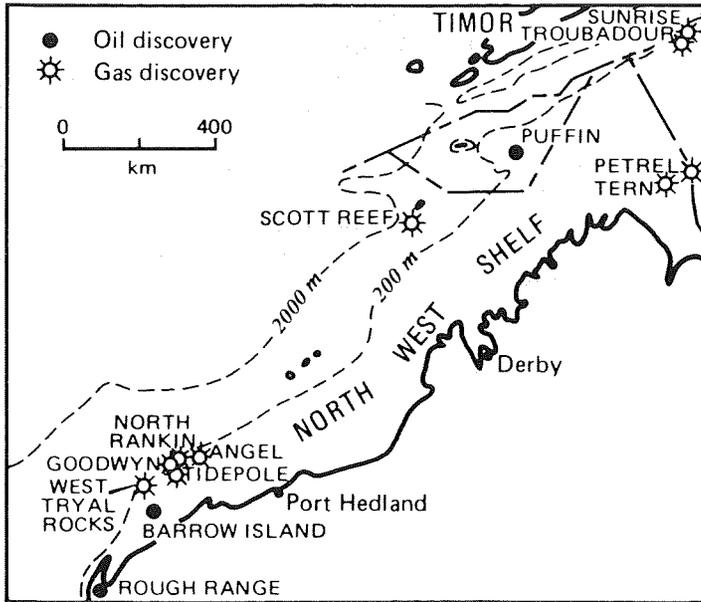
No rocks of Silurian age were known from the western half of the Australian continent until 1957 when a bore sunk by West Australian Petroleum Pty. Ltd. at Dirk Hartog Island in Shark Bay encountered limestones of Silurian age underlain by sandstones which are now correlated with the reddish sandstones which outcrop in the lower reaches of the Murchison River. The search for diamonds, first discovered in the Canning Basin, extended to the Carnarvon Basin and resulted in the initial discovery, near Wandagee, of small igneous pipes intrusive into the Palaeozoic sediments. These proved to be kimberlitic rocks of unusual character and are the only evidence of igneous activity in the Basin.

To the west the Permian rocks are unconformably overlain by Cretaceous sandstones, shales, marls and limestones attaining a total thickness of 600 metres. It is the basal formation, the *Birdrong Sandstone*, of the Cretaceous sequence that is the oil sand encountered in Rough Range Bore No. 1. Another Cretaceous formation, the *Windalia Formation*, is one of the important oil reservoirs of the Barrow Island oilfield. The Cretaceous rocks outcrop in a north-south belt averaging eighty kilometres wide between the Palaeozoic and Precambrian rocks on the east and the Tertiary limestones to the west. The only other Mesozoic formation exposed at the surface in this basin is a Jurassic sandstone eight metres thick. However, a deep well (Cape Range No. 2) drilled in search of oil at Exmouth Gulf, after passing through the base of the Cretaceous at 1,130 metres, entered the Lower Jurassic which extended to the depth of 4,624 metres at which the bore was discontinued, thus proving a thickness of at least 3,494 metres of Lower Jurassic strata in this area. It is apparent that there is a marked thickening of the Mesozoic formations from east to west in this area. The westernmost belt of the Carnarvon Basin is occupied by Tertiary strata, mainly limestones, which are well exposed in the Rough and Cape Ranges of the Exmouth Gulf area. These limestones, which range from Lower Miocene to Pliocene in age, total 365 metres in thickness and are discontinuously overlain by Pleistocene and Recent beds approximately 135 metres thick. Marine Tertiary sediments which are so well developed along the western margin of the basin extend as a thin discontinuous formation unconformably over the Permian beds of the eastern part of the basin, indicating that in Upper Eocene times the sea transgressed practically the whole of the Carnarvon Basin.

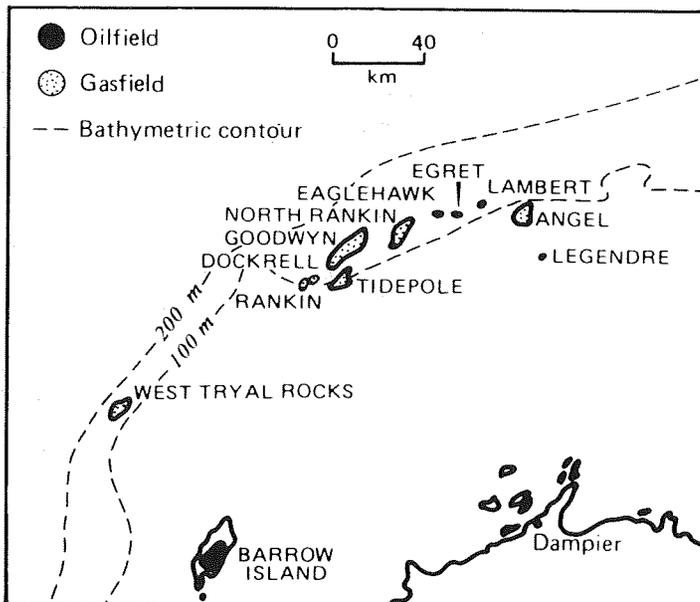
The sedimentary rocks of the Carnarvon Basin were affected by earth movements at various times. Even the youngest of the Tertiary rocks have been thrown into gentle folds which are significant so far as the search for oil is concerned because, in addition to having suitable conditions for the formation and preservation of oil, suitable structures are necessary for its concentration into local areas (oil 'pools'). So far as structure is concerned, the general picture of the Carnarvon Basin is the gentle westerly regional dip of the Palaeozoic sediments of the eastern half of the basin and the gentle dome and basin folding of the western half.

Offshore extensions of the northern part of the Carnarvon Basin have proved to be economically important, for it is here that the Barrow Island and Harriet oilfields are situated. A number of Permian to Recent epicontinental basins lie offshore between the coast and the edge of the Continental Shelf, extending north from North West Cape to the Browse Basin. It is in this area that the rich gas fields (North Rankin, Goodwyn and Angel) of the North West Shelf are situated. These major gas/condensate discoveries, shown in the accompanying sketch maps, were made in the period 1971-73. North Rankin is the largest and with estimated reserves of 242,700 million cubic metres of gas and 29 million cubic metres of condensate is the first field planned for development. Total proved and probable recoverable reserves of the four potentially economic fields are estimated at more than 410,000 million cubic metres of gas and 57 million cubic metres of condensate. Exploration interest in the Carnarvon Basin, centred on the Exmouth Plateau, west of the Rankin Platform, has, to date, proved negative. This area is a major faulted uplift, in water 800 to 2,000 metres deep, and the stratigraphy resembles that of the Rankin Platform.

The *Perth Basin* (formerly called the Coastal Plain Artesian Basin) is a narrow elongated basin on the western border of Western Australia extending from Geraldton in the north to Cape Leeuwin in the south. At Geraldton it is about fifty kilometres wide and is flanked both to the west and east by Precambrian crystalline rocks (mainly gneisses). The maximum width of the basin is



Oil and gas discoveries and bathymetry of the North-West Shelf (above) and the offshore northern Carnarvon Basin (below) (from Playford, in Prider 1979, by courtesy University of Western Australia Press).



approximately eighty kilometres at Watheroo and it narrows again to the south being approximately fifty kilometres wide in the sunland between Busselton and Augusta. At this southern end it is again flanked both to the east and west by Precambrian rocks. The surface of the basin is mostly covered by Recent sands but occasional outcrops of rocks as old as the Permian occur in places. The only evidence available regarding the structure, thickness and age of the sediments in the basin is that provided by geophysical surveys, some deep bores sunk in the search for oil and a number of water bores up to 730 metres deep in the metropolitan area. Gravity surveys indicate that there is a very considerable thickness of sediments, perhaps exceeding 9,000 metres, and it is probable that in this basin we have a complete succession from the Younger Proterozoic (*Cardup Group*), which outcrops along the Darling Scarp, to the Recent sands. Other than the Proterozoic of the Darling Scarp, the oldest sediments exposed are the gently folded Permian marine sediments of the *Eradu* and *Irwin River Basins* at the north end of the main basin. The Permian sediments of the Irwin River area have a total thickness of 1,200 metres and vary from marine glacial beds at the base (as in the Carnarvon and Canning Basins) through fossiliferous marine shales and limestones to lacustrine sandy sediments with coal seams in the upper part of the sequence. Marine and continental Jurassic limestones and sandstones outcrop east of Geraldton and Jurassic beds, overlain by Cretaceous chalks and greensands, occur near Gingin and Dandaragan. In the southern part of the Perth Basin the oldest rocks exposed (if we except the Permian of the separate minor *Collie Basin* which is situated well to the east of the Darling Scarp in a glacially-gouged trough) are the Cretaceous *Donnybrook Sandstones*.

In the vicinity of Perth, artesian bores to a maximum depth of 730 metres expose a sequence varying from Jurassic sandstone at depth, through Cretaceous and Paleocene shales. The *King's Park Shale* of Paleocene (older Tertiary) age is overlain by Pleistocene aeolian sandstones of the *Coastal Limestone Formation*, the base of which is approximately thirty metres below sea-level. There is therefore a big gap in the succession here between the Paleocene and Pleistocene. Many boreholes have been sunk in the north-central part of the basin in the course of oil search operations. Boreholes near the coast (at Jurien Bay and Beagle Ridge) struck Precambrian crystalline basement rocks at comparatively shallow depths of 1,024 metres and 1,481 metres. The sediments thicken further inland, as evidenced by the increasing depth to the Precambrian basement in Cadda No. 1 (2,744 metres), Woolmulla No. 1 (2,810 metres) and Arrowsmith No. 1 (3,420 metres). Very thick sedimentary sequences have been disclosed by Eneabba Bore No. 1 (which bottomed in Lower Triassic at 4,179 metres) and Gingin No. 1 (in Lower Jurassic at 4,544 metres). Some deep wells have been drilled to the south of Perth, namely Pinjarra No. 1 which bottomed in Upper Triassic sandstone at 4,572 metres; in the far south (near the south coast), Sue No. 1 which encountered Precambrian granulites at 3,054 metres; near Perth, Cockburn No. 1 which was abandoned at 3,054 metres in Lower Jurassic sandstone; Whicher No. 1, near Busselton, which reached a depth of 4,653 metres in Permian sandstone before being abandoned; and Blackwood No. 1, abandoned at 3,334 metres in Permian sediments. The first offshore well in the Perth Basin (Quinns No. 1), spudded in on 10 October 1968 at a location approximately thirty-two kilometres north of Rottnest Island, was drilled to a depth of 2,209 metres without finding hydrocarbons. Some oil was found in a second offshore well (Gage Roads No. 1), drilled to a depth of 3,660 metres, approximately fourteen kilometres north-west of Rottnest Island.

Oil search operations in the Perth Basin have led to the discovery of significant oil and gas in the vicinity of Dongara near the northern end of the Basin and gas at Gingin, about eighty kilometres north of Perth. These discoveries, now proved as gasfields, are supplying natural gas to the metropolitan area and industrial areas south as far as Pinjarra. In late 1980 there were significant gas finds at Woodada, approximately fifty kilometres north-west of Eneabba. The other materials of economic significance in the Basin are coal, groundwater, limestone from the Pleistocene Coastal Limestone which is used as a source of lime and as building stone ('Cottesloe Stone'), and sand and clays for building materials. In addition, the Coastal Limestone contains picturesque caves of tourist attraction such as those of Yanchep, Yallingup and Margaret River.

The only evidence of igneous activity in the Basin is the Cretaceous basalt of the sunkland between Bunbury and Cape Gosselin on the south coast.

Very little is known about the structure of this basin. It is bounded to the east by a large fault or monoclinial fold. The evidence available indicates that the main structural character of the deeper part is a regional dip to the east (of 15° to 20°) traversed by north-south trending faults with down-throws to the west. There is an unconformity (Upper Jurassic to Lower Cretaceous) at a depth of approximately 600 metres above which the Cretaceous and Tertiary sediments are almost horizontal.

The *Eucla Basin* occupying the Nullarbor Plain, in the south-eastern corner of the State, is occupied at the surface by marine fossiliferous Middle Tertiary (Miocene) limestones with a marginal belt of Lower Tertiary (Eocene) limestones. The Tertiary rocks lie on sandstones and shales of probable Cretaceous age, which in turn overlie the Precambrian crystalline rocks. Little is known of the details of the stratigraphy and structure of the Eucla Basin since the beds are very flat-lying and have only been penetrated by water bores in a few places such as Madura near the coast and Loongana on the Trans-Australian Railway. The Madura bore is artesian but bores along the Trans-Australian Railway have only yielded sub-artesian water (*i.e.* the water will rise under pressure only part of the way to the surface). The oil prospects of this basin are poor because of the comparatively small thickness (600 metres) of the sediments and the absence of suitable folded structures to form oil traps.

The *Officer Basin* covers an extensive area of about 300,000 square kilometres in the Eastern Division of the State and extends into South Australia. It consists of Proterozoic sediments with a comparatively thin cover of the order of 1,000 metres of Permian glacial and Cretaceous sediments. One well drilled in this basin in 1966 entered presumed Proterozoic rocks at shallow depth and was abandoned. Since then, there has been no significant exploration and prospects for oil or gas are believed to be very low.

The south coastal area, known as the *Bremer Basin*, has a thin Tertiary sequence of about 200 metres overlying basement Precambrian gneisses and, because of the thin sedimentary sequence and limited area, petroleum prospects are considered to be very poor. There are some early Tertiary brown coal deposits in this basin which are not yet economically viable.

The *Collie Coal Basin*. Of the minor basins and isolated occurrences of post-Proterozoic sediments, Collie, since it is the only operating coalfield in Western Australia, is the only one which will be considered here. It is situated approximately 160 kilometres SSE from Perth, and has an area of about 260 square kilometres. Actually it is made up of two basins separated by a sub-surface granitic ridge. It is composed of sandstones and shales with interbedded coal seams and is surrounded by Precambrian rocks. The coal measures, of Permian age, are of the order of 600 metres in thickness of which approximately forty metres is coal. The actual contact between the Permian coal measures and the Precambrian granitic basement has nowhere been seen at the surface but has been encountered in deep drill holes in various parts of the Basin. Such drill holes reveal that Permian mudstone containing granite pebbles lies on an ice-planed surface of the Precambrian granitic rocks. This suggests that the Collie Basin, formerly considered to be a block of the Permian downfaulted into the Precambrian basement, is actually a glacially-gouged trough formed by terrestrial glaciation in the Permian and since filled with Permian lacustrine sediments. Coal occurs at three horizons and the seams, which average two metres in thickness, persist over fairly long distances. From the associated plant fossils these coal measures appear to be comparable in age with those of the upper part of the Permian sequence at the Irwin River near the northern end of the Perth Basin. There is another similar basin, containing Permian coal measures, the *Wilga Basin*, of about fifty square kilometres, approximately thirty kilometres SSE of Collie. There may be other small glacially-gouged Permian basins in the southern part of the State, which are yet unknown. [An early history of the discovery of coal and other minerals in the Colony of Western Australia was published in the *Western Australian Year Book* for 1900-01, page 76. See also the history of the Department of Mines in the 1977 Year Book and the special article on Collie in Chapter VIII, Part 2 of the 1983 issue. Ed.]

### The Superficial Deposits

Over a great part of the State fresh rock outcrops are comparatively sparse. Most of the country is covered by highly-weathered rocks, laterite, drift sand, soils, and, in the arid salt lake country, by calcrete and thin evaporite deposits.

*Laterite.* In the southern half of the State the remnants of the Darling Plateau are covered by a thin layer up to three to five metres thick of a reddish-brown rock composed of spherical pebbles tightly or loosely cemented together by a lighter-coloured earthy matrix. This material in its poorly consolidated state is popularly referred to as 'ironstone gravel' and when strongly cemented as 'ironstone'. This rock, called laterite, although it covers large areas, is purely superficial and wells or bores sunk in it pass within a few metres into highly weathered country rock which may extend down for distances up to thirty metres before encountering fresh unweathered rock. This laterite crust and the underlying highly weathered country rock were developed on a gently undulating surface during a period of warmer, more humid, climatic conditions. These tropical conditions probably existed in Late Tertiary (Pliocene) times when a great part of Western Australia had been reduced by long-continued erosion to a peneplain lying close to sea-level, or soon after, when this peneplain had been uplifted to form the *Darling Plateau*. This uplift, judged by the elevation of the laterite-capped hills and the occurrence of fossiliferous marine Eocene sediments 270 metres above sea-level at Norseman, was of the order of 300 metres. On the Great Plateau, remnants of this Darling Plateau are evidenced by the table-topped hills so characteristic of much of the Plateau country. The significance of the laterite profile and the soils developed from the laterite and associated weathered rocks has already been mentioned. Economically, the laterite is important for bauxite, road-making materials and in a few places (such as Wundowie) as an iron ore. The main constituents of the laterite are the insoluble products of intense rock weathering — iron oxide, alumina and silica. In many places the alumina content is sufficiently high to call them bauxite. Bauxites are the main source of aluminium, and the bauxitic laterites of the Jarrahdale and Del Park-Huntly areas in the Darling Range near Perth are being exploited as aluminium ore. Mining of bauxite at Willowdale near Wagerup was started in February 1984. Bauxite deposits occurring immediately east of the Darling Range about 130 kilometres SSE of Perth at Mount Saddleback and Boddington are also being exploited. These bauxites, developed over greenstones of the Archaean Saddleback Greenstone Belt, have been found to contain very fine-grained gold, generally less than five microns diameter. The gold, which occurs at various levels within the laterite profile, has resulted from *in situ* weathering of mineralised basement rocks. This discovery, approximately twelve kilometres north-west of Boddington, has led to detailed sampling which has established the potential for a gold/bauxite operation of up to three million tonnes per annum (yielding about five million grams of gold per year) for a period of at least fifteen years.

The mid-Tertiary land surface of the southern half of Western Australia on which the laterite profile was developed at a time when this country was subjected to a tropical climate extends into the northern part of the State. In the Hamersley Iron Province of the North-West Division this old land surface truncated the Lower Proterozoic banded iron formations of the Hamersley Group. At and below this old land surface (the *Hamersley Surface*) which can be traced without tectonic break from sea-level to elevations of 1,200 metres, there was a secondary concentration of the iron of the Lower Proterozoic rocks resulting in extensive rich iron-ore deposits which make this area one of the richest iron provinces in the world. Some of the iron ore deposits, such as the pisolitic limonite deposits capping mesas along the Robe River, are iron-rich laterites. Such deposits have been mined at Pannawonica, and extensive unexploited deposits occur at Deepdale, further downstream.

In the far south-west of the State sub-surface hard pan formations consisting of ferruginous sandstone are a potential source of low-grade iron ore.

*Soils and drift sands.* Western Australia, an area of 2,525,500 square kilometres extending from lat. 13° 44' S to lat. 35° 08' S, although having little variety in its broad physical features, has very considerable variation in climates from the tropical areas of summer rainfall in the north

through a central and inland province of low rainfall to the temperate areas of winter rainfall in the south. Moreover, throughout this enormous area there is very considerable variation in the nature of the country rocks. The nature of the soils developed is dependent on these two factors — climate and parent rock — so it will be apparent that there will be very considerable variation in the soils over this extensive area.

L. J. H. Teakle has recognised the following major soil zones of Western Australia:

1. Grey, yellow and red podsolised, or leached, soils of the temperate sclerophyll forests.
2. Red-brown earths of the eucalyptus-acacia woodlands.
3. Grey and brown calcareous, solonised soils of the low rainfall eucalyptus woodlands — ('mallee' soil zone of Prescott).
4. Red and brown acidic soils of the acacia semi-desert scrub — mulga, etc.
5. Brown acidic soils of the spinifex semi-desert steppes of the north-west.
6. Pinkish-brown calcareous soils of the Nullarbor Plain desert shrub steppes.
7. Pinkish-brown calcareous soils of the acacia semi-desert scrub, mallee and salt bush-blue bush zone.
8. Brown soils of the tropical woodlands, savannahs and grasslands.
9. Red sands of the central desert sandhills — spinifex with desert acacias, desert gums and mallees (*Eucalyptus spp.*).

Each of these major soil zones may be subdivided into one or more soil regions and the reader is referred to a paper 'A Regional Classification of the Soils of Western Australia', by L. J. H. Teakle (*Jour. Roy. Soc. West. Aust. XXIV*, pp. 123-95) for details concerning the soil characteristics of these various zones and regions.

There are considerable areas of Western Australia covered by drift sand which may be in the form of parallel red sand dunes or, in the southern part of the State, extensive sandy plains. The latter have been generally considered to be residual from the weathering of granite and to have suffered little or no transport. These sand plains are often underlain by lateritic material and they probably represent the leached zone of the laterite profile. The youngest of the drift sand deposits are the coastal sand dunes.

Coastal sand deposits are of considerable economic importance. At various places along the south and west coasts there are beach sand deposits in which there is a natural concentration of heavy minerals such as zircon, monazite, xenotime, rutile and ilmenite. Such deposits are at present being exploited at Capel and Bunbury for their ilmenite content, which is valuable because of its low chrome content. The other heavy minerals such as zircon, monazite and xenotime are also being exported overseas. Similar deposits occur at Eneabba (approximately thirty kilometres inland at 240 kilometres north of Perth) and these are now being exploited.

Many soils are residual accumulations resulting from the weathering of rocks *in situ*. Where the parent rocks contain weather-resistant minerals such as gold and cassiterite, these minerals will be preserved in the residual soils. Such residual accumulations are called eluvial deposits. Most of the so-called 'alluvial' gold deposits of Western Australia are not true alluvials (which are deposits from running water), but are residual eluvial deposits. The distinction between eluvial and alluvial deposits is important in prospecting.

*Calcrete*. Throughout the arid and semi-arid parts of inland Western Australia, former stream channels are now represented by elongate areas of calcrete deposition or by elongate salt lakes. Calcrete is chemically-deposited calcium carbonate. These calcretes, because they contain networks of solution channels, have a high permeability and therefore are aquifers in which underground water may occur. Such groundwater has been of considerable significance in the establishment of mining communities in outback arid areas. In calcretes of some areas (such as Yeelirrie, south of Wiluna), uranium deposits have been formed from circulating waters draining areas of weathering Precambrian rocks, mainly granites, which contain small amounts of uranium-bearing minerals. Such secondary uranium deposits are of potential economic significance.

*Salt lake deposits.* These, together with the coastal sand deposits, represent the youngest of the geological formations developed — indeed they are in course of formation at the present time. They are evaporite deposits resulting from the evaporation of lake waters in the areas of internal drainage. Soluble salts produced by rock weathering are leached out by rain and running water and transported by streams to these lakes. During the long dry summers most of these lakes dry up and the soluble salts are deposited, yielding accumulations of gypsum and common salt. In a few of these inland lakes hydrated potassium aluminium sulphate (alunite), which is a valuable source of potash for fertilisers, has been formed but its actual mode of formation has not yet been satisfactorily explained.

Valuable potash reserves occur at Lake MacLeod, north of Carnarvon. This 2,700-square kilometre coastal lake contains brines rich in potash salts (which are the last salts to crystallise on the evaporation of sea water) saturating the mud of the lake floor. Attempts have been made to exploit these deposits, but to date without success, the only production from Lake MacLeod being sodium chloride.

Solar salt (sodium chloride) is at present being produced at several localities in the north-west, such as Port Hedland, Dampier, Lake MacLeod and Shark Bay, where a combination of low-lying flat topography and shallow marine embayments (such as Useless Loop in Shark Bay) with a hot dry climate resulting in high evaporation are the ideal conditions for crystallisation of sea water salts. The production of such solar salt amounted to approximately 4.8 million tonnes in 1984-85. In localities such as Shark Bay, where the waters are abnormally saline, other rocks — limestones — are in course of formation. The Shark Bay area has proved a very fruitful area for research on the formation of various limestones and the information being derived from the study of these presently forming rocks has helped in the interpretation of the significance of such deposits which formed in past geological times.

*Groundwater.* Shallow groundwater, one of the most recent accumulations, has become of major importance in Western Australia, particularly in the arid areas of the developing mining areas of the Pilbara, and in supplementing the surface-conserved waters used in the Perth Metropolitan Area. In the Pilbara, the development of the vast iron ore resources has depended largely on the exploitation of shallow underground water supplies. Port Hedland obtains its water mainly from colluvium beneath the coastal plain, which is periodically replenished by river floods. Other coastal towns supplement their water supplies from Millstream, where a mass of cavernous calcrete, some forty kilometres long and up to twelve kilometres wide, occupying the former course of the Fortescue River, forms a highly productive shallow aquifer. The inland mines and towns of Newman, Pannawonica, Paraburdoo and Tom Price, obtain the bulk of their water from river alluvium and calcrete aquifers, although some groundwater comes from fractured volcanic rocks in some places. In the Perth metropolitan area there are two distinct types of groundwater — the deep, confined, pressure (artesian and sub-artesian) water occurring in Mesozoic bedded sedimentary rocks and shallow unconfined, water-table groundwater in the superficial formations consisting of a complex sequence of sand, limestone and clay up to ninety metres thick. It is the latter type that has been most extensively exploited over recent years by both the Government Metropolitan Water Authority and household bores throughout the coastal plain section of the Metropolitan Area.

## **Conclusion**

From the foregoing summary of the geology of Western Australia we see that, although nowhere do we find the complete geological succession, somewhere in the State there are deposits representative of every Period. The geological history of Western Australia begins with the basaltic igneous activity of the Early Archaean more than 3,000 million years ago, followed by sedimentation, intense mountain building activity and associated granitisation and granite intrusions. In post-Archaean times there is a record of sedimentation throughout all the main geological periods. Igneous activity ceased in the Lower Palaeozoic and only recurred during the late Mesozoic (yielding the basaltic lavas of the far south-west) and the Miocene (resulting in the volcanic rocks of the Kimberley). By mid-Tertiary times much of Western Australia had been reduced by denudation to a gently undulating

penplain land surface on which, under tropical climatic conditions, there was an extensive development of laterite which in places constitutes valuable bauxite and iron-ore deposits. Geological processes are continuing and at the present day rocks and soils are still in the process of formation.

A more complete description of the geology of Western Australia is contained in 'The Geology of Western Australia' (*Geol. Surv. West. Aust. Mem. No. 2, 1975*).

GEOLOGICAL EVENTS AND MINERAL DEPOSITS IN WESTERN AUSTRALIA (a)

Era	Main geological events	Economic mineral deposits
CAINOZOIC	15. Weathering and erosion (Present day)	Beach sand deposits, salt, gypsum, sands and clays, peat, alluvial and eluvial deposits (gold, tin, diamonds, etc.), groundwater, uranium in calcrete areas.
	14. Sedimentation (Pleistocene and Recent)	Ilmenite and other black sand minerals, limestone
	13. Peneplanation (mid-Tertiary) and laterite formation	Bauxite Iron and manganese ores Alluvial tin and gold Clays
	12. Sedimentation (older-Tertiary) and Miocene volcanic pipes	Diamonds in volcanic pipes Artesian water
MESOZOIC	11. Sedimentation (with Cretaceous basalt out-flows)	Artesian water Oil and gas, coal Basalt for aggregate stone
PALAEOZOIC	10. Sedimentation, earth movements, periods of erosion	Coal Oil and gas
PROTEROZOIC	9. Basic igneous intrusions	Road metal (blue metal) Lead, zinc and copper
	8. Sedimentation and minor granitic magma intrusions	Iron ore (of Yampi Sound) Alluvial gold (of Nullagine and Paterson Range)
	7. Chemical sediments (banded iron formations)	Iron ore and blue asbestos (in Hamersley Basin)
ARCHAEAN	6. Pegmatite and quartz vein formation from end-stages of granitic intrusions	Tin, tantalum, tungsten, beryllium, lithium, uranium minerals. Gold and silver in early Archaean country rocks (1 and 2)
	5. Intrusion of granitic magma (2,700 million years ago)	Aggregate and building stone
	4. Granitisation — conversion of all pre-existing rocks into granitic rocks — contemporaneous with intense folding, fracturing, and metamorphism of pre-existing rocks approximately 3,200 million years ago	Aggregate and building stone
	3. Intrusion of basic magma forming stratiform layered basic/ultrabasic igneous complexes	Nickel, copper and chromium in ultrabasic rocks
	2. Sedimentation with minor periods of acid volcanic activity	Copper in acid volcanics
	1. Eruption of submarine basaltic lavas and chemical deposition of banded ferruginous cherts	Iron ore

(a) A geological map of Western Australia appears at the beginning of this Part.

### **The Mineral Deposits**

In the foregoing pages mention has been made in various places of the mineral deposits on which the development of Western Australia has been so dependent. These deposits are directly related to the geology — nature of the rocks and their structural relationships — of the areas in which they occur. One would not, for example, look for coal, oil or natural gas in the crystalline Precambrian rocks, nor for gold or nickel deposits in the sedimentary basins that have been described. Moreover, in spite of the fact that the nickel deposits occur in Older Precambrian rocks, not all of these rocks are potential hosts for nickel deposits — they are only likely to occur in the ultrabasic rocks which constitute a very small fraction of one per cent of the Older Precambrian rocks. The preceding tabulated statement summarises the sequence of events represented in the geological history of Western Australia and the mineral deposits associated with each. This table, read in conjunction with a geological map of any area, will indicate the economically important deposits which could possibly occur in that particular geological environment.

### **Current Geological Investigations in Western Australia**

While much is known about the geology and mineral resources of Western Australia, there is still much to be learned. The foregoing summary account of the geology of Western Australia is based on work carried out in the past, which has increased in tempo during the last decade because of the discovery of important oil, gas and metal-bearing mineral deposits.

At present, geological work in Western Australia is being carried out by the following bodies.

1. The Geological Survey Branch of the Department of Mines of Western Australia, which is engaged in regional geological mapping, special investigations of varied character concerned with groundwater resources, mineral deposits, and engineering geology problems, and problems arising daily, which require geological advice to the public. The major results of the Geological Survey's operations are published annually in the Annual Report of the Department of Mines of Western Australia, in Bulletins issued at irregular intervals and in four-mile or 1 : 250,000 scale geological maps with explanatory notes, which are also issued at irregular intervals. The initial phase of the 1 : 250,000 scale geological mapping of the entire State has been completed and re-mapping of appropriate areas is now being carried out along with more detailed mapping of economically significant areas on 1 : 100,000 and 1 : 50,000 scales.
2. The Geology Departments of the University of Western Australia, Murdoch University and the Western Australian Institute of Technology. Research projects are undertaken by members of staff and research students, varying from mapping and petrological-mineralogical projects concerned with the Precambrian rocks which make up the greater part of the State and their associated ore deposits, through petrological and palaeontological work on rocks from the various sedimentary basins, to studies of present-day marine sedimentation. The results of such investigations are published in various scientific periodicals, both in Australia and overseas.
3. Oil exploration companies. Such companies have carried out geological and geophysical surveys of the various sedimentary basins and some offshore areas, and are presently engaged in deep-drilling programmes. Attention is now being given to drilling in the offshore continental shelf areas of the Bonaparte Gulf, Browse, Canning, Carnarvon and Perth Basins.
4. Mineral exploration companies. Following the discovery of important nickel deposits at Kambalda and Scotia near Kalgoorlie, and, subsequently, at Mount Windarra near Laverton, and other localities, many Australian and overseas exploration companies became engaged in base metal exploration, particularly in the Norseman to Laverton belt of Precambrian greenstones. The phenomenal increase in the price of gold in 1979-80 stimulated exploration in the various greenstone belts in which auriferous deposits are known to occur, and the discovery of diamonds in the Kimberley Division has led to exploration for diamonds throughout the State.

The continued efforts of these institutions and exploration companies are adding much to our knowledge of the geology of the western third of the Australian continent.

### **Seismicity of Western Australia**

It had been generally considered that Western Australia was a stable block free of seismic activity in the form of earthquakes but this idea was shattered by the occurrence, on 14 October 1968, of a major earthquake centred near Meckering, 135 kilometres inland from Perth. This earthquake, of magnitude 6.9 on the Richter Scale, completely wrecked the town and most farm houses in the vicinity; alarmed numerous residents of Perth; caused minor damage to many buildings in the Perth Metropolitan Area; was felt within a radius of about 640 kilometres; and made people realise that Western Australia was not as stable as was previously thought. On 2 June 1979, another earthquake of magnitude 6.0 on the Richter Scale, resulted in the destruction of the small town of Cadoux, 215 kilometres NE from Perth. Other major earthquakes, such as the Meeberrie earthquake of 29 April 1941 (of magnitude 7.5 on the Richter Scale, the most severe earthquake yet recorded on the Australian continent) and the more recent submarine earthquake of 23 April 1979, of magnitude 7 on the Richter Scale, which originated on the edge of the continental shelf about 260 kilometres NNW of Broome, have tended to pass without much notice since they either occurred in less densely populated areas or were of low intensity. Records show (according to Everingham in a report of the Bureau of Mineral Resources, Geology and Geophysics, *Seismicity of Western Australia*) that there were forty-seven Western Australian earthquakes of local magnitude greater than 3.5 (Richter Scale) recorded in the period August 1959 to June 1965, and 210 less intense earthquakes during the same period.

Most of the recorded minor earthquakes have originated in the Yandanooka-Cape Riche belt of country about 480 kilometres long by fifty kilometres wide, which lies just within the western margin of the crystalline Precambrian Shield. Indeed, all except five of the 210 recorded minor earthquakes of the period 1959 to 1965 originated in this narrow belt which is parallel to the regional geological structure of the older Precambrian rocks of the southern half of Western Australia. It was in this belt that the severe earthquakes at Meckering (on 14 October 1968) and Cadoux (on 2 June 1979) had their origin. Minor earthquakes still occur periodically in this area.

The major fault structure of Western Australia is the Darling Fault which forms the western margin of the Precambrian Shield and the eastern margin of the Perth Basin. It extends meridionally from the south coast for about 1,000 kilometres. It is considered that the total west block downward movement on this fault has been of the order of 9,000 metres to 12,000 metres. In spite of the fact that there is a major negative gravity anomaly over the Perth Basin causing this region to be isostatically unbalanced, no earthquakes have been recorded which originated on this fault — indeed there is no geological evidence of any movement on the Darling Fault for a least one million years. The October 1968 movement on the Meckering Fault indicates that the Precambrian Shield is in a state of compression and would support a hypothesis that the Darling Fault, instead of being a westerly-dipping tension structure with downthrow to the west as commonly thought, is more probably an easterly-dipping compression structure with the east (continental) block thrust up over the Perth Basin. This would explain the observed stability of the Perth Basin which should, according to the gravity measurements, be a very unstable area. Instead of rising, as it should because of the major negative gravity anomaly, it is being held down by the overthrust continental block.

As has been indicated, the Meckering earthquake has drawn attention to the possibility of earthquake occurrence in south Western Australia and for the necessity to consider this factor when designing large structures. Calculations have been made from records during the period 1960 to 1969 to give an approximate idea of the order of earthquake frequency in the south-west corner of the State. These have indicated that an earthquake of magnitude greater than 6.5 would occur once every fifty years, and one of magnitude greater than 5.5 every ten years, but these figures are thought to be pessimistic because records kept since 1840 suggest a lower average frequency and the data used for these calculations are swamped by the foreshocks and aftershocks of the Meckering earthquake.

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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 a distance of 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.

From the map showing the wettest six-monthly period of the year, it can be seen that the summer rainfall area extends southward from the Kimberley to the inland Eucla. There is then a rapid change to the winter rainfall regime of the south coast. However, the difference between summer and winter totals decreases toward the south, and the southern part of this region is one of almost uniform average rainfall.

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.

The mean annual rainfall for Western Australia is shown on the map later in this Chapter.

The following table shows the average rainfall and number of wet days, the highest and lowest monthly totals, and the highest daily fall for various centres.

#### RAINFALL AT REPRESENTATIVE CLIMATOLOGICAL STATIONS

(Stations are arranged from north to south in three groups: Coastal, Wheat Belt and Other Inland)

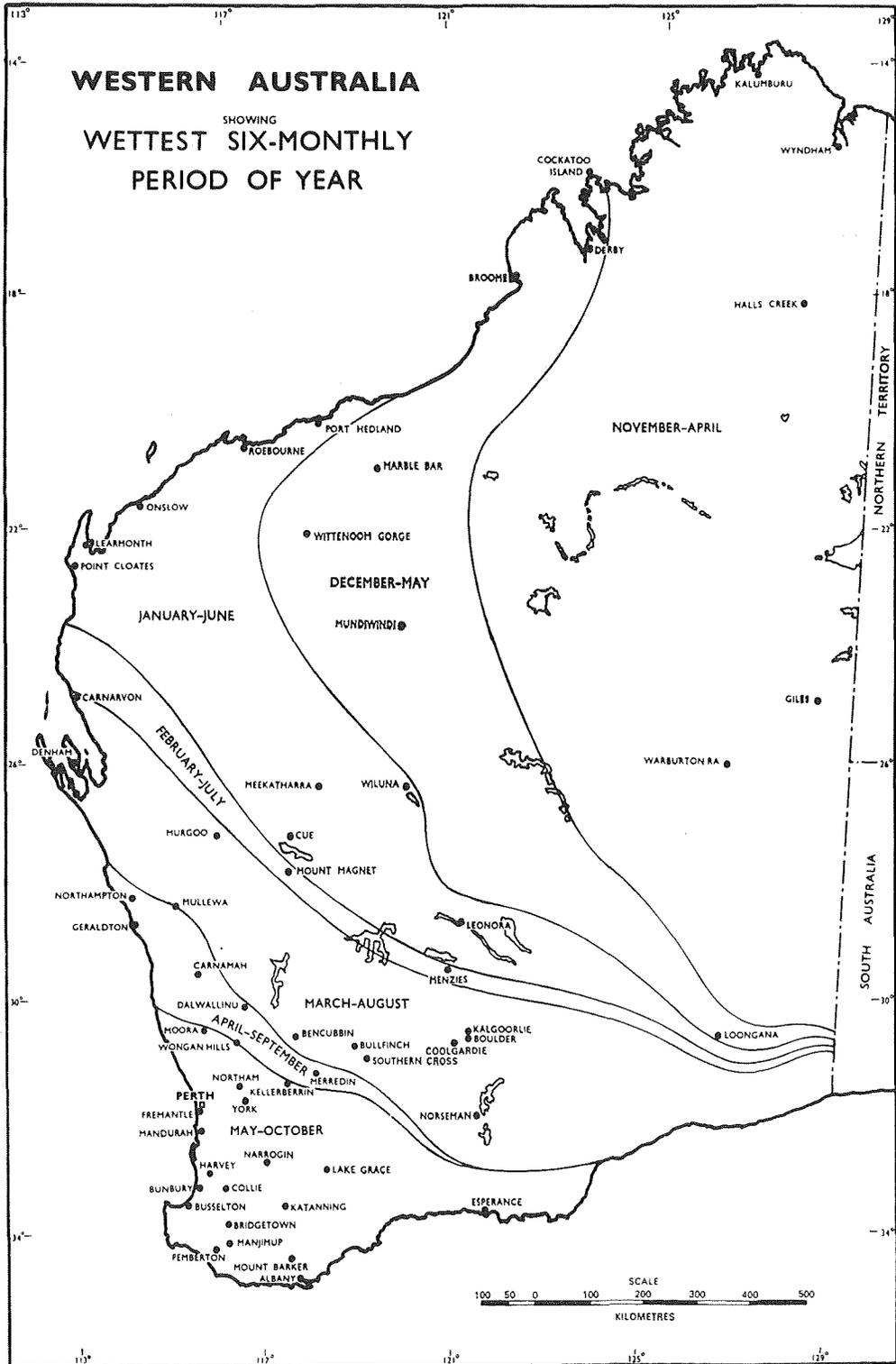
Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
COASTAL													
<i>Wyndham</i> — (New site) (a)													
Rainfall — Average (mm)	161	210	180	27	13	1	7	0	10	20	54	92	775
Highest (mm)	305	369	428	119	98	8	84	0	78	75	174	226	1,101
Lowest (mm)	47	110	15	0	0	0	0	0	0	0	2	15	462
Highest one day (mm)	89	77	140	74	48	8	49	0	78	38	84	83	140
Wet days — Average number	15	15	12	3	1	0	0	0	1	3	6	9	65
<i>Broome</i> —													
Rainfall — Average (mm)	181	166	95	27	33	19	5	2	2	2	9	42	583
Highest (mm)	825	427	439	226	176	208	72	23	24	28	50	279	1,228
Lowest (mm)	5	8	1	0	0	0	0	0	0	0	0	0	139
Highest one day (mm)	351	151	204	107	119	127	55	12	13	15	37	210	351
Wet days — Average number	12	11	8	3	3	2	1	1	1	1	1	5	49

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

RAINFALL AT REPRESENTATIVE CLIMATOLOGICAL STATIONS — *continued*

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
COASTAL — <i>continued</i>													
<i>Port Hedland — M.O. (b)</i>													
Rainfall — Average (mm)	60	99	43	25	31	18	10	4	1	1	4	19	315
Highest (mm)	454	360	251	352	170	125	81	35	9	8	67	219	627
Lowest (mm)	0	0	0	0	0	0	0	0	0	0	0	0	47
Highest one day (mm)	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	1	31
<i>Roebourne —</i>													
Rainfall — Average (mm)	63	63	65	30	30	29	14	5	1	1	2	9	312
Highest (mm)	368	325	408	552	225	309	135	98	40	31	31	129	1,060
Lowest (mm)	0	0	0	0	0	0	0	0	0	0	0	0	3
Highest one day (mm)	213	169	234	146	168	134	57	44	23	29	17	97	234
Wet days — Average number	3	4	3	1	2	3	2	1	0	0	0	1	20
<i>Onslow —</i>													
Rainfall — Average (mm)	27	45	51	20	44	43	19	10	1	1	2	4	267
Highest (mm)	261	539	415	279	259	194	222	107	25	27	56	61	999
Lowest (mm)	0	0	0	0	0	0	0	0	0	0	0	0	15
Highest one day (mm)	158	356	283	157	117	111	76	62	17	21	30	38	356
Wet days — Average number	2	3	3	2	3	4	2	2	0	0	0	1	22
<i>Carnarvon — M.O. (b)</i>													
Rainfall — Average (mm)	14	21	15	11	41	49	45	18	5	6	5	1	231
Highest (mm)	157	149	93	89	195	161	180	51	19	38	81	4	556
Lowest (mm)	0	0	0	0	0	1	0	1	0	0	0	0	75
Highest one day (mm)	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
<i>Geraldton —</i>													
Rainfall — Average (mm)	6	12	13	26	72	116	95	66	30	20	9	5	470
Highest (mm)	53	131	89	100	282	286	243	131	81	109	47	59	843
Lowest (mm)	0	0	0	1	0	25	24	11	0	0	0	0	220
Highest one day (mm)	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
<i>Perth — Bureau —</i>													
Rainfall — Average (mm)	9	12	19	45	123	182	173	137	81	54	21	14	870
Highest (mm)	115	166	145	149	308	476	425	318	199	200	73	81	1,339
Lowest (mm)	0	0	0	0	14	55	62	12	9	1	0	0	509
Highest one day (mm)	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
<i>Bunbury —</i>													
Rainfall — Average (mm)	11	12	22	46	128	183	171	124	80	54	26	14	871
Highest (mm)	157	103	91	175	288	412	417	302	201	195	84	80	1,365
Lowest (mm)	0	0	0	0	10	36	49	21	0	5	0	0	484
Highest one day (mm)	115	86	66	61	79	82	95	62	58	39	38	27	95
Wet days — Average number	2	2	4	7	14	18	20	17	14	11	6	4	119
<i>Albany — M.O. (b)</i>													
Rainfall — Average (mm)	22	24	27	69	96	105	124	105	81	83	46	26	808
Highest (mm)	123	62	85	127	192	224	204	174	133	172	117	97	966
Lowest (mm)	3	4	7	21	47	45	55	52	43	37	6	5	628
Highest one day (mm)	80	36	52	52	40	38	43	44	44	53	29	42	53
Wet days — Average number	8	9	11	14	18	19	21	21	18	15	12	10	176
<i>Esperance — M.O. (b)</i>													
Rainfall — Average (mm)	15	31	23	51	75	85	93	83	57	52	40	18	623
Highest (mm)	35	80	81	155	186	129	193	145	119	117	87	81	1,003
Lowest (mm)	2	2	1	6	18	41	23	40	16	16	21	0	438
Highest one day (mm)	25	70	31	34	51	34	45	31	28	77	42	24	51
Wet days — Average number	6	6	7	11	14	17	17	17	14	12	11	6	138
<i>Eucla —</i>													
Rainfall — Average (mm)	14	16	20	27	33	26	24	25	20	18	17	13	253
Highest (mm)	95	182	127	205	104	155	72	82	85	74	114	116	453
Lowest (mm)	0	0	0	0	0	2	0	2	0	1	0	0	52
Highest one day (mm)	54	115	51	41	75	36	26	38	40	33	74	49	115
Wet days — Average number	3	4	5	7	10	10	9	9	8	6	5	4	80

(b) M.O. denotes Meteorological Office.



RAINFALL AT REPRESENTATIVE CLIMATOLOGICAL STATIONS — *continued*

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
WHEAT BELT													
<i>Carnamah</i> —													
Rainfall — Average (mm)	11	15	21	23	51	83	70	54	29	18	11	9	395
Highest (mm)	103	103	180	121	170	231	188	192	83	73	91	56	782
Lowest (mm)	0	0	0	0	2	13	11	12	1	0	0	0	204
Highest one day (mm)	97	78	153	89	74	61	43	79	33	40	71	50	153
Wet days — Average number	2	2	2	5	9	13	14	11	8	5	3	2	76
<i>Wongan Hills</i> —													
Rainfall — Average (mm)	11	16	20	23	52	77	70	52	28	20	11	9	389
Highest (mm)	78	111	166	81	188	220	174	131	97	66	60	59	675
Lowest (mm)	0	0	0	0	1	17	8	8	2	0	0	0	161
Highest one day (mm)	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
<i>Kellerberrin</i> —													
Rainfall — Average (mm)	11	15	21	22	42	58	53	42	26	19	12	13	334
Highest (mm)	87	127	152	110	119	163	123	100	76	77	86	67	661
Lowest (mm)	0	0	0	0	0	15	11	3	2	1	0	0	172
Highest one day (mm)	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
<i>Southern Cross</i> —													
Rainfall — Average (mm)	14	20	21	22	33	41	38	30	19	16	15	12	281
Highest (mm)	113	137	169	128	119	183	107	88	106	79	75	72	577
Lowest (mm)	0	0	0	0	0	5	6	1	0	0	0	0	118
Highest one day (mm)	63	84	61	44	55	43	36	40	25	55	51	40	84
Wet days — Average number	3	3	3	5	7	10	11	9	6	5	3	2	67
<i>Merredin</i> —													
Rainfall — Average (mm)	11	15	21	23	41	53	52	39	26	19	14	13	327
Highest (mm)	77	113	161	114	132	135	127	86	86	75	71	93	565
Lowest (mm)	0	0	0	0	1	6	9	1	0	0	0	0	130
Highest one day (mm)	66	66	83	60	49	59	45	34	45	30	37	49	83
Wet days — Average number	2	2	3	5	8	11	12	10	7	5	3	2	70
<i>Northam</i> —													
Rainfall — Average (mm)	9	12	19	24	57	85	85	63	37	25	11	9	436
Highest (mm)	80	190	189	88	148	233	221	170	129	100	70	66	711
Lowest (mm)	0	0	0	0	1	10	20	3	3	0	0	0	194
Highest one day (mm)	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	11	7	4	2	91
<i>Wandering</i> —													
Rainfall — Average (mm)	11	15	21	35	80	120	116	94	62	44	18	15	631
Highest (mm)	156	244	122	121	195	368	324	270	192	130	65	106	1,051
Lowest (mm)	0	0	0	0	11	25	34	14	8	1	0	0	297
Highest one day (mm)	115	138	104	51	61	85	69	53	40	43	48	64	138
Wet days — Average number	3	3	4	7	13	17	18	16	14	11	6	4	116
<i>Narrogin</i> —													
Rainfall — Average (mm)	11	17	21	30	66	93	89	69	47	35	17	13	508
Highest (mm)	135	237	128	121	167	300	243	185	121	128	77	95	741
Lowest (mm)	0	0	0	0	10	25	25	16	7	2	0	0	269
Highest one day (mm)	91	115	114	63	68	71	81	42	36	49	38	58	115
Wet days — Average number	2	3	3	6	11	14	15	14	11	9	5	3	96
<i>Katanning</i> —													
Rainfall — Average (mm)	13	17	23	31	61	80	77	63	46	38	21	16	486
Highest (mm)	217	225	134	162	148	214	174	173	123	115	98	74	782
Lowest (mm)	0	0	0	1	7	21	22	13	4	5	0	0	273
Highest one day (mm)	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													
<i>Halls Creek</i> — <i>M.O. (b)</i>													
Rainfall — Average (mm)	147	127	70	24	15	4	6	3	4	17	32	69	518
Highest (mm)	501	484	381	162	105	87	71	49	85	92	175	208	791
Lowest (mm)	14	3	2	0	0	0	0	0	0	0	1	4	250
Highest one day (mm)	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	11	62

(b) *M.O.* denotes Meteorological Office.



RAINFALL AT REPRESENTATIVE CLIMATOLOGICAL STATIONS — *continued*

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
OTHER INLAND — <i>continued</i>													
<i>Marble Bar</i> —													
Rainfall — Average (mm)	76	79	53	21	24	23	12	6	1	4	10	36	345
Highest (mm)	310	337	389	241	187	165	134	46	24	116	62	243	742
Lowest (mm)	0	0	0	0	0	0	0	0	0	0	0	0	72
Highest one day (mm)	152	121	305	125	91	105	63	32	24	84	61	150	305
Wet days — Average number	7	7	5	2	2	2	1	1	0	1	2	4	34
<i>Mundiwindi</i> —													
Rainfall — Average (mm)	43	49	46	22	20	20	10	9	3	7	11	26	266
Highest (mm)	321	325	267	180	121	205	70	53	61	93	71	160	816
Lowest (mm)	0	0	0	0	0	0	0	0	0	0	0	0	26
Highest one day (mm)	133	147	175	80	56	123	43	39	34	53	58	114	175
Wet days — Average number	6	5	5	3	3	3	2	2	1	1	3	4	38
<i>Warburton Range</i> —													
Rainfall — Average (mm)	24	30	24	20	19	22	12	12	5	13	17	23	221
Highest (mm)	177	149	181	111	91	99	54	72	25	102	83	95	691
Lowest (mm)	0	0	0	0	0	0	0	0	0	0	0	0	35
Highest one day (mm)	58	78	101	77	66	42	22	50	24	45	47	61	101
Wet days — Average number	3	3	3	3	3	3	3	2	2	2	2	4	33
<i>Meekatharra</i> — <i>M.O. (b)</i>													
Rainfall — Average (mm)	26	29	22	14	24	32	22	11	4	6	14	9	213
Highest (mm)	129	142	166	65	96	156	166	56	31	62	113	25	420
Lowest (mm)	0	0	0	0	0	1	0	0	0	0	0	0	66
Highest one day (mm)	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
<i>Laverton</i> —													
Rainfall — Average (mm)	22	24	31	23	24	24	15	13	8	7	15	15	221
Highest (mm)	142	144	122	205	124	126	66	85	67	50	152	152	452
Lowest (mm)	0	0	0	0	0	0	0	0	0	0	0	0	66
Highest one day (mm)	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
<i>Kalgoorlie</i> — <i>M.O. (b)</i>													
Rainfall — Average (mm)	21	29	19	20	26	32	26	20	14	15	18	13	253
Highest (mm)	186	308	143	99	110	186	83	65	98	84	115	41	488
Lowest (mm)	0	0	0	0	0	2	2	3	1	0	0	0	108
Highest one day (mm)	154	178	70	50	45	57	28	40	44	77	77	27	178
Wet days — Average number	3	4	4	5	7	9	9	7	5	4	4	3	64
<i>Rawlinna</i> —													
Rainfall — Average (mm)	13	17	20	17	18	19	14	16	13	13	13	15	188
Highest (mm)	210	123	85	114	81	131	59	155	85	64	81	117	497
Lowest (mm)	0	0	0	0	0	0	0	0	0	0	0	0	79
Highest one day (mm)	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
<i>Collie</i> —													
Rainfall — Average (mm)	17	15	24	50	130	189	186	144	101	70	31	16	973
Highest (mm)	243	178	105	183	270	474	440	414	249	213	106	81	1,467
Lowest (mm)	0	0	0	4	15	56	52	31	15	2	1	0	605
Highest one day (mm)	74	106	84	63	62	91	69	73	58	49	36	32	106
Wet days — Average number	3	3	5	9	17	20	22	20	17	14	8	5	143
<i>Manjimup</i> —													
Rainfall — Average (mm)	20	20	31	64	137	180	183	148	109	81	47	24	1,044
Highest (mm)	92	117	138	194	269	332	320	323	257	165	122	78	1,761
Lowest (mm)	0	0	1	8	26	86	43	49	24	9	3	0	650
Highest one day (mm)	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
<i>Pemberton</i> —													
Rainfall — Average (mm)	21	20	39	83	156	206	224	163	120	93	60	35	1,220
Highest (mm)	80	86	128	213	337	365	391	388	214	189	160	92	1,712
Lowest (mm)	1	1	5	6	36	116	130	50	45	13	6	3	802
Highest one day (mm)	60	30	77	81	77	59	91	61	45	44	45	42	77
Wet days — Average number	7	5	8	12	18	20	22	21	18	15	12	9	167

(b) *M.O.* denotes Meteorological Office.

RAINFALL AT REPRESENTATIVE CLIMATOLOGICAL STATIONS — *continued*

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
OTHER INLAND — <i>continued</i>													
<i>Mount Barker</i> —													
Rainfall — Average (mm)	23	25	36	56	86	99	108	92	81	73	42	30	751
Highest (mm)	182	179	129	234	243	209	261	173	157	160	155	87	1,095
Lowest (mm)	1	1	4	4	16	43	22	33	18	16	3	1	431
Highest one day (mm)	105	72	57	139	69	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

ANNUAL RAINFALL AT REPRESENTATIVE STATIONS  
(Millimetres)

Station	1980	1981	1982	1983	1984	1985	Long-term average (a)
Albany (M.O.)	728	812	720	612	773	820	808
Broome (M.O.)	745	907	1,146	497	503	395	583
Bunbury	831	796	810	710	817	(b)	871
Carnamah	(b)	405	360	418	442	231	395
Carnarvon (M.O.)	323	181	145	208	352	202	231
Collie	(b)	948	870	1,040	812	753	973
Esperance (M.O.)	564	555	515	468	643	561	623
Eucla	275	375	270	390	287	240	261
Geraldton (M.O.)	366	480	497	419	512	392	470
Giles (M.O.)	277	239	399	426	208	84	263
Halls Creek (M.O.)	769	619	991	731	679	283	518
Kalgoorlie (M.O.)	321	307	305	240	293	210	253
Katanning	471	399	513	569	467	409	486
Kellerberrin	196	346	284	386	374	261	334
Leonora	361	206	292	225	329	223	222
Manjimup	924	1,153	819	966	1,029	913	1,044
Marble Bar	798	390	558	338	412	238	345
Meekatharra (M.O.)	302	161	353	218	329	170	213
Merredin	212	367	247	311	(b)	250	327
Mount Barker	676	637	696	611	697	601	751
Narrogin	537	513	549	662	462	435	508
Newman	483	281	406	240	316	270	321
Northam	291	503	400	615	357	322	436
Onslow	537	255	226	126	(b)	67	267
Pemberton	1,115	1,251	976	1,039	1,284	1,040	1,220
Perth (Bureau of Meteorology)	847	848	817	820	827	691	870
Port Hedland (M.O.)	479	376	381	289	253	102	315
Rawlinna	196	213	257	(c)	(c)	(c)	188
Roebourne	357	373	218	52	321	(b)	312
Southern Cross	246	337	324	287	304	346	281
Wandering	612	544	497	697	511	489	631
Wongan Hills	265	439	366	471	412	356	389
Wyndham	922	854	743	661	723	462	775

(a) Number of years of record used to calculate the long-term average varies from station to station. (b) Records incomplete. Note: (M.O.) denotes Meteorological Office. (c) Station closed.

## TEMPERATURE

The hottest months in Western Australia are November in the Kimberley, December a little further south and January near the Tropic of Capricorn. In the tropics temperatures generally rise from July, the coldest month, to November. In some places further rises occur, but in others the onset of the 'Wet' prevents this further rise and there is a slight fall. As the rains cease at these latter places temperatures start to rise again and there is another minor peak in March or April. After this there is a general fall until July.

South of the tropics the hottest month is January, except in coastal districts where February is hotter. The coldest month is again July.

The most consistently hot place in the State is Wyndham, where the mean maximum throughout the year is 35.5°C and the mean minimum for the coldest month is 16.9°C. At Marble Bar the yearly mean maximum of 35.3°C is higher, but mean minimum temperatures are consistently lower, falling to 11.6°C in the coldest month. The mean maximum at Marble Bar is the highest in Australia,

exceeding 37.8°C in the five months from November to March inclusive. There are often long spells of hot weather in this region and during one period, from 31 October 1923 to 7 April 1924, the maximum temperature at Marble Bar reached or exceeded 37.8°C on 160 consecutive days.

Further south temperatures are lower, but even in the southern parts of the State there are occasional heat waves, and the highest temperature on record, 50.7°C, was recorded at Eucla on the south coast.

Near the coast the sea breeze generally brings relief from high temperatures. It blows nearly every afternoon in the hot months, and is known in Perth as the 'Fremantle Doctor'. Away from the influence of the sea, extremes are greater, day temperatures being higher and night temperatures lower than in the coastal districts. During the winter, temperatures have fallen below — 1.1°C in most of the inland part of the State south from the tropics. The lowest on record is — 6.7°C which occurred at Booylgoo near Sandstone on 15 July 1943, and as far north as Mundiwindi, almost in the tropics, — 5.3°C has been recorded.

Frosts are at times widespread over the southern part of the State and occasionally extend into the tropics, but in general they are not particularly troublesome as they normally occur during that period of the year when crops are least susceptible to frost damage. They occur mainly in the months May to September inclusive and are most frequent in July and August.

The table below shows, for each month of the year, the mean maximum, mean minimum, and extreme temperatures and the average number of days with registrations of 30.0°C and over and of 40.0°C and over. The average number of days with temperatures of 2.0°C or below, which provides an indication of frost frequency, is also shown.

#### TEMPERATURES 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													
<i>Wyndham — (New site) (a)</i>													
Temperature:													
Mean max., °C	37.0	35.9	35.7	35.8	33.3	31.0	30.9	33.8	36.2	38.5	39.1	38.6	35.5
Mean min., °C	26.2	25.8	25.2	23.5	20.6	17.7	16.9	19.5	22.8	25.5	26.8	26.8	23.1
Highest max., °C	44.2	42.8	41.6	39.8	38.8	36.0	36.2	39.1	40.6	43.1	45.4	45.0	45.4
Lowest min., °C	21.0	23.5	23.5	20.6	19.1	16.8	15.0	18.3	21.1	24.0	24.4	24.5	15.0
No. of days 30.0°C and over	31	27	30	29	27	21	20	29	30	30	30	31	305
No. of days 40.0°C and over	5	2	1	—	—	—	—	—	1	7	12	10	38
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Broome —</i>													
Temperature:													
Mean max., °C	33.3	32.9	33.9	34.4	31.3	29.2	28.5	30.0	31.8	32.9	33.6	33.9	32.1
Mean min., °C	26.2	26.0	25.5	22.8	18.5	15.5	13.6	14.8	18.3	22.1	25.0	26.6	21.2
Highest max., °C	44.2	42.7	42.2	41.7	38.3	36.2	35.0	38.1	39.9	42.8	44.3	44.8	44.8
Lowest min., °C	17.8	15.0	12.8	10.7	7.3	5.2	3.3	4.8	8.9	11.6	14.7	17.4	3.3
No. of days 30.0°C and over	30	27	30	30	22	11	10	16	21	24	28	31	279
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	1	1	1	4
No. of days 2.0°C and under	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Port Hedland —</i>													
Temperature:													
Mean max., °C	36.2	35.9	36.9	35.2	29.9	27.2	26.4	28.8	32.3	34.2	36.2	36.5	33.0
Mean min., °C	25.1	25.1	24.1	20.9	17.0	13.8	11.7	12.4	15.1	17.1	20.9	23.6	18.9
Highest max., °C	47.5	47.1	44.5	45.0	38.3	34.4	34.3	36.8	40.9	43.7	47.4	47.9	47.9
Lowest min., °C	15.6	11.7	15.8	10.7	7.0	4.7	3.2	3.7	7.2	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	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Roebourne —</i>													
Temperature:													
Mean max., °C	38.3	37.7	37.2	34.8	30.0	26.6	26.2	28.5	32.2	34.9	37.8	38.8	33.6
Mean min., °C	26.1	26.0	25.1	21.8	18.1	14.9	13.2	14.2	16.5	19.2	22.6	24.6	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	—	—	—	—	—	—	—	—	—	—	—	—	—

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

TEMPERATURES AT REPRESENTATIVE CLIMATOLOGICAL STATIONS — *continued*

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
<i>COASTAL — continued</i>													
<i>Onslow —</i>													
Temperature:													
Mean max., °C	35.9	35.8	35.4	33.3	28.7	25.3	24.7	26.4	29.2	31.7	34.1	35.4	31.3
Mean min., °C	23.3	23.8	22.8	19.7	15.6	12.6	11.0	11.8	13.7	16.1	18.9	21.2	17.6
Highest max., °C	47.7	48.3	46.4	43.8	38.3	32.2	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	4.4	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	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Carnarvon —</i>													
Temperature:													
Mean max., °C	30.8	32.0	30.1	28.1	25.9	23.1	21.9	22.4	23.8	25.6	27.0	28.9	26.7
Mean min., °C	22.6	23.1	21.9	18.7	14.9	13.0	11.0	11.3	13.8	16.4	18.7	20.8	17.2
Highest max., °C	47.7	46.9	45.3	41.1	38.0	32.3	30.7	32.3	38.4	42.4	43.4	45.4	47.7
Lowest min., °C	16.8	17.2	13.4	9.5	6.1	3.6	2.4	3.5	7.3	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	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Geraldton —</i>													
Temperature:													
Mean max., °C	31.6	32.2	30.6	26.7	24.0	20.6	19.4	19.8	21.6	24.5	27.1	29.9	25.7
Mean min., °C	18.7	19.1	17.5	14.9	12.6	11.2	9.2	8.7	8.8	10.9	13.7	16.7	13.5
Highest max., °C	47.7	47.3	44.3	39.4	36.6	28.8	28.8	31.6	36.8	40.7	42.2	46.7	47.7
Lowest min., °C	8.9	10.0	8.3	5.4	2.1	0.5	0.8	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	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Perth —</i>													
Temperature:													
Mean max., °C	29.6	29.9	27.8	24.5	20.7	18.2	17.3	17.9	19.4	21.2	24.6	27.3	23.2
Mean min., °C	17.7	17.9	16.6	14.1	11.6	9.9	9.0	9.1	10.1	11.5	14.0	16.2	13.1
Highest max., °C	44.7	44.6	41.3	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	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Bunbury —</i>													
Temperature:													
Mean max., °C	27.5	27.6	25.8	22.9	19.8	17.6	16.8	17.1	18.2	19.9	23.0	25.6	21.8
Mean min., °C	14.8	15.1	14.1	12.0	10.2	9.1	8.2	8.3	9.2	10.1	12.1	13.7	11.4
Highest max., °C	41.2	40.1	38.3	33.9	28.7	25.1	22.3	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	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Albany —</i>													
Temperature:													
Mean max., °C	25.8	25.4	24.2	21.0	18.5	16.3	15.7	15.5	16.7	18.8	21.1	23.9	20.2
Mean min., °C	13.3	13.9	12.9	11.6	9.5	8.1	7.4	6.8	7.4	9.0	10.4	12.4	10.2
Highest max., °C	45.6	41.6	40.5	38.8	32.6	23.6	22.5	24.1	27.8	33.1	41.1	41.1	45.6
Lowest min., °C	5.6	5.1	4.5	4.9	1.9	—	1.1	1.4	0.7	1.8	2.9	3.7	—
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	—	—	—	—	—	—	—	—	—	—	—	—	1
<i>Esperance — Post Office —</i>													
Temperature:													
Mean max., °C	25.9	25.2	24.8	22.9	20.1	18.5	17.0	17.2	18.8	20.7	22.5	23.5	21.4
Mean min., °C	15.9	16.4	14.9	13.1	10.1	9.1	7.9	7.2	8.7	10.6	12.6	14.4	11.7
Highest max., °C	47.2	44.3	43.6	38.9	33.1	27.2	27.6	31.5	35.6	40.1	42.2	44.4	47.2
Lowest min., °C	4.9	4.9	3.9	3.3	1.7	—	-0.6	—	1.3	1.0	3.3	4.4	-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
<i>Eucla —</i>													
Temperature:													
Mean max., °C	24.9	24.6	24.7	22.9	20.9	18.7	17.8	18.8	20.6	21.8	22.7	23.8	21.8
Mean min., °C	16.5	16.7	16.1	13.4	10.2	8.2	6.9	7.5	8.9	10.9	13.2	15.1	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	-0.2	—	-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

TEMPERATURES AT REPRESENTATIVE CLIMATOLOGICAL STATIONS — *continued*

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
<b>WHEAT BELT</b>													
<i>Carnamah</i> —													
Temperature:													
Mean max., °C	36.0	35.3	32.7	27.4	22.6	19.1	17.7	19.3	22.2	25.6	29.8	33.1	26.7
Mean min., °C	18.2	18.5	16.6	13.3	10.3	8.6	7.0	6.9	7.8	9.8	12.7	15.4	12.1
Highest max., °C	48.1	45.6	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
<i>Wongan Hills</i> —													
Temperature:													
Mean max., °C	34.0	33.9	30.1	25.3	21.3	17.6	16.9	17.2	19.9	24.9	29.1	32.5	25.2
Mean min., °C	17.6	17.6	15.4	12.4	9.1	7.7	6.2	5.8	6.7	9.9	12.9	15.6	11.4
Highest max., °C	47.4	44.4	42.5	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	9.5	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
<i>Kellerberrin</i> —													
Temperature:													
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
<i>Southern Cross</i> —													
Temperature:													
Mean max., °C	34.7	33.8	30.7	25.7	20.6	17.1	16.3	18.2	22.1	25.6	30.1	33.2	25.7
Mean min., °C	17.1	16.9	14.9	11.1	7.4	5.6	4.2	4.6	6.3	9.0	12.7	15.3	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
<i>Merredin</i> —													
Temperature:													
Mean max., °C	33.6	32.9	29.8	25.0	19.7	16.7	15.6	17.0	20.6	24.1	28.6	31.7	24.6
Mean min., °C	16.8	16.7	15.1	11.6	7.9	6.3	4.7	4.6	5.8	8.4	12.2	14.9	10.4
Highest max., °C	46.0	44.5	42.3	36.2	33.4	25.0	25.1	28.0	34.4	38.4	41.6	42.8	46.0
Lowest min., °C	8.0	8.9	5.4	2.5	-1.4	-2.9	-2.3	-2.8	-1.8	-0.3	0.6	3.3	-2.8
No. of days 30.0°C and over	24	21	16	4	—	—	—	—	—	4	11	21	100
No. of days 40.0°C and over	2	3	—	—	—	—	—	—	—	—	—	1	7
No. of days 2.0°C and under	—	—	—	—	1	2	4	7	4	—	—	—	20
<i>Northam</i> —													
Temperature:													
Mean max., °C	33.9	33.5	30.6	26.1	20.7	17.6	16.6	17.8	20.5	23.5	28.4	31.9	25.1
Mean min., °C	17.0	16.9	15.3	11.8	8.4	6.4	5.4	5.7	7.1	8.9	12.4	15.3	10.9
Highest max., °C	46.2	46.7	43.9	39.5	35.1	27.2	24.4	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
<i>Wandering</i> —													
Temperature:													
Mean max., °C	31.6	30.9	28.2	23.6	18.8	15.8	14.9	15.9	18.1	21.0	25.8	29.4	22.8
Mean min., °C	13.6	13.4	11.8	8.7	6.2	4.9	3.9	4.0	4.9	6.1	8.9	11.8	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
<i>Narrogin</i> —													
Temperature:													
Mean max., °C	30.9	30.0	26.7	22.2	18.1	15.0	14.5	14.6	16.7	20.9	25.1	29.2	22.0
Mean min., °C	14.7	14.5	12.8	10.4	7.4	6.8	5.3	5.0	5.8	8.0	10.4	12.5	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	0.0	-1.4	-2.7	-2.7	-2.7	-3.0	1.7	0.0	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

TEMPERATURES AT REPRESENTATIVE CLIMATOLOGICAL STATIONS — *continued*

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
<b>WHEAT BELT — <i>continued</i></b>													
<i>Katanning —</i>													
Temperature:													
Mean max., °C	30.3	29.4	26.7	22.7	18.2	15.4	14.3	15.4	17.7	20.6	25.2	28.4	22.1
Mean min., °C	13.4	13.5	12.4	10.2	7.8	6.6	5.3	5.5	6.3	7.6	9.9	12.1	9.2
Highest max., °C	43.8	44.6	41.7	36.1	32.3	24.1	22.2	31.1	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>													
<i>Halls Creek —</i>													
Temperature:													
Mean max., °C	37.0	36.3	35.7	34.2	29.7	27.4	26.9	29.8	34.0	37.4	38.5	38.3	33.8
Mean min., °C	24.3	23.8	22.9	20.4	17.0	13.8	12.3	14.5	18.5	22.7	24.3	24.6	19.9
Highest max., °C	44.3	43.8	42.1	39.9	37.2	35.0	34.0	37.8	40.2	43.8	43.8	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	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Marble Bar —</i>													
Temperature:													
Mean max., °C	41.0	40.0	39.1	36.0	30.6	27.0	26.7	29.5	33.9	37.4	40.5	41.6	35.3
Mean min., °C	26.1	25.6	24.6	21.1	16.4	12.9	11.6	13.2	16.6	20.1	23.6	25.4	19.8
Highest max., °C	48.8	47.8	45.0	42.2	37.8	35.6	33.9	37.0	41.9	45.6	46.8	47.3	48.8
Lowest min., °C	18.9	17.8	17.5	12.3	7.2	3.3	2.2	4.4	8.3	12.2	16.1	17.8	2.2
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	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Mundivindi —</i>													
Temperature:													
Mean max., °C	38.3	36.6	35.6	31.2	25.3	22.3	21.2	23.4	28.0	32.8	35.7	37.8	30.7
Mean min., °C	23.8	22.8	21.0	16.2	10.8	8.0	5.7	7.4	11.1	15.7	19.4	22.3	15.4
Highest max., °C	44.6	44.4	42.3	40.6	36.4	31.7	30.6	37.2	39.5	41.4	43.3	45.5	44.6
Lowest min., °C	13.9	12.8	9.4	3.9	-1.7	-4.4	-5.3	-3.6	-1.7	3.3	7.8	10.9	-5.3
No. of days 30.0°C and over	30	27	29	20	4	—	—	1	10	23	28	30	201
No. of days 40.0°C and over	11	5	2	—	—	—	—	—	—	—	2	8	27
No. of days 2.0°C and under	—	—	—	—	1	3	6	3	—	—	—	—	13
<i>Warburton Range —</i>													
Temperature:													
Mean max., °C	38.6	37.2	35.4	29.9	25.0	21.3	21.3	22.5	28.0	32.6	34.8	36.6	30.3
Mean min., °C	22.7	22.5	20.5	14.5	11.5	7.4	6.4	7.2	11.1	16.1	19.2	21.0	15.0
Highest max., °C	46.6	46.9	43.4	40.4	33.9	32.3	31.7	34.3	39.9	42.7	44.4	46.3	46.9
Lowest min., °C	10.0	9.1	9.6	1.8	-1.1	-2.6	-4.1	-2.2	1.1	4.1	7.2	9.4	-4.1
No. of days 30.0°C and over	30	27	27	16	4	—	—	2	12	23	26	29	198
No. of days 40.0°C and over	15	10	1	—	—	—	—	—	—	1	2	5	32
No. of days 2.0°C and under	—	—	—	—	1	2	6	2	—	—	—	—	9
<i>Meekatharra —</i>													
Temperature:													
Mean max., °C	37.8	35.9	34.3	28.9	23.6	19.6	18.6	20.7	24.9	29.6	33.5	36.3	28.6
Mean min., °C	24.2	23.1	21.3	16.8	11.9	9.2	7.3	8.1	11.1	15.1	18.9	22.2	15.8
Highest max., °C	44.9	44.3	43.6	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	0.1	-0.6	5.2	7.2	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	—	—	—	—	—	2
<i>Laverton —</i>													
Temperature:													
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

TEMPERATURES AT REPRESENTATIVE CLIMATOLOGICAL STATIONS — *continued*

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
<i>OTHER INLAND — continued</i>													
<i>Kalgoorlie —</i>													
Temperature:													
Mean max., °C	33.6	32.0	29.5	25.2	21.0	17.8	16.5	18.2	21.7	26.1	29.4	32.0	25.3
Mean min., °C	18.3	7.7	15.8	12.3	8.3	6.7	4.8	5.1	7.3	11.0	14.0	16.5	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	7	6	1	—	—	—	19
<i>Rawlinna —</i>													
Temperature:													
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	0.0	-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	—	—	—	—	—	3	6	4	1	—	—	—	15
<i>Collie —</i>													
Temperature:													
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
<i>Manjimup —</i>													
Temperature:													
Mean max., °C	26.6	26.5	24.3	20.6	17.1	15.1	14.0	14.8	16.4	18.3	21.5	24.3	19.9
Mean min., °C	12.6	12.7	12.0	10.1	8.3	7.1	5.8	6.0	6.8	7.8	9.6	11.2	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	1.1	0.2	-2.8	-1.1	-0.6	0.1	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
<i>Pemberton —</i>													
Temperature:													
Mean max., °C	25.9	25.8	23.9	20.4	17.6	15.6	14.6	15.3	16.4	18.3	21.1	23.4	19.8
Mean min., °C	12.9	13.2	12.6	10.6	8.9	8.2	6.9	6.6	7.2	8.1	9.8	11.6	9.7
Highest max., °C	41.7	40.1	38.9	33.9	28.3	23.2	22.0	25.6	28.3	41.2	39.0	38.5	41.7
Lowest min., °C	4.4	4.4	3.9	2.7	0.0	-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	—	—	—	—	—	—	—	—	—	—	—	—	2
<i>Mount Barker —</i>													
Temperature:													
Mean max., °C	27.4	26.3	24.7	21.0	18.1	15.5	14.8	15.0	16.5	19.2	21.8	24.9	20.4
Mean min., °C	13.3	13.6	12.7	10.8	8.7	7.5	6.5	6.0	6.7	8.3	10.0	12.0	9.7
Highest max., °C	43.9	43.6	40.6	37.2	32.2	24.3	22.2	25.0	29.3	35.6	39.4	42.9	43.9
Lowest min., °C	1.7	3.9	3.6	2.2	0.6	0.0	-0.4	-1.3	-0.6	0.6	1.1	1.1	-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

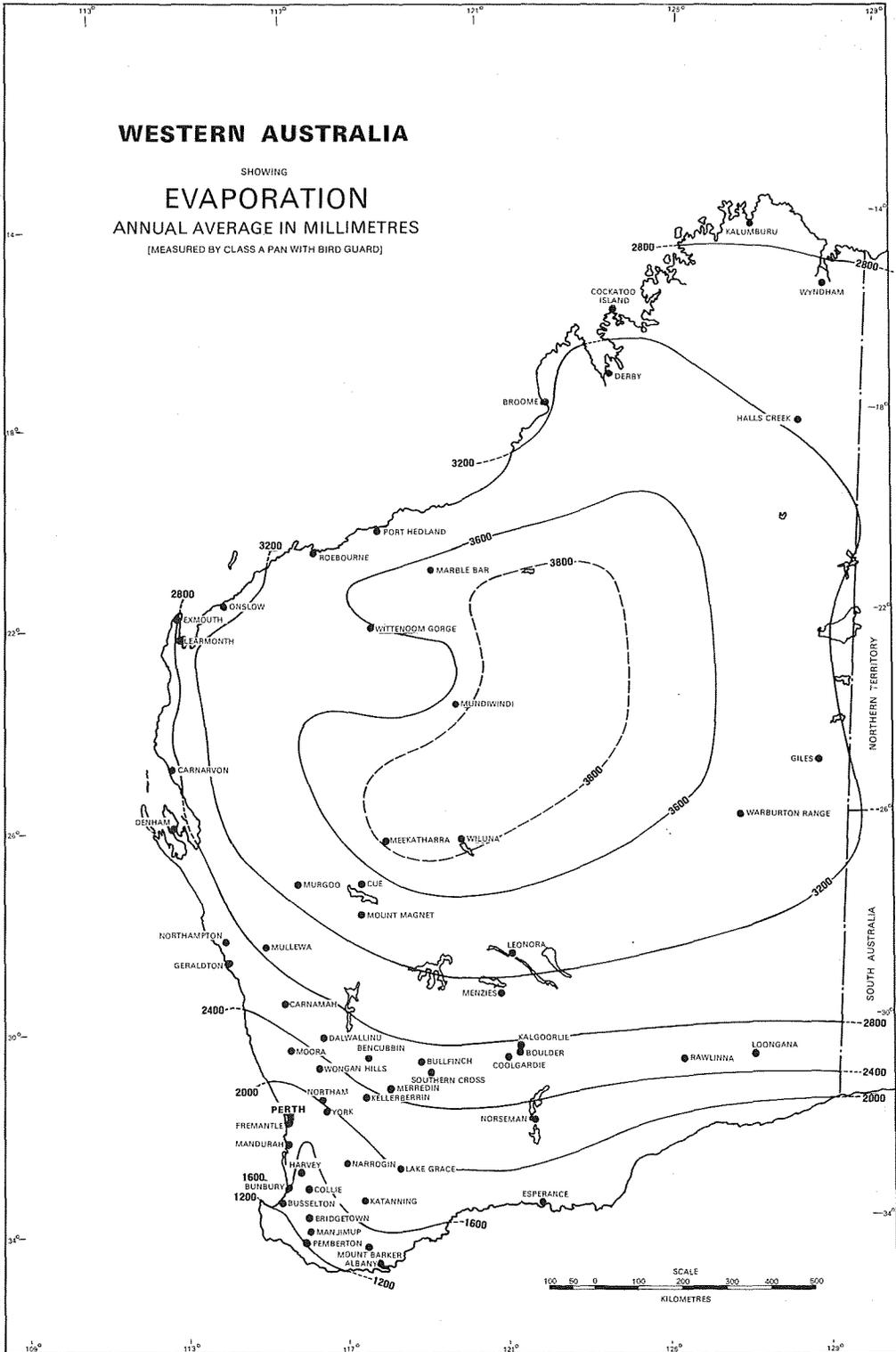
\* Number of occurrences is greater than 0.0 but less than 0.05.

## 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 any 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 in 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.

The average annual evaporation throughout the State, using the Class A pan evaporimeter with bird guard, is shown on the preceding map.

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. The median (50 percentile) value of the rainfall in this period is shown on the first map on page 46. The decile 1 (10 percentile) rainfall, (i.e. the rainfall total which on average is not exceeded in one year in ten) for the same period is also shown on page 46. The most critical part of the season for grain production is the period from July to September. Median rainfalls for this period together with the decile 1 values are shown on the maps on page 47.

METROPOLITAN CLIMATE

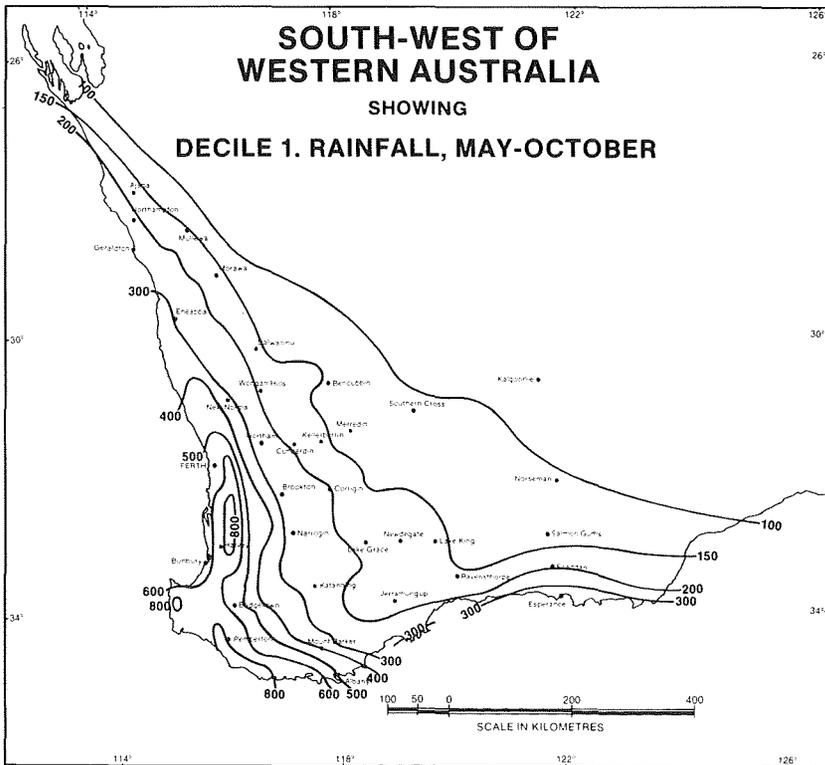
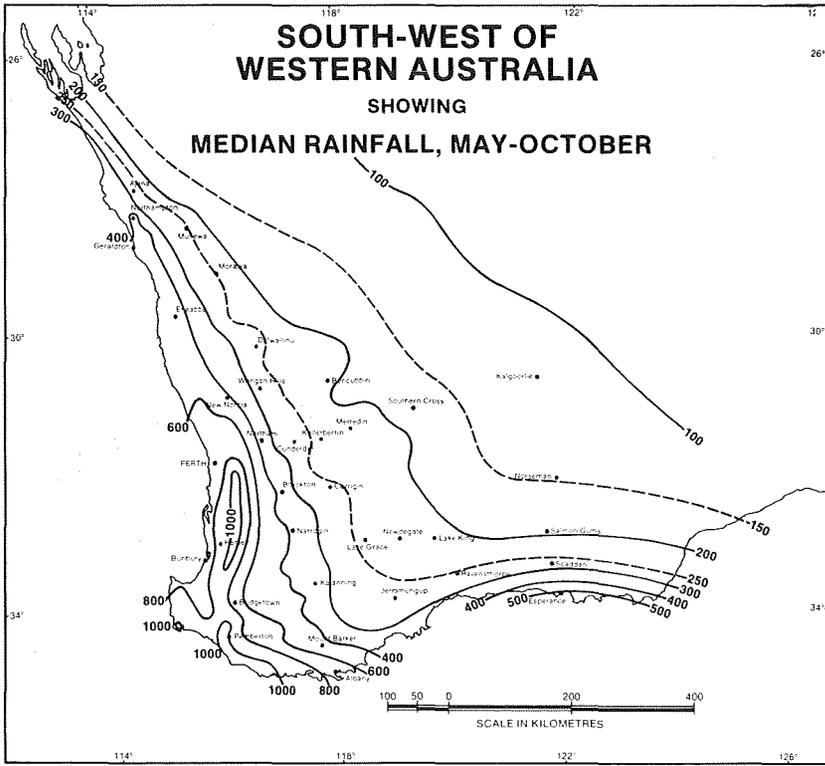
Perth has more sunshine and a greater number of clear days during the year than any other State capital city. It also has the wettest winter, the driest summer, and is the windiest of the capital cities. The highest temperature on record for Perth is 44.7°C (12 January 1978) and the lowest 1.2°C (7 July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

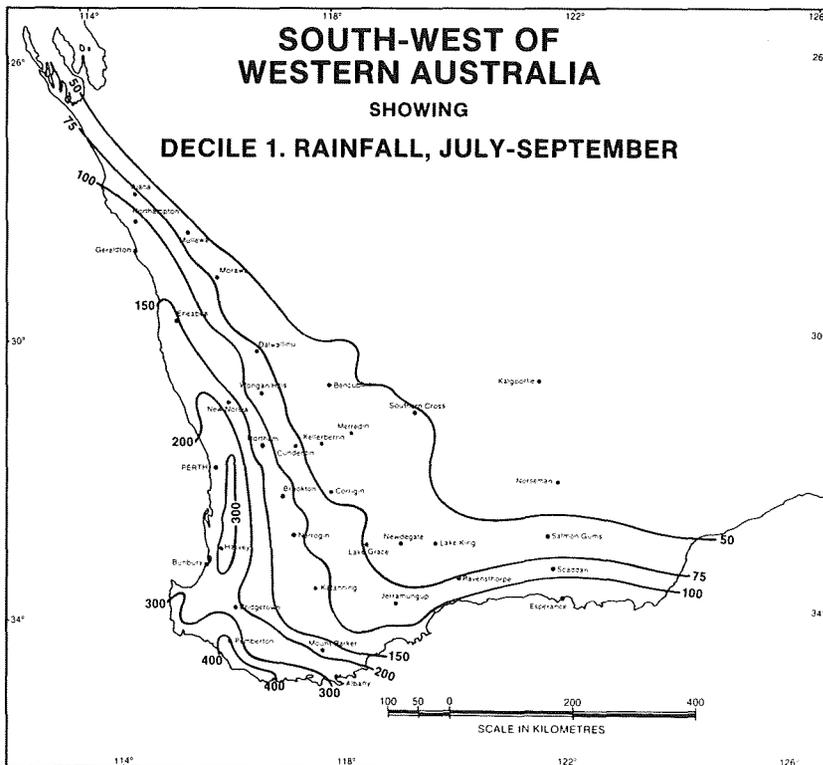
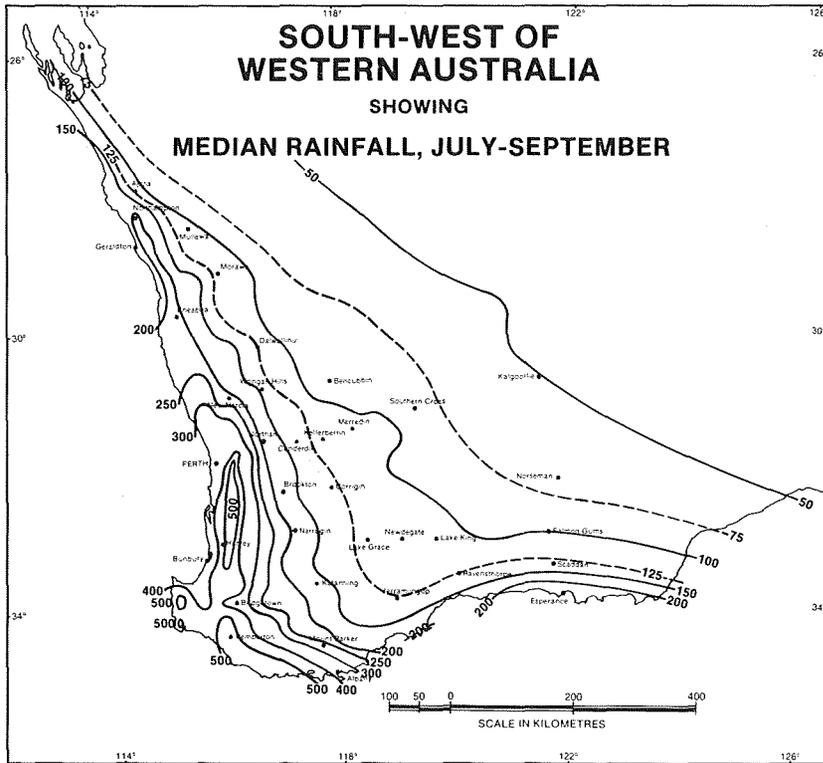
CLIMATOLOGICAL DATA — PERTH BUREAU OF METEOROLOGY

(For other data relating to Temperature and Rainfall see preceding tables.)

Month	Wind		Temperature				Relative humidity (Saturation = 100%)	Sunshine — Mean daily amount	Cloud (proportion of sky covered) — Mean readings at 9 a.m., 3 p.m. and 9 p.m.	Evaporation — Mean daily amount			
	Prevailing direction	Speed	Temperature		Highest in sun	Lowest terrestrial							
	9 a.m.	3 p.m.	Average	Highest			Mean	At 3 p.m.					
Number of years of observations	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	
January	E	SSW	17.5	89	80.7	22/1914	4.2	20/1925	53	43	10.4	29	9.3
February	ENE	SSW	17.2	113	78.7	4/1934	4.3	1/1913	52	43	9.8	31	8.9
March	E	SSW	16.2	113	75.0	19/1918	2.6	(c)	57	46	8.8	35	7.1
April	ENE	SSW	13.7	130	69.4	8/1916	-0.7	26/1960	60	48	7.5	42	4.4
May	NE	WSW	13.5	119	63.3	4/1925	-3.9	31/1964	68	58	5.7	54	3.0
June	N	NW	13.5	128	57.5	9/1914	-3.4	27/1946	72	63	4.8	59	2.3
July	NNE	W	14.2	137	56.2	13/1915	-3.8	30/1920	73	63	5.4	56	2.4
August	N	WNW	15.1	156	62.8	29/1921	-3.0	18/1966	71	60	6.0	56	2.8
September	ENE	SSW	15.1	113	67.5	29/1916	-2.7	(d)	64	57	7.2	49	4.0
October	SE	SW	16.1	104	71.8	19/1954	-1.2	16/1931	64	54	8.1	48	5.7
November	E	SW	17.2	102	75.0	30/1925	-1.1	1/1968	57	47	9.6	39	7.1
December	E	SSW	17.7	102	76.0	11/1927	3.3	29/1957	54	46	10.4	32	8.7
Year —													
Average	E	SSW	15.6	..	..	..	..	..	62	52	7.8	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.





## 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 Range for a short time nearly every winter, but elsewhere is very infrequent and of negligible importance.

## INTERSTATE COMPARISONS

In general, humidity and rainfall are lower in Western Australia than in corresponding places in eastern Australia. The following table shows average rainfall, mean humidity and temperature for groups of reporting stations at approximately the same latitude. The stations have been selected in such a way that, in each pair, one is on the west coast and the other on the east coast or, where a pair relates to inland stations, each station is situated at about the same distance from the coast. The group appearing last in the table has been included to provide a comparison between observations at Albany, the most southerly town in Western Australia, and those at places elsewhere in Australia at about the same latitude. The height above mean sea-level is also given for each station.

## INTERSTATE COMPARISONS — RAINFALL, HUMIDITY, TEMPERATURE

Reporting station	Height above mean sea- level	Average rainfall		Relative humidity (a)		Average daily mean temperature	
		May to October	November to April	May to October	November to April	May to October	November to April
	metres	mm	mm	%.	%.	°C	°C
Bunbury	5	743	132	75	66	13.7	19.6
Sydney, New South Wales	42	590	626	67	65	14.9	21.0
Perth	19	752	120	73	56	14.7	21.7
Newcastle, New South Wales	34	560	585	72	75	14.7	20.7
Kalgoorlie	380	133	123	64	49	13.8	23.1
Cobar, New South Wales	251	165	191	62	42	14.0	24.6
Geraldton	4	400	70	69	50	16.0	23.3
Brisbane, Queensland	42	366	780	64	65	17.7	23.7
Wiluna	518	87	156	49	32	15.9	27.1
Charleville, Queensland	294	158	357	56	46	15.5	25.7
Carnarvon	5	164	70	62	59	18.6	24.6
Bundaberg, Queensland	14	318	841	66	69	18.5	24.5
Mundiwindi	561	69	193	38	29	18.5	28.4
Longreach, Queensland	187	117	374	49	44	19.1	27.9
Onslow	4	118	151	53	46	20.6	28.3
Mackay, Queensland	11	262	1,378	72	75	19.5	25.3
Port Hedland	8	67	251	38	45	22.2	29.8
Townsville, Queensland	22	107	1,097	62	67	21.5	26.6
Derby	16	46	579	38	59	26.4	31.2
Innisfail, Queensland	7	912	2,732	82	81	21.2	25.7
Wyndham	7	52	721	34	52	27.5	31.4
Cooktown, Queensland	5	223	1,561	73	76	23.9	27.2
Albany	13	601	218	81	67	12.5	18.0
Adelaide, South Australia	43	365	168	68	50	13.4	20.5
Swan Hill, Victoria	70	201	144	77	51	11.8	20.6
Canberra, Australian Capital Territory	560	293	340	78	63	8.1	17.3

(a) Saturation 100%.

## Chapter 4

# FLORA AND FAUNA

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

Contributed by T. E. H. Aplin  
(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 which 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. The five families which are endemic in Western Australia are entirely restricted to the South-West Province. These are the Cephalotaceae, Eremosynaceae, Emblingiaceae, Ecdeiocoleaceae and Anarthriaceae. Other large groups of plants which are almost wholly endemic in this State are the *Chloanthaceae*, *Prostantheroideae* (Lamiaceae), *Persoonieae* and *Banksieae* (Proteaceae) and *Epacrideae* (Epacridaceae). The *Chamelaucoideae* (Myrtaceae), although not strictly endemic, has a high percentage of species restricted to Western Australia. 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%.

The State of Western Australia occupies about one-third of the continental land-mass of Australia and lies south of the equator between latitudes 13° and 35°. One-third of the State lies within the tropics, while the remainder extends into the temperate zone. 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, in general terms, 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.

The development of the so-called pan-Australian mesophytic flora, which includes the tropical broad-leaved genera *Cinnamomum* and *Tristania*, the more temperate genera *Dacrydium*, *Podocarpus*, *Araucaria*, *Nothofagus* and *Phyllocladus* and the typically Australian genera *Eucalyptus*, *Allocasuarina*, *Callitris* and *Banksia*, began early in the Tertiary era. 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 Gondwanaland. 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

(1) See Appendix for reference to additional information in earlier issues of the Year Book.

(2) See Chapter 3, — *Climate and Meteorology*.

sub-tropical rainforest and mangrove genera in abundance. This phenomenon has prompted the suggestion that some 'tropical' elements may in fact be 'palaeoantarctic' in origin. 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.

Certain floral and morphological characters are considered to be primitive or to have developed at a very early stage in the evolution of plants. Primitive floral characters are seen in 27 relict genera in Western Australia (17 in the South-West Province, 12 in the Eremaean Province and 16 in the Northern Province). They include *Cycas*, *Macrozamia*, *Callitris*, *Allocasuarina*, *Hibbertia*, *Emblingia*, *Codonocarpus*, *Persoonia*, *Clematis* and *Pandanus*. Relict species which have retained primitive morphological characters number 234 for the State. A large proportion of these are found in the South-West Province. One hundred and nine species are present in the Stirling botanical district. Many endemic genera are represented, e.g. *Isopogon*, *Adenanthos*, *Stirlingia*, *Synaphea* and *Franklandia* (Proteaceae) and *Andersonia*, *Sphenotoma*, *Cosmelia*, *Lysinema*, *Coleanthera* and *Conostephium* (Epacridaceae). *Thysanotus* (Liliaceae) and *Stylidium* (Stylidiaceae) which, although not strictly endemic in, are most richly represented in the State.

There are, in Western Australia, 1,024 species, in 267 genera and 69 families, listed as being rare or threatened. Of these, 853 (83 per cent) are present in the South-West Province. The families with the greatest number (over 50) of endangered species are Proteaceae, Leguminosae, Myrtaceae and Epacridaceae.

#### FORMATIONS AND ALLIANCES

The classification of vegetation involves the grouping 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.

The structural classification of plant communities is based on height/life form of the tallest stratum, and the projective foliage cover of the tallest stratum. Major structural formations recorded in Australia are summarised in the table which follows and further divisions based on height classes and projective foliage cover can be instituted. The nature of the understorey provides logical subdivisions to the formations.

To include floristic detail, the following three categories are often used to define subdivisions within a structural formation.

1. *Alliance* — A series of climax plant communities which have (i) the same structural characteristics, (ii) related species as dominants in the uppermost stratum, and (iii) possibly the same or related species in the understorey.
2. *Association* — A series of climax plant communities which have (i) the same structural characteristics, (ii) the same species as dominants in the uppermost stratum, and (iii) possibly different floristic composition in the understorey.
3. *Society* — A series of climax plant communities which have (i) the same structural characteristics, (ii) the same species as dominants in the uppermost stratum, and (iii) the same species prominent in the lower strata.

High open forest and high woodland are represented by *Eucalyptus diversicolor* (Karri), *E. marginata*-*E. calophylla* (Jarrah-Marri) and *E. gomphocephala* (Tuart) alliances, all in the South-West Province.

Forest formations are represented by *E. marginata*-*E. calophylla* and *Agonis flexuosa* (West Australian Peppermint) alliances in the South-West Province; and by *E. tetradonta*-*E. miniata* (Darwin Stringybark-Darwin Woollybutt), *E. tectifera*-*E. grandifolia* (Darwin Box-Cabbage Gum) alliances in the Northern Province. Woodland and open woodland formations are represented by *E. loxophleba* (York Gum), *E. wandoo* (Wandoo), *E. salmonophloia* (Salmon Gum), *E. occidentalis* (Swamp Yate), *E. astringens* (Brown Mallet), *E. cornuta* (Yate), *E. rudis-Melaleuca* spp. (Flooded Gum-Paperbark) and *Casuarina obesa* (Swamp Sheoak) alliances in the South-West Province; by *E. torquata*-*E. lesouefii* (Coral Gum-Goldfields Blackbutt), *E. dundasii* (Dundas Blackbutt) and *E. transcontinentalis*-*E. flocktoniae* (Redwood-Merrit) alliances in the Eremaean; and by *E. camaldulensis* (River Red Gum), *E. tectifera*-*E. grandifolia*, *E. tetradonta*-*E. miniata*, *E. latifolia* (Round-leaf Bloodwood), *E. papuana* (Ghost Gum), *E. polycarpa*-*E. apodophylla* (Small-flowered Bloodwood-Whitebark), *E. microtheca* (Flooded Box) and by *Terminalia* spp., *Melaleuca* spp. and *Adansonia gregorii* (Baobab) alliances in the Northern Province.

Low forest formations are represented by *Melaleuca lanceolata*-*Callitris preissii* (Rottneest Teatree-Rottneest Cypress Pine), *E. platypus*-*E. spathulata*-*E. annulata* (Moort-Swamp Mallet-Open-fruited Mallee), *E. cornuta* (Yate), *E. conferruminata* (Bald Island Marlock), *Agonis juniperina* (Warren River Cedar), *Banksia menziesii*-*B. attenuata*-*Allocasuarina fraseriana*-*E. todtiana* (Menzies Banksia-Slender Banksia-Fraser's Sheoak-Pricklybark), *E. falcata*, and *B. prionotes* (Acorn Banksia) alliances in the South-West Province. Low woodland and low open woodlands are represented by *E. erythrocorys* (Illyarrie), *Allocasuarina huegeliana* (Rock Sheoak) and *Banksia* spp. alliances in the South-West Province; by *E. brevifolia* (Northern White Gum), *E. pruinosa* (Silver Box), *E. dichromophloia* (Variable-barked Bloodwood), *E. argillacea* (Northern Grey Box), *E. microtheca*, *Grevillea striata* (Beefwood), *Lysiphillum cunninghamii* (Bauhinia) and *Melaleuca* spp. (Paper Bark) alliances in the Northern Province; and by *E. gongylocarpa* (Desert Gum), *E. kingsmillii* (Kingsmill's Mallee), *E. leucophloia* (Migum), *Allocasuarina decaisneana* (Desert Sheoak), *Acacia aneura* (Mulga) and *A. sowdenii* (Myall) alliances in the Eremaean Province.

Scrub formations are represented in the South-West Province by *Acacia rostellifera*-*A. cyclops*-*A. cochlearis*, *Agonis* spp., *Pultenaea reticulata*, *Melaleuca huegelii*, *M. globifera*, *E. foecunda* (Narrow-leaved Red Mallee), *Acacia* spp.-*Allocasuarina* spp.-*Melaleuca* spp. (Wodjil-Tamar-Broombush) and mixed Proteaceae-Myrtaceae alliances; and by *Melaleuca thyoides*, *Melaleuca uncinata* and *Acacia aneura* (Mulga) alliances in the Eremaean Province. High shrubland formations include *Actinostrobus arenarius* (Sandplain Cypress Pine), *Banksia ashbyi*-*B. sceptrum*, *B. baxteri*, *B. speciosa* (Showy Banksia), *E. redunca*-*E. uncinata* (Black Marlock-Hook-leaf Mallee), *E. tetragona* (Tallerack), *Grevillea eriostachya*-*G. didymobotrya*-*G. leucopteris* and *B. hookeriana*-*Xylomelum angustifolium* (Banksia-Sandplain Woody Pear) alliances in the South-West Province; and *Acacia* spp.-*Cassia* spp.-*Eremophila* spp., *E. kingsmillii*, *E. youngiana* (Large-fruited Mallee), *Acacia victoriae*, *A. pyriformis*, *A. pachycarpa*-*Grevillea wickhamii*, *Acacia lysiphloia*-*Acacia* spp., and *A. aneura* alliances in the Eremaean Province.

Heath and low heath formations are restricted to the South-West Province and are made of mixed communities in which the families Proteaceae, Myrtaceae, Epacridaceae, Xanthorrhoeaceae and Leguminosae are well represented. The genera *Dryandra*, *Banksia*, *Hakea*, *Allocasuarina*, *Xanthorrhoea* (Blackboy or Grass Tree), *Leptospermum*, *Kunzea* and *Melaleuca* usually dominate the heath communities. Shrubland and low shrubland formations are dominated by chenopodiaceous shrubs. The most important alliances are *Maireana sedifolia* (Blue Bush), *Atriplex* spp. (Saltbush) and *Halosarcia* spp. (Samphire), which are well represented in the Eremaean Province.

Hummock grasslands are dominated by species of *Triodia* and *Plectrachne*. These genera, commonly called Spinifex, grow outwards leaving the centre senescent or dead. This formation is found in the Eremaean Province. Tussock grasslands are dominated by species of *Astrebula* (Mitchell Grass), *Dichanthium-Chrysopogon* (Blue Grass-Ribbon Grass), *Iseilema* (Flinders Grass) and by *Themeda* (Kangaroo Grass) alliances with *Sehima* (White Grass), *Heteropogon* (Bunch Speargrass), *Cymbopogon* (Scent Grass), *Sorghum* (Wild Sorghum) and *Aristida* (Three-awn Grass)

usually seen only under woodland formations. Fringing grasslands include *Coelorhachis*, *Arundinella* (Reed Grass) and *Imperata* (Blady Grass). These formations are restricted to the Northern Province. Sedgeland is represented in the South-West Province by communities in which the families Juncaceae, Cyperaceae, Restionaceae and Anarthriaceae are prominent.

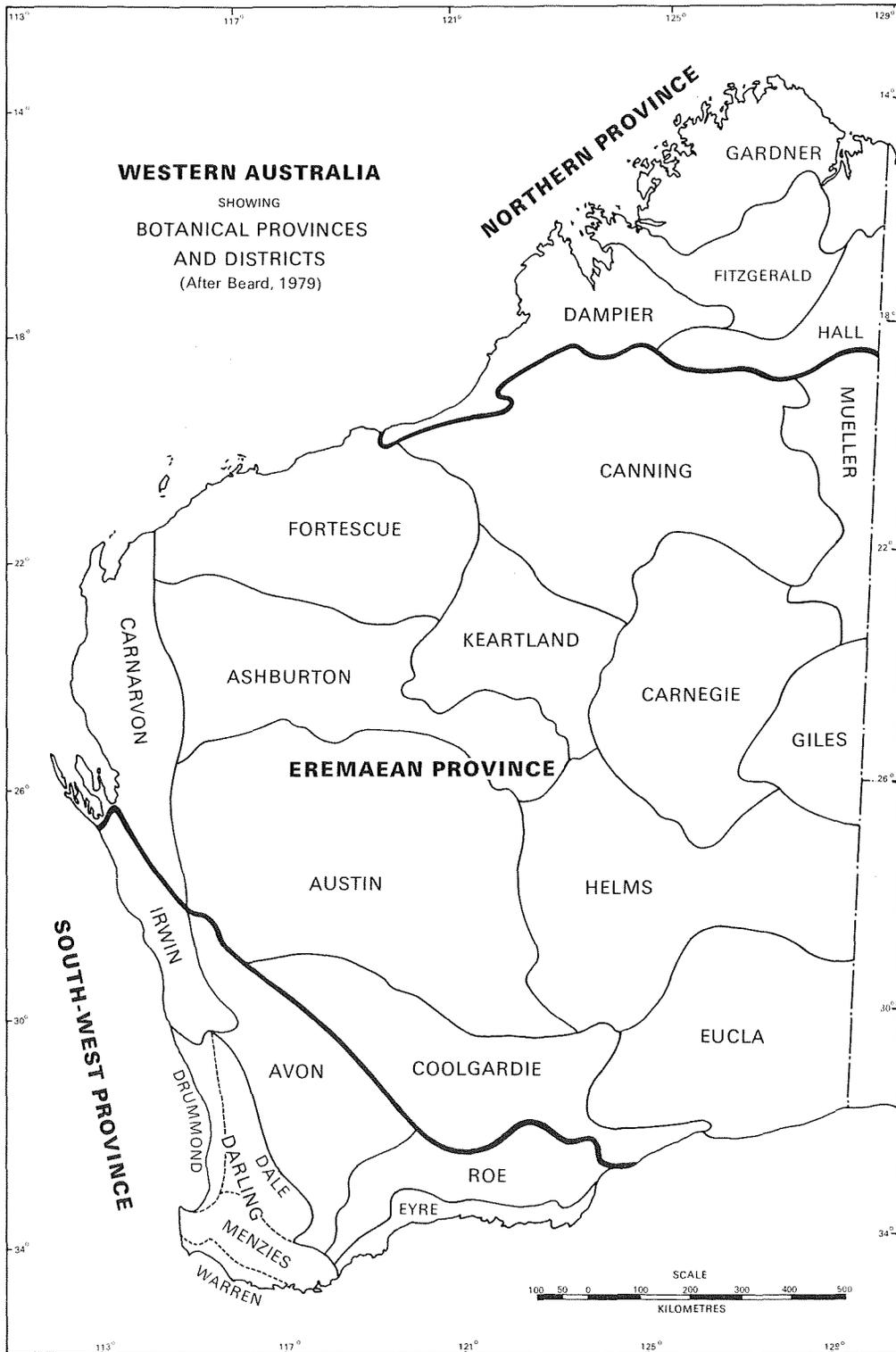
Other plant communities, recorded in edaphic complexes, include coastal dune vegetation, halophytic communities, swamp communities, lithic complexes and aquatic complexes. Each of these complexes may be unimportant in terms of area, but is of significance in providing the habitat for particularly interesting plants, e.g. *Cephalotus*, *Byblis*, *Drosera*, etc.

PLANT COMMUNITIES — MAJOR STRUCTURAL FORMATIONS

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

BOTANICAL PROVINCES AND DISTRICTS

The vegetation of Western Australia has been sub-divided 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 on the following map.



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

The vegetation formations consist 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. These alliances and sub-alliances include a number of plant associations. Each association is characterised by one or more *Eucalyptus* species. The understorey layers consist of a sparse low tree or high shrubland layer and a dense to moderately dense grassland layer. Small tree genera include *Cochlospermum*, *Terminalia*, *Atalaya* and *Erythrophleum*. Grass genera include *Dichanthium*, *Sehima*, *Chrysopogon*, *Sorghum*, *Heteropogon* and *Themeda*.

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. *Callitris intratropica* (Northern Cypress Pine) forms pure stands on deep red sands. *E. dichromophloia* alliance is found on skeletal sands in rugged sandstone areas. The small tree/shrub layer in the *E. tetradonta*-*E. miniata* alliance includes the genera *Petalostigma*, *Grevillea*, *Gardenia*, *Persoonia*, *Buchanania*, *Ventilago*, *Planchonia*, *Eugenia*, *Brachychiton*, *Terminalia*, *Acacia*, *Jacksonia* and *Melaleuca*. The grass storey is dominated by *Plectrachne pungens*, together with *Sorghum* and *Aristida*. Flats and levees usually carry a *E. polycarpa*-*E. apodophylla* alliance, while the very steep scarps carry a *Brachychiton* spp.-*Terminalia* spp.-*E. confertiflora* variable woodland.

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 podsolics, 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 alluvial flood plains of the Ord River system carry a tall grass formation including the genera *Dichanthium*, *Astrebala*, *Chrysopogon*, *Sorghum* and *Ophiurus*. Frontage woodlands carry a *E. papuana* alliance. *E. tetradonta*-*E. miniata* alliance occurs mainly on lateritic areas or on acid rocks. *E. tectifera*-*E. grandifolia* alliance occurs more commonly on soils formed on basic rocks, or shales and limestones.

**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 *Astrebala*, *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*. These areas have suffered severe wind and gully erosion and have in recent years been resown to the alien *Cenchrus ciliaris* (Buffel Grass). Low open woodlands of *E. argillacea* are present on red soils on basic rocks (limestone dolomites and volcanics).

**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 land systems eroded below the quartzite and sandstone surfaces comprise basalt hills with narrow valleys. The vegetation consists of *E. tectifera* woodlands with *Sehima nervosum-sorghum* sp. ground storey on the hills and *Chrysopogon* spp.-*Dichanthium fecundum* grassy understorey on the drainage floors and small areas of cracking clay plains.

**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* in almost pure stands of species. A short grass ground storey with *Enneapogon* and *Aristida* may be seen on the interfluves 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*.

Rocky limestone areas and shallow calcareous soils are characterised by *Triodia wiseana* hummock grassland. *Adansonia gregorii* open woodland association is largely restricted to rugged limestone country, although *A. gregorii* may be found associated with other species, e.g. with *E. dichromophloia* and *E. perfoliata* (Twinleaf Bloodwood) on granite tors or domes to the north. *E. dichromophloia*, *Grevillea striata* and *Lysiphyllum cunninghamii* low open woodland alliances occur on the outcrop plains over the gently folded sandstone, shale and limestone. These may be linearly oriented along strike lines and associated with *Acacia*, *Atalaya*, *Ventilago* and *Dolichandrone*. Cracking clay plains on the sedimentary rocks carry tussock grasslands of *Astrebla*, *Dichanthium* and *Chrysopogon*. The tributary alluvial plains of the Fitzroy River consist mainly of *Grevillea striata* and *Lysiphyllum cunninghamii* low woodland with *Triodia* and *Chrysopogon*. The stable and active flood-plains carry *Astrebla* and *Chrysopogon-Dichanthium* tussock grasslands, with *Acacia suberosa* as an important associate, and *E. papuana* and *E. microtheca* woodland alliances. Lining the main channels are *E. camaldulensis-Terminalia platyphylla* fringing communities. Coastal flats have fringing mangrove forests. Open grasslands of *Xerochloa* spp. occur on the margins of saline influence.

The Dampier botanical district contains extensive areas of sand 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 *Erythrophleum*, 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 grass ground storey is predominantly *Plectrachne pungens-Chrysopogon* spp. Shallow valleys, pans and depressions, which may be up to five kilometres wide, carry woodlands of *E. polycarpa*, *E. tectifera*, *E. microtheca* and *Melaleuca* spp. alliances, with various tall grasses. The saline coastal flats carry *Sporobolus virginicus* and *Halosarcia* spp. communities.

### 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. This district is intermediate in character between the Northern and the Eremaean Provinces. It consists of granite plains to the north and west, rising gently inland to a capping of basalt in the Chichester Range and beyond this to the dolomite and jaspilite of the Hamersley Range. 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. *Acacia* alliances have a strongly developed *Triodia pungens* hummock grassland ground layer. High shrubland and low woodland *A. aneura* alliance is found along the major valleys and southern flanks of the Hamersley Range. A sparse shrub layer and a short grass ground flora composed of *Eragrostis* (Love Grass), *Eriachne* (Wanderrie Grass) and *Aristida* characterise these communities. 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. *E. camaldulensis-Melaleuca leucadendron* fringing communities line the permanent pools of the Fortescue River. Coastal flats have fringing mangrove scrub.

**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*, *Bassia*, *Helipterum*, *Cephalopterum*, *Velleia*, *Swainsona* and other herbaceous annuals. *A. aneura* alliance consists of a number of sub-alliances and associations. These include the *A. aneura-Eremophila leucophylla*, *A. aneura-E. fraseri*, *A. aneura-A. tetragonophylla*, *A. aneura-A. craspedocarpa*, *A. aneura-A. sclerosperma*, *A. aneura-A. linophylla*, *A. aneura-Callitris huegelii*, *A. xiphophylla-A. grasbyi* and *A. sclerosperma-A. ramulosa* sub-alliances. *E. kingsmillii* is associated with *A. aneura*, and with a hummock grassland ground layer. *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*, *Heterodendron* and *Brachychiton*. The upper margins and floors of pans and salt lakes in the Austin district carry a *Halosarcia* spp. alliance. Fringing these flats are *Melaleuca uncinata* communities. The drainage channels are fringed by *E. camaldulensis* and *E. coolabah* (Coolibah) alliances.

**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, Keartland, Carnegie, Giles and Helms botanical districts comprise what was once called the Carnegie botanical district. These 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 ground layer of hummock grassland includes *Triodia* and *Plectrachne*. *Grevillea wickhamii* and *Acacia monticola* are dominant on stony rises. Low trees of *E. pruinosa*, *E. brevifolia*, *E. setosa* and *E. coolabah* occur at a very low density.

**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, *Allocasuarina 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 *A. aneura* alliance, prominent on basalt soils, has a ground flora of seasonal ephemerals and scattered *Eremophila* and *Cassia*.

**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. Salt lakes and salt pans are associated with halophytic communities of *Halosarcia* and *Atriplex* 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 sedgelands of *Evandra aristata*-*Anarthria* spp. in waterlogged areas. Seasonally flooded areas may also carry a *Melaleuca preissiana* low forest alliance. Small patches of *E. cornuta* woodland are to be seen on dune sands. Other species associated with the alliances include *E. jacksonii* and *E. guilfoylei* with *Banksia grandis*, *B. littoralis*, *Allocasuarina decussata*, *Agonis flexuosa* and *A. juniperina* as understorey trees and a dense high shrub layer of *Trymalium*, *Chorilaena*, *Hovea elliptica*, *Acacia pentadenia*, *Albizia* and *Pteridium*, (in *E. diversicolor* alliance) and *E. patens*, *E. megacarpa* and *E. rudis* with *Banksia grandis*, *B. littoralis*, *Allocasuarina fraseriana*, *Persoonia longifolia*, *P. elliptica*, *Nuytsia floribunda* and *Xylomelum occidentale* as understorey trees and a low shrub heathlike groundlayer (in *E. marginata*-*E. calophylla* alliance).

The *Menzies* subdistrict marks the transition from the Warren subdistrict, with its high rainfall, to the Dale subdistrict where the annual rainfall for the most part scarcely exceeds 600 mm. The vegetation is predominantly *E. marginata*-*E. calophylla* open forest, merging eastwards into *E. wandoo* and *E. cornuta* woodlands.

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. This alliance has an understorey tree layer of *Banksia grandis* and *Agonis flexuosa*, with a sparse shrub layer. 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; *Actinostrobos pyramidalis* (Swamp Cypress Pine) is of local significance. 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 understorey layers of the *E. marginata-E. calophylla* alliance resemble those in the same alliance in the Warren district. The *E. wandoo* understorey layer has a more open character. This alliance, which in its most highly developed state fringes the eastern boundary of this district, is more widely distributed in the Avon botanical district.

**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. This district forms one of the two floristically important cusps of the South-West Province. 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 *Actinostrobos 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. These formations, which make up the Kwongan, vary considerably in floristic composition.

On the metamorphic rocks, the vegetation on residual flat tops and plateau surfaces carries low forests of *B. prionotes* alliance with heath on the lateritic surfaces. A low woodland formation of *E. loxophleba-Acacia acuminata* alliance dominates the loamy valley soils, now extensively used for farming. This alliance is associated with a herbaceous ground layer composed of *Stipa*, *Neurachne* and seasonal ephemerals. *E. salmonophloia* alliance is significant only in the eastern part of the district.

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. todtiana* and *B. prionotes* alliances particularly on the deeper sands. *E. lane-polei* (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. The heath communities vary in composition, depending upon the depth of sand and the presence of laterite, and some may eventually develop into high shrubland communities with long-term fire protection. Proteaceae, Myrtaceae and Leguminosae are dominant components, while on laterite hills *Xanthorrhoea reflexa* and *Dryandra* spp. become very conspicuous. *Banksia hookeriana* alliance is locally significant north of the Arrowsmith River. High shrubland communities with *Grevillea eriostachya-G. didymobotrya-G. eriostachya*, *Lambertia multiflora* (Native Honeysuckle) and *Actinostrobos 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. Poisonous plants of the genera *Gastrolobium* and *Oxylobium* are commonly seen in this woodland formation. On granite outcrops, a vegetation complex reflects the succession of colonisation by algae and lichen to shrublands with *Leptospermum* and eventually to climax communities of woodland of *Allocasuarina huegeliana* alliance, which occur on sandy or gritty soils over one metre in depth.

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).

Forming a mosaic with the woodland formations are the low woodland and shrubland formations of Kwongan developed on the plateau areas, on sandy yellow earths containing ironstone gravel and over mottled or pallid-zoned clays. *B. prionotes* woodland alliance and *Acacia* spp.-*Allocasuarina* spp.-*Melaleuca* spp. and *Grevillea eriostachya*-*G. didymobotrya*-*G. leucopteris* shrubland alliances occur on yellow sand. *Dryandra* spp. and mixed Myrtaceae, Proteaceae, Leguminosae and Epacridaceae heath alliances occur on laterite or shallow sand over laterite. Other shrubland formations include *E. eremophila* (Tall Sand Mallee), *E. oldfieldii* (Oldfield's Mallee), *E. drummondii* (Drummond's Gum), *E. pyriformis* (Pear-fruited Mallee) and other mallee or shrub eucalypt alliances. *E. macrocarpa* (Mottlecah) shrubland occurs on deep sand.

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 watercourses. *E. sargentii* (Salt River Gum) and *E. kondininensis* (Kondinin Blackbutt) grow on saline soils.

**The Eyre Botanical District.** The Eyre botanical district, which includes the Stirling and Mount Barren Ranges, forms the second of the two floristically important cusps of the South-West Province. It 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. They are noted for their diversity in the flora and their conspicuous endemic or near endemic species. 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. The former alliance is favoured by higher rainfall and winter wet sites and is often seen on or around clay pans. Low forests of *E. platypus*-*E. gardneri*-*E. falcata* alliance occur locally on scarp slopes. Salt lakes are covered by or fringed by low shrubland formations of *Halosarcia* spp. and *Atriplex* spp. alliances. A scrub formation of *Melaleuca* spp. alliance may also be present.

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. Coastal swamps carry a *Melaleuca* spp. alliance. Islands of the Recherche Archipelago carry low forests of *E. cornuta* and *E. conferruminata* as well as mixed scrub and heath formations.

**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. These merge into *E. eremophila*-*E. oleosa* and *E. redunca*-*E. uncinata* tall shrublands. *E. forrestiana* (Fuchsia Mallee) is present in these alliances. Further to the east, on limestone, the tall shrubland is dominated by *E. cooperiana* (Many-flowered Mallee). Patches of *E. falcata* and *E. gardneri* occur on higher ground, particularly to the west. *E. platypus* low forest is found in pockets on clay soils, *E. salmonophloia* and *E. occidentalis* woodlands are seen in the valleys, the former to the north, the latter mainly to the south.

The salt lakes carry *Halosarcia* spp. low shrubland communities. These are fringed by *Melaleuca* spp. low woodland or shrubland communities. The dominant species are *M. lateriflora* and *M. uncinata*.

#### NATURALISED FLORA

The naturalised flora of Western Australia which now makes up so much of the landscape of the South-West Province is composed of elements from many parts of the world. These plants have in some instances been deliberately introduced, others have been introduced by accident. Some species have been introduced on more than one occasion and several variants may be present. The more successful species originate from areas of similar climate, and in the absence of disease and insect attack, which in their native habitat would keep them in check, are able to disseminate at an alarming rate. South Africa and the Mediterranean Region provide most of the successful alien species found in the South-West Province.

Grasses of importance are represented by the genera *Bromus* (Brome Grass), *Lolium* (Rye Grass), *Hordeum* (Barley Grass), *Avena* (Oats), *Aira* (Silver Grass), *Briza* (Blowfly Grass), *Poa* (Winter Grass), and *Vulpia* (Silver Grass) from Southern Europe, and *Eragrostis* (Love Grass), *Ehrharta* (Veldt Grass) and *Rhynchelytrum* (Red Natal Grass) from South Africa. Pasture legumes from southern Europe include *Trifolium* (Clover), *Medicago* (Medic, Lucerne), *Lupinus* (Lupin), *Ornithopus* (Serradella), *Vicia* (Vetch) and *Lotus* (Birdsfoot Trefoil). *Psoralea pinnata* (African Scurf Pea) from South Africa is a shrubby weed.

The weed flora of Western Australia is composed largely of alien species. Very few native species have become weeds in this State. The ubiquitous composite *Arctotheca calendula* (Cape Weed) originates from South Africa, as do *Arctotis*, *Berkheya*, *Osteospermum*, *Gorteria*, *Cotula* and *Ursinia*. Naturalised European composites include *Carthamus* (Saffron Thistle), *Hypochoeris* (Flat Weed), *Carduus* (Slender Thistle), *Dittrichia* (Stinkwort), *Lactuca* (Lettuce), *Conyza* (Fleabane), *Centaurea* (Cockspur Thistle) and *Cirsium* (Spear Thistle). The Brassicaceae, significant as crop weeds, comprise *Raphanus* (Radish), *Brassica* (Turnip), *Rapistrum* (Turnip Weed) and *Sinapis* (Charlock). *Carrichtera annua* (Ward's Weed) is widely naturalised in the Eucla district. All these are of European origin. The South African Iridaceae are represented by genera such as *Homeria* (Cape Tulip), *Watsonia*, *Gladiolus*, *Moraea*, *Ixia* and *Sparaxis* and were introduced in the first instance

as garden subjects. *Echium* (Paterson's Curse) (Boraginaceae) was another garden introduction, while *Rubus* (Blackberry) (Rosaceae), a woody species, was introduced for its fruit. *Oxalis* (Soursob) (Oxalidaceae), from South Africa, is common in vineyards and orchards, while the family Polygonaceae is represented by *Rumex* (Dock) and *Emex* (Double Gee), weeds of wide habitat. The latter, introduced as a spinach from South Africa, is now extremely widely distributed in the South-West and Eremaean Provinces. Also widely distributed is *Argemone* (Mexican Poppy) (Papaveraceae), with origins in North America. *Prosopis* (Mesquite) (Mimosaceae) and *Parkinsonia* (Ceasalpinaceae) from the Americas, and *Calotropis* (Asclepiadaceae) from Africa, are weedy shrubs or small trees naturalised in the tropics.

In addition to the naturalised alien species which now exceed 750 in number, there are hundreds of species of plants under cultivation in Western Australia. These include field crops (cereals, legumes, fibre and oil seeds), horticultural plants (fruit, vegetables and garden subjects) and forest trees. Other species are being deliberately introduced for particular purposes, e.g. the reclamation of waste land and saline areas.

As man's activities further impinge upon the natural ecosystems and as more and more alien plants become naturalised in this State, so will the effect of these plant species be more widely felt in the natural environment. It is essential to have information on the biology of alien species so that proper management measures can be applied to maintain harmony within our natural ecosystems.

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# The Fauna of Western Australia

(Contributed by the Western Australian Museum)

## EXTINCT FAUNAS (1)

Earth's oldest recorded organic remains occur in Western Australia. Stromatolites discovered in a deposit of barytes, about sixty kilometres north-west of Marble Bar were dated using radioisotopes at about 3,500 million years old and represent the earliest evidence of life yet discovered. They are finely, often intricately layered structures, frequently dome-shaped, in which sediment particles have been trapped by films of simple, single-celled organisms known as Cyanobacteria. Stromatolites have been found sporadically throughout sediments of Precambrian age; remarkably, living survivors also occur in Western Australia, the best known examples being at Hamelin Pool, Shark Bay.

The explosive development of invertebrate marine life in the Cambrian Period (570-500 million years ago) is revealed by limestones and shales of the East Kimberley-Ord River district, crowded with trilobites (*Redlichia*, *Xystridura*), brachiopods (*Wimanella*, *Billingsella*) and *Biconulites*, the affinities of which are uncertain.

The following Ordovician Period (500-440 million years) saw a substantial thickness of marine deposition in the West Kimberley, with abundant fossil nautiloids (e.g. *Kyminoceras*) and other molluscs, graptolites, trilobites (particularly asaphids) and brachiopods (*Spanodonta*).

The Silurian Period (440-395 million years) seems to have passed with little sedimentation in Western Australia, affording only limited evidence of marine life. In the lower Murchison district however, a vast, sandy deltaic deposit was formed around the mouth of what must have been an extensive river system draining highlands of the interior. This sandstone deposit, now incised by the gorge of the Murchison River, has preserved numerous tracks of a range of marine animals. Most significant are those of large, scorpion-like predators known as eurypterids. The Murchison River tracks are believed to be the most extensive of their kind found to date but as yet no associated animal remains are known from the area.

Seas of the Devonian Period (395-345 million years) abounded in early forms of fish, and marine limestones of this age in the West Kimberley have yielded an abundance of exquisitely preserved fossils. These include numerous primitive armoured fishes (Placoderms), a sea-living lungfish (Dipnoan), Rhipidistians, Acanthodians and other early forms of bony fishes. Extraction of these fossils from hard limestone nodules has been achieved by dissolution of the matrix in acid, preserving the most delicate skeletal structures. Because of their fine preservation, these fossils have formed the basis of important research into early fish evolution. Associated fossils include an order of Phyllocarid crustaceans, the Concavicularia, known only from these deposits, and nautiloids (*Orthoceras*).

Extensive, shallow-water Devonian limestone reef complexes occur around the south-western part of the central Kimberley Block and contain abundant, diverse and well-preserved marine faunas, including extensive stromatoporoids (*Amphipora*, *Actinostroma*), corals (*Hexagonaria*, *Thamnopora*), brachiopods (*Stringocephalus*, *Ladjia*, *Schuchertella*), nautiloids (*Beloceras*), goniatites (*Manticoceras*, *Platyglymeria*), 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 Period (345-280 million years) in Western Australia saw deposition confined to limited areas of the East and West Kimberley and Carnarvon areas. The few known marine formations from this time contain rich invertebrate faunas, including corals (*Syringopora*) brachiopods (*Camarotoechia*, *Cleiothyridina*, *Unispirifer*), trilobites, molluscs and bryozoans. Land plants occur occasionally, and their microfossil remains are abundant, indicating that terrestrial vegetation continued to evolve during the period. No coal measures are known from the Carboniferous of Western Australia.

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(1) Contributed by K. J. McNamara and G. W. Kendrick.

Permian deposits (280-225 million years) cover extensive areas in Western Australia and include some of the richest fossil-bearing marine beds in the State. Principal occurrences are in the West Kimberley, Carnarvon and Irwin River districts where marine formations overlie Lower Permian glacial and associated sediments. The warming, post-glacial seas of the Early Permian supported diverse invertebrate faunas, including crinoids (*Calceolispongia*, *Jimbacrinus*), brachiopods (*Neospirifera*, *Linoproductus*, *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*. Similar Permian floras are known from southern Africa, South America, India and Antarctica which are all now regarded, together with Australia, as dispersed fragments of the ancient supercontinent of Gondwana.

Rocks of the Triassic Period (225-194 million years) are exposed only in a few small areas of the State and the fossil record is impoverished by comparison with the preceding Permian. A shallow marine deposit in the Erskine Range, West Kimberley, contains a spectacular fauna of 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 also other invertebrates, including molluscs and brachiopods. This formation, the Kockatea Shale, is considered to be the source of the oil and gas extracted from the Dongara area. Terrestrial deposits in the West Kimberley contain remains of the 'Seed Fern' *Dicroidium*, the bennettitalean *Otozamites* and other plants.

Again, few fossil-bearing sediments of Jurassic age (194-135 million years) are known in surface exposures from Western Australia. Marine sediments laid down at this time 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; no corals are known as yet. Slightly younger marine faunas in the West Kimberley area 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* of eastern Asia. These are all non-flowering gymnosperms; the flowering plants are unknown until well into the following Cretaceous Period.

Extensive fossil-bearing deposits located, mainly in the Perth, Carnarvon and West Kimberley areas, represent the Cretaceous Period (135-65 million years) in Western Australia. Widespread deepwater radiolarites in the Carnarvon hinterland contain the large ammonites *Tropaeum* and *Australiceras*, numerous belemnites and occasional remains of large marine reptiles. Chalk occurs sporadically from near Exmouth Gulf southwards to near Perth and contains rich faunas of bivalves (*Inoceramus*, oysters, etc.), brachiopods (*Inopinatarcula*, *Magadina*), crinoids (*Marsupites*, *Uintacrinus*) and occasional pachydiscoid ammonites. Chalk-associated greensands in the Gingin-Dandaragan district have yielded ichthyosaur, plesiosaur and mososaur remains, as well as shark teeth.

A Late Cretaceous marl near Exmouth Gulf is notable for its prolific ammonite fauna, including *Eubaculites* and numerous pachydiscids, which lived close to the time of extinction of this remarkable 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. Little is known of later Cretaceous vegetation in Western Australia but presumably this became progressively more advanced. The Antarctic beech (*Nothofagus*), an angiosperm, probably appeared in Western Australia during the later Cretaceous,

together with relatives of *Banksia* and other early forms of flowering plants. Geological separation of Australia and Antarctica began during the Cretaceous and the numerous Gondwanic elements in the flora and fauna of Australia probably have their origins then.

The onset of the Tertiary Period (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. Changes in the terrestrial vegetation appear to have been less sweeping, with evidence of greater continuity with later Cretaceous flora. Despite its close proximity to Antarctica during the Early Tertiary, Australia generally seems to have experienced a warmer, more humid climate than at present.

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 (*Tegulorhynchia*) and bryozoans; the nautiloids *Aturoidea*, *Deltoidonautilus* and *Teichertia* are also represented.

Eocene (55-40 million years) marine and continental deposits in the Carnarvon hinterland contain well-preserved faunas, notably corals and molluscs including the nautiloid *Aturia*. Paleocene and Eocene marine fossils from this area show strong affinities with those of similar age in Madagascar and south-eastern Africa. Plant remains associated with marine fossils in the Eocene beds of the Kennedy Range include familiar modern genera, such as *Banksia* and *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 of Western Australia 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*. Studies to date suggest that this fauna is partly related to others of similar age in south-eastern Australia and partly to those of Indian Ocean sub-tropical waters.

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* and the tropical-estuarine *Nypa* Palm, the Antarctic beech, *Nothofagus*, mangroves including rhizophoraceans and genera of humid-tropical affinity, such as *Ficus*, *Terminalia*, *Bombax*, *Anacolosia* and certain proteaceae indicate vegetation profoundly different from that now characteristic of the region and more consistent with a humid temperate rainforest environment.

Nothing is known of life in Oligocene time (38-23 million years) in Western Australia but, in the subsequent 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. Studies of these fossils are at an early stage but suggest that the two areas have few elements in common. Affinities of the northern fauna lie strongly with the tropical Indo-Pacific; those of the Nullarbor area lie mainly with south-eastern Australia. The pollen record indicates that eucalypts, acacias and the daisy family first became widespread in Australia at that time.

No terrestrial fauna or vegetation is known from confirmed Miocene beds in Western Australia, but toward the end of the period, a marked intensification of global cooling has been 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. Molluscs are the predominant group and include the pelagic ianthinid gastropod *Hartungia* and the arcoid bivalve *Cucullaea*; the faunas combine living and extinct species and genera. The coastline near Perth lay close to the foot of the Darling Scarp, the Swan Coastal Plain being, for a time, wholly submerged.

The Quaternary Period spans the last 1.6 million years of geologic time, continuing to the present. An extensive marine deposit formed mainly during the early part of this period underlies

the Swan Coastal Plain and has become a major unconfined aquifer for domestic and industrial water. Its rich, undescribed fossil fauna comprises mostly living species but includes a number of Pliocene forms.

Emergent Quaternary marine deposits are common near the coastline and estuaries of Western Australia, occurring often as lenticular shell beds, within aeolian sandy limestones. The extensive fossil faunas comprise mostly living species but these can show substantial differences in geographic range compared with their modern descendants. These differences appear to reflect responses to the extreme global-climatic instability of Quaternary time, causing frequent, dramatic oscillations of sea levels and shoreline positions.

Many caves formed in Western Australia during Quaternary time, especially in limestone areas. Sediments formed within them have preserved the fossil remains of a vertebrate fauna of much greater diversity than that recorded today. Fluvial and other water-laid deposits have also yielded remains of this fauna, which combines familiar living species with extinct, often large-bodied 'megafauna'. The latter include species of kangaroo (*Macropus*) larger than any living kangaroo, as well as other large macropods including *Sthenurus* and *Protemnodon*; the large diprotodontid *Zygomaturus*; 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*. Similar or related forms occur elsewhere in Australia and evidence of association with Man has been noted on occasions. When these elements became extinct is unknown, but it appears to have been more than 40,000 years ago.

Towards the close of the Pleistocene Epoch, some 30,000 years ago, there seems to have been a migration of marsupial species and other fauna from drier northern and inland areas into the now forested lower south-west. Species involved included a Rock Wallaby (*Petrogale*), the Woilie and Boodie (*Bettongia*), a rodent (*Pseudomys*) and the Ghost-bat (*Macroderma*). Subsequently, these disappeared from the area, possibly as a consequence of climatic or other environmental change, while the Thylacine (*Thylacinus*) and 'Tasmanian Devil' (*Sarcophilus*) became totally extinct within Western Australia, the Thylacine disappearing about 3,500 years ago. The Dingo (*Canis*) 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.

Along the coast some 6-4000 years ago, sea temperatures appear to have been a little warmer than at present, judging from the presence of tropical marine fossils, some well to the south of their modern ranges. The coastline at that time featured many lagoons and other embayments, most of which are now cut off from the sea by dune barriers. A notable example is the salt lake system of Rottneest Island, which at that time supported a rich marine fauna, distinct from any now living.

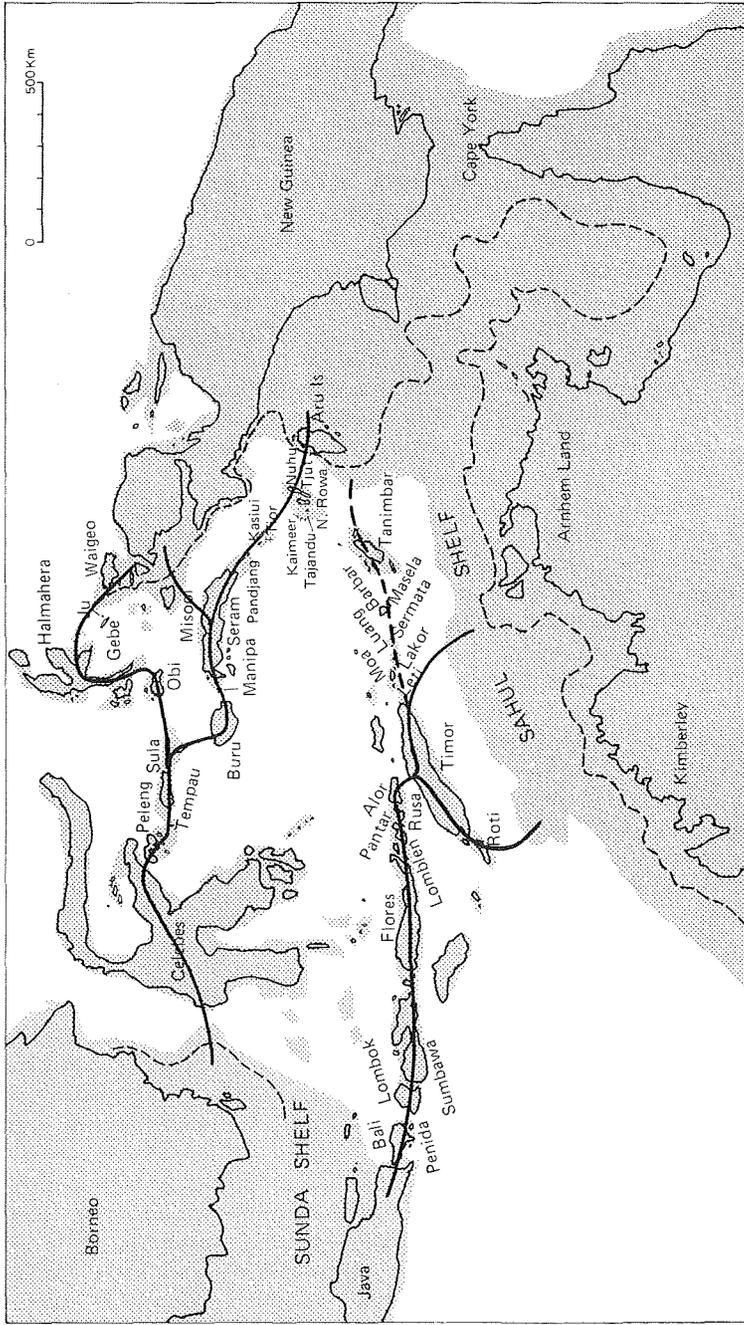
## CONTEMPORARY FAUNAS

### Origins and Distributional Patterns (?)

**Terrestrial.** The origins of the Western Australian fauna can be explained by the breakup of the southern hemisphere supercontinent, Gondwanaland, in the Cretaceous (about 130 million years ago) and the northward drift of Australia during the Tertiary (65-1.6 million years ago) 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 man) less able to cross wide 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 the Celebes to New Guinea and Cape York Peninsula, and via the Sunda Arc to the Kimberley and Arnhemland. (See map on page 68.)

(?) Contributed by P. F. Berry.

### FAUNAL MIGRATION ROUTES TO AUSTRALIA

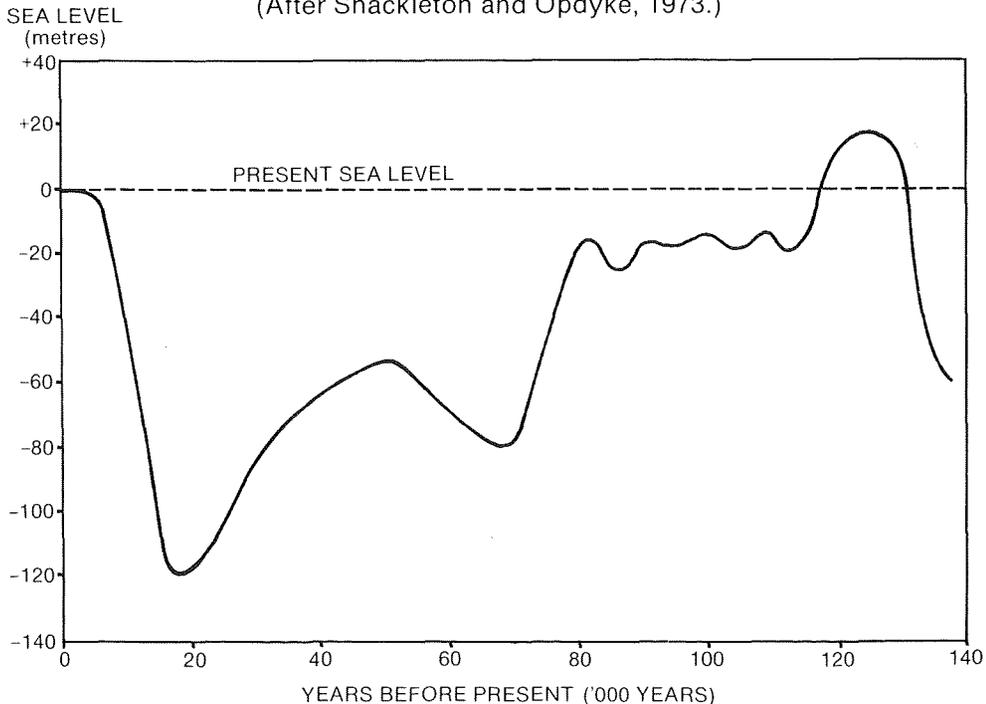


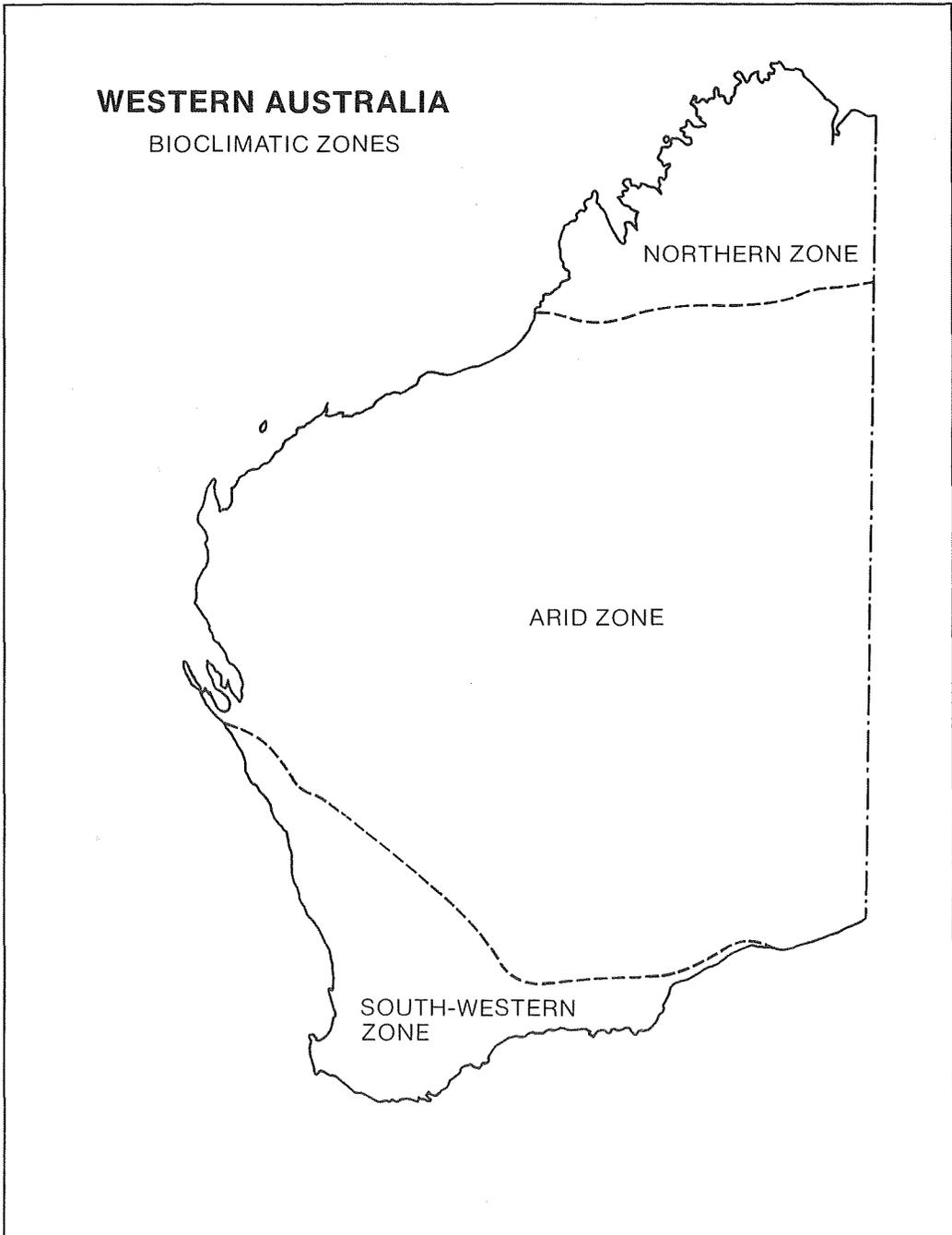
Exposed land areas at the lowest sea-level of approximately minus 120 m (stippled) and at the average sea level over the last 120,000 years of minus 50 m (dotted line). Postulated faunal migration routes are shown as solid lines (redrawn from Birdsell, 1977).

The present distribution of the modern Western Australian fauna reflects not only past geological and climatic events, particularly those of the Quaternary (the last 1.6 million years), but also current short term climatic oscillations. The latter can be measured in only tens of years, and may result in expansion or contraction of range at population level. The broad distribution patterns of most living terrestrial animals can generally be related to today's major climatic zones (see map on page 70.) These 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 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 (Pygopodidae), an onychophoran (*Occiperipatoides*) and the Salamander Fish (*Lepidogalaxias*).

The distribution of some terrestrial species, particularly medium-sized marsupials, has been substantially modified by recent direct and indirect influence of European man (e.g. 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 (see graph below), 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.

ESTIMATED VARIATIONS IN SEA LEVEL OVER THE LAST 140,000 YEARS.  
(After Shackleton and Opdyke, 1973.)





Western Australia showing the northern zone of reliable summer rainfall, the arid zone of seasonally unreliable rainfall and the south-western zone of reliable winter rainfall, which correspond with the three major faunal divisions.

Elevation has little influence on broad faunal distribution as Western Australia is of generally low relief, heights above sea level averaging only about 400 metres with a maximum of 1,200 metres in the north-west.

**Inland Waters.** The inland waters of Western Australia may broadly be divided into rivers and inland drainage systems.

The flow regimes of the rivers reflect the main climatic zones of the State. Rivers of the northern zone flow during the summer wet season. During the winter dry season flow becomes dependent on groundwater and may cease altogether, leaving only pools as permanent habitat for aquatic life. 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. Most of the small creeks along the north-western coast only flow after heavy rain and are too ephemeral to support an aquatic fauna. 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), a freshwater mussel (*Westralunio*) and the Salamander Fish (*Lepidogalaxias*).

The inland drainage systems can be divided into (i) freshwater 'gnamma-holes' usually in granite outcrops, claypans (including man-made dams), swamps, soaks and lakes, and (ii) saline lakes.

Gnamma-holes, claypans and soaks of the arid zone are characterised by an ephemeral fauna, mainly of branchiopod crustacea, but chironomid midge larvae may be conspicuous. Many birds and mammals that require free water to drink are dependent on them and 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. When dry, aggregations of aestivating salt lake snails (*Coxiella*) may be found as well as lycosid spiders and carnivorous tiger beetles (Cicindelinae).

**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 regarded as being 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 fauna largely restricted to the Australian south coast. The south coast has experienced less stable environmental conditions than the north since the break-up of Gondwanaland, including circulation changes (development of the west wind drift) and marked temperature fluctuations due 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 well-known commercially important examples are the Western Rock Lobster *Panulirus cygnus* and the Western Jewfish *Glaucosoma hebraicum*.

The State's coastal marine fauna is distributed along 12,500 kilometres of coastline which may be divided into the following broad habitat zones according to basic geomorphology and physical environmental factors.

1. From the Western Australian-Northern Territory border to Cape Leveque: A coast of drowned river valleys with very broken coastline, a very high semidiurnal tidal range, high turbidity, regular high summer runoff from well vegetated hinterland and no exposure to heavy oceanic swell. The best development of mangroves in the State occurs here.
2. From Cape Leveque to Cape Keraudren: Characterised by long, straight sandy beaches unbroken by headlands, a high semidiurnal tidal range, high to moderate turbidity, minimal irregular runoff; desert sands are blown into the sea by the prevailing offshore winds.
3. From Cape Keraudren to North West Cape: An indented coastline with moderate, semidiurnal tidal range, moderate turbidity and irregular cyclonic runoff.
4. From North West Cape to Kalbarri: Some high cliffs, a large deep embayment (Shark Bay), moderate tidal range — semidiurnal in north, diurnal in south, turbidity generally low but locally high at the mouths of the Gascoyne and Murchison Rivers, elsewhere irregular low runoff from the semi-arid hinterland. There is some exposure to the south-west oceanic swell. A limestone reef tract, with a well developed coral covering, runs parallel to the coast and a few kilometres offshore from North West Cape southward for nearly 220 kilometres.
5. From Kalbarri to Cape Naturaliste: Fairly smooth low white sandy coastline and some limestone headlands; rainfall moderate with little runoff from coastal sands, water clear, low diurnal tidal range; offshore coastal reefs give some protection to the coast from the south-west swell. The protected waters inside these reefs are notable for the diversity of seagrass species.
6. From Cape Naturaliste to Israelite Bay: Broken headland and surf beach formations, high south-west swell exposure, clear water, low diurnal tidal range, many inlets and low-volume winter river discharges.
7. From Israelite Bay to the Western Australian-South Australian border: Smooth coastal outline of beaches and some cliffs, modified exposure to south-west swell, low diurnal tidal range, clear water and negligible rainfall runoff.

In addition, there are a number of reefs, atolls and islands off the coast with interesting marine faunas, for example: Ashmore, Seringapatam and Scott Reefs, the Rowley Shoals, the Ningaloo Reef Tract, the Montebello Islands, the Houtman Abrolhos and the Archipelago of the Recherche. Recent studies have shown that the fauna of the Rowley Shoals has strong affinities with the eastern Indonesian region.

### **Mammals (3)**

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

Most current opinion supports different origins for the marsupials (and monotremes) and eutherians. Marsupials are believed to have reached Australia from South America via Antarctica when these continents were joined together to form the early Cretaceous supercontinent, Gondwanaland. On arrival in Australia marsupials radiated rapidly to fill unoccupied niches. Rodents and bats reached Australia from Asia via the Indonesian islands. This occurred much later when Australia had drifted northwards to reach a position closer to Indonesia. The Australian native rodents, other than the true rats, have a common ancestor and are unique to the Australasian region. They are thought to have reached Australia in several waves, the first of which was about 25 million years ago. The true rats, of which there are only three species in Western Australia, have strong Asian affinities; their ancestors are believed to have reached Australia more recently, perhaps less than a million years ago. Bats reached Australia via the same general route

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(3) Contributed by D. J. Kitchener.

as rodents; the fossil record to date indicated that they arrived about 15-20 million years ago, but it is likely that further excavations will reveal them to have been in Australia at least as long as the old endemic rodents.

The last decade has seen considerable advances in our knowledge of the Western Australian mammal fauna. These advances largely result from biological surveys of little explored parts of the State by the Western Australian Museum and Western Australian Department of Fisheries and Wildlife. For the first time, something approaching a complete inventory of the extant mammal assemblages of areas such as the Kimberley, deserts, Goldfields, Wheatbelt, and coastal parts of the south-west is available; ten new species of mammals have been described (Pilbara Ningai, *Ningai timealeyi*; Wongai Ningai, *N. ridei*; Southern Ningai, *N. yvonneae*; Carpentarian Dunnart, *Sminthopsis butleri*; Lesser Hairy-footed Dunnart, *S. youngsoni*; *Antechinus* sp. ('ningbing'); Warabi, *Petrogale burbidgei*; Yellow-lipped Eptesicus, *Eptesicus douglasorum*; Hill's Taphozous, *Taphozous hilli*; Chapman's Pseudomys, *Pseudomys chapmani*) and several undescribed species of *Sminthopsis* and *Mormopterus* have been recognised. Additionally, the following previously described species have recently been discovered in Western Australia: Gould's Long-eared Bat, *Nyctophilus gouldi*; the mastiff bats, *Tadarida* cf. *beccarii* and *T. cf. loriae* and a little bat, *Eptesicus* cf. *vulturnus*.

Western Australia, with only 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 (see table on page 77). 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 4 seal, 17 whale and 15 killer whale and dolphin species, as well as a particularly large population of Dugong (*Dugong dugon*) at Shark Bay.

Among the whales and dolphins, notable records from Western Australia include six species of beaked whale (including *Mesoplodon mirus*, until recently only known in the southern hemisphere from South Africa, and the type specimen of the Southern Bottlenose Whale (*Hyperoodon planifrons*), as well as the first description of the Pygmy Right Whale (*Caperea marginata*, described in 1846 as the 'Western Australian Whale'). Recent records have included two specimens of *Caperea*, two of Layard's Beaked Whale (*Mesoplodon layardii*), a group of Spotted Dolphins (*Stenella attenuata*) — all from the south or south-west coast — and a north coast record of Risso's Dolphin (*Grampus griseus*). In addition, the larger, commercially valuable whales have often attracted attention off this coast. Nineteenth century American and other whalers took Sperm (*Physeter macrocephalus*), Southern Right (*Eubalaena australis*) and Humpback (*Megaptera novaengliae*) Whales on the 'Coast of New Holland' ground (off Western Australia); local bay whalers also took the latter two species, while in the 20th century Humpbacks and Sperm Whales have been hunted from Western Australian shore stations. Humpbacks were so seriously overfished that the industry ceased in 1963 but there seems to have been some recovery in numbers recently, with up to 40 animals per day being reported during the winter migration off the coast. Southern Right Whales are also being seen more frequently; from a virtual absence this century until 1955, in 1982 there were 12 reports of 29 animals from Western Australia in late winter/early spring when adult females come close inshore to calve. Sperm whaling ceased at Albany (Australia's one remaining whaling station) in 1978. All cetaceans now receive special protection under the *Commonwealth Whale Protection Act 1980*.

Numbers of species within the families of mammals represented in Western Australia do not deviate statistically from their proportions elsewhere in Australia, although amongst the marsupials the Western Australian fauna is low in species of petaurid and burramyid possums. There is only one glider possum, *Petaurus breviceps*; two ring-tail possums, *Pseudocheirus occidentalis* and *P. dahli* and one pygmy possum, *Cercartetus concinnus*. The State is not rich in endemic species, having

only twenty-one species or 13 per cent of the State's mammals restricted to its boundaries. Half of these endemics are from the south-west of the State, while the others are evenly divided between the Kimberley and other regions.

While the subhumid north-west Kimberley has small patches of deciduous vine thickets containing some rainforest elements, the true rainforests of north-eastern Australia are absent from the State. It is, then, to be expected, that at the level of genera of mammals, Western Australia is particularly lacking in those groups which are restricted to true tropical rainforest. These missing genera include the Spiny Bandicoot, *Echymipera rufescens*; cuscuses, *Phalanger* spp.; Striped Possum, *Dactylopsila trivirgata*; Musky Rat-kangaroo, *Hypsiprymnodon moschatus*; tree kangaroos, *Dendrolagus* spp. and pademelons, *Thylogale* spp.

The State's mammal fauna can be grouped into the three broad climatic zones described on page 68: south-western, northern, and arid.

Included in the south-western zone of reliable winter rainfall are the tall eucalypt forests of the State, the agricultural belt of wheatfields and the semi-arid woodlands and heathlands of the Goldfields. This zone is one of the richest in the State for native terrestrial mammals, with sixty-three species recorded since European settlement. Endemics comprise the Dibbler, *Antechinus apicalis*; White-tailed Dunnart, *Sminthopsis granulipes*; Western Ringtail Possum, *Pseudocheirus occidentalis*; Honey Possum, *Tarsipes rostratus*; Broad-faced Potoroo, *Potorous platyops*; Banded Hare Wallaby, *Lagostrophus fasciatus*; Quokka, *Setonix brachyurus*; Western Brush Wallaby, *Macropus irma*; two as yet undescribed marsupial mice, *Sminthopsis* spp; Ashy Grey Mouse, *Pseudomys albocinereus*; 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 kangaroo family are now extinct there and persist only on the continental islands off the coast; those that are 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.

Several of the species in the south-western zone are restricted to the forest block (Brush-tailed Phascogale, *Phascogale tapoatafa*; Yellow-footed Antechinus, *Antechinus flavipes*; Western Ring-tail Possum, *Pseudocheirus occidentalis*; Quokka, *Setonix brachyurus*; Gould's Long-eared Bat, *Nyctophilus gouldi*) but most have wider distributions. Of this latter group some are particularly patchily distributed, such as Ashy Grey Mouse, *Pseudomys albocinereus*, and Honey Possum, *Tarsipes rostratus*, which occur in the sandy heaths of the coastal areas and their inland mosaic. Several coastal species, such as the Ashy Grey Mouse and Western Pygmy-possum, *Cercartetus concinnus*, extend to the semi-arid mulga-eucalypt line, while, at least until recent times, a number of species (Numbat, *Myrmecobius fasciatus*; Western Quoll, *Dasyurus geoffroii*; *Sminthopsis* sp.; Common Brush-tailed Possum, *Trichosurus vulpecula* and Echidna, *Tachyglossus aculeatus*) intruded well into the arid interior — as do the more inland species of the south-west such as Red-tailed Phascogale, *Phascogale calura*; Fat-tailed Dunnart, *Sminthopsis crassicaudata*; Greater Bilby, *Macrotis lagotis* and Euro, *Macropus robustus*. Only the Western Mouse, *Pseudomys occidentalis* and White-tailed Dunnart, *Sminthopsis granulipes*, are largely confined to the inland of the south-western zone.

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 excludes other genera that are widely represented elsewhere (Stick-nest rats, *Leporillus*; hopping mice, *Notomys*; Kultarr, *Antechinomys*; ningauis, *Ningau* and long-nosed bandicoots, *Perameles*).

The following species are endemic to the Kimberley: *Antechinus* sp. 'ningbing'; Scaly-tailed Possum, *Wyulda squamicaudata*; Warabi, *Petrogale burbridgei* 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 dunes, 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 are 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 genus *Sminthopsis* and native rodents of the genus *Pseudomys*, are well represented (both genera by six species). However, other rodent genera are poorly represented there.

Slightly less 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-tail Possum, *Trichosurus arnhemensis*; Northern Nailtail Wallaby, *Onychogalea unquifera* 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 Kimberley. Similar gradational changes are thought to occur 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 (49) 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 (19) 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, *Zyzomys argurus*; Orange Horseshoe Bat, *Rhinonicteris aurantius*); it also has the endemic species: Pilbara Ningau, *Ningau timealeyi* and Chapman's Pseudomys, *Pseudomys chapmani*. The Little Red Antechinus, *Antechinus rosamondae*, once thought to be restricted to the Pilbara is now also known from the adjacent deserts.

As mentioned, a number of species of terrestrial mammals now persist only on the continental islands dotted around the Western Australian coastline. Many of these island survivors were present on the mainland at the time of European settlement; they owe their survival to being removed from the impact of European man, and his agencies, on the habitat of the mainland. The decline in the mammals of the south-western zone was first reported in the 1880s when it was attributed to disease. However, at that time the environment was being dramatically altered by changes in the pattern of burning, by extensive clearing for agriculture, and by browsing of domestic stock. Added to these impacts the introduced feral cat was established in the bush by the mid-1840s — these are known to prey on at least thirty-seven species of Western Australian mammals, including bats. It is likely that all these factors, as well as the more recent introduction of other exotic mammals, such as the fox, have played some part in the demise of much of our mammal fauna in all regions except

for the northern Kimberley. This latter area retains an almost pristine assemblage of mammals. European man has only recently intruded into the northern Kimberley — as also have feral cats; much of the riparian vegetation is as yet unaffected by cattle and other exotic mammals, and burns tend to be restricted to relatively small patches by the geomorphology of the area.

As in eastern Australia, the group of mammals 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 Nail-tail 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*, *N. macrotis* and *Pseudomys shortridgei*.

The only group of mammals that have not apparently declined are the bats. In fact they seem to have been favoured in some areas, such as the Pilbara and Murchison, by mining activity which has created new habitats for them in mine shafts and adits.

NUMBERS OF MAMMAL SPECIES PER FAMILY  
IN WESTERN AUSTRALIA IN REGIONAL GROUPINGS

Family	South Western zone	Northern zone	Arid zone		Total Western Australia
			Deserts	Others	
Monotremata	1	1	1	1	1
Marsupialia —					
Dasyuridae (carnivores)	10	8	14	11	26
Myrmecobiidae (numbat)	1	0	1	0	1
Notoryctidae (marsupial mole)	0	1	1	1	1
Peramelidae (bandicoots)	2	2	2	2	5
Thylacomyidae (bandicoots)	2	1	1	1	2
Phalangeridae (possums)	1	2	2	1	3
Petauridae (possums)	1	2	0	0	3
Burramyidae (possums)	1	0	0	0	1
Tarsipidae (honey possum)	1	0	0	0	1
Vombatidae (wombat)	0	0	1	0	1
Macropodidae (kangaroos and wallabies)	15	11	8	7	25
Chiroptera —					
Pteropodidae (fruit and blossom bats)	1	3	1	2	3
Megadermatidae (ghost bat)	0	1	1	1	1
Hipposideridae (horseshoe bats)	0	3	0	1	3
Emballonuridae (sheath-tailed bats)	1	2	3	3	3
Mollosidae (mastiff bats)	2	3	4	4	5
Vespertilionidae (small bats)	10	13	4	8	18
Rodentia —					
Muridae (rodents)	14	13	8	7	27
Introduced feral	..	..	..	..	19
Sirenia (Dugong)	..	..	..	..	1
Pinnipedia —					
Otariidae (eared seals)	..	..	..	..	2
Phocidae (earless seals)	..	..	..	..	2
Cetacea —					
Balaenidae (right whales)	..	..	..	..	1
Balaenopteridae (rorquals)	..	..	..	..	6
Physeteridae (sperm whales)	..	..	..	..	3
Ziphiidae (beaked whales)	..	..	..	..	7
Delphinidae (killer whales and dolphins)	..	..	..	..	15

#### Birds (4)

In 1944 American Zoologist Ernst Mayr postulated that most, if not all, of the ancestors of Australia's land and freshwater birds reached the continent from Asia. Since then the theory of continental drift has been universally accepted, but very little of Mayr's thesis has been invalidated. It is generally agreed that the ancestors of the emu and cassowary were in Australia before it began to drift from Antarctica some 50 million years ago, but few other Australian birds can claim so ancient a lineage.

This does not mean that the present bird fauna bears a close resemblance to that of Asia. It does not for two main reasons. First, the earliest arrivals have now evolved into distinct families, such as the whistlers, thornbills, fairy-wrens, honeyeaters and bowerbirds. Second, many tropical

(4) Contributed by G. M. Storr.

Asian birds are reluctant crossers of even the narrowest seas; the pheasants, trogons, honeyguides, barbets, woodpeckers, leafbirds and bulbuls have been able to advance little or not at all beyond the South-East Asian continental shelf.

Western Australia is predominantly arid. The lack of rainforests in the north has resulted in the absence or paucity of fruit-eating birds (cassowary, birds of paradise, bowerbirds and fruit-doves) and of litter-searching birds (chowchillas, whipbirds and fernwrens). In the south-west, heavy eucalypt forests are much less extensive and diversified than in south-eastern Australia. Moreover their contraction in periods of greater aridity has rendered them unsafe as refuges; hence the absence of lyrebirds, pilot-birds, mountain thrushes and similar inhabitants of the wet sclerophyll forests of eastern Australia.

For its size Western Australia has a small avifauna. The 378 species breeding in the State belong to nineteen orders. They are enumerated below, with additional non-breeding visitors in brackets. Omitted from the counts are the eleven foreign species now feral in Western Australia.

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.

#### AVIFAUNA OF WESTERN AUSTRALIA

Order	Species	
	Breeding	Non-breeding
Struthioniformes (emu etc.)	1	
Podicipediformes (grebes)	3	
Sphenisciformes (penguins)	1	(4)
Procellariiformes (petrels)	6	(31)
Pelecaniformes (cormorants etc.)	11	(3)
Ardeiformes (herons etc.)	20	(1)
Anseriformes (ducks etc.)	18	(1)
Accipitriformes (hawks etc.)	24	
Galliformes (quails etc.)	5	
Gruiformes (waterhens etc.)	18	(1)
Charadriiformes (plovers, gulls etc.)	29	(48)
Columbiformes (pigeons)	13	
Psittaciformes (parrots)	28	
Cuculiformes (cuckoos)	10	(1)
Strigiformes (owls)	5	(2)
Caprimulgiformes (nightjars etc.)	3	
Apodiformes (swifts)	0	(2)
Coraciiformes (kingfishers etc.)	7	
Passeriformes (songbirds)	174	(7)
Total	376	(101)

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 in Western Australia but which extend eastwards through the Northern Territory to Queensland. In north-west Kimberley, where mean annual rainfall exceeds 1,000 millimetres 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. Nonetheless the Pilbara remains one of the most impoverished parts of Australia so far as land birds are concerned.

Although annual rainfall in the arid zone is even less south of the Tropic of Capricorn than north of it, a larger proportion of it falls in late autumn and winter. This promotes the growth of mulga and other acacia-dominated scrubs and thickets, which in turn provide a home for several species of Acanthizidae (thornbills, whitefaces etc.), a family that is poorly represented in the Kimberley and Pilbara.

Towards the southern boundary of the arid zone the transition from acacia-dominated vegetation to scrubs, woodlands and forests dominated by eucalypts is sharp enough to have been termed the 'mulga-eucalypt line'. This line marks the limits of many species of birds. Sometimes a mulga species is replaced south of the line by a closely related species, e.g. the Chestnut-breasted by the Chestnut Quail-thrush, the Variegated by the Blue-breasted Fairy-wren, and the White-browed by the Rufous Tree-creeper.

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. 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.

The birds of prey (hawks, falcons and owls) and waterfowl (ducks, herons, ibises, etc) tend to range more widely than the smaller landbirds that we have been considering. But some of them are distributed zonally; for example, the White and Red Goshawks, Crested Hawk, Rufous Owl, Great-billed and Pied Herons and Burdekin Duck are restricted in Western Australia to the northern zone.

The shorebirds (plovers, sandpipers, etc.) that live along our coasts and at the edge of inland waters include some resident species such as the Pied and Sooty Oystercatchers and the Red-capped and Masked Plovers; however most of them breed in northern Asia during the boreal summer.

The seabirds are also a mixture of residents and non-breeding visitors. In southern and mid-western seas the dominant groups are cormorants, petrels, gulls and terns. In northern seas they are largely replaced by boobies and frigatebirds.

### Reptiles <sup>(5)</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 the southern supercontinent Gondwanaland; elsewhere these freshwater turtles are found only in South America. 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 their ability to cross salt water, the reptiles resemble birds and differ from most mammals, amphibians and freshwater fishes. Many reptile stocks arrived long ago and have now diverged markedly from their Asian relatives. However, some stocks, notably the snakes of the families Acrochordidae, Homalopsidae and Colubridae have clearly not been here very long; they either belong to the same or closely related species.

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<sup>(5)</sup> Contributed by G. M. Storr.

Only one Australian family, the pitted-shelled turtles (Carettochelyidae) of southern New Guinea and the far north of the Northern Territory, is not represented in Western Australia. The rest are tabulated below with the number of genera and species in each of them.

REPTILE FAMILIES REPRESENTED IN WESTERN AUSTRALIA

Family	Genera	Species
Cheloniidae (marine turtles)	4	5
Derμοchelyidae (leathery turtle)	1	1
Cheluidae (side-necked turtles)	4	6
Gekkonidae (gecko lizards)	11	50
Pygopodidae (legless lizards)	6	20
Agamidae (dragon lizards)	9	46
Scincidae (skink lizards)	15	148
Varanidae (monitor lizards)	1	18
Typhlopidae (blind snakes)	1	18
Boidae (pythons)	2	9
Acrochordidae (wart snakes)	1	1
Homalopsidae (mud snakes)	3	3
Colubridae (colubrid snakes)	3	3
Elapidae (elapid snakes)	11	46
Hydrophiidae (sea snakes)	9	22
Crocodyliidae (crocodiles)	1	2
Total	82	398

The northern summer-rain zone (almost coincident with the Kimberley Division) 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 reptile 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 *Nephrurus*; 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 *Hemiernis*. 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*, *Hemiernis*, *Leiolopisma* and *Notechis*. Except in the far south these genera constitute only a minor part of the fauna, and one of them (*Leiolopisma*) contains only two species, compared to twelve in south-eastern Australia and Tasmania.

### Amphibians (6)

Because of their permeable skin, amphibians are poorly equipped for crossing salt water. The island continent of Australia is therefore not endowed with a great diversity of amphibians. The only groups here are those that were present when Australia broke free from the southern supercontinent Gondwanaland in Eocene times, and those that were able to enter the continent after it drifted northwards into the chain of islands stretching east-south-eastwards from Asia. Hence the complete absence of two of the three orders of amphibians — the salamanders and caecilians.

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). Significantly these families also predominate in South America, which in the Mesozoic Era was connected to Australia via Antarctica. 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).

The frogs of Western Australia thus comprise two families: the Hylidae (2 genera, 25 species) and Leptodactylidae (12 genera, 43 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.

The far north of the State (the subhumid to semi-arid Kimberley region) is continuous with climatically similar country in the Northern Territory. Nevertheless 11 of the 38 species recorded for the Kimberley have not yet been found outside that region. The south-west of the State is separated from similar country in south-eastern Australia by a broad waterless tract. Consequently all but one of its twenty-four species are restricted to the region. The arid zone of Western Australia includes the relatively well-watered Pilbara and Gascoyne regions, which support twelve species of frogs (two of them endemic). In contrast most of the desert country of the State's eastern interior is quite devoid of frogs.

### Fishes (7)

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 sixty 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, mainly from seas off this State. Many of these live in deep, offshore areas and are either midwater species which occur below the zone of light penetration or bottom dwellers of the continental shelf and slope. These habitats remain virtually unsampled. In addition, the State's inshore or coastal waters continue to provide a wealth of new discoveries at the rate of about 20 to 30 species per year. A few of these represent fishes previously unknown to science. Most are merely new records for the State, having been already described from other regions.

**Temperate Marine Fishes.** 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 fifty-five species are confined to the seas of the State, most of which have the major portion of their distributions along the west coast. Examples of these fishes include the Western Australian Jewfish (*Glaucosoma hebraicum*), considered by many West Australians to be the best food fish in our seas, the Baldchin Groper (*Choerodon rubescens*), the Western Buffalo Bream (*Kyphosus cornelii*), the Breaksea Cod (*Epinephelides armatus*) and the Crested Morwong

(6) Contributed by G. M. Storr. (7) Contributed by G. R. Allen and J. B. Hutchins.

(*Cheilodactylus gibbosus*). The relationship of this element to the rest of the State's temperate fishes is best illustrated by the results of a coastal survey of reef fishes undertaken between 1976 and 1982. Of a total of 202 species recorded, the highest proportions, with almost equal numbers, were the endemic species and the wide-ranging species found across southern Australia. The results are shown in the following table.

Distribution	Per cent of total fishes recorded (202 species)
Western Australia only	29
Southern half of Australia	28
Western Australia and South Australia	16
Western Australia, South Australia, Victoria and Tasmania	14
Western Australia, South Australia and New South Wales	7
Western Australia and New South Wales	5
Uncertain	1

Western Australia's temperate fish fauna extends up the west coast to the region of Kalbarri, the numbers of species decreasing sharply northwards of this area until Coral Bay where the temperate element disappears. An interesting feature of the offshore island fish fauna of the west coast is the higher number of tropical species by comparison with the adjacent mainland. Both Rottneet Island and the Houtman Abrolhos have prominent tropical components whereas the mainland waters off Fremantle and Geraldton contain much smaller proportions of tropical fishes. This can be explained by the presence of an offshore south-flowing body of 'warm' water known as the Leeuwin Current. This current not only maintains winter water temperatures at the offshore islands about 3°-4° higher than those of adjacent mainland waters but also provides a means of transport of tropical larvae southwards. The Leeuwin Current has also been responsible for transporting a few Western Australian endemic species as far east as Ceduna in South Australia.

**Tropical Marine Fishes.** The northern or tropical fish fauna is by far the largest in Western Australia, containing approximately 1,200 species. Of the Australian states, only Queensland has more recorded species. The large number of species is the result of extensive coral reef formation, which provides a much wider variety of habitats compared with southern waters. The majority of northern fishes are mainly inhabitants of coral reefs, or their immediate vicinity, for example in adjacent sand flats or weed beds. The tropical fishes tend to be widespread, occurring at numerous localities in the vast Indo-West-Pacific region. They are transported over great distances by wind, waves, and currents during the larval stage. Eggs spawned in Sri Lanka or Indonesia, for example may eventually result in larvae which colonise the coast of Western Australia.

The coral reef and its environs are the most complex of all marine habitats and therefore provide shelter for a wide range of species of all sizes, shapes and colours. The larger predators are perhaps the best known because of their edible qualities and the sport they provide to anglers. The most common fishes in this category include the gropers, coral cods, and coral trout (all members of the family Serranidae), the jacks or trevallies (Carangidae), tropical snappers (Lutjanidae, unrelated to the popular southern snapper of the family Sparidae), sweetlips (Pomadasyidae), emperors (Lethrinidae) and barracuda (Sphyraenidae). The reefs are also populated by large numbers of territorial species; each confined mainly to a small patch, sometimes less than a square metre, or at least restricted to limited sections of reef. Many of these species vigorously defend their homes against intruding fishes which threaten either food resources or nesting sites. Most are relatively small (usually under about twenty centimetres) and include damselfishes (Pomacentridae), blennies (Blenniidae) and gobies (Gobiidae). The latter family is the largest in Australia with about 300 species represented.

Coral reef fishes are well known for their wide assortment of bright colours and bizarre patterns. The butterflyfishes (Chaetodontidae), angelfishes (Pomacanthidae), and wrasses (Labridae) are particularly good examples, containing a wealth of vivid colour patterns. The wrasses are well

represented in both tropical and temperate seas of Western Australia with about seventy-five species, the largest family in the State. The parrotfishes (Scaridae) are another colourful group. They range widely over the reef sometimes in huge aggregations, grazing on filamentous algae. The surgeonfishes (Acanthuridae) and rabbitfishes (Siganidae) are also colourful groups which feed on algae and sometimes occur in large numbers.

The reef fringe is patrolled by various sharks, the most obvious of which are the whaler sharks (Carcharhinidae). This family includes such species as the Common Grey Whaler, Black-tip, Lemon, White-tip and Tiger Sharks. Reefs also attract various tuna (Scombridae), for example several species of Spanish mackerel and the dog-tooth tuna.

Crevices and caverns of the coral reef are inhabited by moray eels (Muraenidae) and various nocturnal species such as the cardinalfishes (Apogonidae), squirrelfishes (Holocentridae), bullseyes (Pemppheridae) and bigeyes (Priacanthidae).

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

**Freshwater Fishes.** 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. This total is still not impressive compared with such figures as 1,400 species for Africa, 600 for China and 2,000 for South America. One of the main reasons for Australia's impoverishment is the extremely arid climate. Nearly all Australian freshwater fishes were derived in relatively recent times (geologically speaking) 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 (*Lepidogalaxias salamandroides*) was formerly believed to belong in 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 mud during drought.

The other four southern species include the Catfish or Freshwater Cobbler (*Tandanus bostocki*), Nightfish (*Bostockia porosa*), and two species of pygmy perch (*Edelia vittata* and *Nannatherina balstoni*). Common marine inhabitants which penetrate freshwater in the south-west include mulletts (Mugilidae), hardyheads (Atherinidae), gobies (Gobiidae), herrings (Clupeidae) and lampreys (Geotriidae). In addition some streams have been stocked with introduced fishes, such as trout, goldfish, perch and mosquitofish.

The northern fauna is much more diverse, although the Pilbara or North-West Division is inhabited by only twelve species. Amongst these are a blind gudgeon (*Milyeringa veritas*) and a blind eel (*Ophisternon candidum*), both endemics which inhabit subterranean water on the west of Cape Range, North West Cape. An additional forty species are known from inland waters of the Kimberley Division. Twenty-one of the northern fishes are unique to Western Australia. The major northern families are the grunters (Teraponidae), catfishes (Ariidae and Plotosidae), rainbowfishes (Melanotaeniidae), hardyheads (Atherinidae), glassfishes (Ambassidae) and gudgeons (Eleotridae). In addition these waters are frequented by long toms (Belonidae), swamp eels (Synbranchidae), the mouth-almighty (Apogonidae), archerfishes (Toxotidae) as well as numerous marine species which penetrate the lower and middle reaches of many streams.

Most of the northern species are small. Only certain catfishes and the Sooty Grunter (*Hephaestus jenkinsi*) are considered worth eating. However, the Barramundi (*Lates calcarifer*), is an exception. This angling favourite reaches a maximum size of approximately 180 centimetres and a weight of over 50 kilograms. It spawns in estuaries, but is regularly caught in the larger rivers of the Kimberley Division.

#### Echinoderms (8)

All five groups of echinoderms, feather stars (Crinoidea), star fish (Asteroidea), brittle stars (Ophiuroidea), sea urchins (Echinoidea) and sea cucumbers (Holothuroidea), are well represented in the rich echinoderm fauna of the continental shelf and shore waters of Western Australia.

The majority are either tropical species or endemic species with tropical affinities.

A recent assessment of the starfish fauna has shown that of the 150 recorded species over half are either widely distributed Indo-West-Pacific species or are found in the East Indian region; less than 20 per cent are southern Australian species and nearly 30 per cent are found only in Western Australia.

The only starfish likely to be of economic importance in Western Australia is *Acanthaster planci*, the crown-of-thorns, which feeds on living corals and has caused extensive damage to coral reefs in the Indo-West-Pacific region when in plague numbers. This species is found in Western Australia from the Kimberley coast to the North West Cape area. A fairly large population in the Dampier Archipelago, monitored by the Western Australian Museum between 1972 and 1974, was found to aggregate seasonally in shallow water but did not cause significant damage to the coral reefs.

Certain edible species of holothurians known as *beche-de-mer* or *trepan* occur on the shores and reefs of north-western Australia. Little is known of the fishing potential for *trepan* on the offshore reefs, but the resource has been traditionally fished by boats from Indonesia.

#### Molluscs (9)

The marine molluscs of Western Australia number over 2,000 species, but each year new species records are being made and the known ranges of others extended. Shallow water marine molluscs in the State 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. The minimum water temperature at the Abrolhos is about 19°C. Inshore at Geraldton at about the same latitude the temperatures are slightly lower and the fauna has a higher proportion of temperate species. 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 very large numbers and are thus ecologically important in coastal habitats.

In Western Australia, major commercial fisheries exist for abalone, scallops, squid and pearl oysters. Many Western Australian shells are sought by professional and amateur collectors worldwide and shell collecting has become increasingly popular. Among the prize shells for collectors are the *Zoila* group of cowries, *Cypraea decipiens*, *C. rosselli* and *C. venusta*, and the volutes *Amoria ellioti*, *A. grayi*, *A. irvinae*, *A. macandrewi*, *Aulicina nivosa*, *Volutoconus coniformis* and *V. hargreavesi*. All of these species occur only in Western Australia.

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(8) Contributed by L. M. Marsh. (9) Contributed by F. E. Wells.

In contrast to the diversity of marine species the mollusc faunas of Western Australia's freshwater and lake habitats are impoverished, but best developed in the Kimberley. The salt lake snails, *Coxiella*, reach their greatest diversity and abundance in the south-western saline lakes. Some native freshwater snails are vectors for parasites of native vertebrates, while one introduced species is capable of acting as intermediate host to a serious livestock parasite.

There is an interesting land snail fauna, 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. Work, still underway by Dr Alan Solem of the Field Museum of Natural History in Chicago, U.S.A., has uncovered a wealth of genera and species. The group *Bothriembryon* is particularly diverse in the south and south-west.

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

Coral reefs are well developed in a number of places along the shores and continental shelf of Western Australia. Patch and platform reefs are numerous on the inner part of the Sahul and North-West Shelves while on the outer parts of these shelves is a series of reefs and atolls — Scott and Seringapatam Reefs and the Rowley Shoals — each with oceanic faunas. In recent short surveys of the Rowley Shoals and Scott Reef, fifty-six coral genera and 233 species were recorded.

Along the shores of the mainland and near-shore islands of the Kimberley and Pilbara coasts there are fringing reefs but coral growth is restricted because of turbidity caused by the outflow of rivers, a partly muddy shoreline and the large tidal range. However, some coral genera such as *Trachyphyllia*, *Caulastrea* and *Moseleya* appear to favour the turbid inshore waters, while many others tolerate these conditions. In the Dampier Archipelago there is a rich coral fauna of more than forty-eight genera found from the most turbid inshore waters to the relatively clear waters of the outer islands.

The Ningaloo Reef Tract, a limestone reef tract with extensive coral cover, extends 220 kilometres southwards from North West Cape. It lies up to five kilometres off the coast with deep water off its outer edge and a shallow lagoon inshore. The reef barrier is broken by a number of passages along the sides of which the most diverse and luxuriant coral growth is found, while there are areas of dense thickets of staghorn corals (*Acropora* spp.) in the lagoon. Forty-four genera and over 140 species of reef-building corals, including the non-scleractinian blue coral *Heliopora* and the fire coral *Millepora* occur on these reefs.

The most southerly true coral reefs in the Indian Ocean are found at the Houtman Abrolhos. *Acropora*, one of the most important reef builders, flourishes at the Abrolhos, where the minimum sea temperature seldom falls below 19°C, but does not occur further south except in Pleistocene fossil beds at Rottneest Island.

The great diversity of habitat in the Abrolhos reefs, from extreme shelter of the 'blue holes' in the inner reefs to extreme exposure on the seaward reefs, provides conditions for several genera not found on more northerly reefs making the Abrolhos an exceptionally rich coral area for its latitude. The generic diversity at the Abrolhos is nearly as high as in the North West Cape area but there is a general reduction in the number of species recorded.

The coral fauna diminishes sharply south of the Abrolhos but a number of species extend their ranges further south, sometimes forming extensive colonies but never true reefs. At Rottneest Island *Pocillopora damicornis* and *Montipora* make striking pink and violet patches in shallow water, while *Pocillopora* covers a shallow reef at Parker Point. Twelve genera of reef corals are found in the Fremantle area including Rottneest Island and Cockburn Sound where corals are well developed despite minimum water temperatures that sometimes fall below 14°C.

Further south, seven genera reach Geographe Bay where several species of *Turbinaria* form large colonies, and three genera including *Turbinaria* extend along the south coast to the Recherche Archipelago.

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

### Crustaceans <sup>(1)</sup>

Commercially, the most important crustacean species in Western Australian waters is the Western Rock Lobster, *Panulirus cygnus*. It occurs from Onslow in the north to Hamelin Bay in the south. In the tropics five additional species of *Panulirus* occur — *Panulirus versicolor*, *P. ornatus*, *P. homarus*, *P. penicillatus* and *P. polyphagus*, collectively referred to as coral, green or tropical rock lobsters. There is no commercial fishery based on these species. On the southern coast *Jasus novaehollandiae*, the Southern Rock Lobster, supports a small fishery in the Esperance Region.

Ten species of deepwater lobster have recently been discovered by exploratory trawling on the continental slope off the North West Shelf. These comprise four species of *Metanephrops* and one of *Nephropsis* (scampi), two species of *Linuparus* (spear lobsters), one species of *Puerulus* (whip lobsters) and one species each of *Stereomastis* and *Polycheles* (blind lobsters). The edible crab (*Geryon trispinosus*) and some interesting deep water barnacles were also collected during these explorations. The barnacles comprise fourteen species of stalked or goose barnacle, one species of acorn barnacle and two species of wart barnacle.

The Swan River Prawn or School Prawn (*Metapenaeus dalli*) is taken by amateur and professional fishermen in west coast estuaries using small handhauled nets. In the northern gulfs and bays larger prawns of the genera *Penaeus* and *Metapenaeus* are sought with large commercial prawn trawls. The present fishing centres are at Shark Bay, Exmouth Gulf and Nickol Bay. The main species are the Western King Prawn (*Penaeus latisulcatus*), the Brown Tiger Prawn (*P. esculentus*) and the Banana Prawn (*P. merguensis*). Two species of shovel-nosed lobsters are sometimes taken in prawn trawls. *Thenus orientalis*, the Moreton Bay Bug, occurs in Exmouth Gulf and along the north coast. *Ibacus peroni*, the Balmain Bug, lives in cooler waters and occurs from Geraldton on the west coast around the south coast. In deep water, *I. alticrenatus* has been taken along the south coast.

The Blue Swimming Crab (*Portunus pelagicus*), plentiful in summer in the estuaries of the Swan River and at Mandurah, is one of the common commercial crabs of Australia. Recently the large edible crab *Hypothalassia armata* has been found in deep water between Rottnest Island and Geraldton, as have two species of scampi (*Metanephrops*). In the mangroves of the north, two species of the large edible mud crab (*Scylla*) occur.

Common species of shore crab are the Variegated Rock Crab (*Leptograpsus variegatus*) and three species of ghost crab (*Ocypode*) of which *O. convexa* is endemic to the west coast. The Variegated Rock Crab scrambles among rocks and jetty piles of the west and south coasts, whereas the ghost crabs dig spiral burrows on beaches. Associated with the mangroves of the north coast are ten species of brightly coloured fiddler crabs (*Uca*) which emerge from their burrows after they have been uncovered by the tide. Marsh crabs (*Sesarma*) are also common in their hooded burrows amongst the roots of the mangrove trees.

Descriptions of some groups of the many other species of non-commercial marine crustaceans are included in monographs. These are the swimming crabs, mantis shrimps, pebble crabs, spider crabs, ghost crabs, snapping shrimps, craylets, mud lobsters, prawns and some marine isopods and amphipods.

The crustaceans of the inland waters fall into the ecological climate-dependent groupings already mentioned on page 68. In the Kimberley the burrows of the Land Crab (*Holthuisana transversa*) may be seen along the banks of pools in the wet season, but in the winter dry period these crabs hibernate in their burrows at about the level of the water table. In the permanent pools occur several species of Cherrabun (*Macrobrachium*), a large freshwater prawn relished by amateur fishermen. Many species of tropical Cladocera (water fleas) are now also known to occur in the pools and rivers of northern Australia. An interesting freshwater fauna occurs in the North West Cape region, where subterranean fresh-to-brackish water flows through limestone caverns under the coastal plain on the west and east sides of Cape Range. Two species of blind shrimp (*Stygiocaris lancifera* and *S. stylifera*) occur together with two species of blind fish. Blind shrimps are also known to occur in the subterranean waters of caves in the Kimberley.

<sup>(1)</sup> Contributed by P. F. Berry and D. S. Jones.

The ephemeral and the permanent inland waters support a variety of small crustaceans. The ephemeral fauna of the inland freshwater claypans and gnamma-holes in rock outcrops may include very high populations of branchiopod crustaceans. The most conspicuous are the shield shrimps. Of these, *Triops australiensis* is large and olive green and found in temporary rain pools and water filled claypans in the hotter and more arid areas of Western Australia; and *Lepidurus viridis* is bright green and occurs in ponds and drainage ditches in the cooler and wetter areas of south Western Australia. A variety of fairy shrimps (Anostraca) and water fleas (Cladocera) also occur with the shield shrimps. The inland salt lakes may support populations of brine shrimps (*Artemia* and *Parartemia*). All these crustaceans of ephemeral inland water 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 of Western Australia support a rich variety of small crustacea. Copepods, especially members of the genus *Boeckella* occur at the edge of running fresh water and in the open water of inland lakes, ponds and dams, as well as on the bottom and amongst aquatic vegetation. *Daphnia carinata* and other members of the Cladocera are common in inland pools or slow-moving waters and shelled fairy shrimps (Conchostraca) occur in permanent lakes, dams and water holes.

The permanent streams of the south-west support several species of freshwater crayfish in slower running parts. The most well-known species are the Marron (*Cherax tenuimanus*) which occurs in permanent streams with deepwater pools; the Jilgie (*C. quinquecarinatus*) found in shallow permanent water, while the Koonac (*C. preissi*) burrows in the mud swamps. Three other species of small crayfish (*Engaewa*) also live in isolated seepages and swamps in the south-west, but these habitats are rapidly disappearing because of their suitability for conversion to dams. The 'White Yabbie' (*C. albidus*) has been introduced from south-eastern Australia into many wheatbelt dams where it is cultivated for local consumption. The small shrimp *Palaemonetes australis* is abundant in the freshwater and estuarine habitats of south-western rivers.

### Spiders (12)

A conservative classification of spiders comprises some 88 families of which about 63 occur naturally in Australia and 45 in Western Australia. Families absent from Western Australia are predominantly either wet tropical forms or groups characteristic of temperate rainforests in south-eastern Australia. Nevertheless relic genera of certain families characteristic of humid forests do occur in Western Australia.

In spite of the ubiquity and abundance of spiders the group is still poorly known taxonomically. In all, over 300 species from about 135 genera have been recorded from the State, of which about 200 and 25 respectively are endemic. The taxonomic status of many of these has altered, while the real figure for the spider fauna is undoubtedly much greater than this.

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

Most of the Araneidae (orbweavers) are arboreal and spin temporary or permanent orbwebs of various designs. The large, hairy Garden Orbweaver *Eriophora biapicata*, an annual species, ranges across southern Australia to the Great Dividing Range. *Araneus pustulosus*, a smaller species is common in the south-west. The Golden Orbweaver, *Nephila edulis*, is common on offshore islands, windblown dunes and through the inland where it often forms colonies of permanent web communities around farmhouses. Other common orbweavers are the Christmas or Jewel Spider, *Gasteracantha minax*, the Scorpion-tailed Spider, *Arachnura higginsii*, the Leaf-rolling Spider, *Phonognatha* (or *Singotypa*) *melania*, *Argiope trifasciata* and *A. protensa* and the non-webweaving Bird-dropping Spider *Celaenia kinbergi*.

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(12) Contributed by B. Y. Main.

The ground-dwelling wolf spiders are especially abundant in semi-arid areas. *Geolycosa leuckarti*, a large spider with a distinctive pattern of radiating marks on the carapace is widespread throughout the southern part of the State. Some species have adapted to living in pastures and suburban lawns; *Lycosa corallina* lives in holes of coral and rocky reefs along shorelines of the Abrolhos islands and north-western coast; a few species live along the fringes of inland salt lakes.

Pest and poisonous species include the notorious Redback Spider, *Latrodectus mactans hasseltii*. Fortunately there have been no fatalities from this spider since the advent of an antivenene. The Black House-spider, *Badumna* (or *Ixeuticus*) *robustus* is sometimes a nuisance around houses, outbuildings and poultry sheds because of its large, untidy lace-like webs. The species is also poisonous, with large necrotic sores resulting from the bite. Other poisonous species include various huntsman spiders (*Olios* species), the White-spot Spider, *Lampona cylindrata* and the Sac Spider, *Chiracanthium diversum* (or *mordax*) the bite of which leaves small, persistent, scab-covered sores similar to a tick bite. Several trapdoor spiders are poisonous, e.g. *Idiommata blackwalli*, which is common in Perth suburbs and *Selenocosmia stirlingi*. Although no serious effects have been suffered from bites by *Missulena* species, the venom is highly toxic.

Several spiders commonly occur in houses, particularly the Black House-spider, and the following introduced species; the Cobweb Spider or Grey House-spider, *Achaearanea tepidariorum*, the tiny wall-dwelling *Oecobius annulipes*, the Daddy-long Legs Spider, *Pholcus phalangioides* and in the inland and tropics, several native pholcids.

Spiders, as well as being one of the dominant invertebrate predatory groups in many natural habitats, are useful predators of insect pests of certain commercial crops and orchards.

### Ticks, Scorpions, Centipedes and Millipedes <sup>(13)</sup>

**Ticks.** Ticks are blood-feeding ectoparasites. By far the commonest native species is the Ornate Kangaroo Tick (*Amblyomma triguttatum*) which in addition to its normal host — the kangaroo and its kin — attaches to a wide range of creatures including lizards, rabbits, horses, cattle and sheep, and occasionally man. Many people react adversely to tick-attachment, particularly by the young or 'seed' ticks. Other common hard-bodied (ixodid) ticks are a few native species of the genus *Aponomma*, which attach mostly to reptiles, and 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 of the genus *Argas*. Fortunately, local ticks are not known to infect their hosts with viral and other diseases which they are notorious for spreading in Queensland and tropical countries.

**Scorpions.** Three families and five genera of scorpions are represented in Western Australia. The large brown *Urodacus* scorpions (twelve species) are widely distributed, and normally active at night. They live in deep spiral burrows in the ground and under rocks and logs. They sometimes enter houses or fall into swimming pools. *Liocheles* is only known from the far north. The small mottled scorpions, *Lychas* (two species) and *Cercophonius squama*, live under bark, litter and stones. Another *Lychas* species and the strong-tailed *Isometroides vescus* are vagrant and feed on burrowing spiders. The sting of Australian scorpions is painful but there is only one record of a human fatality possibly due to a scorpion sting in Australia. Related scorpions overseas are known to be lethal.

**Centipedes.** The medium-sized to very large centipedes, which are colourful and mostly banded, belong to the family Scolopendridae. Included are the cosmopolitan *Scolopendra morsitans*, ten native species of the genus *Cormocephalus* and five of *Ethmostigmus*. There are numerous species in other families such as the narrow, long-bodied, many-legged geophilids and the small cryptic lithobiids and cryptopids. The conspicuous very long-legged scutigeraid house centipedes, particularly *Allotheruea maculata*, are occasionally found in wash troughs in country areas. Most of the larger centipedes can give a painful bite, but they are usually nocturnal and live concealed under bark and litter, and in shallow burrows.

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<sup>(13)</sup> Contributed by L. E. Koch.

**Millipedes.** About fifteen genera of millipedes have been recorded. Several introduced species are common around habitation. Millipedes feed on plant debris and are generally 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. A wide range of environmental conditions exists, from the tropical north to the temperate south, and the geographical isolation of the State has allowed the development of numerous endemic forms. As may be expected, the insect fauna of the Kimberley Division shows closer affinities with that of North Queensland than with the lower half of the State. The central desert, which reaches the coast to the south along the Great Australian Bight and to the north along the Eighty Mile Beach, forms an effective barrier discernible in the distribution of flora, mammals, insects and birds.

Owing to the limitations of space no attempt has been made to cover all the various orders of insects (and other closely related creatures) which occur in the State, but the economic importance of various groups and their influence on major agricultural industries have been outlined, and some of the more outstanding forms of general interest have been mentioned. There are several references to beneficial insects and mites which have been introduced to the State for the control of agricultural pests. This reflects a worldwide trend towards the use of biological control measures which can operate in conjunction with, and sometimes replace, chemical pesticides. 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. It has spread to almost all the clover-growing areas in the south-west and is a very serious pasture pest. Partial control is exercised by the predatory pasture snout mite, *Bdellodes lapidaria* (Kramer).

## CLASS INSECTA (Insects)

**Order Odonata** (Dragonflies and Damselflies)

These insects are predatory in both the immature and adult stages and are usually regarded as beneficial creatures. However, they sometimes injure vegetable seedlings by ovipositing into furrow-irrigated crops. This has occurred mainly at Carnarvon where surface water is scarce and where irrigated plants are presumably mistaken for aquatic vegetation.

In order to survive in the diverse climatic conditions which exist in Western Australia, some members of the dragonfly group have developed the ability to breed in highly saline waters and to take advantage of ephemeral inland pools.

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

The grasshoppers and locusts are represented by a large number of different species. The most important pest form is the small plague grasshopper, *Austroicetes cruciata* (Saussure). The normal habitat of this species lies roughly between the 200 millimetre and the 400 millimetre isohyets. 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), so troublesome in other States, occurs in Western Australia but rarely as a plague species. During the last few years, the wingless grasshopper, *Phaulacridium vittatum* (Sjöstedt) has been causing increasing damage to lucerne and other summer crops, particularly in south coastal areas. 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, but in the southern agricultural districts they occur in the solitary phase only. The mantids (Mantidae) are represented by many different species. Their well developed fore-limbs are admirably adapted for catching prey and, like their foliage-feeding relatives the phasmatids or leaf insects (Phasmatidae), their colouring harmonises remarkably with the sticks and leaves on which they rest. The cockroach fauna includes a large number of native species as well as several introduced forms. The commonest pest species is the cosmopolitan American cockroach, *Periplaneta americana* (Linnaeus). Some large and quite colourful forms occur in the inland regions with the genus *Polyzosteria* well represented.

**Order Isoptera** (Termites)

The so-called white ant is a serious pest in all parts of the State. Earth-dwelling types occur mainly, and 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). The large mounds of the spinifex termite, *Nasutitermes triodiae* (Froggatt) are characteristic of certain landscapes in the pastoral areas. 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)

This order is represented locally by a large number of native species as well as several introduced forms. The most serious native species is the plague thrips, *Thrips imaginis* Bagnall which may swarm in apple blossoms and seriously affect the crop setting.

*Thrips tabaci* Lindeman, often called 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 well controlled by the introduced parasitic wasp, *Trissolcus basalus* (Wollaston). The native Rutherglen bug, *Nysius vinitor* Bergroth may at times swarm on vegetables and fruit trees, but seems less serious in this State than on the other side of the continent. The crusader bug, *Mictis profana* (Fabricius), so named because of the light-coloured St Andrew's cross on the back of the adult, feeds normally on acacias and other native plants, but it frequently invades cultivated areas and it may be troublesome to young citrus. The apple dimpling bug, *Campylomma livida* Reuter is a native species which sometimes causes severe malformation of apples by feeding upon the very small developing fruit.

One native aphid, *Anomalaphis comperei* Pergande has been recorded. The only two districts from which it has so far been collected are Albany and Karridale where it has been found infesting native peppermint, *Agonis flexuosa*. A point of interest about these occurrences is that the aphids were associated with a heavy Argentine ant infestation in the area. Since the removal of the ants no further aphids have been discovered.

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, rape, etc.; 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. The cowpea aphid, *Aphis craccivora* Koch carries a virus disease of subterranean clover known as 'stunt' and also transmits bean yellow mosaic virus to lupins. The spotted alfalfa aphid, *Therioaphis trifolii* (Monell) f. *maculata* was found in eastern Australia in 1977 and was first detected in Western Australia in 1978. It is a serious pest of lucerne and has since spread to all lucerne growing areas of the State. Three species of parasitic wasp have been introduced to help in its control. One of these wasps, *Trioxys complanatus* Quilus has become established in south-west lucerne areas. The bluegreen aphid, *Acyrtosiphon kondoi* Shinji, another exotic pest species which attacks lucerne, medics, clovers and lupins was recorded for the first time in Western Australia in June 1979. The parasitic wasp *Aphidius ervi* Haliday has been introduced to combat this pest and is now widely established. The sowthistle aphid, *Hyperomyzus lactucae* (Linnaeus) transmits lettuce necrotic yellow virus to lettuces. A parasitic wasp *Aphidius sonchi* Marshall, introduced in 1982 to reduce the activity of this aphid, is now widely established through the metropolitan area.

Of the native coccids the gall-forming members of the genus *Apiomorpha* are among the most remarkable. The woody galls in which the female insects pass their days vary from minute structures to woody knobs the size of an apple. From an economic point of view, however, the various introduced scale insects demand most attention. Included in the list of pest species are the following:

San José scale, *Comstockaspis perniciosus* (Comstock), which is a serious pest of apples,  
Red scale, *Aonidiella aurantii* (Maskell), which is found mainly on citrus but with a wide host range,

black scale, *Saissetia oleae* (Olivier), 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 many cultivated shrubs,

soft brown scale, *Coccus hesperidum* Linnaeus, which has a wide host range but is of greatest importance on citrus, and

grass-crown mealybug, *Antonina graminis* (Maskell), which is a widespread and troublesome pest causing damage to lawns particularly in warm parts of the State.

### Order Coleoptera (Beetles)

This order is the dominant one among existing insects and is represented in Western Australia by many and varied forms. The carnivorous ground beetles (Carabidae) are widely distributed, one of the best-known species being the green carab beetle, *Calosoma schayeri* Erichson. The tiger beetles, of the sub-family Cicindelinae, are of interest not only because of the metallic colouration seen in many forms but because of their association with the inland salt-lakes. The larvae are subterranean and may be collected by digging on the lake margins.

The ladybirds (Coccinellidae) comprise a group of considerable economic importance and in addition to native species the State contains a number specially introduced to combat various scale insects and aphids. Among the best known of the introduced species are the mealybug ladybird, *Cryptolaemus montrouzieri* Mulsant and the common spotted ladybird, *Harmonia conformis* (Boisduval). The larvae of *Cryptolaemus* are covered with a whitish material which makes the insect superficially resemble the mealybugs upon which it feeds. *H. conformis*, in conjunction with the parasitic wasp, *Aphelinus mali* (Haldeman), plays an important role in combatting the woolly aphid of apple trees. Destructive leaf-eating ladybirds belonging to the genus *Henosepilachna* were once found only in the northern parts of the State where they attack vegetables, especially pumpkins and melons. In 1956, specimens of *Henosepilachna* were collected in Perth and since then they have become established in several suburban areas.

The jewel beetles (Buprestidae) contain some of the most colourful beetles to be found anywhere in the world. Western Australia is particularly rich in species and at times the beetles may be found in large numbers on flowering mallee and sandplain flora. One of the most attractive is the metallic green *Stigmodera gratiosa* Chevrolat, and one of the largest is *Julodimorpha bakewelli* White, measuring approximately seventy millimetres in length.

The cockchafers or scarabs (Scarabaeidae) are represented by a great diversity of forms. Several species may swarm on to flowering fruit trees and roses in the early summer and are popularly known as spring beetles. The bronze-coloured *Colymbomorpha vittata* Britton is a common pest of apple trees during the blooming period and the saddle-backed beetle, *Phyllotocus ustulatus* Blanchard sometimes visits citrus blossoms in large numbers. An introduced species commonly known as the African black beetle, *Heteronychus arator* (Fabricius) has gained a firm footing in the State and is a troublesome pest of lawns and turf. It is also growing in importance as a pasture and vegetable pest. 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 represented by a number of different species. They are often blamed for the death of forest eucalypts, although investigations have shown that heavy beetle infestations are usually secondary and that healthy trees are seldom seriously affected by the beetles. The larval stage of this group is the so-called 'bardee', at one time prized by the Aborigines as food. They are not a pest of structural timber as they do not attack seasoned material.

The leaf beetles (Chrysomelidae) may superficially resemble ladybirds in general appearance as some of them are rounded and quite brightly coloured. Two species have been introduced into the State for the purpose of combating St John's wort, a troublesome weed in some districts. *Chrysolina quadrigemina* (Suffrian) and *C. hyperici* (Forster) were originally introduced into Australia from the South of France and liberated in Victoria with very satisfactory results. The local colonies were obtained from the latter source and have become established in several districts. In some situations a reduction in St John's wort can be attributed definitely to beetle activity, but in many areas the picture is obscure because of the extensive use of chemical sprays.

Common pest species in eastern Australia are the pumpkin beetles, *Aulacophora hilaris* (Boisduval) and *A. abdominalis* (Fabricius). These beetles are found in the north of the State but do not extend into the cooler latitudes.

The weevils (Curculionidae) are a very specialised group characterised by the presence of a rostrum or 'snout' which bears the mouth and antennae. The genus *Leptopius* contains a number of large greyish weevils, many of which breed in association with acacias. One of the best-known members of the family is the redlegged weevil, *Catasarcus impressipennis* (Boisduval) which feeds on eucalypt foliage and may disfigure young street trees. The almost world-wide rice weevil, *Sitophilus oryzae* (Linnaeus) is our principal weevil pest of stored grain, but the granary weevil, *S. granarius* (Linnaeus) also occurs. Two common orchard pests are the introduced apple weevil, *Otiornychus cribricollis* Gyllenhal and Fuller's rose weevil, *Asynonychus cervinus* (Boheman). The small lucerne weevil, *Atrichonotus taeniatus* (Berg) and the whitefringed weevil, *Graphognathus leucoloma* (Boheman) have recently increased their attack on the roots of lucerne and potato tubers in the lower south-west and coastal areas. Two other pest species of weevil which appear to have been introduced recently into this State are the sitona weevil, *Sitona discoideus* Gyllenhal, a pest of legumes, and the garden weevil, *Phlyctinus callosus* Boheman.

#### Order Neuroptera (Lacewings)

This order contains a number of useful insects, for many of the neuropterous larvae feed upon scale insects and other pests. The family Myrmeleontidae has a number of large, rather dragonfly-like species, the larval stages of which build conical sand pits and are commonly known as ant lions. Amongst the most remarkable of the local lacewings are two members of the family Nemopteridae in which the hind wings are greatly modified. In the genus *Croce* they are long and thread-like and in the spoonwinged lacewing, *Chasmoptera hutti* Westwood they are spoon-shaped or paddle-shaped.

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

This group contains a vast number of species, many of which are of major economic importance.

The mosquitoes are well represented, the commonest species being the brown house mosquito, *Culex quinquefasciatus* Say and the dengue mosquito, *Aedes aegypti* (Linnaeus). The latter species is the carrier for dengue fever in the northern portion of the State. The anophelines are represented by the widely distributed *Anopheles annulipes* Walker and several much rarer forms. *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, *Ceratitidis capitata* (Wiedemann). Recent research has revealed that 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 Division of the State, but so far has not become established in the cattle areas of the south. It is believed to have originally reached Australia on buffaloes introduced from Asia.

The common house fly, *Musca domestica* Linnaeus is widespread as is also the native bush fly, *Musca vetustissima* Walker.

Insecticides such as DDT, dieldrin and the various organic phosphates gave outstanding control of various fly pests for several years. The widespread development of resistance in both house fly and blowfly populations has greatly complicated the matter, however, and drawn attention to the importance of preventive measures, such as sanitation in the case of house flies, and the Mules operation and crutching in the case of sheep blowfly.

The March flies (Tabanidae) are well represented but, although their blood-sucking habits render them annoying both to livestock and humans they are not a serious pest.

Of the many useful flies may be mentioned the blowfly-like tachinids which parasitise caterpillars, grasshoppers and other pests and the bee flies (Bombyliidae) which parasitise the eggs of other insects. The maggots of the bombyliid fly, *Cyrtomorpha flaviscutellaris* Roberts are commonly found in the egg pods of the small plague grasshopper, *Austroicetes cruciata* (Saussure).

### Order Siphonaptera (Fleas)

A number of introduced as well as native fleas occur in this State. The red flea, *Echidnophaga myrmecobii* Rothschild, found originally on native mammals, is a very common parasite of rabbits in the drier parts of the State. The poultry stickfast flea, *E. gallinacea* (Westwood) closely resembles the former species but 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 primitive ghost moths (Hepialidae) are represented locally by a number of very beautiful forms. The larvae are wood borers but do not occur in sufficient numbers to constitute a serious forestry pest. Several large and striking members of the genus *Aenetus* occur in the lower south-west.

A group of small native moths of the family Pyralidae, sub-family Crambinae and commonly known as pasture webworm moths, *Hednota pedionoma* (Meyrick), *H. crypsichroa* Lower, etc. are serious pests of cereal crops (excepting oats) and grass pastures. Depredations are controlled by planting on clean fallow, but the recent trend towards ley farming has greatly favoured these pests.

A family of considerable interest to the orchardist is the Tortricidae, in which group are included the codling moth, *Cydia pomonella* (Linnaeus) and the oriental fruit moth, *C. molesta* (Busck). Outbreaks of codling moth have occurred on a number of occasions but drastic eradication measures have so far prevented this major apple pest from becoming permanently established and have given Western Australia the distinction of being the only large apple-producing region where the moth is not a major problem. The oriental fruit moth has not recurred since eradication measures were taken against an outbreak in the Bickley Valley in 1952.

One of the best-represented families is the Noctuidae which contains several important pests. Included under this heading are 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). Various parasitic wasps, including two *Apanteles* species, have been introduced to help in the control of armyworms and cutworms. The fruit-piercing moth, *Othreis materna* (Linnaeus) also belongs to this group and causes heavy losses in citrus fruit grown around pastoral homesteads in the Kimberley and the north-west. In almost all cases where moths and butterflies are regarded as pests it is only the caterpillar stage which is destructive. The fruit-piercing moth, however, has a rasp-like proboscis capable of piercing orange and citrus skins and then sucking up the juice. Fortunately the creatures do not normally range to the citrus areas of the south-west.

One of the most remarkable members of the family Agaristidae is the whistling moth, *Hecatesia thyridion* Feisthamel. The male of this species is active just at sunset and makes a loud clicking noise during its fast circling flight.

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

The beautiful dryandra moth, *Carthaea saturnioides* Walker with its large eye spots on the wings superficially resembles the emperor moths. Its range is restricted to south-west Australia.

The butterfly fauna of the State lacks many large and showy forms. Some of the northern species such as *Hypolimnas bolina nerina* Fabricius are quite colourful but the State has nothing to compare with the conspicuous and beautiful species found in the tropics of eastern Australia.

The blues (Lycaenidae) are well represented and the association of many larvae with ant nests renders the group a particularly interesting one.

The skippers (Hesperiidae) are relatively drab-coloured butterflies with strong powers of flight. Over twenty species are recorded from the State and some forms are endemic to the south-west.

Only one butterfly is of major economic importance and that is the introduced cabbage white butterfly, *Pieris rapae* (Linnaeus) which reached this State in 1943. It attacks cabbages, cauliflowers

and related plants as well as one or two other strong-tasting herbs such as watercress. The butterfly belongs to the whites, or Pieridae, which group contains a number of native species. Several members of this family, including the cabbage white, display extraordinary powers of flight and the caper white, *Anaphaëis java teutonia* (Fabricius) has been observed to carry out mass migrations of remarkable proportions on the eastern side of the continent.

A rather showy butterfly which has established itself here is the wanderer or monarch, *Danaus plexippus plexippus* (Linnaeus). This large orange and black butterfly has apparently reached Western Australia from the other States. The colourful larvae feed on certain noxious weeds such as the introduced narrow-leaf cotton-bush, *Asclepias fruticosa*. Another butterfly which has become established in this State recently is the orange palmdart, *Cephrenes augiades sperthias* (Felder). This species is native to Queensland and New South Wales. As the larvae attack the foliage of various palms, it is causing some concern to nurserymen and other growers of these plants.

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

The ant fauna (Formicidae) of the State is extremely varied. One of the best-known native species is the meat ant, *Iridomyrmex purpureus* (F. Smith) which often nests on gravel paths and roadsides. Among the most remarkable of the local ants may be listed *Melophorus bagoti* Lubbock, the honeypot ant of the interior, and *Myrmecia regularis* Crawley of the karri forest area which has the frog *Metacrinia nichollsi* (Harrison) as a tolerated guest in its nest. The honeypot ant derives its name from the fact that certain individuals in the nest store honey until their abdomens become inflated to the size of grapes. This honey is then regurgitated to other ants as required. These ants were once prized by Aborigines as a food delicacy.

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 the metropolitan area, Albany and Bunbury, with several other country outbreaks. The insect has been reduced in recent years, however, as a result of a large-scale control campaign. The scheme involved the spraying of all infested areas, with government-controlled labour, and a restriction on the movement of goods likely to spread the pest. From the commencement of the campaign in 1954 to 30 June 1985 30,520 hectares have been treated at a cost of approximately \$4.5 million.

The wood wasps and sirex wasps (Siricidae) include several pests which have been established in New Zealand and Tasmanian pine forests. Imported timber has been fumigated from time to time following the location of infested material.

The sawflies (Pergidae and Tenthredinidae) are represented locally by a number of native forms. The larvae of the genus *Perga* may often be seen in caterpillar-like clusters amongst 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 species known as the leafblister sawfly, *Phylacteophaga froggatti* Riek causes severe disfigurement to various eucalypts. However, some control of this pest is now being exerted by parasitic eulophid wasps.

The smaller parasitic wasps (ichneumonids, chalcids and their allies) 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, so that without their aid the problem of pest control would be even more difficult than at present.

The social wasps (Vespidae) were once known only from the northern portion of the State. About 1949, however, colonies of a paperwasp, *Polistes humilis synoecus* de Saussure were found to be located in various parts of the Perth suburban area and they have now extended their range into surrounding country areas.

The European wasp, *Vespula germanica* (Fabricius) was detected in Western Australia for the first time in January 1977, in the Mosman Park area. Subsequent surveys and follow-up of reports from the public resulted in a further seven nests being found in the suburbs of Cottesloe, Peppermint Grove, Attadale, Willetton and Kewdale and eighteen nests within the township of Albany. All nests of this troublesome exotic insect have been destroyed and it is hoped that the wasp has now

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

During surveys in 1977 for the above insect, several colonies of another exotic wasp species, *Polistes dominulus* (Christ) were discovered, mainly in the suburbs around Fremantle. Coincidentally, this insect is similar in appearance to the European wasp in that it is roughly the same size and it has yellow and black markings. This wasp, which has been named the yellow paperwasp, differs by having a more slender body and a more pronounced 'wasp waist'. It is now spreading throughout other metropolitan areas.

The burrowing wasps, including the spider wasps (Pompilidae), the flower wasps (Scoliidae) and velvet ants (Mutillidae) are well represented. The mutillids are, of course, not true ants but the wingless females bear a superficial resemblance to ants which is further accentuated by their ability to inflict a painful sting. The flower wasps are particularly numerous and winged males carrying wingless females are common around flowering plants in the early summer. Of the velvet ants the black and white *Ephutomorpha rugicollis* Westwood is the best known. Most of the wasps mentioned are beneficial, for they store caterpillars and other insects in mud nests and underground burrows to serve as food for the wasp grubs.

The majority of native bees are solitary forms although some, like the Colletidae, often choose a common site for nest burrowing and hundreds of tunnels may be located close to one another.

The leaf-cutting bees (Megachilidae) often attract notice from their habit of cutting circular pieces from rose leaves and other foliage for use in nest construction.

The only native social bees belong to the genus *Trigona* which does not occur in the southern portions of the State.

#### FURTHER SOURCES OF INFORMATION ON THE INSECTS OF WESTERN AUSTRALIA

The difficulties confronting anyone trying to review in a few pages the entomological fauna of such a large State as Western Australia will be better appreciated if it is remembered that in the *Western Australian Year-Book* for 1898-99 the late A. M. Lea expressed the opinion that there were about 30,000 species of insects indigenous to this State. Many additions have been made in the last eighty years or so and one is faced with the problem of deciding which creatures warrant special mention and which must be excluded for lack of space. The general reader interested in consulting other short reviews of the local insect fauna is referred to A. M. Lea's article in the 1898-99 Year Book under the title of 'The Insects of Western Australia'; in the Year Book for 1900-01 the late H. M. Giles wrote 'A Glimpse of Western Australian Entomology' which may also be of interest.

Two short summaries have also appeared in conjunction with science conferences in this State. The *Handbook and Review* published for the 1926 meeting of the Australasian Association for the Advancement of Science contained an article by L. J. Newman and the *Handbook* for the 1947 meeting of the Australian and New Zealand Association for the Advancement of Science printed a short summary of the local insects by L. Glauert.

Readers interested in more technical summaries are referred to Professor G. E. Nicholl's 'The Composition and Biographical Relation of the Fauna of Western Australia' (*A.N.Z.A.A.S.*, Vol. XXI, 1933, p. 93), the relevant volumes of *Die Fauna Sudwest-Australiens* by Michaelsen and Hartmeyer, 1907-1930, and the report of the Swedish expedition under Dr E. Mjöberg.

More detailed information relating to the forms of economic importance will be found in the publications of the Western Australian Department of Agriculture.

Literature covering the general aspects of Australian entomology is given below. Some of these publications are now out of print and possibly only obtainable through libraries.

ANON. *The Insects of Australia*. Division of Entomology, C.S.I.R.O. University Press, Melbourne, 1970. 1,029 pp.

BARRETT, C. and BURNS, A. N. *Butterflies of Australia and New Guinea*. N. H. Seward Pty. Ltd., Melbourne, 1951. 187 pp.

- BURNS, ALEXANDER and ROTHERHAM, E. R. *Australian Butterflies In Colour*. A. H. & A. W. Reed, Sydney, 1969. 112 pp.
- COMMON, I. F. B. *Australian Moths*. Jacaranda Press, Brisbane, 1963. 128 pp.
- COMMON, I. F. B. *Australian Butterflies*. Jacaranda Press, Brisbane, 1966. 131 pp.
- COMMON, I. F. B. and WATERHOUSE, D. F. *Butterflies of Australia*. Angus and Robertson Pty. Ltd., Sydney, 1981. 682 pp.
- GOODE, JOHN. *Insects of Australia*. Angus and Robertson Pty. Ltd., Sydney, 1980. 260 pp.
- HEALY, ANTHONY and SMITHERS, COURTENAY. *Australian Insects in Colour*. A. H. & A. W. Reed, Sydney, 1971. 112 pp.
- HUGHES, R. D. *Living Insects*. The Australian Naturalist Library. Collins, Sydney, 1975. 304 pp.
- MCKEOWN, K. C. *Australian Insects*. An Introductory Handbook. Published by R.Z.S. of N.S.W., Sydney, 1945. 303 pp.
- MAIN, BARBARA YORK. *Spiders of Australia*. Axiom Distributors, South Australia, 1981. 124 pp.
- RIEK, EDGAR. *Insects of Australia*. Jacaranda Press, Brisbane, 1963. 128 pp.
- TILLYARD, R. J. *The Insects of Australia and New Zealand*. Angus and Robertson Ltd., Sydney, 1926. 560 pp.
- WATERHOUSE, G. A. *What Butterfly is That? A Guide to the Butterflies of Australia*. Angus and Robertson Ltd., Sydney, 1932. 291 pp.
- WATSON, J. A. L. *The Dragonflies (Odonata) of South-Western Australia*. Western Australian Naturalists' Club, Perth, 1962. 72 pp.

## 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 Man's 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.

### FURTHER SOURCES OF INFORMATION ON THE NATURAL REGIONS OF WESTERN AUSTRALIA

- CLARKE, E. de C. 'Natural Regions in Western Australia'. *J. Roy. Soc. W. Aust.*, vol. XII, 1927, pp. 117-32.
- GENTILLI, J. (ed.). *Western Landscapes*. University of Western Australia Press (Sesquicentenary Series), Nedlands, 1979.



CHARACTERISTICS OF THE NATURAL REGIONS OF WESTERN AUSTRALIA

The subdivision of Western Australia into Natural Regions (see accompanying map) 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)	Sand ridges and table-top hills	Palaeozoic and Mesozoic	Summer, 375 millimetres or less	Springs, pools, artesian water? (undeveloped)	'Spinifex' (species of <i>Triodea</i> ) and desert shrubs
CARNEGIE (David Carnegie, explorer)	Sand ridges and table-top hills	Mesozoic, Palaeozoic and Younger Precambrian	Variable and unreliable, probably about 125 millimetres	Catchments, wells	'Spinifex' and desert shrubs
WARBURTON (Warburton Range)	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'
NORTH-WEST (common usage)	Rugged hills. Rivers in well-defined valleys	Younger and Older Precambrian. Many economic minerals	Variable, unreliable, 375 millimetres or less	Wells, catchments, pools	'Spinifex', few shrubs and trees
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. catophylla</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	Spring, 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 Younger and Older 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.

## 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 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 the 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 in respect of 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 Right Honourable Sir Ninian Martin Stephen, P.C., A.K., G.C.M.G., G.C.V.O., K.B.E., K.St.J., who was sworn in on 29 July 1982. 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 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, the Chief Justice 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 1982 issue of the Year Book.

#### 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 a 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 the *Official Year Book of 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 Allowances Act 1948*.

### **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 summarised description of which is given below.

The total number of first preference votes for all candidates is divided by one more than the number of candidates to be elected, and the resulting quotient, plus one, is taken as the quota necessary for each candidate to obtain in order to become elected. When the number of first preference votes received by an elected candidate is greater than the quota, and there are still vacancies to be filled, his votes in excess of the quota (surplus votes) are transferred in the following manner to the continuing candidates in proportion to the voters' preferences. The number of the elected candidate's surplus votes is divided by the number of his first preference votes, the resulting fraction representing the transfer value of his surplus votes. The totals of the elected candidate's ballot papers, after the latter have been arranged in parcels according to the next available preference for continuing candidates, are multiplied by the transfer value. This determines the number of the elected candidate's votes to be transferred to each continuing candidate, the method being to transfer, after random selection, the appropriate number of ballot papers which bear the next available preference for that candidate.

After the surplus votes of all candidates elected on the count of first preferences have been so transferred, any continuing candidate who has received a number of votes equal to or greater than the quota is elected.

This procedure of the transfer of surplus votes of elected candidates is continued, while there are vacancies to be filled, until the stage is reached where no continuing candidate has received the quota of votes. Then the candidate with the lowest votes is excluded, and the whole of his ballot papers are transferred to the continuing candidates according to preferences. Any continuing candidate thereby obtaining the quota is elected, and if there are still vacancies his surplus votes are transferred.

The process of exclusion and transfer of ballot-papers is repeated until remaining vacancies are filled by candidates obtaining the quota, or, in respect of the last vacancy, by obtaining a majority of votes, even if this is less than the quota.

When transferring the surplus votes of elected candidates other than those elected on the count of first preference votes, only those ballot papers which have been transferred to the elected candidates at the last preceding count are considered. Similarly, in the transfer of surplus votes of a candidate elected during the exclusion procedure, only the ballot papers transferred from the candidate last excluded are taken into account.

The exclusion of the candidate with the lowest votes and the distribution of his ballot papers operate also immediately after the count of first preference votes, where no candidate has obtained the quota.

The Act also provides for the filling of a long casual vacancy by the continuing candidate who, next after the periodical vacancies have been filled as above, first receives a number of votes equal to or greater than the quota.

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. Aboriginals, 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 1 December 1984. The following table shows the Western Australian membership of the Senate as from 1 July 1985.

#### WESTERN AUSTRALIAN MEMBERS OF THE SENATE

Due to retire on 30 June 1988		Due to retire on 30 June 1991	
Name	Political party	Name	Political party
Chaney, Hon. F. M.	Lib.	Cook, P. F.	A.L.P.
Coleman, R. N.	A.L.P.	Crichton-Browne, N. A.	Lib.
Durack, Hon. P. D., Q.C.	Lib.	Giles, P. J.	A.L.P.
McIntosh, G. D.	A.L.P.	Knowles, S.	Lib.
Vallentine, J.	Ind.	McKiernan, J.	A.L.P.
Walsh, P. A.	A.L.P.	Withers, Rt. Hon. R. G.	Lib.

A.L.P. = Australian Labor Party.

Lib. = Liberal Party of Australia.

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.

Western Australia's population growth had been such as to necessitate an increase in representation from five to eight, and this number was raised to nine in 1955 as a result of a redistribution following the Census of 30 June 1954. At the same time, the total number of members of the House of Representatives was increased to 122, excluding the two members for the internal Territories.

Consequent upon the population changes disclosed by the 1966 Census, a redistribution of the State electoral division boundaries was carried out in 1968 and the following representation in the House of Representatives became effective as from the general election held on 25 October 1969: New South Wales 45, Victoria 34, Queensland 18, South Australia 12, Western Australia 9, and Tasmania 5, the total number of members (excluding the members for the internal Territories) being increased from 122 to 123.

A redistribution of Western Australian electoral division boundaries was carried out in 1973, as a result of the population changes disclosed by the 1971 Census, and the State gained an additional seat in the House of Representatives. The tenth seat was named Tangney after Dame Dorothy Tangney, a former Labour senator for Western Australia. Representation of the Australian Capital

Territory in the House was increased from one to two by the *Australian Capital Territory Representation (House of Representatives) Act 1973* and consequently the total number of members was raised to 127.

Although Western Australia's representation remained at ten until 1979 most other States experienced a redistribution of boundaries prior to the election of 10 December 1977. This reduced the total number of members in the House of Representatives to 124.

Distribution Commissioners were appointed for Western Australia in April 1979, with the result that the eleventh Western Australian seat of O'Connor was contested for the first time at the election of 18 October 1980. At this election the following number of members were elected to the House of Representatives: New South Wales 43, Victoria 33, Queensland 19, South Australia 11, Western Australia 11, Tasmania 5, plus the Australian Capital Territory 2 and the Northern Territory 1, making a total of 125.

As a result of the *Representation Act 1983* a general redistribution for the House of Representatives was completed on 31 August 1984 with the result that Western Australia was to receive two more seats (those of Brand and Cowan), bringing its representation in the House to thirteen seats. The two new seats were contested for the first time at the election of 1 December 1984. At this election the following number of members were elected to the House of Representatives: 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.

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 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. Aboriginals, although entitled to enrol, are not required to do so. Voting is on the preferential system and 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.

Elections for the House of Representatives were last held on 1 December 1984. The next table shows the Western Australian membership of the House of Representatives at 30 June 1986.

#### WESTERN AUSTRALIAN MEMBERS OF THE HOUSE OF REPRESENTATIVES

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

A.L.P. = Australian Labor Party.

Lib. = Liberal Party of Australia.

#### 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-five separate Ministries as shown in the following table. 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.

## MINISTRIES FROM 1890

Name of Premier	Political party	Date of assumption of office	Duration		
			Years	Months	Days
Forrest		1890 — 29 December	10	1	17
Throssell		1901 — 15 February	—	3	12
Leake	(a)	27 May	—	5	25
Morgans		21 November	—	1	2
Leake		23 December	—	6	8
James		1902 — 1 July	2	1	9
Daglish	Labour	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	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.  
of Australia (W.A.) Inc. on 5 May 1975.  
Incorporated on 15 July 1968.

(b) At 30 June 1986.

(c) The name of the Party was changed to the *National Country Party*

(d) The name of the Party was changed to *The Liberal Party of Australia (Western Australian Division)*

The Constitution Act of 1889 provided for a Ministry of five members. This number was increased to six by an amendment to the Act in 1896, to eight by another amendment in 1927, and to ten by the *Acts Amendment (Increase in Number of Ministers of the Crown) Act 1950*. The Ministry was increased to twelve members under the provisions of the *Constitution Acts Amendment Act 1965* and further increased to thirteen by the *Constitution Acts Amendment Act (No. 4) 1975*. The present number of fifteen Ministers was provided for by the *Constitution Amendment Act 1980*. The names of the Ministers and the portfolios held by them at 30 June 1986 are shown in the next table.

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*.

THE MINISTRY AT 30 JUNE 1986

Name of Minister	Title of Office
Hon. Brian Thomas Burke, J.P., M.L.A.	Premier, Treasurer, Minister Co-ordinating Economic and Social Development, and Minister for Women's Interests
Hon. Malcolm John Bryce, B.A., J.P., M.L.A.	Deputy Premier, and Minister for Industry and Technology, Defence Liaison, Communications and Parliamentary and Electoral Reform
Hon. Desmond Keith Dans, M.L.C.	Minister for Works and Services, and Water Resources, Minister with special responsibility for the America's Cup and Leader of the Government in the Legislative Council
Hon. Joseph Max Berinson, LL.B., M.L.C.	Attorney General, Minister for Budget Management, and Prisons and Deputy Leader of the Government in the Legislative Council
Hon. Jeffrey Phillip Carr, B.A., J.P., M.L.A.	Minister for Local Government, and Regional Development
Hon. Robert John Pearce, B.A., Dip. Ed., J.P., M.L.A.	Minister for Education, Planning, and Police and Emergency Services and Leader of the House in the Legislative Assembly
Hon. Barry James Hodge, M.L.A.	Minister for Conservation and Land Management, and Environment
Hon. David Charles Parker, B.A., J.P., M.L.A.	Minister for Minerals and Energy, the Arts and Minister Assisting the Minister Co-ordinating Economic and Social Development
Hon. Julian Fletcher Grill, LL.B., J.P., M.L.A.	Minister for Agriculture, the South West, Fisheries, and the North West
Hon. Keith James Wilson, M.L.A.	Minister for Housing, Sport and Recreation, Consumer Affairs, and Aboriginal Affairs
Hon. Peter M'Callum Dowding, LL.B., M.L.C.	Minister for Employment and Training, and Industrial Relations
Hon. Ian Frederick Taylor, B.Ec. (Hons.), J.P., M.L.A.	Minister for Health, and Lands
Hon. Pamela Anne Beggs, J.P., M.L.A.	Minister for Tourism, and Racing and Gaming
Hon. Elsie Kay Hallahan, B.App.Sci.(Soc.Wk.), J.P., M.L.C.	Minister for Community Services, The Family, Youth, The Aged, Multicultural and Ethnic Affairs and Minister assisting the Minister for Women's Interests
Hon. Gavan John Troy, B.Bus., A.F.A.I.M., J.P., M.L.A.	Minister for Transport, and Small Business
Hon. Ernest Francis Bridge, M.L.A.	Honorary Minister assisting the Ministers for Water Resources, The North West, and Aboriginal Affairs
Hon. Gordon Leslie Hill, J.P., M.L.A.	Honorary Minister assisting the Ministers for Police and Emergency Services, and Multicultural and Ethnic Affairs
Terence Joseph Burke, Esquire, J.P., M.L.A.	Parliamentary Secretary of the Cabinet

### The Legislative Council

At 30 June 1986 the Legislative Council consisted of thirty-four members, each of the seventeen electoral provinces into which the State was divided being represented by two members. Election is for a term of six years and one-half of the members retire every three years.

The qualifications of a candidate for election to the Legislative Council are that he or she shall be at least eighteen years of age, shall have resided in Western Australia for a minimum of one year, be a natural-born or naturalised British subject, and be enrolled or qualified for enrolment, as an elector. No person may hold office as a Member of the Legislative Council and a Member of the Legislative Assembly at the same time. A Judge of the Supreme Court, the Sheriff of Western Australia, an undischarged bankrupt, a debtor against whose estate there is a subsisting order in bankruptcy, or a person who has been attainted or convicted of treason or felony may not be elected to the Legislative Council. The qualifications for election as a member of the Legislative Council are identical with those necessary for election as a member of the Legislative Assembly. The

qualifying age for a candidate for election to either House was reduced from twenty-one years of age to eighteen years of age under the provisions of the *Constitution Acts Amendment Act 1973* which was proclaimed operative from 1 January 1974.

The *Electoral Act 1907* requires that to qualify for enrolment as an elector a person shall be at least eighteen years of age, be a natural-born or naturalised British subject, shall have lived in the Commonwealth of Australia for six months continuously, and shall have lived in Western Australia for three months continuously and in the district for which he claims enrolment for a continuous period of one month immediately preceding the date of his claim. The qualifying age for enrolment as an elector for both the Legislative Council and the Legislative Assembly was reduced from twenty-one years of age to eighteen years of age under the provisions of the *Electoral Act Amendment Act (No. 2) 1970*. The Act operated for the first time at the conjoint election for the Legislative Council and the Legislative Assembly held on 20 February 1971. A person is disqualified from enrolment if he is of unsound mind, has been attainted of treason, has been convicted and is serving sentence for any offence punishable by imprisonment for one year or longer, is the holder of a temporary entry permit for the purposes of the *Migration Act 1958* (Commonwealth) or is a prohibited immigrant under that Act. Enrolment is compulsory under the *Electoral Act Amendment Act 1964* for all qualified persons except those who are Aboriginal natives of Australia. Aboriginals, although entitled to enrol, are not required to do so. Voting at elections is on the preferential system and, as provided by the foregoing Act, is compulsory for all enrolled persons.

The *Acts Amendment (Electoral Provinces and Districts) Act 1981* provides that 'until 21 May 1983 the State shall be divided into 16 Electoral Provinces under the Electoral Districts Act 1947 and shall return in all 32 members to serve in the Legislative Council. On and after 21 May 1983 the State shall be divided into 17 Electoral Provinces under the Electoral Districts Act 1947 and shall return in all 34 members to serve in the Legislative Council'.

The Act also provides that 'the State shall be divided into (a) 55 Electoral Districts until the dissolution of the Legislative Assembly or the expiry thereof by effluxion of time first occurring after 31 December 1982; and (b) 57 Electoral Districts thereafter, under the provisions of the Electoral Districts Act 1947, each returning one member to serve in the Legislative Assembly'.

The increase in the number of members of the Legislative Council and the Legislative Assembly to thirty-four and fifty-seven, respectively, came into effect at the State elections which took place on 19 February 1983.

Details of the final recommendations of the Commissioners appointed under the Electoral Districts Act to effect the division of the State into seventeen Electoral Provinces and fifty-seven Electoral Districts were promulgated in the *Government Gazette of Western Australia* dated 20 January 1982. A summary is given below.

#### ELECTORAL PROVINCES AND ELECTORAL DISTRICTS

Electoral province	Component electoral districts	Electoral province	Component electoral districts
METROPOLITAN AREA			
Metropolitan	Cottesloe Floreat Nedlands Perth Subiaco	North-East Metropolitan	Ascot Helena Maylands Morley-Swan Welshpool
North Metropolitan	Joondalup Karrinyup Scarborough Whitford	South Metropolitan	Cockburn Fremantle Melville Rockingham
North Central Metropolitan	Balcatta Balga Mount Lawley Nollamara		

ELECTORAL PROVINCES AND ELECTORAL DISTRICTS — *continued*

Electoral province	Component electoral districts	Electoral province	Component electoral districts
METROPOLITAN AREA — <i>continued</i>			
South Central Metropolitan	Clontarf East Melville South Perth Victoria Park	South-East Metropolitan	Armadale Canning Gosnells Murdoch
AGRICULTURAL, MINING AND PASTORAL AREA			
Central	Avon Merredin Mount Marshall	South-East	Esperance-Dundas Kalgoorlie
Lower Central	Collie Narrogin Warren	South-West	Bunbury Mitchell Vasse
Lower West	Dale Mandurah Murray-Wellington	Upper West	Geraldton Greenough Moore
South	Albany Katanning-Roe Stirling	West	Darling Range Kalamunda Mundaring
NORTH-WEST — MURCHISON-EYRE AREA			
Lower North	Gascoyne Murchison-Eyre	North	Kimberley Pilbara

The composition of the Legislative Council at 30 June 1986 is given in the following table.

## MEMBERS OF THE LEGISLATIVE COUNCIL AT 30 JUNE 1986

Name	Political party	Electoral province
DUE TO RETIRE IN 1989 (a)		
Bell, Hon. Colin John	Lib.	Lower West
Charlton, Hon. Eric James	N.P.A.	Central
Dans, Hon. Desmond Keith	A.L.P.	South Metropolitan
Edwards, Hon. Graham John	A.L.P.	North Metropolitan
Ferry, Hon. Victor Jasper, D.F.C.	Lib.	South-West
Griffiths, Hon. Clive Edward	Lib.	South Central Metropolitan
Hallahan, Hon. Elsie Kay, B.App.Sci. (Soc. Wk.)	A.L.P.	South-East Metropolitan
McKenzie, Hon. Fred Evan	A.L.P.	North-East Metropolitan
McNeil, Hon. Thomas	N.P.A.	Upper West
Moore, Hon. Norman Frederick, B.A., Dip. Ed.	Lib.	Lower North
Nevill, Mark Warriedar, B.Sc.(Hons.), J.P.	A.L.P.	South-East
Oliver, Hon. Oscar Neil Blackburne, E.D.	Lib.	West
Piantadosi, Hon. Samuel Mathew	A.L.P.	North Central Metropolitan
Stephens, Hon. Thomas Gregory, B.A., J.P.	A.L.P.	North
Stretch, Hon. William Noel	Lib.	Lower Central
Williams, Hon. Richard John Lloyd, B.A.	Lib.	Metropolitan
Wordsworth, Hon. David John	Lib.	South

MEMBERS OF THE LEGISLATIVE COUNCIL AT 30 JUNE 1986 — *continued*

Name	Political party	Electoral province
DUE TO RETIRE IN 1992 (a)		
Berinson, Hon. Joseph Max, LL.B.	A.L.P.	North Central Metropolitan
Brown, Hon. James McMillan	A.L.P.	South-East
Butler, Hon. Thomas George	A.L.P.	North-East Metropolitan
Caldwell, Hon. John Norman	N.P.A.	South
Gayfer, Hon. Harry Walter	N.P.A.	Central
Halden, Hon. Stanley John	A.L.P.	North Metropolitan
Helm, Hon. Thomas Richard	A.L.P.	North
Hetherington, Hon. Robert, B.A.	A.L.P.	South-East Metropolitan
Jones, Hon. Beryl Lillian	A.L.P.	Lower West
Kelly, Hon. Garry Kenneth, B.App.Sci. (Physics)	A.L.P.	South Metropolitan
Lewis, Hon. Alexander Ashley	Ind.	Lower Central
Lockyer, Hon. Phillip Harry	Lib.	Lower North
McAleer, Hon. Margaret	Lib.	Upper West
Masters, Hon. Gordon Edgar	Lib.	West
Medcalf, Hon. Ian George, E.D., Q.C.	Lib.	Metropolitan
Pendal, Hon. Phillip George	Lib.	South Central Metropolitan
Wenn, Hon. Douglas William	A.L.P.	South-West

## SUMMARY

Australian Labor Party (A.L.P.)	16
Independent (Ind.)	1
National Party of Australia (N.P.A.)	4
The Liberal Party of Australia (Western Australia Division) Incorporated (Lib.)	13

(a) Section 8 of the *Constitution Acts Amendment Act 1899* provides that a retiring member shall vacate his seat on 21 May in the year of retirement.

**The Legislative Assembly**

The following table shows the composition of the Legislative Assembly at 30 June 1986.

## MEMBERS OF THE LEGISLATIVE ASSEMBLY AT 30 JUNE 1986

Name	Political party	Electoral district
Barnett, Michael, J.P.	A.L.P.	Rockingham
Beggs, Pamela Anne, J.P.	A.L.P.	Whitford
Bertram, Ronald Edward, A.A.S.A.	A.L.P.	Balcatta
Blaikie, Barry Roy	Lib.	Vasse
Bradshaw, John Leslie, M.P.S., J.P.	Lib.	Murray-Wellington
Bridge, Hon. Ernest Francis	A.L.P.	Kimberley
Bryce, Hon. Malcolm John, B.A., J.P.	A.L.P.	Ascot
Buchanan, Pamela Anne, J.P.	A.L.P.	Pilbara
Burke, Hon. Brian Thomas, J.P.	A.L.P.	Balga
Burke, Terence Joseph, J.P.	A.L.P.	Perth
Burkett, Graham John, J.P.	A.L.P.	Scarborough
Carr, Hon. Jeffrey Phillip, B.A., J.P.	A.L.P.	Geraldton
Cash, Samuel George Ernest, B.Bus., A.C.I.S., J.P.	Lib.	Mount Lawley
Clarko, James George, A.E., B.A., Dip. Ed., M.A.C.E., J.P.	Lib.	Karrinyup
Court, Richard Fairfax, B.Com.	Lib.	Nedlands
Cowan, Hendy John	N.P.A.	Merredin
Crane, Albert Victor	Lib.	Moore
Dowding, Hon. Peter M'Callum, LL.B.	A.L.P.	Maylands
Evans, Hon. Hywel David, B.A.	A.L.P.	Warren
Gallop, Dr Geoffrey Ian, B.Ec., M.A., M.Phil., D.Phil.	A.L.P.	Victoria Park

MEMBERS OF THE LEGISLATIVE ASSEMBLY AT 30 JUNE 1986 — *continued*

Name	Political party	Electoral district
Grayden, Hon. William Leonard	Lib.	South Perth
Grill, Hon. Julian Fletcher, LL.B., J.P.	A.L.P.	Esperance-Dundas
Hassell, William Ralph Boucher, LL.B., M.A.	Lib.	Cottesloe
Henderson, Yvonne Daphne, B.A., Dip.Ed., J.P.	A.L.P.	Gosnells
Hill, Hon. Gordon Leslie, J.P.	A.L.P.	Helena
Hodge, Hon. Barry James	A.L.P.	Melville
House, Montague Grant, J.P.	N.P.A.	Katanning-Roe
Jones, Thomas Henry, J.P.	A.L.P.	Collie
Laurance, Ian James, B.A.	Lib.	Gascoyne
Lawrence, Dr Carmen Mary, B.Psych., Ph.D.	A.L.P.	Subiaco
Lewis, Kennon Richard	Lib.	East Melville
Lightfoot, Philip Ross	Lib.	Murchison-Eyre
MacKinnon, Barry John, B.Ec., F.A.S.A.	Lib.	Murdoch
Marlborough, Norman Richard	A.L.P.	Cockburn
Mensaros, Hon. Andrew	Lib.	Floreat
Nalder, Cambell Crawford	N.P.A.	Narrogin
Parker, Hon. David Charles, B.A., J.P.	A.L.P.	Fremantle
Pearce, Hon. Robert John, B.A., Dip. Ed., J.P.	A.L.P.	Armadale
Read, John Bell, J.P.	A.L.P.	Mandurah
Rushton, Hon. Edgar Cyril	Lib.	Dale
Schell, Morton William	N.P.A.	Mount Marshall
Smith, David Lawrence, LL.B., J.P.	A.L.P.	Mitchell
Smith, Philip John, B.Ed.	A.L.P.	Bunbury
Spriggs, George Clarence Charles, J.P.	Lib.	Darling Range
Stephens, Matthew Ernest	N.P.A.	Stirling
Taylor, Ian Frederick, B.Ec. (Hons.), J.P.	A.L.P.	Kalgoorlie
Thomas, William Ian, B.A.	A.L.P.	Welshpool
Thompson, Hon. Ian David, J.P.	Lib.	Kalamunda
Tonkin, Hon. Arthur Raymond, D.A., Dip. Ed., J.P.	A.L.P.	Morley-Swan
Trenorden, Maxwell Wayne	N.P.A.	Avon
Troy, Gavan John, B.Bus, A.F.A.I.M., J.P.	A.L.P.	Mundaring
Tubby, Reginald John, J.P.	Lib.	Greenough
Watkins, Jacqueline Patricia, J.P.	A.L.P.	Joondalup
Watson, Dr Judyth, Cert.Nsg.Ed., B.Sc. (Hons.), Ph.D.	A.L.P.	Canning
Watt, Leon Harold, J.P.	Lib.	Albany
Williams, Rex Geoffrey, A.F.A.I.M., J.P.	Lib.	Clontarf
Wilson, Hon. Keith James	A.L.P.	Nollamara

## SUMMARY

Australian Labor Party (A.L.P.)	32
National Party of Australia (N.P.A.)	6
The Liberal Party of Australia (Western Australian Division) Incorporated (Lib.)	19

At 30 June 1986 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. Members are elected for the duration of the Parliament, which is limited to three years.

A candidate for election must have resided in Western Australia for twelve months, be at least eighteen years of age, be a natural-born or naturalised British subject, and be enrolled or qualified for enrolment as an elector at Legislative Assembly elections. No person is qualified to be a Member of the Legislative Assembly if he is a Member of the Legislative Council, a Judge of the Supreme Court, the Sheriff of Western Australia, an undischarged bankrupt, a debtor against whose estate there is a subsisting order in bankruptcy, or has been attainted or convicted of treason or felony.

The qualifications and disqualifications applying to enrolment as an elector of the Legislative Assembly are the same as those prescribed for electors of the Legislative Council and enumerated in the preceding section *The Legislative Council*. As provided by the *Electoral Amendment Act*

1919 enrolment is compulsory for all qualified persons except those who are Aboriginal natives of Australia. Aboriginals, although entitled to enrol, are not required to do so. Voting at elections is on the preferential system and is compulsory for all enrolled persons as provided by the *Electoral Act Amendment Act 1936*.

## ELECTIONS

### The Federal Parliament

General elections for the Federal Parliament were held on 1 December 1984. The Australian Labor Party, led by R. J. L. Hawke, A.C., was elected to office with a majority of sixteen seats in the House of Representatives.

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

### The State Parliament

At the conjoint election for the Legislative Council and the Legislative Assembly held on 18 February 1986, the Australian Labor Party, led by B. T. Burke, J.P., M.L.A., was elected to office with a majority in the Legislative Assembly of seven seats.

## LEGISLATION DURING 1984

During the second period of the first session, and the first period of the second session of the thirty-first Parliament, which lasted from 22 March 1984 to 30 May 1984, and from 25 July 1984 to 13 December 1984 respectively, the Western Australian legislature enacted 127 Public Statutes and, in addition, dealt with nineteen Bills which were introduced but not passed.

The titles and a brief summary of the Acts passed by the State Parliament during 1984 are given below. The full text of the legislation enacted is contained in the volumes of *The Acts of the Parliament of Western Australia*, to which reference should be made if further details are required.

## ACTS PASSED DURING 1984

No. of Act	Title and summary
54	Aboriginal Affairs Planning Authority Amendment Act. Amends the <i>Aboriginal Affairs Planning Authority Act 1972</i> .
52	Acts Amendment (Abolition of Capital Punishment) Act. Provides for the abolition of capital punishment, and for that purpose amends <i>The Criminal Code</i> , the <i>Prisons Act 1981</i> , the <i>Bail Act 1982</i> , the <i>Offenders Probation and Parole Act 1963</i> , the <i>Child Welfare Act 1947</i> , the <i>Juries Act 1957</i> , the <i>Justices Act 1902</i> , and the <i>District Court of Western Australia Act 1969</i> .
102	Acts Amendment and Repeal (Credit) Act. Amends the <i>Bills of Sale Act 1899</i> , the <i>Control of Vehicles (Off-road areas) Act 1978</i> , the <i>Door to Door (Sales) Act 1964</i> , the <i>Hire-Purchase Act 1959</i> , the <i>Road Traffic Act 1974</i> , the <i>Supreme Court Act 1935</i> , and the <i>Transport Act 1966</i> , and repeals the <i>Money Lenders Act 1912</i> .
78	Acts Amendment and Repeal (Disqualification for Parliament) Act. Amends the <i>Alcohol and Drug Authority Act 1974</i> , the <i>Audit Act 1904</i> , the <i>Constitution Act 1889</i> , the <i>Constitution Acts Amendment Act 1899</i> , the <i>Electoral Act 1907</i> , the <i>Fremantle Port Authority Act 1902</i> , the <i>National Parks Authority Act 1976</i> , the <i>Salaries and Allowances Act 1975</i> , and the <i>Waterways Conservation Act 1976</i> , and repeals the <i>Constitutional Convention Act 1974</i> .
94	Acts Amendment and Repeal (Industrial Relations) Act (No. 2). Amends the <i>Industrial Arbitration Act 1979</i> , the <i>Education Act 1928</i> and the <i>Public Service Act 1978</i> , and repeals the <i>Government Employees (Promotions Appeal Board) Act 1945</i> , the <i>Government School Teachers Arbitration and Appeal Act 1979</i> , the <i>Public Service Arbitration Act 1966</i> and the <i>Railways Classification Board Act 1920</i> .
40	Acts Amendment (Bingo) Act. Amends the <i>Lotteries (Control) Act 1954</i> , and the <i>Liquor Act 1970</i> .
112	Acts Amendment (Conservation and Land Management) Act. Amends the <i>Wildlife Conservation Act 1950</i> , the <i>Land Act 1933</i> , the <i>Bush Fires Act 1954</i> , the <i>Agriculture and Related Resources Protection Act 1976</i> , the <i>Fisheries Act 1905</i> , and the <i>Public Works Act 1902</i> .
69	Acts Amendment (Court Fees) Act. Amends the <i>Justices Act 1902</i> , and the <i>Local Courts Act 1904</i> .
121	Acts Amendment (Department of Community Services) Act. Amends the <i>Community Welfare Act 1972</i> .

ACTS PASSED DURING 1984 — *continued*

No. of Acts	Title and summary
72	Acts Amendment (Insolvent Estates) Act. Amends the <i>Administration Act 1903</i> , the <i>Married Womens Property Act 1892</i> and the <i>Supreme Court Act 1935</i> .
79	Acts Amendment (Local Government Electoral Provisions) Act. Amends the <i>Local Government Act 1960</i> , and the <i>Local Government Amendment Act (No. 2) 1984</i> .
25	Acts Amendment (Mining Tenements) (Rating) Act. Amends the <i>Local Government Act 1960</i> and the <i>Valuation of Land Act 1978</i> .
22	Acts Amendment (Soccer Football Pools) Act. Amends the <i>Police Act 1892</i> , and the <i>Lotteries (Control) Act 1954</i> .
7	Acts Amendment (Western Australian Meat Industry Authority) Act. Amends the <i>Western Australian Meat Industry Authority Act 1976</i> and the <i>Western Australian Meat Industry Authority Amendment Act 1982</i> .
57	Administration Amendment Act.
70	Adoption of Children Amendment Act.
115	Appropriation (Consolidated Revenue Fund) Act 1984-85.
114	Appropriation (General Loan Fund) Act 1984-85.
49	Audit Amendment Act.
74	Bail Amendment Act.
85	Bee Industry Compensation Amendment Act.
84	Beekkeepers Amendment Act.
11	Bills of Sale Amendment Act.
14	Builders' Registration Amendment Act.
108	Building Societies Amendment Act.
34	Casino Control Act. Provides for the establishment of a casino in Western Australia, for licensing the operator of the casino and for the control of gaming operations therein.
125	Censorship of Films Amendment Act.
31	Child Welfare Amendment Act.
61	Child Welfare Amendment Act (No. 2).
103	Commercial Tribunal Act. Provides for the constitution of a tribunal and for the exercise of the functions of the tribunal.
126	Conservation and Land Management Act. Makes better provision for the use, protection and management of certain public lands and waters and the flora and fauna thereof, and establishes the responsible authorities.
75	Constitution Amendment Act.
89	Construction Safety Amendment Act.
41	Country Areas Water Supply Amendment Act.
16	Country Towns Sewerage Amendment Act.
99	Credit Act. Relates to the provision of credit.
100	Credit (Administration) Act. Provides for the licensing of credit providers and the facilitation of inquiries into matters relating to the provision of credit.
82	Credit Unions Amendment Act.
122	District Court of Western Australia Amendment Act.
5	Eastern Goldfields Transport Board Act. Preserves and continues the Eastern Goldfields Transport Board as the operator of certain passenger road transport services.
86	Election of Senators Amendment Act.
76	Electoral Amendment Act.
83	Equal Opportunity Act. Promotes equality of opportunity in Western Australia, and provides remedies in respect of discrimination on the grounds of sex, marital status, pregnancy, race, religious or political conviction, or involving sexual harassment.
68	Explosives and Dangerous Goods Amendment Act.
19	Financial Institutions Duty Amendment Act.
110	Financial Institutions Duty Amendment Act (No. 3).
111	Financial Institutions Duty Amendment Act (No. 4).
63	Grain Marketing Amendment Act.
27	Health Legislation Administration Act. Relates to the administration of certain Acts and facilitates the provision of health services to the people of the State.
28	Health Legislation Amendment Act.
55	Herd Improvement Service Act. Establishes the Herd Improvement Service of Western Australia, and repeals the <i>Artificial Breeding Board Act 1965</i> .

ACTS PASSED DURING 1984 — *continued*

No. of Act	Title and summary
116	Housing Agreement (Commonwealth and State) Act. Relates to financial assistance from the Commonwealth for the purposes of housing.
92	Industrial Arbitration Amendment Act (No. 2).
12	Interpretation Act. Amends and consolidates the law relating to the construction, application, interpretation, and operation of written law, and provides for the exercise of statutory powers and duties.
37	Iron Ore (Cleveland-Cliffs) Agreement Amendment Act.
59	Juries Amendment Act.
44	Justices Amendment Act.
87	Land Tax Assessment Amendment Act.
15	Land Valuers Licensing Amendment Act.
48	Legal Aid Commission Amendment Act.
47	Legal Practitioners Amendment Act.
113	Loan Act. Authorises the raising of a sum of One Hundred and Twenty Two Million Four Hundred and Twenty Thousand Dollars by loan for the construction of certain public works and for other purposes.
17	Local Government Amendment Act.
42	Local Government Amendment Act (No. 2).
107	Lotteries (Control) Amendment Act.
90	Machinery Safety Amendment Act.
38	Main Roads Amendment Act.
64	Metropolitan Market Amendment Act.
117	Metropolitan (Perth) Passenger Transport Trust Amendment Act.
88	Mines Regulation Amendment Act.
24	Museum Amendment Act.
101	Occupational Health, Safety and Welfare Act. Promotes and improves standards for occupational health, safety and welfare, establishes the Occupational Health, Safety and Welfare Commission, and facilitates the co-ordination of the administration of the laws relating to occupational health, safety and welfare.
67	Ord River Dam Catchment Area (Straying Cattle) Amendment Act.
124	Parliamentary Commissioner Amendment Act.
45	Parole Orders (Transfer) Act. Relates to the reciprocal enforcement of parole orders.
71	Pawnbrokers Amendment Act.
96	Payroll Tax Amendment Act.
33	Payroll Tax Assessment Amendment Act.
97	Payroll Tax Assessment Amendment Act (No. 2).
39	Pensioners (Rates Rebates and Deferments) Amendment Act.
51	Plant Diseases Amendment Act.
4	Podiatrists Registration Act. Makes provision for the regulation of the practice of podiatry, the registration of persons as podiatrists, and repeals the <i>Chiropodists Act 1957</i> .
23	Public Meetings and Processions Act. Makes provision as to the use of streets for public meetings and processions, for purposes incidental thereto, and amends section 52 and repeals section 54B of the <i>Police Act 1892</i> .
46	Public Trustee Amendment Act.
123	Public Works Amendment Act.
60	Racing Restriction Amendment Act.
77	Real Estate and Business Agents Amendment Act.
13	Reprints Act. Makes provision for the reprinting of Acts of Parliament, and subsidiary legislation made thereunder, and provides for the incorporation of certain formal amendments in reprints.
120	Reserves Act. Relates to certain reserves and other lands.
6	Reserves Act and Reserves Amendment Act. Relates to certain Reserves and other lands and amends the <i>Reserves Act (No. 3) 1939</i> .
73	Restraint of Debtors Act. Provides for the protection of creditors in certain circumstances and repeals the <i>Absconding Debtors Act 1977</i> .
119	Rights in Water and Irrigation Amendment Act.
95	Road Traffic Amendment Act.
93	Rural and Industries Bank Amendment Act.

ACTS PASSED DURING 1984 — *continued*

No. of Act	Title and summary
53	Rural Housing (Assistance) Amendment Act.
20	Rural, Reconstruction and Rural Adjustment Schemes Amendment Act.
118	Secondary Education Authority Act. Establishes the Secondary Education Authority and the Tertiary Entrance Subject Committee and amends the <i>Education Act 1928</i> .
105	Secret Harbour Management Trust Act. Constitutes a management trust to manage and regulate the maintenance, safety and environment of the Breakwaters, the Sand By-pass System, the Outer Harbour, the Inner Harbour and the Foreshore Reserve at Secret Harbour.
26	Shipping and Pilotage Amendment Act.
80	Small Business Guarantees Act. Authorizes the execution of guarantees for the repayment of loans made to owners of certain small businesses.
21	Soccer Football Pools Act. Provides for the promotion, conduct and operation of soccer football pools.
32	South West Development Authority Act. Establishes a South West Development Authority to plan, co-ordinate and promote the economic and social development of the south western region of Western Australia and a South West Development Authority Advisory Committee to advise that Authority in the exercise and performance of its powers, functions and duties.
81	Stamp Amendment Act.
109	Stamp Amendment Act (No. 2).
36	State Energy Commission Amendment Act.
66	State Engineering Works Act. Establishes a State Engineering Works of Western Australia and repeals section 7a of the <i>State Trading Concerns Act 1916</i> .
65	Stock (Brands and Movement) Amendment Act.
91	Stock (Brands and Movement) Amendment Act (No. 2).
50	Stock Diseases (Regulations) Amendment Act.
58	Suitors' Fund Amendment Act.
30	Superannuation and Family Benefits Amendment Act.
1	Supply Act. Grants supply of \$1,485 million for the year 1984-85, and \$65 million for the purpose of temporary advances.
9	Supreme Court Amendment Act.
29	Totalisator Duty Amendment Act.
106	Tourist Development (Secret Harbour) Agreement Amendment Act.
127	Unleaded Petrol Act. Provides for the sale, supply and use of unleaded petrol.
10	Valuation of Land Amendment Act.
43	Valuation of Land Amendment Act (No. 2).
8	Veterinary Surgeons Amendment Act.
35	War Relief Funds Repeal Act. Repeals the <i>War Relief Funds Act 1926</i> .
3	Water Authority Act. Establishes the Water Authority of Western Australia and provides for the constitution, maintenance and functions of that Authority and for a Board of Management.
18	Western Australian College of Advanced Education Act. Makes better provision for the Western Australian College of Advanced Education.
2	Western Australian Water Resources Council Amendment Act.
98	Wheat Marketing Act. Relates to the marketing of wheat, repeals the <i>Wheat Marketing Act 1979</i> and amends the <i>Bulk Handling Act 1967</i> .
56	Wheat Marketing Amendment Act.
104	Workers Compensation and Assistance Amendment Act.
62	Youth, Sport and Recreation Repeal Act. Repeals the <i>Youth, Sport and Recreation Act 1978</i> .

## 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 Departments are Aboriginal Affairs Planning Authority, Agriculture, Audit, Building Management Authority of Western Australia, Community Services, Computing and Information Technology, Conservation and Environment, Conservation and Land Management, Consumer Affairs, Corporate Affairs, Crown Law, Education, Electoral, Employment and Training, Fisheries, Government Stores, Health Department of Western Australia, Industrial Affairs, Industrial Development, Lands and

Surveys, Local Government, Marine and Harbours, Mines, Occupational Health, Safety and Welfare, Office of Racing and Gaming, Police, Premier and Cabinet, Prisons, Public Service Board, Regional Development and the North West, Resources Development, State Government Insurance Office, State Housing Commission, State Taxation, Town Planning, Treasury, Water Authority of Western Australia, Workers' Assistance Commission and Sport and Recreation.

The establishment, abolition or alteration of Departments is subject to the approval of the Governor.

Other parts of the State 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.

### **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* as, for example, in the issue dated 6 March 1984.

### HISTORY OF STATE GOVERNMENT DEPARTMENTS

A short but reasonably comprehensive history of State Government Departments was commenced in the 1971 issue of the Year Book. The following article, the fifteenth in the series, presents the historical development of the Department the Public Service Board. Departments dealt with in previous articles were the Public Works Department, the Education Department, the Police Department, the Premier's Department, the Department of Tourism, the Forests Department, the Department of Mines, the Department of Agriculture, the Department of Lands and Surveys, the Department for Community Welfare, the Treasury Department, the Crown Law Department, the Department of Fisheries and Wildlife, and the Department for Sport and Recreation.

### THE DEPARTMENT OF THE PUBLIC SERVICE BOARD

The primary function of the Western Australian Public Service Board is '... to promote and maintain effective, efficient and economic management and operation of the Public Service of the State.'

Under its enabling legislation, the *Public Service Act 1978*, the Board is empowered to do all things it considers expedient or desirable to discharge this function and to exercise all its other powers expressed or implied.

The Board is therefore required to advise the Government of the day as to the impact of the changing administrative environment, report on the performance of the Service and to ensure an adequate supply of skilled staff exists to meet the requirements of departments. Furthermore, it seeks the effective management of human resources and works to establish, promote and maintain effective organisational management within the Service.

The three-member Public Service Board as it exists today was established in 1971, and is serviced by a department of the same name. Prior to this, the responsibility for the administration of the Public Service lay with the Public Service Commissioner and his Office. Because of the role of this department, much of its history is, in a truer sense, a history of issues within the Public Service as a whole.

In 1889, under the framework of the new Constitution Act, Western Australia was granted responsible Government. This replaced a system of administration of the Public Service in which the Governor performed the dual functions of policy making and administration. The Governor was the sole arbiter in all questions relating to the personnel of the Service. He appointed, dismissed, promoted, fixed salaries, granted leave and personally settled all disputes.

Although responsible Government had been granted in 1889, it was not until 1900 with the passing of the first Public Service Act, that any definite attempt was made to recognise and set out

the rights of public servants by Act of Parliament. Initially, this had little impact on the administration of the Public Service. Whilst it divided the Service into three sections, Professional, Clerical and non-Clerical, it continued to affirm the authority of the Governor to determine the number of public servants required for efficient work, the type of work to be done and the salaries to be paid. There was no machinery to regulate salaries or classify the Service, and the Act had no effect whatsoever on ministerial control of appointments and promotions.

It was not until 24 December 1904, with the passing through Parliament of a new, more comprehensive Public Service Act, that the placement of the administration of the Service along defined principles, under an independent Commissioner, came into effect.

The first Public Service Commissioner Mr M. E. Jull, was appointed on 20 April, 1905. His staff consisted of a clerk-in-charge, a shorthand/typist and an office boy at a total salary cost of just £382.5s.

It is clear from the first Annual Report, that economy and efficiency are by no means new concepts to the administrative arm of the Public Service. Indeed the Annual Report listed as an objective and duty of the Commissioner: 'to see that economy and efficiency prevail in the Public Service.'

Another duty was the grading and classifying (and regrading and reclassifying where necessary) of all positions in the Public Service; that is, the setting of appropriate salaries to positions, in accordance with their responsibilities. This classification was undertaken in stages commencing with the approval of the Clerical Division submission in 1906. The preparation of the Professional and General Division Classification followed in 1907 and the work of classifying all 1,110 officers then under the Public Service Act was finally completed in 1908.

The classification process was, however, not without its problems. The very nature of the Appeal system, granted by the Act, opened the way for individual officers, dissatisfied with their classification, to voice this in front of a Board comprising a Government-nominated member, a Public Service-nominated member and the Commissioner who presided and voted when the other two could not agree. Two hundred and sixty Clerical Division appeals were heard in the year ending 30 June 1907, and to deal with this number, the Appeal Board held seventy-four sittings. A Report and List of Decisions of the Appeal Board was to become a regular feature of Annual Reports.

In 1912, with the advent of a newly-constituted Board of Appeal, an Assistant Commissioner was appointed to act in conjunction with the Commissioner in the classification and grading of officers. This, coupled with an amendment to the Arbitration and Conciliation Act (thereby providing for only one authority for the determination of salaries and conditions) was thought to be the most efficient and satisfactory way to deal with appeals received.

The Establishment and Industrial Branches of today's Public Service Board find their origins in the issues of classification and appeals. These remain important issues with the recent introduction of Broadbanding, which aims to provide a more uniform salary scale than that presently in existence.

Another major issue which confronted the new Public Service Commissioner's Office was that of recruitment. In order to reform the system of patronage which until 1906 had been a major source of recruitment, the Office provided for the first competitive examinations for entrance into the Service. Forty-three candidates sat the exam but only seven passed. Thirty junior clerks already in the Service were also examined and only three passed. By providing this as the avenue of selection, the Office was fulfilling one of its objectives: 'To see that no one is admitted to the Public Service by the side door.' In those early years, the Public Service Commissioner's Office had to strike a careful balance between the rule of selection by examination apart from the political motive of the hour and ministerial control. The Public Service Commissioner stressed that his Office was called upon to administer the Act only and that the principle underlying the administration in Australia was still ultimately that of ministerial control and responsibility.

While classification, salaries and recruitment dominated the first septennial period under the Public Service Act, other features, still recognisable in one form or another at the Board today, were emerging. For example, the Regulations were drafted to assist Permanent Heads (those

persons appointed as heads of State Government departments) in the administration of departments. Completion of these Regulations laid the foundation for what were to become regular conferences between the Commissioner and Permanent Heads from 1910 onwards.

Another example was the publication of the first Public Service List in 1909. Its compilation involved considerable inquiry and provided a great deal of information about some 1,200 officers. Inspection of Government departments further revealed that accounts and records systems were 'cumbersome and unnecessarily expensive'. This resulted in the development of improved procedures and the drafting of suitable forms to prevent duplication of work.

This, therefore, was the position prior to the Great War. During the war, 50 per cent of eligible public servants entered military service, with the result that the administration of the Public Service was forced to change step after 1914.

Two important issues concerned the Office of the Public Service Commissioner throughout the First World War. Firstly, the terms and conditions under which men engaged under the Public Service Act could join the Expeditionary Force, and secondly, the special and exclusive tax on public servants. (Indeed, these issues sowed the seeds of discontent in the years prior to the Great Strike of 1920.) Public servants joining up were required to apply for leave of absence without pay. Such leave was treated as service. Their salary on resuming their duties in the Service was to be calculated at the rate they would have received had they not joined the Expeditionary Force. Real problems arose, however, with the war tax imposed on public servants in 1914-1915.

The war tax stopped annual or grade increments and overtime and led to a 7.8 per cent reduction in weekly salaries. The Premiers' Conference held in 1915 agreed not to adopt a policy whereby the difference between a soldier's official and military pay was made up by the Government. Financial stringency was clearly the principle which imposed limitations on the administration of the Public Service during this period.

By 1917, total enlistments for active service numbered 432. As a result, the temporary staff in the Public Service was comparatively much higher than would have been the case under normal conditions. Furthermore, the Commissioner declined to reclassify on the grounds that officers were called upon to carry out duties in excess of those for which the position they occupied was originally classified.

The placement of returned soldiers in their old positions or in offices of equal value became a difficult task for the Commissioner's Office in the later years of the war, and following its conclusion. Every effort was made to preserve the rights of the officers who had been on active service — the policy of the Government being that 'in making appointments to the Public Service, active military service must be given first consideration.' The Service was therefore called upon to cope with officers largely out of touch with the work of their departments.

These were amongst the first issues tackled by the new Commissioner, Mr G. W. Simpson, on his appointment after the death of Mr M. E. Jull, while still in office in March 1917. It was during the early years of the Simpson administration that the first and only strike of Public Servants occurred. It lasted for a two-week period in May and June of 1920.

Apart from the re-employment problems facing returned servicemen, the other major grievance voiced by the Civil Service Association (the sole representative union for public servants, formed in 1902) was the lack of any principle of arbitration. Ministers could exercise an arbitrary power of decision without, it was claimed, sufficient knowledge of the qualifications required in a large Service. An independent Public Service Appeal Board was seen as the initial concession in negotiations between the Association and the Government.

Legislation to this effect was passed in 1920, which commenced a decade marked by advances in industrial relations. The legislation placed a requirement on the Commissioner to reclassify the whole Service at least once every five years, thereby replacing the discretionary power of the Commissioner to reclassify at will. Additionally, the independent tribunal set up to hear and determine appeals against classification and other decisions of the Commissioner, replaced a system where such appeals were heard by a Board of which the Commissioner was Chairman.

The introduction of this legislation did, however, cause an inevitable increase in the volume of work handled by the Public Service Commissioner's Office. Regular reclassifications, and the exercise of the statutory rights of officers to appeal contributed the most to this increase. So great was the increase, that in 1921 a second Assistant Commissioner was appointed. His responsibilities included investigating and reporting on all industrial matters, liaison with unions and representation of the Commissioner before the Arbitration Court, the Public Service Appeal Board and the Wages Board.

The 44-48 hour working week was one of the more controversial industrial matters faced by the Assistant Commissioner in the early 1920s. Awards and Agreements which had provided for a 44 hour week during the war had expired, opening the way for the Government to revert to the 48 hour week. The question of hours and the basic wage was referred to the Arbitration Court which found in favour of the 48 hour week in 1923. This, however, did not see an end to the issue. In 1924, the Government decided to restore the 44 hour week to those employees who had enjoyed it prior to the decision.

The 1920s also saw the emergence of a number of new and expanding roles for the Commissioner's Office. In order to satisfy the statutory requirement of effective, efficient and economic management of the Service, greater emphasis was placed on the inspection of Government Departments and consequential re-organisation. Additionally, the question of office accommodation was a new function which fell within the Commissioner's area of responsibility. The role of the Commissioner's Office was thus becoming more defined by the end of the decade. While the areas of Industrial relations, establishment and accommodation did not form separate branches as in later years, the Commissioner and his office (now numbering six) dealt with all these matters.

The year 1930 marked the completion of twenty-five years of administration under the Public Service Act. It also marked the beginning of a world-wide recession. By 1931 the impact of an increasingly restrictive financial position was being felt in the public sector. There was a reduction in the business of every department and this was reflected in an all-round reduction in expenditure and salaries. Policies of retrenchment and reduction were the order of the day and the corresponding administrative action necessary to implement these policies accounted for much of the output of the Public Service Commissioner's Office during these years. By 1932, the number of permanent public service staff had fallen to 1,467, compared with 1,642 in the previous year. Such was the situation which greeted the third Commissioner, coincidentally, another Mr G. W. Simpson, who commenced duties in July 1931, after the retirement of his predecessor.

Throughout this period, the Public Service Commissioner's Office pursued a policy of amalgamation of services. Careful monitoring of departmental activities ensured that staff were transferred from one department to another to meet emergencies, thus eliminating the need to engage additional staff.

By mid 1935, conditions were on the improve and the period of renewed activity necessitated an increase in appointments to carry on the business of the State. During this time, important amendments were made to the Public Service Act, the Public Service Appeal Board Act and the Industrial Arbitration Act. The Industrial Arbitration Act Amendment Act No. 31 of 1935 in particular, had special application to Government employees. The Act opened the way for the Civil Service Association to approach the Arbitration Court for the settlement of any differences arising between the Association and the Commission on the fixing of salaries and allowances. The Civil Service Association's inability to agree with the Commissioner on the setting of an automatic maximum, (a ceiling annual salary for base-grade clerical officers) first went to arbitration in November 1936. This first case did not meet with success for the Civil Service Association, since the Court affirmed the Commissioner's decision. In the years which followed this decision, a conciliatory approach (encouraged by the Act) was adopted, for the quick and satisfactory settlement of disputes.

The establishment of a Promotions Appeal Board by Regulation (and later, in 1945, by Statute) was clearly another forward legislative move. This provided officers of the department in which

a vacancy had occurred and who were senior to the officer recommended for promotion, with access to the Arbitration Court. This resulted in the exercise of greater care in the making of recommendations for promotions and provided the Commissioner's Office, whose duty it was to administer the Act, with improved knowledge and records of individual officers.

Mr Simpson's term as Public Service Commissioner was renewed in the year prior to the outbreak of the Second World War. As had been the case in the Great War, the Commissioner ensured that enlisted or drafted officers were granted military leave and were assured a position on their return to civil life. As occurred during the first war, attempts were made to establish legislation requiring the State Government to make up the difference between the civil and military pay. Again these attempts were unsuccessful.

By 1942, 780 officers were on active military service, resulting in acute staffing problems. The Commissioner's Office adopted a priority policy whereby work which could be deferred was postponed to a future date. The number of temporary staff necessarily increased with officers engaged to continue the provision of services for the duration of the war. Furthermore, with a steady increase in the number of male officers enlisting, the percentage of women employed began to rise. It was partly as a result of this intake that women's employment issues became more prominent in later years.

In February of 1942, approval was given for the temporary employment of married women whose husbands were members of the fighting forces with rank not higher than Sergeant. Two reasons were given — firstly, the insufficient level of military pay and, secondly, a reduction in the availability of male officers. Women therefore acted in the positions of male officers, but received only 65 per cent of their pay. A decision of the Federal Government Womens' Employment Board in March 1943 however, enforced equal pay for the duration of the war.

By the end of the war, the University of Western Australia was offering a course in Public Administration within the Department of Economics. This was followed by the introduction of a number of internal training and education programs aimed at preparing servicemen for return to the workforce and rebuilding the Service after many years of disruption.

The second half of the 1940s also brought with it many issues concerning terms and conditions of employment. The matter of leave was resolved in 1947 with the provision of long service leave as a right and not a concession. Further, in 1948, the Commissioner agreed to reconsider Public Service salaries in response to a rapidly rising basic wage and changes in the salary structures of other industries. This was conceded despite the fact that the 1946 reclassification was just two years old.

The establishment of a Public Service Board to replace the administration of a single Commissioner was not greeted as a new proposal when the issue was raised in March 1951. Indeed, as far back as 1936, Governments had considered the appointment of a Public Service Board as a means of introducing and maintaining a uniform basis of remuneration and conditions, and as a means of controlling all arbitration proceedings. This question remained unresolved until 1971, when an amendment to the Public Service Act finally brought about the establishment of a Board.

Meanwhile, the proposal was again revived in 1954, and the Government indicated its intention to introduce a Bill to this effect in the 1955 session of Parliament. It was not passed during this session but reintroduced as part of a package completely repealing and re-enacting the Public Service Act in 1956. The Bill was again defeated and the Government decided not to proceed with this measure but to revert to the appointment of a Commissioner for the usual seven year term. Mr K. J. Townsing was appointed in January 20, 1958 succeeding Mr M. E. Smith. It had been envisaged that Mr Smith would act as a short-term Commissioner only, filling a gap between the retirement of Mr S. A. Taylor in February, 1955 and the introduction of the Public Service Board. However, Mr Smith held office until December 1957 and his replacement by Mr Townsing.

One of the major problems facing the new Public Service Commissioner's Office in the mid to late 1950s was a basic shortage of staff caused by the reduced intake of juniors and trained staff during the war years. Accepted recruitment policy required "school leavers" to possess a certain minimum educational standard. The shortage of this type of recruit resulted in an increase in the

temporary establishment, an uneven age distribution and a serious shortage of younger, qualified officers who would normally have formed the training material for senior executive and administrative positions. To improve this situation, the Commissioner adopted a policy of increased recruitment publicity. It was the first time the Public Service had taken to actively advertising in the press, establishing direct contact with schools and other educational institutions and distributing recruitment material.

Although the intake of cadets in Engineering, Architecture, Agricultural Science, Veterinary Science, Land Surveying and Drafting assisted somewhat in the provision of trained staff, the problem itself was nationwide.

The emphasis on training was clearly the most important development from the Office in the late 1950s. During 1958, a Personnel and Training Officer was appointed with the object of developing training programs to induct new officers and provide them with a broad knowledge of the Public Service. They were also to be provided with an outline of the conditions of their employment and an introduction to the principles of public service and public relations. Today, the responsibility for the majority of staff development has been delegated to departments, leaving the Board to focus its attention on the development and continued training of managers for departments.

The 1960s are traditionally described as "Boom Times" and the improving economic climate was clearly reflected in the benefits secured for public servants.

The seventh Commissioner, Mr R. J. Bond, was appointed in June, 1959. It was during his time as Commissioner that negotiations were carried out on matters which included the provision of protective clothing, equal pay, overtime and higher duties allowance. Departmental Heads were also encouraged to accept greater responsibility for management and to devise means of simplifying procedures so that a greater proportion of the personnel and routine work could be carried out within their departments, under delegated authority.

The year 1963 was one of rapid development in Western Australian industries. In order to meet the demands accompanying this development, Government departments found it increasingly important to keep in touch with modern trends in administration and technology. As a result, the Commissioner's Office was concerned with maintaining a high standard of recruitment. The intense activity in industrial relations, especially with regard to salaries and conditions of service, was another area of special emphasis.

In 1966-67 the Government indicated its intention to change the whole system of Public Service Arbitration in Western Australia. These changes occurred in the early years of Mr R. H. Doig's administration. The new *Public Service Arbitration Act 1966*, provided for the appointment of a Public Service Arbitrator and established new procedures for the determination of salaries, appeals, allowances and overtime claims. These claims were submitted to the Commissioner by the Civil Service Association and, where agreement could not be reached, the Association had the further option of submitting them to the Arbitrator, who was empowered to confer with the parties, hear evidence and determine the claim. Once a new Award or Agreement was issued, the legislation required the Commissioner to review the positions and allocate appropriate salaries and titles for those positions covered by the Award or Agreement. Provision was made, however, for a right of appeal to the Arbitrator against the Commissioner's allocation of salary, salary range or title to any office.

By the end of the decade, the Commissioner's Office had a staff of sixty-one and a clearly defined structure. Its Staffing Branch dealt with recruitment and establishment and the Industrial Branch with salaries, allowances and appeals. To enhance the efficiency of the Service, the Inspection Branch conducted investigations and surveys concerning organisations and methods. Within this area, the Commissioner's Office also engaged management consultants where special expertise was necessary.

A Central Training Program was co-ordinated by the Office, and was directed primarily at developing officers in the fields of management, supervision and organisation and methods. This section has, over the years, evolved into the Development and Training Services Division.

A continuing function within the Commissioner's Office was the provision of planned, appropriate office accommodation for the Public Service. However, this was relinquished in November 1985, with the formation of the Office of Government Accommodation.

The *Public Service Act Amendment Act 1970*, which provided for the appointment of a Public Service Board came into effect in February 1971. The Public Service Board constituted under this Act replaced the Public Service Commissioner as the authority responsible for the administration of the Public Service of Western Australia. The original members were Mr R. H. Doig (Chairman), Mr J. B. Crooks (Deputy Chairman) and Mr E. P. Shaddick (Commissioner).

The 1970s were clearly a period of consolidation for the Public Service Board. This in itself was a direct result of the implementation of Government policies designed to combat unemployment and inflation.

The ninth Commissioner, Mr G. H. Cooper, took office as Chairman in February 1974, at a time when the Government decided to limit the growth of the Public Service to approximately 2 per cent per annum — a policy which was to continue throughout the decade. The Board took consequent action to restrict recruitment of new staff and replacement of other staff to the minimum possible. With the co-operation of Permanent Heads, growth during the 1974-75 financial year was restricted to 2.6 per cent.

Despite these constraints the Board continued to look forward. It established a new training centre at Mount Lawley as a service unit for the development of future senior executive officers and extended its consultancy to semi-government instrumentalities, with services such as providing them with assistance in the negotiation of agreements covering salaries.

In 1977, a Projects and Development Branch was established with the responsibility for reporting on matters which concerned the administration of the Service and examining the feasibility of new projects designed to increase the productivity of the Public Service. This was a clear example of economic restrictions having the beneficial effect of stimulating research into alternative methods of maintaining efficiency.

The year 1979 was marked by changing organisational structure within the Board. During this, the first year of Mr K. M. McKenna's administration, changes were made to enable the Board to respond more quickly to demands of Government and of the Service. A Management Services Branch was created, subsuming the Organisation and Methods and Management Development Sections. An Administrative Branch was also created and included the following sections: Personnel, Relieving Staff, Records, Typists and Graduate Assistants. The change in emphasis was away from an "inspectorial" and "enforcement" approach towards one of greater co-operation with departments.

The relationship between the Board and departments was destined to change direction in the 1980s. In the most recent publication produced by the Board in 1985, "Management in the Public Service", the comment is made that "in anticipation of this evolution, the Public Service Board some years ago initiated research into a series of changes designed to make the Public Service more efficient, more capable and more able to respond to the demands made on it by elected Government." One of the major areas of research alluded to concerned a revision of the system of classification in the Public Service. Broadbanding, developed over a period of some four years, proposed a far simpler system for classifying levels of positions than that which had evolved over many decades.

The need to simplify the existing structure of the Service was one priority reiterated at the Futures Conference held at the Board in February 1983. The other two major issues identified at that time were the training and professional development of public servants, and the delegation of various functions of the Public Service Board, in pursuit of the increased emphasis on consultancy. The Conference also specified further areas in which the Public Service Board has devoted much time and many resources since 1983, and which now comprise (along with those areas already referred to) the main services provided by the Department. These include corporate (strategic) planning, performance appraisal, computerised information systems, monitoring of other departments' performance in management, and human resource planning and deployment. In contrast, while

day-to-day administrative areas of the Board's operations have continued, it is these which have been identified as most suitable for delegation in the near future.

In the specific field of industrial relations, the Public Service Board has seen a number of changes occur during the 1980s. The creation of the Western Australian Government Industrial Relations Service (later renamed the Office of Industrial Relations), in September 1982, saw the Board's area of responsibility re-defined to cater for the Public Service alone; other Government employees' (such as nurses and police officers) industrial relations were handled by the new organisation.

Recent years have seen the conclusion of an agreement to implement a more comprehensive flexi-time arrangement for the majority of Public Service staff; this became operative in the latter half of 1985.

In 1986 the Public Service Board is headed by Mr McKenna (in his seventh year as Chairman) and by the Deputy Chairman, Mr K. E. Mann and the Commissioner, Mr F. J. Campbell. The Department of the Board has been restructured to more effectively direct its energies towards improving the standard of management of human, technical and economic resources in the Public Service. The new divisional structure (and major responsibilities) are:

**Management Advisory Services.** Consultancy on Corporate Planning, organisation design and management systems. Development and implementation of strategic computerised information systems.

**Development and Training Services.** Programs for human resource development and planning, performance management consultancy and traineeship.

**Personnel and Industrial Services.** Staff selection, conditions of service, appeals, discipline, classification, establishment (of departmental structures).

**Regional Services.** Regional representation and provision of services. Additionally, the Public Service Board has a Management Performance Review Branch, an Internal Services Branch and a number of smaller sections with special responsibilities in the areas of policy review, records management (including the provision of centralised records repository for all departments), occupational health and welfare, and public relations. A number of these are still in the developmental stage.

Clearly, the Public Service Board has evolved in response to changes in the Public Service as a whole. Throughout its history, the Department has sought to fulfill its role as the body responsible for the effective management of the Service. From its modest origins in the first decade of the century, (in 1910 there existed only nine departments, in which 1,308 officers were employed), the Board has grown in proportion to its responsibilities. At the end of January 1986, the Public Service numbered some 17,600 officers, working in forty-eight agencies. It is for these agencies, and for the Government of Western Australia, that the Public Service Board provides its services.

PUBLIC SERVICE EMPLOYMENT, 1915-1985

At 30 June (a)	Number of public servants employed (b)
1915	1,812
1925	1,864
1935	1,824
1956	4,336
1965	5,957
1975	11,575
1985	16,191

(a) 1945-1955 totals unavailable. (b) Total permanent and temporary staff.

## 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.

Listed below are members of the Western Australian judiciary.

*Supreme Court of Western Australia*

Chief Justice	The Honourable Sir Francis Burt, K.C.M.G.
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 H. W. Olney
	The Honourable W. P. Pidgeon
	The Honourable B. W. Rowland
	The Honourable E. M. Franklyn
Masters	Mr G. T. Staples
	Mr P. L. Seaman Q.C.

*The District Court of Western Australia*

Chief Judge	His Honour Judge D. C. Heenan
Judges	His Honour Judge F. Ackland
	His Honour Judge V. J. A. O'Connor
	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 J. A. Samuel
	His Honour Judge N. H. S. Clarke
	Her Honour Judge A. Kennedy
His Honour Judge P.J. Healy	

*The Family Court of Western Australia*

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

Particulars of these and other Western Australian courts, and Commonwealth courts appear in Chapter 9 and Chapter 22.

## 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. A. N. Douglas, 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;

2 Royal Arcade, Melbourne;

92 Pitt Street, Sydney;

Level 2, City Mutual Building, 307 Queen Street, Brisbane;

4th Floor, Heathcoat House, 20 Saville Row, London;

8th Floor, Orchard Towers, 400 Orchard Road, Singapore;

15th Floor, Quay Tower, 29 Customs Street West, Auckland;

Suite 1610, 3550 Wilshire Boulevard, Los Angeles;

31st Floor, 489 Fifth Avenue, New York;

7th Floor, Sankaido Building, 9-13 Akasaka, 1-CHOME, Minato-ku107, Tokyo;

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.

#### OVERSEAS REPRESENTATION IN WESTERN AUSTRALIA

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

Austria — T. A. Holmes, Honorary Consul, 6 Graham Court, Cottesloe 6011.

Belgium — R. M. B. Reynolds, A.M., Honorary Consul, 16 St George's Terrace, Perth 6000.

Belgium — L. Bae, Trade Commissioner, 16 St George's Terrace, Perth 6000.

Britain — E. J. Sharland, Consul-General, 95 St George's Terrace, Perth 6000.

Canada — C. William Ross, Consul-General, 160 St George's Terrace, Perth 6000.

Chile — E. E. Puffe, Honorary Consul, 2 South West Highway, Armadale 6112.

Denmark — J. Holck, Honorary Consul, 19 Phillimore Street, Fremantle 6160.

Finland — R. C. Mattiske, Honorary Consul, 47 Allerton Way, Booragoon 6154.

France — G. Collet, Honorary Consul, 22 Hardy Street, Glen Forrest 6071.

Germany, Federal Republic of — A. E. Blankensee, Honorary Consul, 16 St George's Terrace, Perth 6000.

Greece — A. Callidopoulos, Consul, 16 St George's Terrace, Perth 6000.

Honduras — E. Tapero de Newmann, Honorary Consul, 44 Troy Street, Daglish 6008.

Indonesia — R. C. H. Manser, Honorary Consul, Building 201, Western Australian Institute of Technology, Kent Street, Bentley 6102.

Ireland — G. M. Nolan, Honorary Consul-General, 10 Lilika Road, City Beach 6015.

Italy — Dr C. Di Gesu, Consul, 31 Labouchere Road, South Perth 6151.

Japan — J. Aoki, O.B.E., Consul-General, 150 St George's Terrace, Perth 6000.

Malaysia — I. Mohammed Rashdi, Consul, 77 St George's Terrace, Perth 6000.

Nepal — H. L. Roberts, Honorary Consul, 476 Hay Street, Perth 6000.

Netherlands — T. C. Dercksen, Honorary Consul, 111 St George's Terrace, Perth 6000.  
 New Zealand — J. H. Robinson, Consul, 16 St George's Terrace, Perth 6000.  
 Norway — P. G. Lynn, Honorary Consul, 11 Cliff Street, Fremantle 6160.  
 Philippines — R. V. Hemery, Honorary Consul-General, 26 St George's Terrace, Perth 6000.  
 Portugal — F. Correia, Honorary Consul, 245 South Terrace, South Fremantle 6162.  
 Seychelles — G. F. Robert, Honorary Consul, 271 Canning Road, Lesmurdie 6076.  
 Spain — A. Quintela, Honorary Vice-Consul, 110 William Street, Perth 6000.  
 Sweden — H. Morgan, Honorary Consul, 849-51 Wellington Street, Perth 6000.  
 Switzerland — R. H. Abplanalp, Consular Agency, 29 Marie Way, Kalamunda 6076.  
 Thailand — Brigadier W. D. Jamieson, Honorary Consul-General, 135 Victoria Avenue, Dalkeith 6009.  
 United States of America — S. Ecton, Consul, 246 St George's Terrace, Perth 6000.  
 Yugoslavia — V. Panov, Consul, 24 Colin Street, 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.

As early as 1838 an Act providing a measure of local government was passed and under its provisions the management and control of the town of Perth was vested in a body of trustees. The first elected Town Trust was constituted at Perth in 1842 under an Act of 1841 for the 'Improvement of Towns in Western Australia'. The Trust was dissolved in 1858 and replaced by a City Council, the town of Perth having been constituted a city when it became the seat of a Bishop in 1856.

Legislation was enacted in 1871 establishing Municipalities and Road Boards throughout the Colony. The existing Statute regulating the operations of the local authorities is the *Local Government Act 1960*, which is administered through a Department of Local Government by the Minister for Local Government. This Act consolidates the law relating to local government in Western Australia, and by its provisions the Municipal Corporations Act, the Road Districts Act and a number of other, less important, Acts were repealed. The legislation came into operation on 1 July 1961 and from that date new designations were applied to many local government districts, bodies and offices. Former Municipalities, other than Cities, became known as 'Towns' and Road Districts were renamed 'Shires'. Municipalities which already had city status remained 'Cities'. The executive body in each local government district became a 'Council', City Councils and Town Councils being presided over by a Mayor, and Shire Councils by a President. The chief non-elective executive office of a City or a Town is that of 'Town Clerk' and of a Shire, that of 'Shire Clerk'.

At 30 June 1985 there were thirteen Cities, twelve Towns and 114 Shires in Western Australia.

#### Local Government Districts

The only unincorporated area in mainland Western Australia is Kings Park, a public reserve of about 403 hectares in Perth, all other land being incorporated within the district of a City, Town or Shire.

On presentation of a petition signed by a prescribed minimum number of electors, the number varying with the subject matter, 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 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.

The Act establishes a Local Government Boundaries Commission of three members, one being an officer of the Department of Local Government, who is Chairman of the Commission. The other members must be persons having experience in local government and nominated by associations of local government authorities. 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.

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 preceding 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. Of the thirteen cities in Western Australia, twelve are situated in the Perth Statistical Division, with Bunbury being the first country city. There had been five cities granted city status before the requirements imposed by the present legislation became operative. These five cities are Perth (proclaimed in 1856), Fremantle (1929), Subiaco (1952), Nedlands (1959), and South Perth (1959). Having satisfied the requirements for city status provided by the Local Government Act the Town of Melville was declared a city on 3 May 1968, the Shire of Perth was redesignated the City of Stirling with effect from 24 January 1971 and the Town of Gosnells was declared a city on 1 July 1977. In 1979 the following areas were declared cities: the Shire of Belmont, 17 February; the Town of Canning, 10 March; the Town of Bunbury, 8 October and the Town of Cockburn, 26 October. The Shire of Bayswater was declared a city on 29 October 1983.

The boundaries of local government districts as they existed at 30 June 1985 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.

Two methods of election to the office of Mayor or of President are prescribed. In the case of a City or Town, election is usually by a poll of the electors enrolled for the district. The President of a Shire is usually elected by the councillors from among their own number. It is provided, however, that a City or Town may adopt the system of election of the Mayor by the councillors, and that a Shire may conduct a poll of its electors for election to the office of President. The question of the adoption of the alternative system must, in all cases, be determined by submission to a poll of the electors, after delivery to the Mayor or the President of a resolution of a majority of the councillors or a petition signed by one-tenth of the electors, or by fifty electors, whichever is the greater. If not less than 15 per cent of eligible electors vote at the poll and a majority of the valid votes cast are in favour of the proposed alteration, the Governor shall order its adoption.

The Act constitutes the office of Deputy Mayor, in the case of a City or a Town, and of Deputy President in the case of a Shire, and requires that the Council shall elect one of the councillors to the office.

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. The Act contains provisions enabling nominees of corporations owning or occupying land in a district to vote at local government elections. 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.

It is provided that, if in a particular district there should at any time be no Council or insufficient councillors to form a quorum, a Commissioner may be appointed to exercise all the powers of the local authority.

### **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 Year Book. For example, reference to local government activity in the fields of road construction and maintenance will be found in Chapter 24 and Chapter 20; the provision of parks, gardens and recreation grounds in Chapter 11; libraries in Chapter 11; public transport facilities in Chapter 20; water supplies in Chapter 13; town planning and building control in Chapter 19; and the licensing of vehicles in Chapter 20. 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.

The operations of any local government authority may be subject to investigation by a person appointed by the Governor or the Minister and having, for the purposes of the inquiry, the powers of a Royal Commission.

### **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. It is provided, however, that any Council may, under certain specified conditions, adopt the alternative basis. Although in general a Council levies a rate which is uniform throughout its district, it has the authority to differentiate between certain types of rateable properties. 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. With the written permission of the Minister a Council may also borrow from a permanent building society to enable it to acquire or develop land for the purpose of subdivision into residential lots. Money may also be borrowed by the sale of debentures, repayment being either by the system of reducible principal or by means of a sinking fund. Payments to debenture holders are made at prescribed intervals. Under the system of reducible principal, the local authority undertakes to pay both principal and interest by fixed instalments. Where redemption is by means of a sinking fund, the local authority is required to establish and maintain the necessary fund at the State Treasury. Interest on the loan is normally paid half-yearly and the full amount of the loan is repaid at maturity.

The extent of loan raisings for works and undertakings is controlled by a provision which, except with the specific approval of the Governor, imposes a limit on the borrowings of an authority. The total amount of loans for which a Council may be indebted at any one time is a sum equal to ten times the amount obtained by subtracting from the average of the ordinary revenue of the authority during the preceding two years the average, for the same period, of its annual expenditure on the servicing of loans. The legislation allows that balances standing to the credit of sinking funds for loan repayment, as well as amounts actually repaid, may be deemed to be repayments for purposes of calculating net total debt. In the case of borrowings to liquidate existing loans, it is provided that the money raised shall not exceed the outstanding balance of the loan.

Before a loan may be raised by the issue of debentures, approval of the borrowing must be obtained from the State Treasury and the local authority must then publish in a newspaper and in the *Government Gazette of Western Australia* a notification of its intention to borrow money, including a statement of the amount of the proposed loan, its purpose and other relevant matters. Except in the case of a loan to liquidate an existing loan debt, the electors of the district may demand that the proposition be submitted to a poll. If less than 15 per cent of the electors vote at the poll, or a majority of the votes are in favour of the loan, the raising of the loan is approved.

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 20 — Transport, *Finance for Roads*.

**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.

State legislation constituting the Western Australian Local Government Grants Commission became effective on 11 May 1978, under the authority of the *Local Government Grants Act 1978*. The 1978 Act prescribes that 80 per cent of the State's entitlement be distributed on primarily a population basis. The Minister has discretion to vary this percentage, subject to the requirement that not less than 30 per cent of the funds are distributed on a population basis (In 1979-80 and 1982-83 it was reduced to 70 per cent; from 1983-84, 30 per cent applied). The remainder of the funds are to be allocated upon the recommendations of the Local Government Grants Commission according to the special needs of local government authorities. The Minister is empowered to request the Commission to review its recommendations. In such circumstances, the Commission shall re-submit its recommendations to the Minister with, or without amendment.

**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 five-year period ending with the financial year 1983-84 are given in the section *Local Government Finance* in Chapter 24.

## 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.

The partition of the Australian States into statistical divisions originated from a resolution of a conference of 1928 between the Federal Health Council of Australia and the Statisticians of the Commonwealth and the States concerning the need for the delineation of areas appropriate for the purposes of statistical tabulation. They first became operative in 1929 after consultation between the Australian Statistician, the Statisticians of the States in collaboration with the State health authorities, and the Commonwealth Department of Health. Although statistical divisions were devised initially for use in the compilation and presentation of vital statistics, the advantages of extending the system to other fields of statistical investigation were recognised at once and it soon came to have general application in cases where consideration of geographic areas was relevant.

**LIST OF STATISTICAL DIVISIONS**  
with component Local Government Areas at 30 June 1985

(Statistical divisions are indicated thus: *SOUTH-WEST*: sub-divisions thus: *BLACKWOOD*: local government areas thus: Manjimup. Cities are marked (C) and Towns (T), all other local government areas being Shires.)

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

**LIST OF LOCAL GOVERNMENT AREAS**  
at 30 June 1985

Local government area	CITY (C) Town (T) Shire (S)	Statistical division in which situated	Local government area	CITY (C) Town (T) Shire (S)	Statistical division in which situated
<i>Albany</i>	T	Lower Great Southern	Mandurah	S	South-West
Albany	S	Lower Great Southern	Manjimup	S	South-West
<i>Armadale</i>	T	Perth	Meekatharra	S	Central
Augusta-Margaret River	S	South-West	MELVILLE	C	Perth
<i>Bassendean</i>	T	Perth	Menzies	S	South-Eastern
BAYSWATER	C	Perth	Merredin	S	Midlands
BELMONT	C	Perth	Mingenew	S	Central
Beverley	S	Midlands	Moora	S	Midlands
Boddington	S	Upper Great Southern	Morawa	S	Central
Boulder	S	South-Eastern	<i>Mosman Park</i>	T	Perth
Boyup Brook	S	South-West	Mount Magnet	S	Central
Bridgetown-Greenbushes	S	South-West	Mount Marshall	S	Midlands
Brookton	S	Upper Great Southern	Mukinbudin	S	Midlands
Broome	S	Kimberley	Mullewa	S	Central
Broomehill	S	Lower Great Southern	Mundaring	S	Perth
Bruce Rock	S	Midlands	Murchison	S	Central
BUNBURY	C	South-West	Murray	S	South-West
Busseton	S	South-West	Nannup	S	South-West
CANNING	C	Perth	Narembeen	S	Midlands
Capel	S	South-West	<i>Narrogin</i>	T	Upper Great Southern
Carnamah	S	Central	Narrogin	S	Upper Great Southern
Carnarvon	S	Central	NEDLANDS	C	Perth
Chapman Valley	S	Central	<i>Northam</i>	T	Midlands
Chittering	S	Midlands	Northam	S	Midlands
<i>Claremont</i>	T	Perth	Northampton	S	Central
COCKBURN	C	Perth	Nungarin	S	Midlands
Collie	S	South-West	Peppermint Grove	S	Perth
Coolgardie	S	South-Eastern	Perenjori	S	Central
Coorow	S	Central	PERTH	C	Perth
Corrigin	S	Upper Great Southern	Pingelly	S	Upper Great Southern
<i>Cottesloe</i>	T	Perth	Plantagenet	S	Lower Great Southern
Cranbrook	S	Lower Great Southern	Port Hedland	S	Pilbara
Cuballing	S	Upper Great Southern	Quairading	S	Midlands
Cue	S	Central	Ravensthorpe	S	South-Eastern
Cunderdin	S	Midlands	Rockingham	S	Perth
Dalwallinu	S	Midlands	Roebourne	S	Pilbara
Dandaragan	S	Midlands	Sandstone	S	Central
Dardanup	S	South-West	Serpentine-Jarrahdale	S	Perth
Denmark	S	Lower Great Southern	Shark Bay	S	Central
Donnybrook-Balingup	S	South-West	SOUTH PERTH	C	Perth
Dowerin	S	Midlands	STIRLING	C	Perth
Dumbleyung	S	Upper Great Southern	SUBIACO	C	Perth
Dundas	S	South-Eastern	Swan	S	Perth
<i>East Fremantle</i>	T	Perth	Tambellup	S	Lower Great Southern
East Pilbara	S	Pilbara	Tammin	S	Midlands
Esperance	S	South-Eastern	Three Springs	S	Central
Exmouth	S	Central	Toodyay	S	Midlands
FREMANTLE	C	Perth	Trayning	S	Midlands
<i>Geraldton</i>	T	Central	Upper Gascoyne	S	Central
Gingin	S	Midlands	Victoria Plains	S	Midlands
Gnowangerup	S	Lower Great Southern	Wagin	S	Upper Great Southern
Goomalling	S	Midlands	Wandering	S	Upper Great Southern
GOSNELLS	C	Perth	Wanneroo	S	Perth
Greenough	S	Central	Warroona	S	South-West
Halls Creek	S	Kimberley	West Arthur	S	Upper Great Southern
Harvey	S	South-West	West Kimberley	S	Kimberley
Irwin	S	Central	West Pilbara	S	Pilbara
Jerramungup	S	Lower Great Southern	Westonia	S	Midlands
Kalamunda	S	Perth	Wickepin	S	Upper Great Southern
<i>Kalgoorlie</i>	T	South-Eastern	Williams	S	Upper Great Southern
Katanning	S	Lower Great Southern	Wiluna	S	Central
Kellerberin	S	Midlands	Wongan-Ballidu	S	Midlands
Kent	S	Lower Great Southern	Woodanilling	S	Lower Great Southern
Kojonup	S	Lower Great Southern	Wyalkatchem	S	Midlands
Kondinin	S	Upper Great Southern	Wyndham-East Kimberley	S	Kimberley
Koorda	S	Midlands	Yalgoo	S	Central
Kulin	S	Upper Great Southern	Yilgarn	S	Midlands
<i>Kwinana</i>	T	Perth	York	S	Midlands
Lake Grace	S	Upper Great Southern			
Laverton	S	South-Eastern			
Leonora	S	South-Eastern			

## 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 persons in Western Australia. 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 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 March 1984, 2.46 per cent, has been higher than that of any other State and of Australia as a whole (1.72 per cent).

### THE CENSUS

While counts of the population were conducted in earlier years, the first systematic census of the Colony of Western Australia was taken in 1848. There have been sixteen enumerations since then, at the dates shown in the first table in this Chapter. The Census of 1881 was the first taken simultaneously in all the Australian Colonies and formed part of the first simultaneous census of the British Empire.

The first census of the Commonwealth of Australia conducted under the authority of the *Census and Statistics Act* 1905 was taken in 1911. The Act provided that a census should be taken in that year 'and in every tenth year thereafter'. In 1930 this provision was amended by the addition of the words 'or at such other time as is prescribed'. The depressed economic conditions of 1931 caused the postponement of the third Australian census to 1933, and because of war conditions the fourth Australian census was not taken until 1947. Consideration was then given to holding future censuses in the series of years originally provided for by the Act. However, it was thought that the interval from 1947 to 1951 was too short, and it was therefore decided to take the fifth census in 1954, at the mid-point of the period from 1947 to 1961. The sixth census was held in 1961. Since 1961 censuses have been conducted at five-yearly intervals. In 1977 the Census and Statistics Act was further amended to read 'in the year 1981 and in every fifth year thereafter, and at such other times as are prescribed'.

### Scope of the Census

The Australian census records the population actually in Australia, persons being enumerated at the place where they spent the night of the census, and the population so recorded being credited in census tabulations to that place whether or not it is the usual place of residence.

The census covers the population of Australia and the dwellings in which it lives. The only persons excluded from the census tabulations are diplomatic personnel and their families, who have diplomatic immunity in accordance with international practice. Prior to the Census of 30 June 1971 full-blood Australian Aborigines were also excluded.

**Aborigines.** Before an amendment to the Commonwealth Constitution in 1967, it was provided by section 127 that 'in reckoning the numbers of the people of the Commonwealth, or of a State or other part of the Commonwealth, aboriginal natives shall not be counted'. This provision was deleted following a referendum held on 27 May 1967 which resulted in a large majority of votes in favour of its repeal. The enabling Act, the *Constitution Alteration (Aborigines) 1967*, came into operation on 10 August 1967.

With regard to the original provision, Commonwealth legal authorities were of the opinion that persons of half-blood were not 'aboriginal natives' within the meaning of the Constitution, and *a fortiori* that persons of less than half Aboriginal blood were not Aboriginal natives. Accordingly, only persons having Aboriginal blood to a degree greater than one-half were excluded from the census tabulations. Dwellings occupied solely by full-blood Aborigines so defined were similarly excluded.

### **Under-enumeration**

Post-enumeration surveys, which are designed to measure the degree of error in a census, were conducted after the 1966, 1971, 1976 and 1981 Censuses, by specially trained interviewers. Net under-enumeration was derived by comparing results from the Census and the post-enumeration survey for the same individuals, and identifying omissions and duplications in the Census.

While every effort is made to minimise under-enumeration in the Census, some inevitably remains for various reasons (e.g. inadvertent omission of very young children, treatment by the collector of an occupied dwelling as unoccupied). Refusal by householders to complete the Census Schedule is not considered to be a significant cause of under-enumeration, as estimates by the collector are used in such cases.

The 1981 post-enumeration survey was based on a sample size of two-thirds of one per cent of households, as it was for 1976. This sample size was chosen to provide reliable data on the characteristics (e.g. sex, age) of omitted persons. Under-enumeration in Western Australia, as measured by the survey, was 2.7 per cent in 1976 and 1.9 per cent in 1981.

Persons living in non-private dwellings (e.g. hotels, motels, hospitals) and sparsely settled areas are excluded from post-enumeration surveys because of operational difficulties in conducting follow-up interviews. However, these amount only to about 5 per cent of the population and hence any under-enumeration of them is unlikely to have a significant effect on the total level of under-enumeration.

Adjustments have been made to the Australian and State totals for numbers of males and females at the 1971 Census as well as to total population for capital city divisions. In addition, for the 1976 and 1981 Censuses, adjustments have been made to the numbers at each age at the Australian and State levels and to total population at the local government area level.

### **The 1981 Census**

Processing of the 1981 Census data was completed in June 1982. In order to prevent the inadvertent release of identifiable information slight adjustments have been made to some data produced in the more detailed tabulations. Hence totals may be slightly greater or less than the sum of their components. Further information is contained in the publication *Effects of Introduced Random Error* (Catalogue No. 2156.0) issued by the Australian Statistician, Canberra.

### Population at each Census Date

The population of Western Australia at each census date from 1848, its relation to the Australian population, and the masculinity ratio are shown in the following table.

The masculinity ratio of the Australian population at the three latest census dates was 101.06 in 1971, 100.44 in 1976 and 99.63 in 1981.

POPULATION OF WESTERN AUSTRALIA AND AUSTRALIA  
CENSUS DATES, 1848-1981 (a)

Date of census	Western Australia			Australia	Western Australia Proportion of	
	Males	Females	Persons	Persons (b)	Australia (per cent)	Masculinity ratio (c)
1848 — 10 October	2,818	1,804	4,622	326,500	1.42	156.21
1854 — 30 September	7,779	3,964	11,743	671,500	1.75	196.24
1859 — 31 December	9,522	5,315	14,837	1,097,000	1.35	179.15
1870 — 31 March	15,375	9,410	24,785	1,606,000	1.54	163.39
1881 — 3 April	17,062	12,646	29,708	2,250,194	1.32	134.92
1891 — 5 April	29,807	19,975	49,782	3,177,823	1.57	149.22
1901 — 31 March	112,875	71,249	184,124	3,773,801	4.88	158.42
1911 — 3 April	161,565	120,549	282,114	4,455,005	6.33	134.02
1921 — 4 April	177,278	155,454	332,732	5,435,734	6.12	114.04
1933 — 30 June	233,937	204,915	438,852	6,629,839	6.62	114.16
1947 — 30 June	258,076	244,404	502,480	7,579,358	6.63	105.59
1954 — 30 June	330,358	309,413	639,771	8,986,530	7.12	106.77
1961 — 30 June	375,452	361,177	736,629	10,508,186	7.01	103.95
1966 — 30 June	432,569	415,531	848,100	11,599,498	7.31	104.10
1971 — 30 June	539,332	514,502	1,053,834	13,067,265	8.06	104.83
1976 — 30 June	599,959	578,383	1,178,342	14,033,083	8.40	103.73
1981 — 30 June	657,249	642,807	1,300,056	14,923,260	8.71	102.25

(a) Figures for 1961 and earlier exclude full-blood Aborigines; those for 1966 and later refer to total population (i.e. including Aborigines). Figures for 1966 and earlier refer to census counts; those for 1971 and later refer to estimated resident population. (b) Figures for dates prior to 3 April 1881 are estimates. (c) Number of males to each 100 females.

The following table shows the population of Western Australia at each census date from 1891 to 1981, and the intercensal gains or losses by natural increase and by migration. It also shows the average annual gains or losses in each intercensal period.

POPULATION — ANALYSIS OF INTERCENSAL INCREASES, 1891-1981 (a)  
(‘000)

Period (b)	Population at beginning of period	Natural increase (c)		Net migration (d)		Total increase		Population at end of period
		Total	Annual average	Total	Annual average	Number	Annual average	
1891 — 1901 (10 years)	49.8	15.9	1.6	118.4	11.8	134.3	13.4	184.1
1901 — 1911 (10 years)	184.1	44.2	4.4	53.7	5.4	98.0	9.8	282.1
1911 — 1921 (10 years)	282.1	51.8	5.2	-1.2	-0.1	50.6	5.1	332.7
1921 — 1933 (12½ years)	332.7	60.1	4.9	46.0	3.8	106.1	8.7	438.9
1933 — 1947 (14 years)	438.9	69.4	5.0	-5.8	-0.4	63.6	4.5	502.5
1947 — 1954 (7 years)	502.5	65.6	9.4	71.7	10.2	137.3	19.6	639.8
1954 — 1961 (7 years)	639.8	79.4	11.3	17.4	2.5	96.9	13.8	736.6
1961 — 1966 (5 years)	736.6	53.1	10.6	46.9	9.4	100.0	20.0	836.7
1966 — 1971 (5 years)	848.1	64.5	12.9	117.9	23.6	182.4	36.5	1,030.5
1971 — 1976 (5 years)	1,053.8	67.0	13.4	59.3	11.9	(e) 124.5	24.9	1,178.3
1976 — 1981 (5 years)	1,178.3	64.3	12.9	51.0	10.2	(e) 121.7	24.3	1,300.1

(a) Figures for 1961 and earlier exclude full-blood Aborigines. Figures for 1966 and earlier refer to census counts; those for 1971 and later refer to the estimated resident population. (b) For census dates, see first table in this Chapter. (c) Excess of births registered over deaths registered. Figures for periods prior to the 1971 Census are on a State of registration basis; those for later periods are on the basis of State of usual residence. (d) Interstate and overseas. Minus sign (—) indicates loss by migration. (e) Discrepancies between the sum of natural increase and net migration, and total increase, are due to intercensal adjustment.

### Characteristics of the Population

**Age.** The following table shows the numbers and proportions of the population of Western Australia in selected age groups at each census date from 1961 to 1981. 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.

POPULATION IN SELECTED AGE GROUPS (a)  
CENSUS DATES, 1961 TO 1981

Age last birthday (years)	Number in each age group					Per cent of total				
	Census, 30 June —					Census, 30 June —				
	1961	1966	1971	1976	1981	1961	1966	1971	1976	1981
Under 6	98,447	104,984	127,355	132,088	126,105	13.36	12.38	12.08	11.21	9.70
6 — 12	110,438	125,498	150,108	154,666	166,126	14.99	14.80	14.24	13.13	12.78
6 — 15	153,294	176,627	211,987	223,441	234,663	20.81	20.83	20.12	18.96	18.05
Under 18	276,182	313,316	377,620	399,794	430,211	37.49	36.94	35.83	33.93	33.09
Under 21	307,473	356,913	432,916	462,691	500,662	41.74	42.08	41.08	39.27	38.51
15 — 44	293,882	353,971	466,942	539,810	621,087	39.90	41.74	44.31	45.81	47.77
15 — 64	441,821	518,202	656,806	752,211	848,697	59.98	61.10	62.33	63.84	65.28
65 and over	55,097	65,129	78,225	93,751	113,143	7.48	7.68	7.42	7.96	8.70
All ages	736,629	848,100	1,053,834	1,178,342	1,300,056	100.00	100.00	100.00	100.00	100.00

(a) See footnote (a) to previous table.

**Religion; Birthplace.** The religion and birthplace of the population as recorded at the Censuses of 1976 and 1981 are shown in the following tables. The Census and Statistics Act 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.

RELIGION OF THE POPULATION (a)  
CENSUSES, 1976 AND 1981

Religion	Census, 30 June 1976				Census, 30 June 1981			
	Males	Females	Persons	Per cent of total	Males	Females	Persons	Per cent of total
	'000	'000	'000		'000	'000	'000	
Christian —								
Baptist	7.1	7.3	14.4	1.26	7.6	8.2	15.9	1.25
Catholic, Roman Catholic	141.5	141.8	283.2	24.74	156.6	159.8	316.3	24.84
Church of England	177.4	182.9	360.3	31.47	183.4	192.4	375.8	29.51
Churches of Christ	5.7	6.8	12.6	1.10	6.5	7.7	14.2	1.11
Methodist	36.9	40.1	77.0	6.73	24.5	26.7	51.2	4.02
Presbyterian	20.9	21.8	42.6	3.72	15.3	16.8	32.0	2.52
Other	41.4	43.6	85.0	7.43	63.1	68.6	131.6	10.34
Total, Christian	430.9	444.3	875.2	76.44	457.0	480.1	937.1	73.58
Non-Christian —								
Hebrew	1.5	1.4	2.9	0.25	1.6	1.5	3.2	0.25
Muslim	1.1	0.8	1.9	0.17	2.0	1.6	3.6	0.28
Other	1.8	1.4	3.3	0.29	2.6	2.2	4.9	0.38
Total, Non-Christian	4.5	3.6	8.1	0.71	6.2	5.4	11.6	0.91
Non-classifiable	3.0	2.4	5.5	0.48	4.4	3.6	8.0	0.63
No religious denomination	69.1	50.4	119.5	10.44	98.0	74.1	172.1	13.51
Not stated	73.6	63.0	136.6	11.93	77.6	67.2	144.8	11.37
GRAND TOTAL	581.2	563.7	1,144.9	100.00	643.1	630.5	1,273.6	100.00

(a) Figures as counted.

BIRTHPLACE OF THE POPULATION (a)  
CENSUSES, 1976 AND 1981

Birthplace	Census, 30 June 1976				Census, 30 June 1981			
	Males	Females	Persons	Per cent of total	Males	Females	Persons	Per cent of total
Australia	'000	'000	'000		'000	'000	'000	
	417.1	415.3	832.4	72.71	454.2	456.8	911.0	71.53
Europe —								
United Kingdom and Eire	90.8	85.8	176.6	15.43	94.8	91.3	186.1	14.62
Italy	16.1	13.2	29.3	2.56	16.1	13.1	29.2	2.29
Netherlands	5.8	4.9	10.6	0.93	6.1	5.2	11.3	0.89
Yugoslavia	6.0	4.4	10.4	0.91	6.2	4.8	11.0	0.87
Germany	3.7	3.7	7.4	0.65	4.0	4.2	8.1	0.64
Poland	2.5	1.9	4.4	0.38	2.8	2.2	5.0	0.40
Greece	2.4	2.1	4.5	0.39	2.3	2.0	4.3	0.34
Other	8.5	6.8	15.3	1.33	8.7	7.0	15.8	1.24
Total, Europe	135.8	122.8	258.6	22.58	140.9	129.9	270.9	21.27
Asia —								
India	4.9	5.0	9.9	0.86	4.9	5.2	10.1	0.79
Malaysia	2.1	1.9	4.0	0.35	2.7	2.8	5.4	0.43
Burma	1.9	2.1	4.0	0.35	2.1	2.3	4.4	0.35
Singapore	1.3	1.2	2.5	0.22	1.6	1.8	3.4	0.26
Other	4.9	4.0	8.9	0.78	7.3	7.0	14.2	1.12
Total, Asia	15.1	14.2	29.3	2.56	18.6	19.0	37.6	2.95
Oceania —								
New Zealand	4.9	3.9	8.9	0.77	10.1	8.4	18.5	1.45
Other	0.6	0.5	1.1	0.09	0.8	0.8	1.6	0.12
Total, Oceania	5.5	4.5	9.9	0.87	10.9	9.2	20.0	1.57
Africa —								
Republic of South Africa	1.1	1.2	2.3	0.20	2.1	2.2	4.2	0.33
Other	2.7	2.5	5.2	0.46	3.7	3.5	7.2	0.56
Total, Africa	3.8	3.7	7.6	0.66	5.7	5.7	11.4	0.90
America —								
United States of America	2.1	1.5	3.6	0.32	2.3	1.8	4.1	0.32
Other	1.8	1.6	3.4	0.30	2.2	2.2	4.4	0.34
Total, America	3.9	3.2	7.1	0.62	4.5	4.0	8.5	0.66
GRAND TOTAL (b)	581.2	563.7	1,144.9	100.00	643.1	630.5	1,273.6	100.0

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

## GEOGRAPHICAL DISTRIBUTION

### Urban, Rural and Migratory Population

At the 1971, 1976 and 1981 Censuses a boundary was defined for each population cluster of 1,000 or more persons. These clusters are named 'urban centres' and the population enumerated in them is classified as urban for statistical purposes.

In determining the boundary of an urban centre with a population of 25,000 or more, all contiguous census collectors' districts which were found to have a minimum population density of approximately 200 persons per square kilometre at the census were included. Some areas of lower density were classified as urban in accordance with certain other specified criteria. The term *Major urban* is applied to those centres which had a population of 100,000 or more, and supersedes the term *Metropolitan* as used at previous censuses. Urban Perth is the only such centre in Western Australia.

Around each urban centre with a population of at least 100,000 a further boundary was defined to contain the anticipated development of the urban centre and associated smaller urban centres for a period of at least twenty years. This boundary delimits an area which is now, or is expected to be, in close social and economic contact with the urban centre. It is a fixed boundary, as distinct from the boundary of the urban centre which moves from census to census as urbanisation proceeds. In Western Australia, the area within this fixed boundary is described as the Perth Statistical Division (see maps inside back cover).

Urban Perth at 30 June 1981 comprised the Cities of Belmont, Fremantle, Nedlands, Perth, South Perth and Subiaco; the Towns of Bassendean, Claremont, Cottesloe, East Fremantle and Mosman Park; the Shires of Bayswater and Peppermint Grove; parts of the Cities of Canning, Cockburn, Gosnells, Melville and Stirling, part of the Town of Armadale and parts of the Shires of Kalamunda, Mundaring, Swan and Wanneroo.

In delimiting urban centres with a population of less than 25,000 persons all continuous urban growth is included (which, in small urban centres, would not necessarily occur if the density criterion were applied), together with any close but non-contiguous development which could be clearly regarded as part of the centre.

*Rural* population represents persons enumerated in the area not included in urban centres. The term *Migratory* refers to persons (both passengers and crew) who, at midnight on census night, were enumerated on board ships in Western Australian ports, or ships which had left an Australian port before census night for a next port of call in Western Australia. It includes also those who were enumerated on long-distance trains, motor coaches or aircraft.

URBAN AND RURAL POPULATIONS (a) (b) IN STATES AND TERRITORIES  
CENSUSES, 1976 AND 1981

State or Territory	Census, 30 June 1976				Census, 30 June 1981			
	Urban	Rural	Migratory	Total population	Urban	Rural	Migratory	Total population
New South Wales	4,239,012	531,657	6,434	4,777,103	4,517,742	604,249	4,226	5,126,217
Victoria	3,203,666	441,610	1,705	3,646,981	3,365,991	464,352	2,100	3,832,443
Queensland	1,634,034	400,905	2,258	2,037,197	1,816,352	476,294	2,477	2,295,123
South Australia	1,056,956	186,433	1,367	1,244,756	1,090,042	194,040	951	1,285,033
Western Australia	956,077	186,115	2,665	1,144,857	1,073,885	197,671	2,068	1,273,624
Tasmania	301,923	100,368	575	402,866	314,934	103,569	454	418,957
Northern Territory	64,439	32,083	568	97,090	91,479	31,147	698	123,324
Australian Capital Territory	194,517	3,105	—	197,622	219,331	2,278	—	221,609
AUSTRALIA	11,650,624	1,882,276	15,572	13,548,472	12,489,756	2,073,600	12,974	14,576,330

(a) See text preceding table for definitions of *Urban*, *Rural*, etc. (b) Figures as counted at the Census.

Population of Urban Centres and Bounded Localities

Those urban centres and bounded localities which had a population of more than 200 persons at the 1981 Census are included in the following table.

POPULATION IN URBAN CENTRES AND BOUNDED LOCALITIES  
CENSUSES, 1976 AND 1981

Urban centre (U) or bounded locality	Population (a)				Intercensal increase or decrease	
	Census, 30 June —					
	1976	1981		1976		
	Persons	Males	Females	Persons	Number	Per cent
Albany (U)	13,696	7,402	7,820	15,222	1,526	11.14
Augusta	464	278	310	588	124	26.72
Australind	832	866	815	1,681	849	102.04
Balgo	n.a.	248	213	461	..	..
Beverley	755	376	380	756	1	0.13
Boddington	355	188	179	367	12	3.38
Boyanup	283	177	188	365	82	28.98
Boyup Brook	611	310	338	648	37	6.06
Bridgetown (U)	1,316	771	750	1,521	205	15.58
Brookton	604	304	291	595	-9	-1.49
Broome (U)	2,920	1,943	1,723	3,666	746	25.55
Bruce Rock	603	289	276	565	-38	-6.30
Brunswick Junction	893	468	421	889	-4	-0.45
Bunbury (U)	19,513	10,915	10,834	21,749	2,236	11.46
Busselton (U)	5,550	3,101	3,362	6,463	913	16.45
Byford (U)	822	525	506	1,031	209	25.43
Capel	669	336	344	680	11	1.64
Carnamah	449	222	200	422	-27	-6.01
Carnarvon (U)	5,341	2,604	2,449	5,053	-288	-5.39
Cervantes	n.a.	131	111	242	..	..

POPULATION IN URBAN CENTRES AND BOUNDED LOCALITIES  
CENSUSES, 1976 AND 1981 — *continued*

Urban centre (U) or bounded locality	Population (a)				Intercensal increase or decrease	
	Census, 30 June —					
	1976	1981		Persons	Number	Per cent
	Persons	Males	Females			
Chidlow	248	195	193	388	140	56.45
Collie (U)	6,771	3,973	3,694	7,667	896	13.23
Coolgardie	643	473	418	891	248	38.57
Coorow	209	120	106	226	17	8.13
Corrigin	853	439	402	841	-12	-1.41
Cranbrook	375	173	143	316	-59	-15.73
Cue	258	174	146	320	62	24.03
Cundeelee	n.a.	148	112	260	..	..
Cunderdin	756	386	345	731	-25	-3.31
Dalwallinu	683	322	317	639	-44	-6.44
Dampier (U)	2,727	1,555	916	2,471	-256	-9.39
Darkan	266	119	123	242	-24	-9.02
Deanmill	281	123	101	224	-57	-20.28
Denham	346	218	184	402	56	16.18
Denmark	786	491	494	985	199	25.32
Derby (U)	2,411	1,546	1,387	2,933	522	21.65
Dongara	324	(b)	(b)	(b)	..	..
Dongara-Port Denison (U)	n.a.	633	522	1,155	..	..
Donnybrook (U)	1,008	590	607	1,197	189	18.75
Dowerin	421	204	206	410	-11	-2.61
Dumbleyung	263	142	132	274	11	4.18
Dunsborough	294	191	201	392	98	33.33
Dwellingup	450	247	206	453	3	0.67
Eaton (U)	1,423	1,095	1,131	2,226	803	56.43
Eneabba	n.a.	227	137	364	..	..
Esperance (U)	5,262	3,270	3,105	6,375	1,113	21.15
Exmouth (U)	2,336	1,342	1,241	2,583	247	10.57
Fitzroy Crossing	n.a.	219	209	428	..	..
Geraldton (U)	18,773	10,550	10,345	20,895	2,122	11.30
Gingin	332	192	190	382	50	15.06
Gnowangerup	892	448	424	872	-20	-2.24
Gogo	n.a.	108	109	217	..	..
Goldsworthy (U)	989	550	373	923	-66	-6.67
Goomalling	644	301	299	600	-44	-6.83
Greenbushes	232	170	151	321	89	38.36
Halls Creek	767	487	479	966	199	25.95
Harvey (U)	2,418	1,266	1,213	2,479	61	2.52
Jarrahdale	356	175	140	315	-41	-11.52
Jerramungup	225	156	138	294	69	30.67
Jurien	605	248	201	449	-156	-25.79
Kalbarri	695	401	419	820	125	17.99
Kalgoorlie-Boulder (U)	19,041	10,509	9,339	19,848	807	4.24
Kambalda (U)	4,784	2,488	1,975	4,463	-321	-6.71
Karratha (U)	4,243	4,833	3,508	8,341	4,098	96.58
Katanning (U)	4,162	2,192	2,221	4,413	251	6.03
Kellerberrin (U)	1,198	549	542	1,091	-107	-8.93
Kojonup (U)	944	558	544	1,102	158	16.74
Kondinin	368	173	153	326	-42	-11.41
Kooyanobbing	296	160	117	277	-19	-6.42
Koorda	419	204	174	378	-41	-9.79
Kulin	357	185	161	346	-11	-3.08
Kununurra (U)	1,540	1,111	970	2,081	541	35.13
Kwinana Town Centre (U)	10,981	6,102	6,253	12,355	1,374	12.51
La Grange	n.a.	199	173	372	..	..
Lake Grace	616	317	258	575	-41	-6.66
Lancelin	247	223	176	399	152	61.54
Laverton	848	516	356	872	24	2.83
Leeman	n.a.	193	192	385	..	..
Leinster	n.a.	618	379	997	..	..
Leonora	468	299	225	524	56	11.97
Looma	n.a.	128	107	235	..	..
Mandurah (U)	7,050	5,505	5,473	10,978	3,928	55.72
Manjimup (U)	3,734	2,111	2,039	4,150	416	11.14
Marble Bar	262	201	156	357	95	36.26
Margaret River	701	408	390	798	97	13.84
Meekatharra	829	546	443	989	160	19.30

POPULATION IN URBAN CENTRES AND BOUNDED LOCALITIES  
CENSUSES, 1976 AND 1981 — *continued*

Urban centre (U) or bounded locality	Population (a)				Intercensal increase or decrease	
	Census, 30 June —					
	1976	1981		Persons	Number	Per cent
	Persons	Males	Females			
Menzies	n.a.	140	92	232	..	..
Merredin (U)	3,661	1,845	1,675	3,520	-141	-3.85
Mingenew	423	196	172	368	-55	-13.00
Moora (U)	1,545	863	814	1,677	132	8.54
Morawa	814	386	308	694	-120	-14.74
Mount Barker (U)	1,562	770	749	1,519	-43	-2.75
Mount Helena	261	153	158	311	50	19.16
Mount Magnet	362	372	246	618	256	70.72
Mowanjumb	n.a.	121	102	223	..	..
Mukinbudin	392	191	179	370	-22	-5.61
Mullewa	933	476	442	918	-15	-1.61
Mundaring	677	405	418	823	146	21.57
Mundijong	299	191	165	356	57	19.06
Nannup	487	294	258	552	65	13.35
Narembeen	506	261	239	500	-6	-1.19
Narrogin (U)	4,812	2,473	2,496	4,969	157	3.26
Newman (U)	4,672	3,234	2,232	5,466	794	16.99
Norseman (U)	2,029	1,058	837	1,895	-134	-6.60
North Pinjarra (U)	1,006	584	544	1,128	122	12.13
Northam (U)	6,866	3,385	3,406	6,791	-75	-1.09
Northampton	703	387	363	750	47	6.69
Onslow	220	324	270	594	374	170.00
Pannawonica (U)	n.a.	758	412	1,170	..	..
Paraburdoo (U)	2,402	1,394	963	2,357	-45	-1.87
Peelhurst-Singleton	332	279	277	556	224	67.47
Pemberton	777	468	403	871	94	12.10
Perenjori	305	149	108	257	-48	-15.74
Perth (U)	731,275	397,235	411,800	809,035	77,760	10.63
Pingelly	978	482	455	937	-41	-4.19
Pinjarra (U)	1,196	671	665	1,336	140	11.71
Port Denison	522	(b)	(b)	(b)	..	..
Port Hedland (U)	11,144	7,079	5,869	12,948	1,804	16.19
Quairading	808	378	363	741	-67	-8.29
Quinns Rocks	560	399	417	816	256	45.71
Ravensthorpe	256	165	162	327	71	27.73
Rockingham (U)	17,693	12,496	12,436	24,932	7,239	40.91
Roebourne (U)	1,368	941	747	1,688	320	23.39
Shay Gap	856	519	334	853	-3	-0.35
Southern Cross	880	416	382	798	-82	-9.32
Strelley	n.a.	159	170	329	..	..
Tambellup	377	232	180	412	35	9.28
Tammin	288	133	121	254	-34	-11.81
Telfer	n.a.	240	104	344	..	..
Three Springs	605	341	297	638	33	5.45
Tom Price (U)	3,193	1,958	1,582	3,540	347	10.87
Toodyay	550	293	267	560	10	1.82
Turkey Creek	n.a.	118	94	212	..	..
Two Rocks	661	353	363	716	55	8.32
Wagin (U)	1,658	756	732	1,488	-170	-10.25
Walpole	262	156	135	291	29	11.07
Wanneroo (U)	4,319	3,377	3,368	6,745	2,426	56.17
Warburton	n.a.	186	174	360	..	..
Waroona (U)	1,160	770	692	1,462	302	26.03
Wickepin	246	138	129	267	21	8.54
Wickham (U)	2,312	1,287	1,100	2,387	75	3.24
Williams	475	234	219	453	-22	-4.63
Wiluna	n.a.	120	101	221	..	..
Wittenoom	962	140	107	247	-715	-74.32
Wongan Hills	888	488	459	947	59	6.64
Wundowie	969	382	338	720	-249	-25.70
Wyalkatchem	534	235	218	453	-81	-15.17
Wyndham (U)	1,383	823	686	1,509	126	9.11
Yanchep Beach	384	231	255	486	102	26.56
Yarloop	483	271	237	508	25	5.18
York (U)	1,108	599	537	1,136	28	2.53

(a) Figures as counted at the Census.

(b) See Dongara-Port Denison.

### Population in Statistical Divisions

In 1929, when statistics were first presented according to statistical divisions, Western Australia was divided into seven such areas. At the 1981 Census there were nine statistical divisions, and these have been used for compiling the particulars in the next table.

For further information on the origin and purpose of statistical divisions see Chapter 5 — *Constitution and Government*.

The estimated resident population of the Perth Statistical Division at 30 June 1981 was 922,040, or 70.9 per cent of the State total, compared with 832,760 (70.7 per cent) five years earlier, an increase of 89,280 persons or 10.7 per cent. The State's natural increase between the Censuses was 64,332.

The total estimated resident population in the area outside the Perth Statistical Division rose by 32,440 or 9.39 per cent.

The South-Eastern Statistical Division, and Carnegie and De Grey Statistical Sub-divisions together comprised an area of 1,564,516 square kilometres (or almost two-thirds of the State) and had an estimated resident population of only 70,920 persons at 30 June 1981. A low rainfall renders much of it virtually uninhabitable and desert or near-desert conditions prevail over some 900,000 square kilometres including much of the eastern and northern parts of the area and extending into the southern portion of the Kimberley Statistical Division. Little of this desert area has an annual rainfall greater than 250 millimetres and a considerable proportion has much less. Of the total population of 70,645 persons counted in the three areas at the Census of 30 June 1981, approximately 85 per cent were enumerated in the urban centres of Kalgoorlie-Boulder (19,848), Port Hedland (12,948), Esperance (6,375), Newman (5,466), Kambalda (4,463) and Norseman (1,895), and the townships of Leinster (997), Meekatharra (989), Goldsworthy (923), Coolgardie (891), Laverton (872), Shay Gap (853), Southern Cross (798), Mount Magnet (618), Leonora (524), Marble Bar (357), Telfer (344), Ravensthorpe (327), Cue (320) and Menzies (232).

### Population North of 26° S Latitude

For administrative and other purposes, the portion of the State lying north of the 26th parallel of latitude frequently has special significance. This area, which embraces part of the Central Statistical Division, and the whole of the Pilbara and Kimberley Statistical Divisions, is 1,371,367 square kilometres in extent and is therefore somewhat greater in area than half the entire State. It had a population, as counted at the Censuses, of 65,086 persons in 1976 and 78,319 in 1981. Of the 1981 total, over three-quarters were enumerated in the ports and other coastal settlements of Port Hedland (12,948), Karratha (8,341), Carnarvon (5,053), Broome (3,666), Derby (2,933), Exmouth (2,583), Dampier (2,471), Wickham (2,387), Roebourne (1,688), Wyndham (1,509) and Onslow (594); the iron ore mining centres of Newman (5,466), Tom Price (3,540), Paraburdoo (2,357), Pannawonica (1,170), Goldsworthy (923) and Shay Gap (853); the Ord River agricultural settlement at Kununurra (2,081); and the townships of Halls Creek (966), Marble Bar (357), Telfer (344) and Wittenoom (247).

### Population Density

Urban Perth is the most densely populated part of the State. Among the statistical divisions, Perth with an estimated resident population of 922,040 and 5,363 square kilometres in area showed the highest density, 172 persons per square kilometre. The Kimberley Statistical Division was the most sparsely populated with an area of 421,451 square kilometres (more than one-sixth of the entire State) and an estimated resident population of only 17,940 persons, equivalent to an average of one person to every twenty-three square kilometres.

The next table shows the area, estimated resident population and density of the State and of each statistical division at 30 June 1981.

AREA, POPULATION AND DENSITY OF STATISTICAL DIVISIONS  
30 JUNE 1981

Statistical division	Area (a)		Population (b)		
	Square kilometres	Per cent of total	Persons	Per cent of total	Density (per square kilometre)
Perth Statistical Division	5,363	0.21	922,040	70.92	171.93
Other divisions —					
South-West	26,661	1.06	101,880	7.84	3.82
Lower Great Southern	40,528	1.60	44,040	3.39	1.09
Upper Great Southern	45,684	1.81	23,650	1.82	0.52
Midlands	110,262	4.37	49,800	3.83	0.45
South-Eastern	614,388	24.33	43,260	3.33	0.07
Central (c)	753,365	29.83	50,820	3.91	0.07
Pilbara	510,335	20.21	46,630	3.59	0.09
Kimberley	421,451	16.69	17,940	1.38	0.04
Total	2,522,675	99.89	378,020	29.08	0.15
WESTERN AUSTRALIA	2,525,500	100.00	1,300,060	100.00	0.51

(a) See Chapter 2. (b) Estimated resident population. (c) Includes Houtman Abrolhos (unincorporated).

Western Australia had a population density at the 1981 Census of only 0.51 persons per square kilometre, compared with an average of 1.94 for Australia as a whole. Victoria was the most densely populated State, having an average of 17.35 persons per square kilometre.

AREA, POPULATION AND DENSITY OF STATES AND TERRITORIES  
30 JUNE 1981

State or Territory	Area (a)		Population (b)				
	Square kilometres	Per cent of total	Persons			Per cent of total	Density (per square kilometre)
			Males	Females	Number		
	'000		'000	'000	'000		
New South Wales	801.6	10.43	2,608.4	2,626.5	5,234.9	35.08	6.53
Victoria	227.6	2.96	1,958.7	1,988.2	3,946.9	26.45	17.34
Queensland	1,727.2	22.48	1,178.4	1,166.8	2,345.2	15.72	1.36
South Australia	984.0	12.81	653.9	664.8	1,318.8	8.84	1.34
Western Australia	2,525.5	32.87	657.2	642.8	1,300.1	8.71	0.51
Tasmania	67.8	0.88	212.6	214.7	427.2	2.86	6.30
Northern Territory	1,346.2	17.52	65.4	57.2	122.6	0.82	0.09
Australian Capital Territory	2.4	0.03	113.6	114.0	227.6	1.53	94.83
AUSTRALIA	7,682.3	100.00	7,448.3	7,475.0	14,923.3	100.00	1.94

(a) See Chapter 2. (b) Estimated resident population.

### ABORIGINAL POPULATION

Reference is made at the beginning of this Chapter to the exclusion of *full-blood* Aborigines from the tabulations of census data prior to 1971. Aborigines have, however, been enumerated at all censuses of the Commonwealth, although the degree of coverage and information obtained have varied substantially since 1911. Since the Census taken in 1933, the adequacy of the particulars obtained has improved progressively, as a result of an increasing number of Aborigines coming into contact with more populated areas.

Since the 1971 Census, the question relating to a person's race has differed from that asked at previous censuses and the figures shown in the tables in this section are therefore not comparable with those from earlier censuses.

ABORIGINAL POPULATION (a) IN STATISTICAL DIVISIONS  
CENSUS, 30 JUNE 1981

Statistical division	Persons			Per cent of total
	Males	Females	Number	
Perth Statistical Division	3,421	3,614	7,035	22.44
Other divisions —				
South-West	610	553	1,163	3.71
Lower Great Southern	665	673	1,338	4.27
Upper Great Southern	512	427	939	3.00
Midlands	861	779	1,640	5.23
South-Eastern	1,171	1,120	2,291	7.31
Central	2,558	2,536	5,094	16.25
Pilbara	2,025	1,885	3,910	12.47
Kimberley	4,088	3,845	7,933	25.30
Total	12,490	11,820	24,308	77.54
Total all divisions	15,911	15,434	31,343	99.97
Migratory (b)	6	2	8	0.03
WESTERN AUSTRALIA (c)	15,920	15,431	31,351	100.00

(a) Includes Torres Strait Islanders. (b) See letterpress in the earlier section *Geographical Distribution*. (c) For information concerning random adjustment of data see section *The 1981 Census* at the beginning of this Chapter.

AGE DISTRIBUTION OF  
ABORIGINAL POPULATION (a)  
CENSUS, 30 JUNE 1981

Age last birthday (years)	Persons			Per cent of total
	Males	Females	Number	
0 — 4	2,119	1,989	4,108	13.10
5 — 9	2,393	2,190	4,583	14.62
10 — 14	2,330	2,284	4,614	14.72
15 — 19	1,953	1,871	3,824	12.20
20 — 24	1,521	1,569	3,090	9.86
25 — 29	1,191	1,177	2,368	7.55
30 — 34	861	914	1,775	5.66
35 — 39	710	714	1,424	4.54
40 — 44	636	622	1,258	4.01
45 — 49	568	528	1,096	3.50
50 — 54	478	434	912	2.91
55 — 59	289	286	575	1.83
60 — 64	292	298	590	1.88
65 and over	578	565	1,143	3.65
Total (b)	15,920	15,431	31,351	100.00

(a) Includes Torres Strait Islanders. (b) See footnote (c) to previous table.

ESTIMATES OF POPULATION

For dates other than those of the periodic census of population, estimates are based on records of births and deaths and of 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 as at 31 March, 30 June, 30 September 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 succeeding census become known.

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 the population. The June 1981 estimate for Western Australia was derived by adjusting the Census count for under-enumeration, subtracting all interstate and overseas visitors, and adding residents who were temporarily interstate or overseas on Census night.

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'. In some cases it is appropriate to relate a characteristic to the population as at a specified date as, for example, savings bank balances per head of population at 30 June, or motor vehicles per head of population at 31 December.

Where events, as for instance births or deaths, are taking place continuously throughout a period, it is obviously not appropriate to relate these events to the population as at a specific date. It is necessary, therefore, to devise a measure which takes account of the change in population which occurs continuously throughout any period. This measure is known as the *mean population*.

As stated earlier, estimates of population are prepared as at the end of each quarter of the year. The mean population of a quarter might be taken to be the average, or arithmetic mean, of the populations at the beginning and the end of the quarter. If *a* represents the population at the beginning of year and *b*, *c*, *d* and *e* the populations at the end of the first, second, third and fourth quarters, respectively, these quarterly means would then be  $\frac{1}{2}(a + b)$  for the first quarter,  $\frac{1}{2}(b + c)$  for the second,  $\frac{1}{2}(c + d)$  for the third and  $\frac{1}{2}(d + e)$  for the fourth quarter. The mean population for the year might then be taken as the arithmetic mean of the four quarterly average populations, or

$$\frac{1}{4}[\frac{1}{2}(a + b) + \frac{1}{2}(b + c) + \frac{1}{2}(c + d) + \frac{1}{2}(d + e)]$$

which may be more simply expressed as  $\frac{1}{6}(a + 2b + 2c + 2d + e)$ . This method of deriving mean population had been in use in Western Australia prior to its general adoption by the 1903 Conference of Australian Statisticians. It was later superseded by the more precise measure

$$\frac{1}{6}(a + 4b + 2c + 4d + e)$$

which is now commonly used in Australian statistics. In order to establish uniformity with current practice, estimates of mean population for 1901 and later years were revised, where necessary, by the application of this formula.

The estimated mean population of Western Australia is shown in the next table for each financial and calendar year in the period from 1 January 1979 to 30 June 1984.

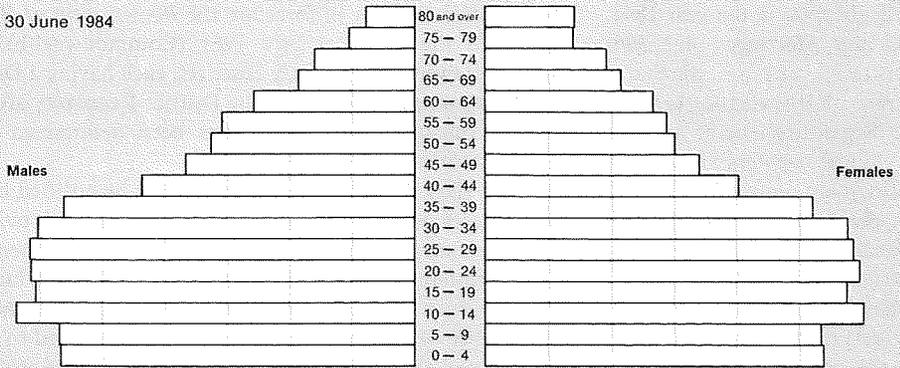
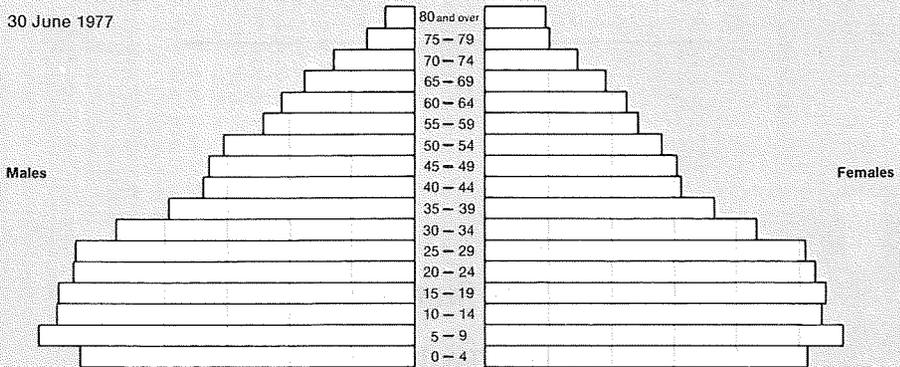
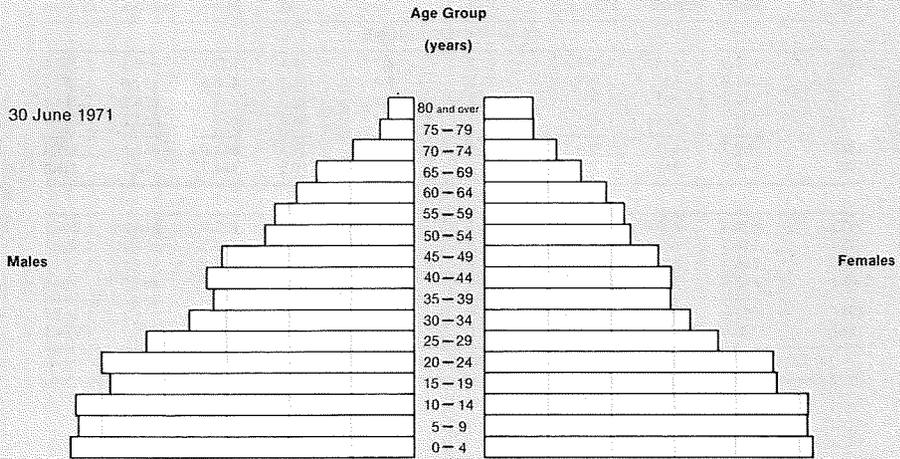
### Population Estimates

As a result of the repeal, with effect from 10 August 1967, of section 127 of the Commonwealth Constitution, to which reference is made earlier, current population estimates no longer exclude full-blood Aboriginals. Estimates for earlier dates and periods back to the Census of 30 June 1961 have also been prepared on the basis of *total* population (i.e. including Aboriginals). From 1 January 1977 to 31 December 1981 figures for dates and periods have been revised in accordance with the results of the 1981 Census and are now final. The estimates at 30 June 1982 and later are preliminary and subject to revision in accordance with the final results of the 1986 Census and adjustments to numbers of persons who were temporarily overseas on Census night.

ESTIMATED RESIDENT POPULATION IN STATES AND TERRITORIES  
(<sup>'000</sup>)

State or Territory	Estimated population at 31 December —					
	1979	1980	1981	1982	1983	1984p
New South Wales	5,140.2	5,205.4	5,268.4	5,333.6	5,383.3	5,442.0
Victoria	3,900.0	3,930.7	3,968.6	4,013.9	4,056.4	4,099.7
Queensland	2,239.7	2,301.7	2,385.3	2,448.3	2,489.6	2,526.4
South Australia	1,304.6	1,312.6	1,323.9	1,334.4	1,348.0	1,358.3
<b>Western Australia</b>	<b>1,257.1</b>	<b>1,283.5</b>	<b>1,319.0</b>	<b>1,351.3</b>	<b>1,374.9</b>	<b>1,394.0</b>
Tasmania	422.2	425.2	428.2	430.8	434.8	439.6
Northern Territory	116.1	121.7	127.2	131.3	136.8	141.3
Australian Capital Territory	222.6	226.6	228.9	233.2	240.4	247.7
<b>AUSTRALIA</b>	<b>14,602.5</b>	<b>14,807.4</b>	<b>15,049.5</b>	<b>15,276.8</b>	<b>15,464.2</b>	<b>15,648.9</b>

### Estimated Resident Population, by Age Group



70 60 50 40 30 20 10 0  
THOUSAND PERSONS

0 10 20 30 40 50 60 70  
THOUSAND PERSONS

ESTIMATED RESIDENT POPULATION  
(<sup>'000</sup>)

Year	Population at end of year			Increase during year			Mean population		
	Males	Females	Persons	Natural increase (a)	Estimated net migration (b)	Estimated total increase (c)	Males	Females	Persons
YEAR ENDED 30 JUNE									
1979	632.0	614.6	1,246.6	12.7	4.7	18.8	627.6	609.5	1,237.1
1980	641.9	627.1	1,269.1	12.3	8.8	22.5	636.6	620.6	1,257.2
1981	657.2	642.8	1,300.1	12.9	17.0	31.0	649.2	634.8	1,284.0
1982	675.9	661.0	1,336.9	14.1	22.7	36.9	667.0	652.2	1,319.2
1983	689.3	675.1	1,364.5	14.4	13.1	27.5	683.0	668.5	1,351.4
1984	698.6	685.1	1,383.7	13.9	5.3	19.2	694.3	680.3	1,374.6
YEAR ENDED 31 DECEMBER									
1979	636.4	620.7	1,257.1	12.5	6.8	20.7	632.0	614.8	1,246.8
1980	648.9	634.6	1,283.5	12.5	12.6	26.4	642.1	627.2	1,269.3
1981	666.7	652.2	1,319.0	13.9	21.1	35.5	657.9	643.3	1,301.2
1982	682.9	668.4	1,351.3	14.1	18.3	32.4	675.7	660.9	1,336.6
1983	694.4	680.5	1,374.9	14.8	8.7	23.6	689.0	674.9	1,363.9
1984p	703.4	690.5	1,394.0	13.1	5.9	19.1	698.8	685.3	1,384.1

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

## Vital Statistics

## THE REGISTRATION SYSTEM

Compulsory registration of births, deaths and marriages in Western Australia was originally provided for by legislation in the year 1841. The Statutes currently in force are the *Registration of Births, Deaths and Marriages Act 1961* (State) and the *Marriage Act 1961* (Commonwealth). For administrative purposes, the State is divided into twenty-six Registry Districts, each having a District Registrar. Particulars of births, deaths and marriages reported to the District Registrars are sent to the Registrar-General at Perth, where a central registry office has been maintained since 1841. Local registers are kept at each district office.

Births are required to be registered within sixty days of the event, and must be notified by the father, the mother or the occupier of the premises where the birth took place. Special provisions and penalties apply to notification and registration after the expiration of the sixty-day period.

A fetal death (stillbirth) is required to be registered both as a birth and a death. From 1 January 1968 the term 'stillbirth', for registration purposes, refers to a child, not born alive, of at least twenty weeks' gestation, or with a birthweight of at least 400 grams. Previously it was restricted to cases where the gestation period was at least twenty-eight weeks. However, in accordance with the recommendations of the Ninth Revision Conference (1975) of the World Health Organisation, figures for fetal deaths in this Chapter relate to any child, not born alive, weighing at least 500 grams at delivery or, when birthweight is unavailable, of at least 22 weeks gestation.

Deaths are required to be registered within fourteen days. Notification must be given by the person who disposes of the body or by the occupier of the premises where the death occurred. As in the case of births, special provisions and penalties exist for the late registration of a death.

Marriages are celebrated by persons authorised as celebrants under the provisions of the *Marriage Act 1961* (Commonwealth). These may be ministers of religion, District Registrars, or other authorised persons. Celebrants other than District Registrars are required to lodge a marriage certificate with the District Registrar for registration within fourteen days of the celebration of a marriage. A penalty fee is provided for registrations after fourteen days from the date of marriage.

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

The following table shows, for 1982, the number of births and deaths registered in Western Australia. Figures from 1983 include births and deaths registered in Australia when the usual State of residence was Western Australia. The figures do not necessarily represent the number of such events which actually occurred in a particular statistical division during each year, since births are allocated to the usual place of residence of the mother and deaths to the usual place of residence of the deceased. Further, the statistics are compiled according to date of registration and not date of occurrence.

The statistical divisions shown on the following page are as they existed at 30 June 1985 and their component local government areas are given in lists at the end of Chapter 5.

Additional information concerning births, deaths, marriages and divorce is contained in the annual publication *Compendium of Demographic and Social Statistics* (Catalogue No. 4103.5) published by the Western Australian Office of the Bureau. Details of the number of births and deaths relating to individual local government areas in the State appear in *Local Government* (Catalogue No. 1303.5).

**BIRTHS AND DEATHS — NUMBERS REGISTERED (a)**  
**STATISTICAL DIVISIONS (b)**

Statistical division (b)	Live births			Deaths (c)		
	1982	1983	1984	1982	1983	1984
Perth Statistical Division	14,546	15,266	14,217	6,052	6,148	6,350
Other divisions —						
South-West	1,881	1,933	1,886	714	725	697
Lower Great Southern	821	823	789	259	277	299
Upper Great Southern	489	492	473	126	141	131
Midlands	1,018	1,009	885	268	277	242
South-Eastern	949	898	922	281	264	269
Central	1,022	1,028	1,005	277	282	276
Pilbara	1,056	1,087	942	101	117	114
Kimberley	454	551	506	109	138	125
Total	7,690	7,821	7,408	2,135	2,221	2,153
WESTERN AUSTRALIA	22,236	23,087	21,625	8,187	8,369	8,503

(a) From 1983 figures are based on State of usual residence — see text on previous page. (b) For component local government areas, see lists at the end of Chapter 5. In the few cases where the LGA of usual residence was not stated, the birth or death has been included in Perth Statistical Division. (c) Fetal deaths are not included; see next table.

### BIRTHS

Statistics of births registered in each of the six years 1979 to 1984 in the Perth Statistical Division, the rest of the State, and in Western Australia as a whole, according to mother's usual place of residence, are shown in the following table. Figures from 1983 relate only to births registered in Australia whereas earlier figures relate only to births registered in Western Australia. Additional details of fetal deaths appear later in this Chapter.

## BIRTHS REGISTERED (a)

Year	Live births					Fetal deaths
	Males (b)	Females (b)	Persons (b)	Ex-nuptial births	Multiple births (c)	
PERTH STATISTICAL DIVISION						
1979	6,950	6,735	13,685	1,521	267	99
1980	7,038	6,738	13,776	1,575	296	104
1981	7,487	6,910	14,397	1,764	300	89
1982	7,459	7,087	14,546	1,811	312	89
1983	7,945	7,321	15,266	2,009	337	100
1984	7,405	6,812	14,217	1,921	305	p79
OTHER DIVISIONS						
1979	3,455	3,329	6,784	1,262	125	52
1980	3,491	3,340	6,831	1,258	98	55
1981	3,855	3,625	7,480	1,536	151	65
1982	3,931	3,759	7,690	1,505	165	57
1983	3,965	3,856	7,821	1,638	135	50
1984	3,747	3,661	7,408	1,568	159	p62
WESTERN AUSTRALIA						
1979	10,405	10,064	20,469	2,783	392	151
1980	10,529	10,078	20,607	2,833	394	159
1981	11,342	10,535	21,877	3,300	451	154
1982	11,390	10,846	22,236	3,316	477	146
1983	11,910	11,177	23,087	3,647	472	150
1984	11,152	10,473	21,625	3,489	464	p141

(a) From 1983 figures are based on State of usual residence. In the few cases where the LGA of usual residence was not stated, the birth has been included in Perth Statistical Division. (b) Includes ex-nuptial births and multiple births. (c) Number of live-born children.

In the following table, births registered in Western Australia during each of the years 1979 to 1984 are classified according to age of mother.

## BIRTHS REGISTERED — AGE OF MOTHER

Age of mother (years)	1979	1980	1981	1982	1983	1984 (a)
NUPTIAL BIRTHS						
Under 15	—	—	—	n.p.	—	n.p.
15	—	1	1	n.p.	—	n.p.
16	24	21	18	n.p.	12	10
17	83	64	72	69	60	54
18	222	233	195	179	127	105
19	428	418	380	355	330	273
20	648	663	620	599	538	472
21-24	5,005	4,837	4,844	4,797	4,917	4,307
25-29	7,227	7,189	7,656	7,903	8,058	7,627
30-34	3,215	3,476	3,808	3,898	4,203	4,114
35-39	749	748	841	985	1,042	1,046
40-44	82	115	139	116	143	117
45 and over	3	9	3	6	10	n.p.
Not stated	—	—	—	—	—	—
Total, nuptial births	17,686	17,774	18,577	18,920	19,440	18,136
EX-NUPTIAL BIRTHS						
Under 15	23	18	21	n.p.	21	n.p.
15	60	47	40	n.p.	56	n.p.
16	141	152	147	n.p.	135	132
17	223	224	243	244	247	227
18	264	263	277	289	280	275
19	286	268	322	299	299	302
20	239	247	298	297	302	271
21-24	726	775	891	893	1,059	978
25-29	491	513	629	683	767	761
30-34	231	229	298	291	353	369
35-39	76	82	105	100	106	101
40-44	19	14	26	26	22	22
45 and over	4	—	3	3	—	n.p.
Not stated	—	1	—	—	—	—
Total, ex-nuptial births	2,783	2,833	3,300	3,316	3,647	3,489

## BIRTHS REGISTERED — AGE OF MOTHER — (continued)

Age of mother (years)	1979	1980	1981	1982	1983	1984 (a)
TOTAL BIRTHS						
Under 15	23	18	21	21	21	n.p.
15	60	48	41	40	56	n.p.
16	165	173	165	143	147	142
17	306	288	315	313	307	281
18	486	496	472	468	407	380
19	714	686	702	654	629	575
20	887	910	918	896	840	743
21-24	5,731	5,612	5,735	5,690	5,976	5,285
25-29	7,718	7,702	8,285	8,586	8,825	8,388
30-34	3,446	3,705	4,106	4,189	4,556	4,483
35-39	825	830	946	1,085	1,148	1,147
40-44	101	129	165	142	165	139
45 and over	7	9	6	9	10	11
Not stated	—	1	—	—	—	—
Total, births	20,469	20,607	21,877	22,236	23,087	21,625

(a) From 1983 figures are based on State of usual residence.

**Ex-nuptial Live Births.** A birth is registered as ex-nuptial if the parents were not married to each other at the time of the confinement. Ex-nuptial births in 1984 comprised 16.1 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 were not married to each other at the time of its birth becomes legitimised on the subsequent marriage of its parents. The legitimation 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.

**Crude Birth Rates.** The crude birth rate in any period may be defined as the number of live births occurring during the period for every thousand of the mean population.

The average annual rates for each five-year period in the thirty years from 1951 to 1980 and the rates for single years from 1979 to 1984, for Western Australia and Australia as a whole, are shown in the following table.

CRUDE BIRTH RATES (a)  
WESTERN AUSTRALIA AND AUSTRALIA

Period	Average annual rate		Annual rate		
	Western	Australia	Year	Western	
	Australia	Australia		Australia (b)	Australia
1951-55	25.4	22.9			
1956-60	24.2	22.6			
1961-65	21.7	21.3	1979	16.4	15.4
			1980	16.2	15.3
1966-70	21.1	20.0	1981	16.8	15.8
			1982	16.6	15.8
1971-75	19.5	18.8	1983	16.9	15.8
1976-80	16.8	15.7	1984	15.6	15.0

(a) Rates prior to 1966 exclude particulars of full-blood Aborigines. Rates for years prior to 1971 are based on final census counts; those for 1971-75 and later are based on the estimated resident population. (b) From 1983 rates are based on State of usual residence. (c) The rate for Australia has been affected by delays in the registration process in N.S.W.

In each year of the period under review, Western Australia's crude birth rate has been higher than that of Australia.

In Western Australia, the rate showed a marked and almost continuous decrease from the beginning of the century to the depression of thirty years later when the unprecedentedly low rate of 17.6 was recorded in 1934. In the following years a fairly consistent increase was evident until 1952

when the rate reached 25.7. Since then the rate has shown a generally downward trend, reaching 15.6 in 1984. This is the lowest rate ever recorded.

**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.

#### AGE-SPECIFIC BIRTH RATES (a) — WESTERN AUSTRALIA

Year	Age group (years)						
	15-19	20-24	25-29	30-34	35-39	40-44	45-49
1954	42.7	231.1	217.8	135.7	71.7	23.6	1.5
1961	47.1	246.9	231.9	127.4	61.8	20.6	1.2
1966	53.8	203.1	197.1	102.1	45.7	13.3	1.4
1971	61.6	198.2	198.2	99.7	40.7	9.7	0.7
1976	39.9	142.2	148.9	69.4	21.5	5.0	0.5
1981	30.3	116.4	147.5	75.3	22.5	4.6	0.2
1982	28.8	112.1	148.6	75.3	23.5	3.7	0.3
1983	27.7	115.4	152.2	80.3	23.3	4.3	0.3
1984	24.7	101.2	142.7	77.5	21.9	3.4	0.3

(a) Number of live births registered per 1,000 women in each age group. Rates prior to 1966 exclude particulars of full-blood Aboriginals. Rates for years prior to 1971 are based on final census counts; those for 1971 and later are based on the estimated resident population. 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. Pro rata adjustment is made in respect of births for which age of mother is not given.

For purposes of comparison with Western Australian experience, age-specific birth rates for Australia as a whole are given in the following table.

#### AGE-SPECIFIC BIRTH RATES (a) — AUSTRALIA

Year	Age group (years)						
	15-19	20-24	25-29	30-34	35-39	40-44	45-49
1954	39.2	197.1	194.0	121.8	64.4	20.2	1.5
1961	47.4	225.8	221.2	131.1	63.4	19.2	1.4
1966	49.3	172.8	183.3	105.3	50.6	14.3	1.1
1971	54.3	176.1	188.1	99.5	42.9	11.1	0.8
1976	35.2	128.3	146.2	72.5	24.1	5.5	0.4
1981	28.2	107.5	145.2	77.6	24.5	4.5	0.3
1982	27.4	104.0	145.0	80.6	25.6	4.5	0.3
1983	26.5	102.7	146.1	81.5	25.0	4.3	0.2
1984 (b)	23.2	94.2	140.8	81.4	24.9	4.3	0.3

(a) See footnote (a) to previous table. (b) 1984 rates have been affected by delays in the registration process in N.S.W.

**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.

GROSS AND NET REPRODUCTION RATES (a)  
WESTERN AUSTRALIA AND AUSTRALIA

Year	Gross reproduction rate		Net reproduction rate	
	Western Australia	Australia	Western Australia	Australia
1954	1.772	1.559	(b) 1.704	(b) 1.499
1961	1.785	1.728	(c) 1.730	(c) 1.672
1966	1.486	1.401	(d) 1.441	(d) 1.357
1971	1.477	1.403	(e) 1.434	(e) 1.362
1976	1.035	1.004	(f) 1.011	(f) 0.981
1981	0.954	0.942	(f) 0.939	(f) 0.925
1982	0.956	0.942	(f) 0.941	(f) 0.925
1983	0.969	0.940	(f) 0.953	(f) 0.923
1984	0.901	0.901	(f) 0.883	(f) 0.885

(a) Rates prior to 1966 exclude particulars of full-blood Aborigines. Rates for years prior to 1971 are based on final census counts; those for 1971 and later are based on the estimated resident population. 1983 rates are based on State of usual residence. The rates for Australia for 1984 have been affected by delays in the registration process in N.S.W. (b) Based on 1953-55 mortality experience. (c) Based on 1960-62 mortality experience. (d) Based on 1965-67 mortality experience. (e) Based on 1970-72 mortality experience. (f) Based on Annual Life Tables calculated by the Australian Statistician. Because of the method of calculation, these figures are subject to annual fluctuation which may not be indicative of a longer term trend.

DEATHS

DEATHS REGISTERED (a)

Year	Deaths (b)			Infant deaths (c)		
	Males	Females	Persons	Males	Females	Persons
PERTH STATISTICAL DIVISION						
1979	3,291	2,634	5,925	90	55	145
1980	3,429	2,694	6,123	79	57	136
1981	3,318	2,574	5,892	68	43	111
1982	3,354	2,698	6,052	76	44	120
1983	3,397	2,751	6,148	73	44	117
1984	3,458	2,892	6,350	69	71	140
OTHER DIVISIONS						
1979	1,302	793	2,095	63	39	102
1980	1,247	796	2,043	64	39	103
1981	1,339	762	2,101	44	38	82
1982	1,353	782	2,135	48	36	84
1983	1,399	822	2,221	32	30	62
1984	1,359	794	2,153	50	42	92
WESTERN AUSTRALIA						
1979	4,593	3,427	8,020	153	94	247
1980	4,676	3,490	8,166	143	96	239
1981	4,657	3,336	7,993	112	81	193
1982	4,707	3,480	8,187	124	80	204
1983	4,796	3,573	8,369	105	74	179
1984	4,817	3,686	8,503	119	113	232

(a) Fetal deaths are not included. From 1983 figures are based on State of usual residence. In the few cases where LGA of usual residence was not stated, the death has been included in Perth Statistical Division. (b) Including infant deaths. (c) Deaths occurring in the first year of life.

**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. In order to enable valid international comparisons, it is necessary that each country presents its statistics of causes of death in a uniform manner. The first classification of causes of death to be adopted internationally was that compiled by Dr J. Bertillon at the request of the International Statistical Institute meeting in Vienna in 1891. Subsequently this classification was periodically revised by the Institute in collaboration with the League of Nations Health Organization. More recently, revisions have been carried out by a Committee of the World Health Organization.

PRINCIPAL CAUSES OF DEATH, 1984 (a)

International number	Cause of death	Males	Females	Persons	Per cent of all deaths	Rate (b)p
000-139	Infectious and parasitic diseases	29	19	48	0.6	3.5
140-239	Neoplasms—					
140-208	Malignant—					
150-159	Digestive organs and peritoneum	307	266	573	6.7	41.4
162	Trachea, bronchus and lung	376	102	478	5.6	34.5
179-189	Genito-urinary organs	164	137	301	3.5	21.7
	Other	309	375	684	8.0	49.4
210-239	Benign, other and unspecified	6	9	15	0.2	1.1
240-279	Endocrine, nutritional and metabolic diseases	85	88	173	2.0	12.5
280-289	Diseases of blood and blood-forming organs	11	8	19	0.2	1.4
290-319	Mental disorders	46	44	90	1.1	6.5
320-389	Diseases of the nervous system and sense organs	92	73	165	1.9	11.9
390-459	Diseases of the circulatory system—					
410-414	Ischaemic heart disease	1,375	963	2,338	27.5	168.9
430-438	Cerebrovascular disease	337	460	797	9.4	57.6
	Other	384	419	803	9.4	58.0
460-519	Diseases of the respiratory system—					
490-496	Chronic obstructive pulmonary disease	323	106	429	5.0	31.0
	Other	135	111	246	2.9	17.8
520-579	Diseases of the digestive system	174	122	296	3.5	21.4
580-629	Diseases of the genito-urinary system	54	72	126	1.5	9.1
630-676	Complications of pregnancy, childbirth and the puerperium	..	1	1	*	0.1
680-709	Diseases of the skin and subcutaneous tissue	..	1	1	*	0.1
710-739	Diseases of the musculoskeletal system and connective tissue	13	26	39	0.5	2.8
740-759	Congenital anomalies	47	41	88	1.0	6.4
760-779	Certain conditions originating in the perinatal period	47	45	92	1.1	6.6
780-799	Symptoms, signs and ill-defined conditions	41	38	79	0.9	5.7
800-999	Accidents, poisonings and violence—					
810-819	Motor vehicle traffic accidents	158	57	215	2.5	15.5
950-959	Suicide and self inflicted injury	139	37	176	2.1	12.7
	Other	165	66	231	2.7	16.7
	All causes	4,817	3,686	8,503	100.0	614.3

(a) Based on State of usual residence. Fetal deaths are not included. (b) Per 100,000 of mean estimated resident population.

\* Greater than 0.0 but less than 0.05.

The figures in the previous table 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'.

From 1983 details relate to deaths of persons whose usual State of residence was Western Australia. Details for earlier years are tabulated according to State of registration of death.

**Crude Death Rates.** The crude death rate is perhaps the most common measure of mortality, and is derived by relating the deaths occurring in a period to the mean population for that period. It is usually expressed as number of deaths per thousand of mean population.

The average annual rates for each five-year period in the thirty years from 1951 to 1980 and the rates for single years from 1979 to 1984, for Western Australia and Australia as a whole, are shown in the following table.

CRUDE DEATH RATES (a)  
WESTERN AUSTRALIA AND AUSTRALIA

Period	Average annual rate		Year	Annual rate	
	Western Australia	Australia		Western Australia (b)	Australia
1951-55	8.5	9.2	1979	6.4	7.3
1956-60	7.9	8.8	1980	6.4	7.4
1961-65	7.8	8.8	1981	6.1	7.3
1966-70	7.8	8.9	1982	6.1	7.6
1971-75	7.1	8.3	1983	6.1	7.2
1976-80	6.5	7.6	1984	6.1	7.1

(a) Rates prior to 1966 exclude particulars of full-blood Aborigines. Rates for years prior to 1971 are based on final census counts; those for 1971-75 and later are based on the estimated resident population. Fetal deaths are not included. The rates for Australia for 1984 have been affected by delays in the registration process in N.S.W. (b) From 1983 rates are based on State of usual residence.

In the early years of the century, the Western Australian rate was higher than that for Australia as a whole, but fell below the Australian average in 1909. Since that time, the rate for Western Australia has, with very few exceptions, remained lower than that for Australia.

Western Australia's crude death rate for the year 1902 was 13.8 per thousand of the mean population but by 1931 it had fallen to 8.5. After that year, the rate increased until it reached 10.6 in 1942. Then there was a general decline until 1963 when the rate was 7.7. The rates for 1981, 1982, 1983 and 1984 were 6.1 per thousand of the mean population, the lowest ever recorded in Western Australia.

**Infant Deaths.** The term 'infant death' refers to the death of a live-born infant which occurs before the completion of the first year of life. In the following table, infant deaths registered in Western Australia during each of the six years to 1984 are classified according to age at death.

INFANT DEATHS — AGES AT DEATH (a)

Year	Days					Total under 28 days	Months			Total under 1 year
	Under 1	1-6	7-13	14-20	21-27		Under 3	3-5	6-11	
MALES										
1979	58	30	7	3	2	100	127	14	12	153
1980	54	26	10	4	2	96	115	20	8	143
1981	43	11	6	9	1	70	87	18	7	112
1982	52	12	5	2	2	73	99	16	9	124
1983	41	16	3	2	1	63	83	12	10	105
1984	42	15	7	2	1	67	90	16	13	119
FEMALES										
1979	35	22	8	2	2	69	78	8	8	94
1980	39	20	9	4	2	74	82	9	5	96
1981	28	11	6	6	3	54	66	10	5	81
1982	28	9	5	2	3	47	65	9	6	80
1983	24	10	9	—	2	45	60	6	8	74
1984	32	22	2	4	5	65	87	14	12	113
PERSONS										
1979	93	52	15	5	4	169	205	22	20	247
1980	93	46	19	8	4	170	197	29	13	239
1981	71	22	12	15	4	124	153	28	12	193
1982	80	21	10	4	5	120	164	25	15	204
1983	65	26	12	2	3	108	143	18	18	179
1984	74	37	9	6	6	132	177	30	25	232

(a) Fetal deaths are not included. From 1983 figures are based on State of usual residence.

**Infant Death Rates.** The infant death rate expresses the relationship between deaths of live-born infants and the live births occurring in a period, and is stated in terms of number of deaths under one year of age per thousand live births.

The average annual rates for each five-year period in the thirty years from 1951 to 1980 and the rates for single years from 1979 to 1984, for Western Australia and Australia as a whole, are shown in the following table.

INFANT DEATH RATES (a)  
WESTERN AUSTRALIA AND AUSTRALIA

Period	Average annual rate		Year	Annual rate	
	Western	Australia		Western	Australia
	Australia			Australia (b)	
1951-55	24.4	23.3	1979	12.1	11.4
1956-60	21.4	21.1	1980	11.6	10.7
1961-65	20.7	19.4	1981	8.8	10.0
1966-70	20.2	18.1	1982	9.2	10.3
1971-75	16.7	16.2	1983	7.8	9.6
1976-80	12.1	12.1	1984	10.7	9.2

(a) Rates prior to 1966 exclude particulars of full-blood Aboriginals. Fetal deaths are not included. The rate for 1984 for Australia has been affected by delays in the registration process in N.S.W. (b) From 1983 rates are based on State of usual residence.

In the first decade of the century, the average annual rate (106.1) in Western Australia was considerably above the Australian average of 86.8, and was the highest of any State. Since then both the Western Australian and the Australian rates have shown a remarkable decrease. In the five years ended 1980, Western Australia's average annual rate of 12.1 was the same as the Australian rate.

**Causes of Infant Deaths.** The causes of infant deaths registered during the years 1983 and 1984 are set out in the following table.

INFANT DEATHS — CAUSES OF DEATH, 1983 and 1984 (a)

International number	Cause of death (b)	1983			1984		
		Males	Females	Persons	Males	Females	Persons
	Causes mainly of prenatal and natal origin —						
740-759	Congenital anomalies	27	22	49	35	32	67
765	Immaturity	13	3	16	12	11	23
767	Birth trauma	6	3	9	4	2	6
768	Hypoxia and birth asphyxia	4	3	7	4	5	9
769	Respiratory distress syndrome	6	7	13	10	9	19
770	Other respiratory conditions	7	2	9	7	4	11
771	Infections specific to the perinatal period	2	3	5	5	3	8
772	Fetal and neonatal haemorrhage	8	4	12	3	6	9
	Other	—	3	3	2	4	6
	Total	73	50	123	82	76	158
	Causes mainly of postnatal origin —						
798	Sudden death, cause unknown	23	14	37	27	28	55
	Other	9	10	19	10	9	19
	Total	32	24	56	37	37	74
	All causes	105	74	179	119	113	232

(a) Fetal deaths are not included. From 1983 figures are based on State of usual residence. (b) Classified in accordance with the *International Statistical Classification of Diseases, Injuries, and Causes of Death* (Ninth Revision), operative from 1 January 1979.

**Fetal Deaths.** The infant death rate discussed above is that most commonly used, and takes no account of fetal deaths. It is informative, however, to examine the occurrence of fetal deaths in comparison with infant deaths, as in the next table, which deals with the experience of the six years 1979 to 1984.

FETAL AND INFANT DEATHS  
NUMBERS AND MASCULINITY (a)

Year	Fetal deaths (b)				Infant deaths			
	Males	Females	Persons	Mascu- linity (c)	Males	Females	Persons	Mascu- linity (c)
1979	80	71	151	112.7	153	94	247	162.8
1980	71	88	159	80.7	143	96	239	149.0
1981	79	75	154	105.3	112	81	193	138.3
1982	81	65	146	124.6	124	80	204	155.0
1983	86	64	150	134.4	105	74	179	141.9
1984	77	64	141	120.3	119	113	232	105.3

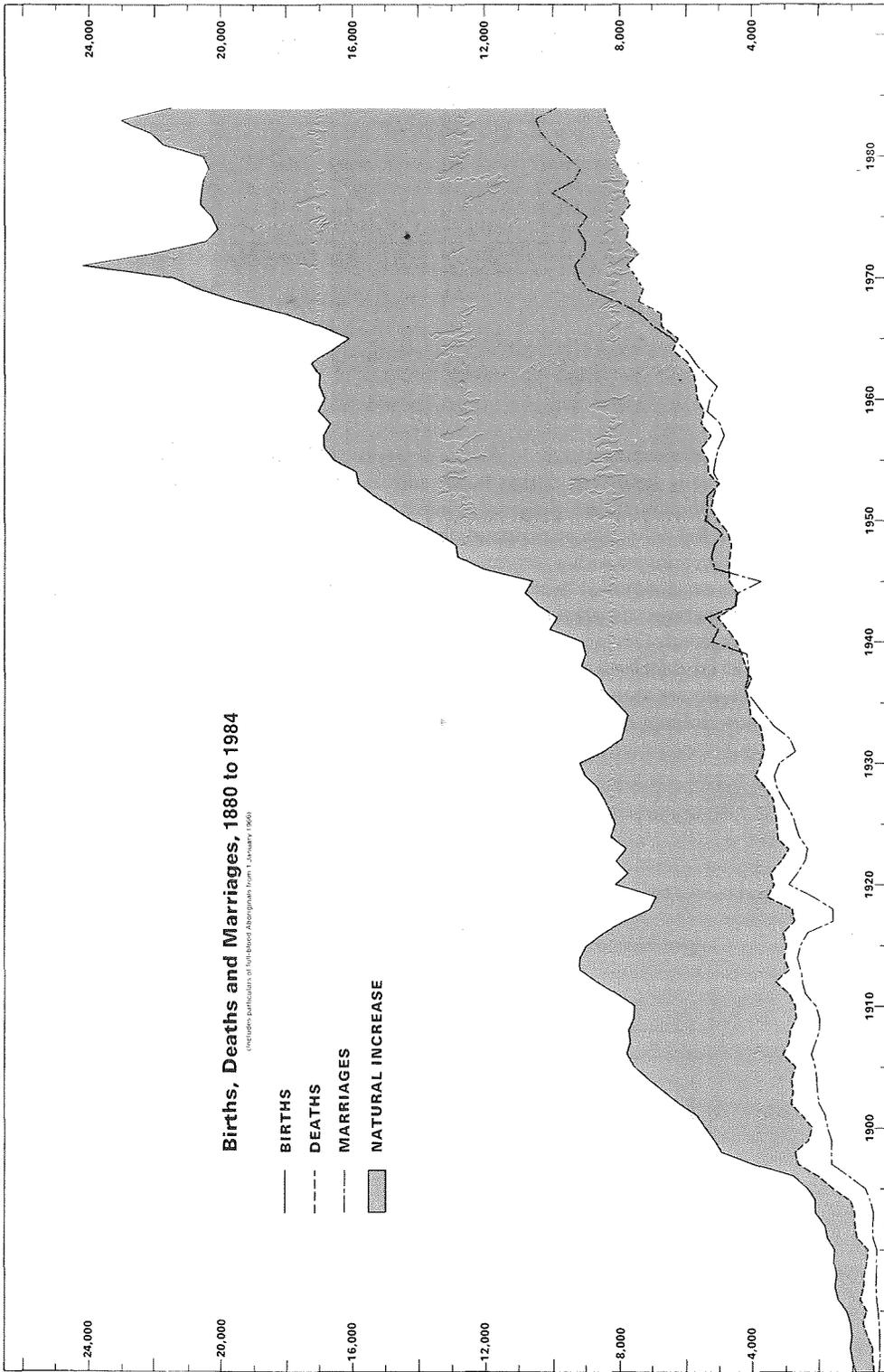
(a) From 1983 details are based on State of usual residence. (b) See details of *The Registration System* earlier in this Chapter. (c) Number of males to each 100 females.

**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 from that previously used, in accordance with a recommendation of the Ninth Revision Conference (1975) of the World Health Organization that 'perinatal statistics should include 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 fetal deaths (stillbirths) and livebirths combined. The rates for neonatals are 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.

PERINATAL DEATHS (a)  
NUMBERS AND RATES

Year	Fetal deaths	Neonatal deaths			Perinatal deaths
		Under 7 days	7 days and under 28 days	Total neonatal deaths	
NUMBER					
1979	151	136	24	160	311
1980	159	129	31	160	319
1981	154	89	31	120	274
1982	146	93	19	112	258
1983	150	84	16	100	250
1984	141	98	21	119	260
RATE					
1979	7.3	6.6	1.2	7.8	15.1
1980	7.7	6.3	1.5	7.8	15.4
1981	7.0	4.1	1.4	5.5	12.4
1982	6.5	4.2	0.9	5.0	11.5
1983	6.5	3.6	0.7	4.3	10.8
1984	6.5	4.5	1.0	5.5	12.0

(a) See text above for definitions and methods used to calculate rates. From 1983 details are based on State of usual residence.



**Age-specific Death Rates.** The age-specific death rate expresses the number of deaths at specified ages in terms of the population at those particular ages.

## AGE-SPECIFIC DEATH RATES (a) (b) (c)

Age group (years)	1932-34	1946-48	1953-55	1960-62	1965-67	1970-72	1975-77	1980-82
MALES								
Under 1	12.8	9.3	7.0	{(b) 22.9	(b) 22.1	(b) 20.6	(b) 14.3	(b) 11.1
1- 4	1.6	0.9	0.7	{ 1.2	1.2	1.2	1.0	0.6
5- 9	1.4	0.6	0.5	{ 0.5	0.5	0.5	0.4	0.3
10-14	1.8	1.5	1.6	{ 0.4	0.4	0.4	0.4	0.4
15-19	2.5	2.2	2.0	{ 1.2	1.2	1.4	1.3	1.1
20-24	2.9	2.0	1.9	{ 1.7	1.6	1.8	1.7	1.5
25-29	3.1	2.3	1.8	{ 1.5	1.5	1.5	1.3	1.2
30-34	4.0	2.5	2.2	{ 1.6	1.8	1.6	1.7	1.2
35-39	5.7	4.2	3.2	{ 2.1	2.3	2.1	2.0	1.8
40-44	8.8	6.3	5.8	{ 3.5	3.4	2.9	2.9	2.5
45-49	13.5	11.5	9.0	{ 5.0	5.3	5.3	5.1	4.5
50-54	21.4	17.2	15.8	{ 9.5	9.2	8.2	8.3	7.1
55-59	28.3	26.3	24.8	{ 14.8	16.1	14.5	13.6	11.5
60-64	42.4	40.3	41.5	{ 23.8	25.4	24.4	22.0	18.8
65-69	63.4	61.0	62.9	{ 40.3	41.4	39.2	35.8	30.0
70-74	105.1	98.7	93.8	{ 59.6	63.6	59.3	55.2	48.7
75-79	176.8	149.5	146.9	{ 96.7	96.4	94.9	85.4	77.4
80-84	265.0	222.4	225.7	{ 140.9	146.5	149.0	135.1	118.2
85-89	380.8	376.2	297.4	{ 244.5	247.4	{ 212.4	190.5	170.9
90 and over						{ 325.2	296.1	274.2
FEMALES								
Under 1	8.6	7.9	5.1	{(b) 19.4	(b) 17.7	(b) 16.6	(b) 11.4	(b) 8.3
1- 4	1.3	0.5	0.5	{ 1.2	0.8	1.0	0.6	0.5
5- 9	1.0	0.6	0.3	{ 0.3	0.3	0.3	0.2	0.2
10-14	1.3	0.7	0.7	{ 0.2	0.2	0.2	0.2	0.2
15-19	1.9	1.2	0.7	{ 0.5	0.4	0.6	0.6	0.4
20-24	2.8	1.5	0.8	{ 0.6	0.7	0.5	0.5	0.4
25-29	3.1	1.6	1.0	{ 0.8	0.7	0.4	0.5	0.4
30-34	4.2	2.6	1.5	{ 1.4	0.8	0.8	0.6	0.5
35-39	5.8	3.1	2.1	{ 2.0	1.4	1.3	1.0	0.8
40-44	6.4	5.1	3.6	{ 3.3	2.1	1.7	1.6	1.4
45-49	9.1	6.8	5.9	{ 5.0	3.3	3.1	2.8	2.2
50-54	10.7	10.1	8.6	{ 7.2	5.3	4.6	4.2	3.8
55-59	17.3	16.1	13.9	{ 11.4	7.6	7.3	6.4	5.5
60-64	29.8	24.6	20.7	{ 19.4	12.6	11.0	9.9	9.6
65-69	44.1	40.8	39.2	{ 35.4	20.7	19.0	17.5	13.9
70-74	74.4	74.2	67.7	{ 60.6	34.6	34.2	27.3	23.9
75-79	121.0	117.6	109.7	{ 101.9	57.8	56.8	50.2	44.5
80-84	192.4	187.5	189.9	{ 191.5	100.6	92.5	87.3	73.3
85-89	397.2	273.8	285.9	{ 182.4	{ 160.0	139.2	123.8	
90 and over						{ 269.8	249.1	222.7

AGE-SPECIFIC DEATH RATES (a) (b) (c) — *continued*

Age group (years)	1932-34	1946-48	1953-55	1960-62	1965-67	1970-72	1975-77	1980-82
PERSONS								
Under 1				(b) 21.2	(b) 19.9	(b) 18.7	(b) 12.9	(b) 9.7
1-4	11.4	8.6	6.1	1.2	1.0	1.1	0.8	0.5
5-9	1.4	0.7	0.6	0.4	0.4	0.4	0.3	0.3
10-14	1.2	0.6	0.4	0.3	0.3	0.3	0.3	0.3
15-19	1.5	1.1	1.2	0.8	0.8	1.0	1.0	0.7
20-24	2.2	1.7	1.4	1.2	1.2	1.2	1.1	1.0
25-29	2.8	1.7	1.4	1.1	1.1	1.0	0.9	0.8
30-34	3.1	1.9	1.4	1.2	1.3	1.2	1.2	0.9
35-39	4.1	2.5	1.8	1.8	1.9	1.7	1.5	1.3
40-44	5.2	3.7	2.7	2.8	2.8	2.3	2.3	1.9
45-49	7.7	5.7	4.8	4.2	4.3	4.3	4.0	3.4
50-54	11.5	9.2	7.6	7.4	7.3	6.4	6.3	5.5
55-59	16.6	13.8	12.3	11.4	12.1	10.9	10.0	8.6
60-64	23.4	21.4	19.3	17.8	193	17.7	15.8	14.0
65-69	37.0	32.6	30.9	29.1	30.8	29.1	26.3	21.5
70-74	55.3	50.8	50.4	46.5	47.2	45.7	40.4	35.0
75-79	91.1	86.6	79.8	76.3	74.1	72.1	64.8	58.8
80-84	149.7	133.2	125.9	118.0	118.3	113.4	103.5	89.8
85-89	222.9	204.1	205.8	210.7	203.8	178.1	155.0	137.9
90 and over	389.2	312.3	290.4			284.8	260.9	235.6

(a) Average annual number of deaths at the specified ages during each three-year period per 1,000 of population in the corresponding age group at the relevant census date. Rates for 1965-67 and earlier are based on census counts; those for 1970-72 and later are based on the estimated resident population. Figures for 1960-62 and earlier exclude particulars of full-blood Aborigines; those for 1965-67 and later relate to total population, i.e. including Aborigines. (b) For age *Under 1*, figures for 1960-62 and later represent infant deaths per 1,000 live births registered. (c) Fetal deaths are not included.

In the preceding table, which shows age-specific death rates for Western Australia, the average annual rates for each period relate to deaths in a three-year period (the census year and the years immediately preceding and following it). For census dates see the table earlier in this Chapter.

**Australian Life Tables.** It has been the practice at each census from 1911 onwards to prepare Life Tables representative of the mortality experience of Australia. The mortality of the Australian population for the thirty years from 1881 to 1910 inclusive was investigated in 1911 by the Australian Statistician. Tables were compiled for each State and for Australia as a whole in respect of each sex for each of the decennial periods 1881 to 1890, 1891 to 1900, and 1901 to 1910. At the Census of 1921, Life Tables were prepared by the Australian Statistician from the recorded census population and the deaths in the three years 1920 to 1922. Tables based on data derived from later censuses have been compiled by the Commonwealth Actuary.

The expectation of life of males and females at various ages as revealed by these investigations is shown in the following table.

EXPECTATION OF LIFE (a) — AUSTRALIA: 1881-90 TO 1980-82  
(Years)

Age last birthday (years)	1881-90	1891-1900	1901-10	1920-22	1932-34	1946-48	1953-55	1960-62	1965-67	1970-72	1975-77	1980-82
MALES												
0	47.20	51.08	55.20	59.15	63.48	66.07	67.14	67.92	67.63	67.81	69.56	71.23
5	52.86	55.61	57.91	60.43	62.57	63.77	64.32	64.77	64.36	64.52	65.83	67.24
10	48.86	51.43	53.53	56.01	58.02	59.04	59.53	59.93	59.50	59.66	60.95	62.35
15	44.45	46.98	49.03	51.44	53.36	54.28	54.72	55.07	54.63	54.78	56.06	57.44
20	40.58	42.81	44.74	46.99	48.81	49.64	50.10	50.40	49.98	50.19	51.47	52.78
25	37.10	38.90	40.60	42.70	44.37	45.04	45.54	45.80	45.40	45.64	46.89	48.19
30	33.64	35.11	36.52	38.44	39.90	40.40	40.90	41.12	40.72	40.94	42.18	43.51
35	30.06	31.34	32.49	34.20	35.46	35.79	36.25	36.45	36.04	36.23	37.46	38.77
40	26.50	27.65	28.56	30.05	31.11	31.23	31.65	31.84	31.44	31.61	32.81	34.07
45	23.04	23.99	24.78	26.03	26.87	26.83	27.18	27.38	26.99	27.12	28.32	29.49

EXPECTATION OF LIFE (a) — AUSTRALIA: 1881-90 TO 1980-82 — *continued*  
(Years)

Age last birthday (years)	1881-90	1891-1900	1901-10	1920-22	1932-34	1946-48	1953-55	1960-62	1965-67	1970-72	1975-77	1980-82
MALES												
50	19.74	20.45	21.16	22.20	22.83	22.67	22.92	23.13	22.76	22.87	24.05	25.12
55	16.65	17.08	17.67	18.51	19.03	18.84	19.00	19.18	18.83	18.92	20.06	21.02
60	13.77	13.99	14.35	15.08	15.57	15.36	15.47	15.60	15.27	15.35	16.40	17.23
65	11.06	11.25	11.31	12.01	12.40	12.25	12.33	12.47	12.16	12.21	13.13	13.80
70	8.82	8.90	8.67	9.26	9.60	9.55	9.59	9.77	9.52	9.51	10.31	10.81
75	6.72	6.70	6.58	6.87	7.19	7.23	7.33	7.47	7.33	7.29	7.91	8.31
80	5.11	5.00	4.96	5.00	5.22	5.36	5.47	5.57	5.51	5.52	5.95	6.27
85	3.86	3.79	3.65	3.62	3.90	3.84	4.01	4.08	4.07	4.13	4.45	4.67
90	2.91	2.91	2.64	2.60	2.99	2.74	2.93	3.02	3.05	3.15	3.45	3.47
95	2.16	2.16	1.88	1.86	2.11	1.93	2.10	2.29	2.33	2.60	2.94	2.66
100	1.32	1.29	1.18	1.17	1.10	—	—	—	1.82	2.25	2.67	2.13
FEMALES												
0	50.84	54.76	58.84	63.31	67.14	70.63	72.75	74.18	74.15	74.49	76.56	78.27
5	56.00	58.64	60.80	63.64	65.64	67.91	69.61	70.78	70.64	70.97	72.66	74.13
10	51.95	54.46	56.39	59.20	61.02	63.11	64.78	65.92	65.75	66.08	67.75	69.20
15	47.54	49.97	51.86	54.55	56.29	58.27	59.90	61.01	60.84	61.17	62.82	64.27
20	43.43	45.72	47.52	50.03	51.67	53.47	55.06	56.16	56.00	56.35	57.98	59.40
25	39.67	41.69	43.36	45.71	47.19	48.74	50.24	51.32	51.17	51.51	53.12	54.54
30	36.13	37.86	3.33	41.48	42.77	44.08	45.43	46.49	46.34	46.67	48.26	49.67
35	32.58	34.14	35.37	37.28	38.37	39.46	40.67	41.70	41.56	41.88	43.43	44.81
40	29.08	30.49	31.47	33.14	34.04	34.91	36.00	36.99	36.85	37.16	38.67	40.00
45	25.56	26.69	27.59	28.99	29.74	30.45	31.44	32.38	32.26	32.55	34.03	35.28
50	22.06	22.93	23.69	24.90	25.58	26.14	27.03	27.92	27.83	28.10	29.53	30.70
55	18.64	19.29	19.85	20.95	21.58	22.04	22.81	23.63	23.58	23.82	25.19	26.27
60	15.39	15.86	16.20	17.17	17.74	18.11	18.78	19.51	19.52	19.74	21.04	22.02
65	12.27	12.75	12.88	13.60	14.15	14.44	15.02	15.68	15.70	15.90	17.13	18.00
70	9.70	9.89	9.96	10.41	10.98	11.14	11.62	12.19	12.23	12.39	13.52	14.26
75	7.24	7.37	7.5	7.73	8.23	8.32	8.69	9.16	9.22	9.36	10.29	10.89
80	5.27	5.49	5.73	5.61	6.01	6.02	6.30	6.68	6.72	6.88	7.58	8.01
85	3.90	4.12	4.19	4.06	4.30	4.32	4.52	4.79	4.85	5.03	5.49	5.74
90	2.98	3.07	2.99	2.91	3.05	3.08	3.24	3.48	3.53	3.73	4.02	4.11
95	2.25	2.18	2.10	2.07	2.00	2.14	2.31	2.59	2.66	2.81	3.11	2.99
100	1.37	1.23	1.24	1.24	1.02	—	—	—	2.04	2.13	2.72	2.22

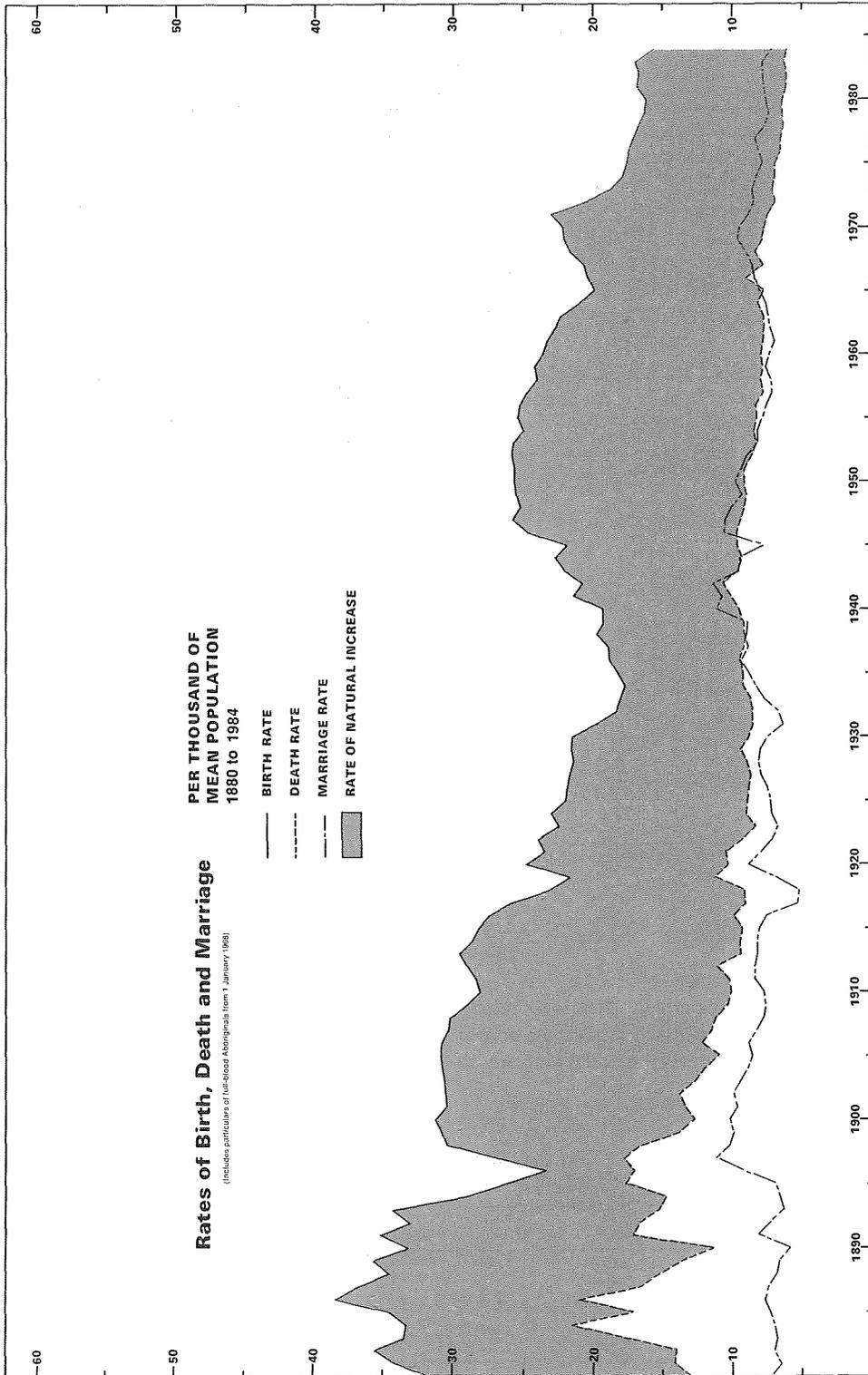
(a) Figures for years prior to 1965-67 refer to population exclusive of full-blood Aborigines.

### MARRIAGES

The number of marriages registered in Western Australia in each of the six years 1979 to 1984 is shown in the following table. Marriages celebrated by ministers of religion are distinguished from those celebrated by civil officers, and the proportions of the total number of marriages which were celebrated by each category of celebrant are also shown.

#### MARRIAGES REGISTERED

Year	Marriages celebrated by —			Proportion celebrated by —	
	Ministers of religion	Civil officers	All marriages	Ministers of religion	Civil officers
1979	5,052	4,187	9,239	54.68	45.32
1980	5,354	4,240	9,594	55.81	44.19
1981	5,502	4,609	10,111	54.42	45.58
1982	5,760	4,695	10,455	55.09	44.91
1983	5,620	4,899	10,519	53.43	46.57
1984	5,193	4,727	9,920	52.35	47.65



**Religious and Civil Marriages.** *The Marriage Act 1961* (Commonwealth) provides that 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.

The following table, which relates to marriages registered in Western Australia during the period 1979 to 1984, shows the numbers and proportions celebrated by ministers of the principal religious denominations and by civil officers.

## RELIGIOUS AND CIVIL MARRIAGES

Category of authorised celebrant	1979	1980	1981	1982	1983	1984	
						Number	Per cent of total
Ministers of religion —							
Registered ministers of recognised religious denominations (a) —							
Assemblies of God in Australia	8	18	12	38	28	29	0.29
Church of England in Australia	1,463	1,526	1,579	1,582	1,521	1,309	13.20
Church of Jesus Christ of the Latter Day Saints	33	38	31	48	25	20	0.20
Church of the Four Square Gospel in Australia	21	25	29	33	47	34	0.34
Churches of Christ in Australia	194	148	192	199	235	214	2.16
Jehovah's Witnesses	52	55	50	51	45	45	0.45
Jewry	12	11	10	12	11	7	0.07
Lutheran Church	45	32	33	48	42	28	0.28
Orthodox Church (b)	80	82	65	79	72	72	0.73
Reorganized Church of Jesus Christ of Latter Day Saints	17	19	23	14	22	21	0.21
Roman Catholic Church	1,720	1,856	1,997	1,993	1,980	1,898	19.13
Seventh-day Adventist Church	40	36	27	40	39	41	0.41
The Baptist Union of Australia	125	171	129	161	156	145	1.46
The New Church in Australia	18	39	1	41	63	66	0.67
The Presbyterian Church of Australia (c)	31	30	29	43	30	28	0.28
The Salvation Army	55	50	82	97	105	77	0.78
Uniting Church in Australia (c)	983	1,013	992	1,008	965	871	8.78
Other	90	100	114	148	118	141	1.42
Total	4,987	5,249	5,395	5,635	5,504	5,046	50.87
Other ministers of religion	65	105	107	125	116	147	1.48
Total	5,052	5,354	5,502	5,760	5,620	5,193	52.35
Civil officers —							
Registrar-General, etc.	1,263	1,046	1,020	1,012	1,057	838	8.45
Other persons	2,924	3,194	3,589	3,683	3,842	3,889	39.20
Total	4,187	4,240	4,609	4,695	4,899	4,727	47.65
Total marriages	9,239	9,594	10,111	10,455	10,519	9,920	100.00

(a) Under authority of the Marriage Act. (b) Includes denominations grouped under this heading in the proclamation made under the Marriage Act. (c) The Uniting Church in Australia was formed in June 1977 by the union of all the Methodist Churches and most of the Congregational and Presbyterian Churches.

The following table gives details of the average age and of the marital status of bridegrooms and brides in each of the six years to 1984.

## AVERAGE AGES OF BRIDEGROOMS AND BRIDES

Year	Average age of bridegrooms (years)				Average age of brides (years)			
	Bachelors	Widowers	Divorced	Total	Spinsters	Widows	Divorced	Total
1979	24.78	57.03	38.11	28.59	22.20	50.69	34.40	25.68
1980	24.89	56.40	37.75	28.41	22.32	49.72	34.43	25.53
1981	24.97	58.53	37.92	28.47	22.38	51.28	34.27	25.55
1982	25.28	58.33	37.74	28.63	22.60	50.17	34.55	25.78
1983	25.41	57.59	38.10	28.80	22.91	50.07	34.32	25.90
1984	25.66	60.12	38.37	29.35	23.20	53.04	35.15	26.55

**Marriage Rates.** The average annual marriage rates per thousand of mean population for Western Australia and for Australia in each five-year period from 1951 to 1980, as well as the rates for each of the years from 1979 to 1984, are shown in the following table.

MARRIAGE RATES (a)  
WESTERN AUSTRALIA AND AUSTRALIA

Period	Average annual rate		Year	Annual rate	
	Western Australia	Australia		Western Australia	Australia
1951-55	8.4	8.3	1979	7.4	7.2
1956-60	7.4	7.5	1980	7.6	7.4
1961-65	7.4	7.6	1981	7.8	7.6
1966-70	8.9	8.8	1982	7.8	7.7
1971-75	8.4	8.4	1983	7.7	7.5
1976-80	7.8	7.4	1984	7.2	7.0

(a) Rates prior to 1966 exclude particulars of full-blood Aboriginals. Rates for years prior to 1971 are based on final census counts; those for 1971-75 and later are based on the estimated resident population. The rate for 1984 for Australia has been affected by delays in the registration process in N.S.W.

### DIVORCE

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.

The Family Court of Western Australia which commenced operation on 1 June 1976 also exercises jurisdiction in matters concerning the adoption of children, and the guardianship, custody or maintenance of children.

In the following table particulars are given of the duration of marriage, i.e. the interval between marriage and the time of dissolution, for marriages dissolved during the six years 1978 to 1983.

### DISSOLUTIONS OF MARRIAGE — DURATION OF MARRIAGE

Year of dissolution of marriage	Marriages dissolved after a duration of —							Total marriages dissolved
	Under 5 years	5-9 years	10-14 years	15-19 years	20-24 years	25-29 years	30 years and over	
1979	654	953	637	439	345	205	164	3,397
1980	644	847	598	366	275	196	147	3,073
1981	704	1,009	673	429	309	204	153	3,481
1982	752	1,147	772	484	319	201	167	3,842
1983	772	1,086	760	530	318	171	185	3,822
1984	797	1,157	779	564	373	207	192	4,069

## Chapter 7

# SOCIAL WELFARE

The conditions relating to payment of the several benefits dealt with in this Chapter are described *as they existed at December 1985*. The information given is intended to serve only as a general guide to the main provisions relating to social security and repatriation benefits provided by the Commonwealth Government and assistance given by the State Government. Information relating to health services and benefits is shown in Chapter 8.

The Australian social security system is intended to protect people from economic hardship caused by circumstances such as loss of earnings through age, invalidity, sickness, unemployment or the loss or absence of a supporting spouse as a result of death, desertion or long-term separation. It is designed also to compensate veterans for service-related disabilities and the dependants of those whose deaths are service-related and to assist parents with the expenses associated with raising children.

Much of this assistance is provided by way of cash benefits. Assistance is also provided, either directly or through State and local government authorities and voluntary agencies, for a wide range of welfare services for people with special needs. Assistance is provided in a variety of forms for the advancement of Aborigines. Details of Commonwealth Government cash benefits paid since 1971 are given in the *Statistical Summary* — Chapter 26.

In addition to these outlays on social security and welfare, assistance is provided through the personal income tax system. For example, concessional income tax rebates provide tax relief for many pensioners and beneficiaries, the dependent spouse and sole parent rebates assist single income families, tax concessions for occupational superannuation provide support for retirement incomes and the deductions allowed for gifts to certain welfare bodies provide indirect assistance to the organisations concerned.

The State Government makes certain payments to assist persons in necessitous circumstances which in most cases supplement benefits provided by the Commonwealth Government (see text *State Financial Assistance* near the end of this Chapter).

### PRINCIPAL BENEFITS PAYABLE UNDER THE SOCIAL SECURITY ACT

#### Rates of Benefit

The following table shows the maximum weekly rates applying to age and invalid pensions, sheltered employment allowances, widows' pensions, supporting parents' benefits, and unemployment and sickness benefits. The rates shown apply also to service pensions. More detailed information about rates, along with more specific eligibility criteria are shown in the Annual Report of the Department of Social Security.

## MAXIMUM WEEKLY RATES OF BENEFIT

(\$)

Benefit	Rate current at —					
	May 1983	November 1983	May 1984	November 1984	May 1985	November 1985
Single (i.e. unmarried) rate —						
Unemployment and sickness beneficiaries aged						
6-17 on benefit less than 6 months	40.00	45.00	45.00	45.00	45.00	50.00
More than 6 months	40.00	45.00	45.00	50.00	50.00	50.00
Unemployment and sickness beneficiaries aged						
16-17 with dependants	40.00	45.00	45.00	91.90	94.30	97.90
Unemployment beneficiaries aged 18-20	68.65	73.60	78.60	81.10	85.20	88.20
Unemployment beneficiaries aged 21 and over	68.65	73.60	78.60	81.10	85.20	91.45
Pensioners of any age, sickness beneficiaries aged						
18 and over and unemployment beneficiaries						
aged 18 and over with dependants	82.35	85.90	89.40	91.90	94.30	97.90
Married rate (combined)	137.30	143.20	149.10	153.30	157.30	163.30
Each dependent child, including student children	10.00	12.00	12.00	14.00	14.00	16.00
Mother's/guardian's allowance (a) —	8.00	8.00	8.00	10.00	10.00	10.00
Rent assistance (b)	10.00	10.00	10.00	15.00	15.00	15.00

(a) Mother's/guardian's allowance is paid to single pensioners and beneficiaries with dependent children. (Before May 1984 mother's or guardian's allowance was paid at the rate of \$8.00 for a child under 6 years or an invalid child requiring full time care; other cases were paid \$6.00) (b) Payable where pensioner or sickness beneficiary is dependent on the pension or benefit and is paying rent or lodging charges.

**Age Pensions.**

Age pensions are payable to men and women who have reached the ages of 65 and 60 respectively. A period of ten years continuous residence is usually necessary. The pension is means tested on income or, since March 1985, on assets. The income test and assets test are applied separately and the actual rate of pension payable is the lower of the rates determined. Pensions payable to blind persons are not affected. Age pensioners over seventy are subject to an income test which is more liberal than that applied to pensioners aged under seventy.

Additional payments, subject to an income test, are made to pensioners with dependent children. Rent assistance may also be payable, subject to a special income test, to pensioners who are required to pay rent, lodging or board and lodging charges. On the death of one of a married pensioner couple, the surviving member may become entitled to receive, for up to six fortnightly instalments, the equivalent of the two pensions that would have been paid if the spouse had not died. Single age pensioners with a dependent child or children are also eligible for a mother's/guardian's allowance.

## AGE PENSIONS — WESTERN AUSTRALIA

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Number of pensioners at 30 June —						
Males	34,320	34,935	35,530	35,875	33,864	32,755
Females	64,567	66,107	67,867	69,909	70,025	70,188
Wife/spouse carers (a)	2,813	2,708	2,473	2,355	2,232	2,122
Persons	101,700	103,750	105,870	108,139	106,121	105,065
Amount paid during year (b) \$'000	258,650	290,394	334,791	364,234	400,380	428,546

(a) Spouse carers' pensions were introduced in December 1983. (b) Includes allowances, rent assistance and wives'/spouse carers' pensions.

**Invalid Pensions.**

Invalid pensions are payable to persons aged not less than sixteen years who are either permanently incapacitated for work to the extent of at least 85 per cent or permanently blind. Pensions are subject to the same income and assets tests as are applied to the age pension except in the case of those who are permanently blind, although a restriction is placed on the amount a blind pensioner can receive by way of pension plus war pension. No qualifying period of residence in Australia is necessary unless the incapacity occurred outside Australia, in which case the residence qualification is the same as that for an age pension.

Invalid pensioners are eligible for the same additional payments as age pensioners and the rates of benefit are the same.

## INVALID PENSIONS — WESTERN AUSTRALIA

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Number of pensioners at 30 June —						
Males	10,941	11,301	12,058	13,205	15,289	17,499
Females	4,953	5,051	5,137	5,393	5,835	6,390
Wife/spouse carers (a)	4,163	4,262	4,466	4,922	6,041	7,213
Persons	20,057	20,614	21,661	23,520	27,165	31,102
Amount paid during year (b) \$'000	54,228	63,269	74,563	86,706	106,982	133,686

(a) Spouses carers' pensions were introduced in December 1983. (b) Includes allowances, rent assistance and wives'/spouse carers' pensions.

**Wives' Pensions**

A wife's pension is payable to the wife of an age, invalid or service pensioner who does not receive another pension in her own right.

**Carers' Pensions**

A carer's pension is payable to the husband, wife or near relative of an age, invalid or service pensioner if he or she provides the pensioner with constant care and attention, at home, permanently or for a long time because the pensioner is severely disabled or has a serious illness. Persons already in receipt of a social security payment or service pension are not eligible to receive a carer's pension.

Spouse carers' pensions were subsumed by the carers' pensions from November 1985.

**Sheltered Employment Allowances**

Sheltered employment allowances are payable to disabled persons 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. The allowance is subject to the same income and assets tests as are applied to the age pension, and is paid at the same rate. It is payable in the form of a supplement to the sheltered employee's wages. As an incentive to remain in sheltered employment, a weekly non-taxable incentive allowance is paid, income-test free, to recipients of sheltered employment allowances. (Refer also the text *Disability Services* later in this Chapter).

## SHELTERED EMPLOYMENT ALLOWANCES — WESTERN AUSTRALIA

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Number of (a) —						
Workshops paying allowances	11	11	7	7	7	7
Employees receiving allowances	699	735	695	774	819	834
Expenditure on allowances \$'000	1,997	2,422	2,871	3,394	3,689	4,257

(a) At 30 June.

**Widows' Pensions and Allowances**

Pensions are payable to widows, subject to the same income and assets tests as are applied to the age pension. No period of residence is necessary if a woman and her husband were residing permanently in Australia when she became a widow. In other cases, five years continuous residence immediately preceding lodgment of claim is necessary but this requirement is waived in the case of a woman widowed overseas who returns to Australia, provided she had resided continuously in Australia for ten years at any time.

## WIDOWS' PENSIONS — WESTERN AUSTRALIA

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Number of pensions current at 30 June—						
Class A pensioners	5,942	5,775	5,867	6,064	6,031	6,004
Class B pensioners	6,524	6,738	6,775	6,758	6,888	6,970
Class C pensioners	10	13	12	8	15	3
Total	12,476	12,526	12,654	12,830	12,934	12,977
Amount paid during year (a) \$'000	40,647	45,925	52,420	56,683	63,051	69,265

(a) Includes allowances and rent assistance.

There are three classes of widow pensioners: Class A — a widow with one or more dependent children in her care; Class B — a widow without dependent children who is at least fifty years of age, or is not less than forty-five years of age when her Class A pension ceases because she no longer has a 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 death or within twenty-six weeks thereafter. For all classes, the term 'widow' includes a woman who was the common-law wife of a man for at least three years immediately before his death. For Classes A and B, the term includes a wife who has been deserted for six months, a divorcee, or a woman whose husband has been imprisoned for six months.

Widow pensioners are eligible for rent assistance, additional payments for dependent children, and mother's/guardian's allowance at the same rates and subject to the same conditions as age and invalid pensioners.

### Supporting Parent's Benefit

Supporting parent's benefits are paid to sole parents who care for at least one child under 16 years of age or a dependent full-time student aged 16 to 24 and who are not receiving another pension or benefit. The benefit may also be paid to a married person who is left with the responsibility of caring for a child or children because his or her spouse is unable to live at home indefinitely as a result of ill health. People who have adopted a child and have never married, are widowed, divorced, or separated may also be eligible for the benefit. The benefit is subject to the same income and assets tests as are applied to the age pension. There is also a residency qualification if the claimant was not living in Australia at the time of becoming a supporting parent. Beneficiaries are also entitled to a mother's/guardian's allowance.

#### SUPPORTING PARENTS' BENEFITS — WESTERN AUSTRALIA

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Number on benefit at 30 June —						
Males	348	482	593	825	940	1,021
Females	7,210	10,654	12,337	14,053	15,560	17,109
Persons	7,558	11,136	12,930	14,878	16,500	18,130
Amount paid during year (a) \$'000	27,590	44,108	62,803	75,364	94,337	114,366

(a) Includes allowances and rent assistance.

### Fringe Benefits

The Commonwealth Government makes available to pensioners and recipients of supporting parent's benefits several 'fringe benefits'. In most cases these are subject to a special income test. These benefits include: a comprehensive range of pharmaceuticals free of charge; a one-third reduction in telephone rental (subject to the income of co-residents); reduced fares for Commonwealth Government railway and shipping services; postal redirection concessions; free hearing aids and free optometrical consultations if the practitioner directs the bill to the Health Insurance Commission which administers Medicare benefits.

The State Government, local government authorities and private organisations also provide certain fringe benefits. The most valuable of these are reductions in local government rates and in public transport charges.

### Unemployment, Sickness and Special Benefits

Unemployment benefit is paid to a person who is unemployed, fit for work and actively seeking it. Sickness benefit is paid to a person who is temporarily incapacitated for work and has suffered a loss of income for that reason. Both benefits are subject to an income test. There is a waiting period of seven days before benefits are paid. Where a claimant for unemployment benefit does not lodge a claim immediately after becoming unemployed, the waiting period of seven days may commence in the week before the claim is made if the Director-General is satisfied that for each day in that week the person was capable of undertaking and willing to undertake suitable work and had taken reasonable steps to obtain work. If this does not occur, a special benefit may be paid in the waiting period of seven days if the claimant is suffering hardship or in certain cases payment of unemployment benefit can be advanced.

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.

To be eligible for unemployment or sickness benefit, a person must be at least sixteen years of age and under sixty, in the case of a female, or under sixty-five, in the case of a male. The claimant must also have lived in Australia for at least a year immediately before applying for benefit, or have the intention of remaining in Australia permanently.

Except for unmarried unemployment beneficiaries of any age and unmarried sickness beneficiaries under eighteen the rates of benefit are the same as for the basic pension. A beneficiary with a dependent child or children is eligible for an additional benefit for each dependent child. After having received benefit for six consecutive weeks, a sickness beneficiary may also be eligible, subject to a special income test, to receive rent assistance if paying rent, lodging or board and lodging to a private landlord.

#### UNEMPLOYMENT, SICKNESS AND SPECIAL BENEFITS — WESTERN AUSTRALIA

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Unemployment benefit —						
Number admitted to benefit during year	(a) 88,700	87,231	96,566	122,430	113,034	100,412
Average number on benefit at end of each week	(a) 29,800	28,638	31,636	50,992	(a) 59,400	(a) 57,900
Number on benefit at end of year —						
Males	20,589	19,888	26,888	44,249	42,770	39,556
Females	9,506	9,386	10,844	13,824	14,744	14,472
Persons	30,095	29,274	37,732	58,073	57,514	54,028
Sickness benefit —						
Number admitted to benefit during year	(a) 13,200	13,408	13,567	r 13,238	12,294	12,509
Average number on benefit at end of each week	(a) 2,700	3,161	3,189	r 3,418	(a) 3,880	(a) 3,900
Number on benefit at end of year —						
Males	2,332	2,538	2,405	r 2,912	2,814	2,872
Females	743	857	861	r 977	1,020	1,040
Persons	3,075	3,395	3,266	r 3,889	3,834	3,912
Special benefit (b) —						
Number admitted to benefit during year	(a) 6,850	7,872	8,443	6,872	11,249	12,208
Average number on benefit at end of each week	(a) 1,400	1,840	1,965	1,935	(a) 1,880	(a) 1,800
Number on benefit at end of year —						
Males	990	1,165	856	1,004	903	874
Females	821	991	668	961	929	1,001
Persons	1,811	2,156	1,524	1,965	1,832	1,875
Benefits paid (c) during year —						
Unemployment	\$'000 87,402	\$'000 87,891	\$'000 112,047	\$'000 209,151	\$'000 274,987	\$'000 289,404
Sickness (a)	8,676	10,713	13,342	15,495	19,763	21,134
Special (b)	4,336	6,208	7,174	8,360	9,232	9,770
Total (b)	100,414	104,812	132,563	233,006	303,982	320,308

(a) Estimated. (b) From 1980-81 includes special benefits to migrants in accommodation centres. (c) Amount includes additional benefit for children and dependent students. (d) Includes rent assistance.

### Mobility Allowance

This allowance is paid to severely handicapped persons who are gainfully employed or undertaking vocational training but who, because of their disabilities, are unable to use public transport to travel to and from their employment or training. The rate payable is \$10 per week, tax and income test free. It is not payable to persons who have received the benefit of sales tax exemption for a new vehicle during the previous two years.

### Family Allowances

A 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. 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. Approved charitable, religious or government establishments are paid family allowances for children in their care.

Twelve months residence in Australia is required if the claimant and the child were not born here, but this requirement is waived if the Department of Social Security is satisfied that they intend to remain in Australia permanently. Under certain conditions, family allowance may be paid to Australians who are temporarily absent overseas.

#### FAMILY ALLOWANCES — WESTERN AUSTRALIA

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Endowed families at 30 June —						
Number of claims in force	183,254	186,075	191,501	196,159	198,951	201,519
Number of endowed children	373,511	375,407	384,116	390,621	392,982	395,930
Average number of endowed children per claim	2.04	2.02	2.01	1.99	1.97	1.97
Approved establishments at 30 June —						
Number of endowed child inmates	1,502	1,706	1,592	1,264	970	921
Amount paid during year (a)	\$'000	91,567	84,338	93,881	124,032	136,955
				124,032	136,955	137,697

(a) Includes payments to establishments.

### Multiple Births Payments

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 at the rate of \$150 a month for triplets and \$200 a month for quadruplets (and \$200 a month for higher multiples) in addition to family allowances are made until the children reach six years of age.

### Handicapped Child's Allowance

The handicapped child's 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 in respect of 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 \$85 per calendar month is payable free of income test in respect of a severely handicapped child. A rate of between \$20 and \$85 per calendar month, determined by the income level of the parent or guardian and the amount of special expenses incurred in caring for the child, is payable if the disability is classified as substantial but marginally less than severe.

### Double Orphan's Pension

Conditions relating to payment of double orphan's pension are generally similar to those applying to family allowances. For the purposes of the Social Security Act a double orphan is a child aged under sixteen years, or a student child aged sixteen but under twenty-five years, both of whose parents are dead or one of whose parents is dead and the whereabouts of the other unknown to the claimant. The benefit extends also to a child whose only surviving parent is serving a prison sentence of not less than ten years or is a patient in a mental hospital or similar institution and is likely to remain so for an indefinite period. The pension, which is additional to family allowances, is paid

at the rate of \$55.70 per calendar month and is not subject to an income test. It may be paid to a person, establishment or authority and is to be applied to the maintenance, training and advancement of the child. The pension is not payable in the case of a child in respect of whom a war orphan's pension is being paid in terms of the Repatriation Act. The pension may also be payable on behalf of certain categories of refugee children who have been granted refugee status by the Australian Government.

### **Family Income Supplement**

This payment is an income tested non-taxable supplement for families not in receipt of other Commonwealth support. It is paid at a maximum rate of \$16 per week for each child.

### **Payment of Benefits outside Australia**

Age, invalid and widows' pensions and supporting parents' benefits continue in force for recipients who have left Australia unless they left before 8 May 1973 or their 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.

## **DEPARTMENT OF COMMUNITY SERVICES**

The Department of Community Services was created on 13 December 1984 to administer programs which provide or subsidise services to the aged, the disabled, children and others in special need.

The Department took over responsibility for subsidies, child care, rehabilitation and related functions previously administered by the Department of Social Security. The Department of Social Security retained responsibility for the payment of pensions and benefits.

The new Department also assumed responsibility for nursing homes, home nursing and assistance for the disabled which were previously administered by the Department of Health.

### **Commonwealth Rehabilitation Service**

The Commonwealth Rehabilitation Service aims to provide accessible rehabilitation services to people with disabilities in the broad working age group. It aims to assist people with disabilities to make substantial gains towards employment, personal independence within the community, and/or the capacity to undertake household duties.

Towards this aim, the Commonwealth Rehabilitation Service provides co-ordinated, individual programs to meet the special needs of the disabled. Assistance may be given in the following areas:

**Vocational Assistance.** Assessing present work abilities; identifying suitable employment; assistance with retraining to gain skills needed for work; altering the work place to meet special needs of the disabled person; sponsorship to undertake further studies.

**Independent Living.** Assistance in the form of aids to enable independence at home or in the community; assistance with special needs and adaptation.

**Alternatives to Work.** Assistance for those people who are unable to return to work; adjustment to a lifestyle that does not include full-time work, for example voluntary work, sheltered employment or home bound employment.

The Commonwealth Rehabilitation Service in Western Australia has developed outreach services with the aim of making rehabilitation more accessible to disabled people in their own community. Regional rehabilitation units have been established in Bunbury, Cannington, the Northern Metropolitan region (in Mirrabooka) and the Central Metropolitan region (in Perth). Other facilities include Melville Rehabilitation Centre, the Work Preparation Program in Osborne Park and the Commonwealth Rehabilitation Unit at Royal Perth (Rehabilitation) Hospital in Shenton Park.

**Rehabilitation Allowances.** Persons who undertake a rehabilitation program with the Commonwealth Rehabilitation Service and who are otherwise eligible for a social security pension or benefit are eligible to receive a rehabilitation allowance equivalent to the invalid pension. The allowance is subject to the same income and assets tests as are applied to the invalid pension and it is paid during treatment or training and for up to six months thereafter.

In instances where a person is accepted for vocational training, a training allowance is payable as well as assistance with books and equipment and reimbursement of fares.

#### REHABILITATION SERVICE — WESTERN AUSTRALIA

Particulars	1982-83	1983-84	1984-85
Number accepted for rehabilitation —			
Invalid pensioners	136	194	192
Unemployment and sickness beneficiaries	504	563	497
Other beneficiaries	34	26	35
Other (a)	547	466	449
Total	1,221	1,249	1,173
Number placed in employment —			
Invalid pensioners	17	29	34
Unemployment and sickness beneficiaries	72	136	103
Other beneficiaries	5	4	8
Other (a)	103	95	100
Total	197	264	245
Expenditure (b) —			
Salaries	1,633	1,882	2,446
Rehabilitation Allowance (c)	776	2,584	2,840
Other	991	776	922
Total	3,400	5,242	6,208

(a) Includes workers compensation recipients. (b) Includes recoveries made under the Social Security Act 1947. (c) Commenced 1 March 1983.

#### Assistance Through Welfare Organisations

**Aged or Disabled Persons Homes Grants.** The *Aged or Disabled Persons Homes Act 1954* incorporates the *Aged Persons Homes Act 1954* and extends its provisions to include disabled persons. The purpose of the legislation is to enable the Commonwealth Government to give financial assistance to religious, charitable and other organisations in providing accommodation for the aged or disabled. The Act is administered, subject to any directions of the Minister, by the Secretary of the Department of Community Services.

#### AGED OR DISABLED PERSONS HOMES GRANTS WESTERN AUSTRALIA

Particulars	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Grants approved (a) —						
Number	5	15	13	12	17	20
Persons accommodated —						
Type of accommodation —						
Self-contained	20	82	50	34	69	46
Hostel	50	68	11	112	184	247
Nursing	—	45	397	18	70	—
Total persons	70	195	458	164	323	293
Amount	\$'000	1,100	2,073	4,888	2,160	4,820
					4,820	4,697

(a) A supplementary grant may be approved in a year subsequent to the year when the original grant was approved. In this table each supplementary grant has been included in the year in which the additional amount was actually approved.

For the purposes of the Act, the term 'aged person' means a man aged sixty-five years or over or a woman aged sixty years or over and includes the spouse of the aged person; 'disabled person' means a person who has attained the age of sixteen years and who is permanently blind or permanently incapacitated for work but does not include the spouse of that person unless the spouse is also disabled. Grants are made to organisations 'to encourage and assist the provision of suitable homes

for eligible persons, and in particular homes at which eligible persons may reside in conditions approaching as nearly as possible normal domestic life . . .'. The legislation authorises grants to eligible organisations to be applied towards the cost of erecting or purchasing approved homes to be used permanently for the accommodation of aged or disabled persons. To be eligible for assistance an organisation must be one which is carried on otherwise than for the purpose of profit or gain to its individual members, and may be a religious, charitable or benevolent organisation, an organisation of former members of the defence forces, an organisation approved by the Governor-General, or a local governing body. An organisation conducted or controlled by the Commonwealth Government or a State Government is not eligible for assistance. Grants are made from moneys appropriated by the Parliament from the Consolidated Revenue Fund and from 20 May 1976 were made on the basis of \$2 for each \$1 raised by the organisation. There is a maximum subsidy limit based on the number of persons to be housed in the new accommodation.

**Aged or Disabled Persons Hostels Grants.** The *Aged or Disabled Persons Hostels Act 1972* was designed to encourage the provision of hostel accommodation for the aged. Grants under this Act are made only in respect of hostels which were approved for funding under the Act within the three year period commencing on 27 September 1972. (Grants for hostel accommodation approved after this period are made under the *Aged or Disabled Persons Homes Act 1954*.) Subject to certain conditions, under this Act the Commonwealth meets the cost of hostel accommodation provided by eligible organisations up to a maximum limit per person for buildings, land and furnishings.

**Hostel Care Subsidies.** Under the *Aged or Disabled Persons Homes Act 1954* the Commonwealth currently pays hostel, personal and respite care subsidies to eligible organisations providing hostel type accommodation and services for aged or disabled people. The personal care subsidy is paid in respect of hostel residents assessed as requiring, and receiving, assistance in the performance of daily living tasks. The subsidy is payable in addition to hostel care subsidy.

Respite care bed subsidy is paid to encourage the provision of respite care beds in hostels. This initiative assists those families and individuals who care for elderly people in their homes but who require a facility to allow short breaks from the demands of care at home. From 18 December 1985 the subsidies are paid at a daily rate of \$1.80 for hostel care, \$7.80 personal care and \$7 for respite care.

During 1984-85 \$5,559,000 in hostel, personal and respite care subsidies was paid to 101 organisations in respect of 3,740 approved beds.

**Nursing Home Benefits.** There are two forms of Commonwealth benefit payable in respect of patients accommodated in premises approved as nursing homes under the *National Health Act 1953*. These benefits are outlined below:

**Basic Nursing Home Benefit.** The Commonwealth pays basic nursing home benefits in respect of all qualified nursing home patients other than those who are entitled to damages or compensation. Basic benefit levels are reviewed and adjusted annually. The maximum amount of basic nursing home benefit payable per day from 14 November 1985 was \$35.55

**Commonwealth Extensive Care Benefit.** The Commonwealth extensive care benefit is payable at the rate of \$6 a day, in addition to the Commonwealth basic benefit, in respect of patients who need and receive 'extensive care' as defined in the National Health Act. Application must be made for payment of the extensive care benefit. As in the case of the Commonwealth basic benefit, the extensive care benefit is only payable in respect of qualified patients who are not entitled to damages or compensation.

**Minimum Patient Contribution.** All participating nursing home patients are normally required to make a statutory minimum contribution towards the cost of their accommodation and care in the nursing home in recognition of those costs which would otherwise be incurred outside the nursing home in any alternative long-term residence.

The statutory minimum patient contribution equals 87.5 per cent of the sum of the standard single rate pension plus rent assistance, which at 14 November 1985 was \$14.10 a day.

Where the fees charged by a participating nursing home are in excess of the combined total of nursing home benefits plus the statutory minimum patient contribution, the difference must be met by the patient. Conversely, where the nursing home fee is less than this combined total, the basic benefit paid by the Commonwealth is reduced by that amount.

Fees charged to patients in Government nursing homes are determined by State Governments. Patients in these homes also attract basic and extensive care benefits from the Commonwealth Government, and the patient contribution is usually the same as the statutory minimum patient contribution described above.

**Deficit Financing.** *The Nursing Homes Assistance Act 1974* makes provision for nursing homes conducted by religious, charitable and other non-profit organisations to be funded under deficit financing arrangements. Alternatively these organisations may operate their nursing homes under the fee control system provided under the *National Health Act 1953*.

Under the deficit financing arrangements, the Commonwealth meets the approved operating deficits and the cost of approved asset replacements of nursing homes. Financial assistance is provided by way of monthly advances based on a budget approved by the Department of Community Services. A final statement for a financial year is made after audited accounts are received by the Department.

Patients in deficit financed nursing homes are required to be charged a prescribed fee in respect of their accommodation and care. This fee is determined by reference to the fee control system provided under the *National Health Act 1953*.

Organisations seeking financial assistance for nursing homes under the deficit financing arrangements as provided for under the *Nursing Homes Assistance Act* are required to enter into a legally binding agreement with the Commonwealth.

**Domiciliary Nursing Care Benefit.** The domiciliary nursing care benefit is paid to assist in meeting the cost of home nursing for persons aged sixteen years or over who are chronically ill and are being cared for in the private home of a relative or other approved person. The benefit applies to a patient who has a continuing need for nursing care, and is receiving such care given by or under the supervision of a registered nurse. The benefit is payable at the rate of \$42 per fortnight.

**Home and Community Care Program.** The Home and Community Care Program came into operation in Western Australia from 17 October 1985. It is a cost shared program between the Commonwealth of Australia 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.

The Home and Community Care Program incorporates services provided under the *Delivered Meals Subsidy Act 1970*, *States Grants (Paramedical Services) Act 1969*, *States Grants (Home Care) Act 1969*, and the *Home Nursing Subsidy Act 1957*.

The day to day administration of the Home and Community Care Program is the responsibility of the Health Department of Western Australia.

**Supported Accommodation Assistance Program.** *The Supported Accommodation Assistance Act 1985* provides for a cost shared program between the Commonwealth of Australia and State Governments to operate from 1 January 1985.

The Supported Accommodation Assistance Program aims to assist organisations to provide a range of supported accommodation and related services to people who are either permanently or temporarily homeless as a result of crisis. The program is directed at men, women, young people and dependents who need such assistance to move towards independent living, wherever possible and appropriate.

The program incorporates the Homeless Persons Assistance Program, the Women's Emergency Services Program, the Youth Services Scheme and elements of the Family Support Services Scheme and the Children's Services Program.

Some services for the homeless will continue to be funded in 1985-86 under the *Homeless Persons Assistance Act 1974* pending their inclusion in the Supported Accommodation Assistance Program.

The day to day administration of the Supported Accommodation Assistance Program is the responsibility of the Western Australian State Department for Community Services.

**Disability Services.** Under the *Handicapped Persons Assistance Act 1974* eligible organisations may apply for subsidies towards the cost of providing capital projects, maintenance and equipment. Grants are also available in respect of rental and certain salary payments.

The Act provides that grants may be made to eligible organisations which are deemed by the Minister to provide 'prescribed services' for disabled persons. Prescribed services which may be approved for the purposes of the Act include training, activity therapy, sheltered employment, residential accommodation, holiday accommodation, recreational facilities and rehabilitational facilities. Assistance may be provided towards meeting the cost of purchase or construction of premises to provide the prescribed services. The Act allows the payment of subsidy in respect of residential accommodation to be extended to include accommodation for disabled persons capable of engaging in normal employment. Subsidies may also be approved to help meet expenditure on building maintenance, rental of premises, equipment, and the salaries of certain staff involved in providing prescribed services. The Act also authorises the payment to organisations of a training fee for each person who, after being employed for six months or longer in a sheltered workshop, has spent at least twelve months in normal employment. From 1 October 1983 an open employment incentive bonus of \$500 is also payable to each person who meets these conditions. An eligible organisation which provides approved residential accommodation for handicapped children is entitled to receive benefit in respect of each such child at the rate of \$5.00 for each day on which accommodation is provided for the child.

HANDICAPPED PERSONS ASSISTANCE ACT  
ANNUAL EXPENDITURE — WESTERN AUSTRALIA  
(\$)

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Capital	267,619	1,033,518	577,360	2,284,657	460,000	521,108
Equipment	239,137	301,425	391,522	428,015	278,292	526,880
Maintenance	35,781	30,564	17,530	68,119	128,706	202,491
Rent	86,255	126,786	164,561	172,382	238,215	244,051
Salary	3,270,631	4,049,977	4,950,997	5,456,026	6,595,465	8,247,045
Training fee	—	—	3,000	1,500	2,000	5,500
Open employment incentive bonus (a)	—	—	—	—	—	5,500
Total	3,899,423	5,542,270	6,104,970	8,410,699	7,702,678	9,752,575

(a) Introduced 1 October 1983.

### Children's Services Program

The Commonwealth provides capital and recurrent assistance for a wide range of services for children and their families. These include early childhood services such as day care centres, family day care and emergency and occasional care. Services for school aged children include before and after school care and vacation care. Other projects provide support for families in crisis and special services for Aboriginal, migrant and disabled children.

Services providing day care for pre-school aged children are, as a condition of funding, required to develop and implement an income test and fee scale within approved guidelines so families satisfying the income test will be eligible for a fee rebate funded by the Commonwealth.

The Commonwealth has allocated some \$107 million to create 20,000 new child care places to be introduced nationally between July 1985 and June 1988.

## CHILDREN'S SERVICES PROGRAMS FUNDED (a) — WESTERN AUSTRALIA

Service type	1981	1982	1983	1984
Child care services and neighbourhood centres	55	43	48	68
Family day care schemes	6	6	7	7
Outside school hours care	31	31	36	36
Children's services workers	6	6	8	—
Research and evaluation	—	—	—	2
Advice and resource services	2	2	1	12
Services for disabled children	9	9	11	—
Family Support Services Scheme	24	17	16	15
Family support services (b)	8	10	11	—
Youth Services Scheme	4	7	6	6
Youth services (b)	1	1	1	1
Child care in women's refuges	—	12	13	13
Family and child assistance services	—	—	—	31
Miscellaneous services	12	9	10	1
Total	158	153	168	192

(a) At 30 June. (b) Not funded through relevant scheme.

## PRINCIPAL BENEFITS PAYABLE UNDER THE REPATRIATION ACT

The Repatriation Commission, established under the *Repatriation Act 1920*, is responsible for the administration of the Repatriation Act and associated legislation, all matters of policy, and the general administration and overall supervision of the provision of benefits under the legislation. The Chairman of the Commission is also the Secretary of the Department of Veterans' Affairs which provides the administrative machinery through which the Commission operates. The central office is in Canberra and there is a branch office, under the control of a Deputy Commissioner, in each State.

The principal functions of the Department are: the payment of disability and dependants' pensions and service pensions and allowances to eligible veterans and their dependants; the provision of medical treatment for veterans for injuries and illnesses accepted as service-related; the provision of medical treatment in certain circumstances for veterans who are suffering from injuries and illnesses whether service-related or not; the provision of medical treatment for war/defence widows and certain dependants of deceased veterans; and provision of a wide range of other benefits for eligible persons.

Repatriation benefits are provided in respect of service not only in the 1914-18 and 1939-45 Wars but also in the South African War 1899-1902, in the Korea and Malaya operations, in prescribed areas with the British Commonwealth Far East Strategic Reserve (F.E.S.R.) and the Special Overseas Forces and, in certain circumstances, in the Regular Defence Forces or peacekeeping forces.

**Pensions for Veterans.** Pensions are paid to eligible veterans in three main categories: the Special Rate (known as the T.P.I.) pension, payable to a veteran who, as a result of service, is blind, or is totally and permanently incapacitated so that he is unable to earn more than a negligible percentage of a living wage; the Intermediate Rate, payable to a veteran who, because of the severity of his incapacity accepted as related to service, can work only part-time or intermittently and, in consequence, cannot earn a living wage; and the General Rate, payable to a veteran who has an incapacity accepted as related to service but is not, because of that incapacity, prevented from being able to work full-time. General Rate pensions payable range from 10 per cent to 100 per cent of the maximum rate, according to the assessed degree of incapacity.

A disability pension is not subject to personal income tax or an income or assets test. It is not regarded as income for the purposes of the service pension.

**Pensions for Dependants.** When the death of a veteran has been accepted as related to his service, his widow qualifies for the war widow's rate of pension and for associated benefits, while his children receive pensions at 'orphan' rates and other benefits. If a veteran's death has not been accepted

as related to service, but at the time of death he was receiving, or is later adjudged to have been eligible to receive, a pension at the Special Rate (or one of certain other rates) his dependants qualify for pensions as if his death had been accepted as due to service.

Dependants' pension were formerly granted to the wives and children of veterans receiving a disability pension. The conditions now applying to dependants' pensions are that, except for war or defence widows' and orphans' pensions, dependants' pensions would not be granted on or after 6 June 1985 and existing pensions were frozen at the rates payable at that date, except where the pension was subject to automatic indexation.

**Allowances.** Several allowances are provided to supplement disability pensions. These allowances vary according to the type or 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 in respect of children of special rate pensioners and children of veterans who died as a result of service.

DISABILITY PENSIONS AND ALLOWANCES — RATES OF BENEFIT  
(\$)

Pension or allowance	Rate current at —					
	May 1983	November 1983	May 1984	November 1984	May 1985	November 1985
	per week	per week	per week	per week	per week	per week
Disability pensions —						
Veterans —						
Special (T.P.I.) rate	157.75	164.55	171.30	171.30	175.75	182.45
Intermediate rate	108.65	113.30	117.95	117.95	121.00	125.60
General rate	59.50	62.05	64.60	64.60	66.30	68.80
Wife	4.05	4.05	4.05	4.05	4.05	..
Each dependent child	1.38	1.38	1.38	1.38	1.38	..
War widow	82.35	85.90	89.40	91.90	94.30	97.90
War orphan —						
Where father dead	16.60	18.45	18.45	19.20	19.20	20.50
Where both parents dead	33.20	36.90	36.90	38.40	38.40	41.00
Allowances —						
Payments for certain amputations and/or loss of vision	4.75	5.30	5.30	5.50	5.50	5.85
to	98.25	102.50	106.70	106.70	109.45	113.65
Attendant's allowance —						
Higher rate	46.60	51.80	51.80	53.80	53.80	57.40
Lower rate	23.30	25.90	25.90	26.90	26.90	28.70
Domestic allowance	12.00	12.00	12.00	12.00	12.00	12.00
Recreation transport allowance —	per month	per month	per month	per month	per month	per month
Higher rate	53.00	59.00	59.00	61.40	61.40	65.60
Lower rate	26.50	29.50	29.50	30.70	30.70	32.80

Particulars of disability pensions in Western Australia for the six years 1979-80 to 1984-85 are given in the following table.

DISABILITY PENSIONS — WESTERN AUSTRALIA

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	
Number of pensions current at 30 June —							
Incapacitated veterans	14,874	14,482	14,268	14,143	14,042	13,983	
Dependants of incapacitated veterans	17,258	16,742	16,550	16,387	16,248	15,984	
Dependants of deceased veterans	3,693	3,670	3,852	4,184	4,505	4,973	
Miscellaneous (a)	32	26	26	12	13	12	
Total	35,857	34,920	34,696	34,726	34,808	34,952	
Amount paid in pensions during year (b)	\$'000	29,098	33,411	35,597	44,394	49,981	58,502

(a) Pensions payable under Seamen's War Pensions and Allowances Act. Prior to 1984-85 includes 'Act of grace' pensions. (b) Includes widows' allowances.

### Service Pensions and Allowances

A service pension is payable, subject to an income or assets test similar to that applied to age and invalid pensions, to a male veteran who served in a theatre of war and who has attained the age of sixty years or is permanently unemployable. It is payable to a female veteran who served in a theatre of war or embarked for service abroad and has attained the age of fifty-five years or is permanently unemployable.

A service pension is therefore a broad equivalent of an age or invalid pension. The advantages to the recipient are the availability of pension five years earlier and, in certain circumstances for veterans of the Australian Forces, eligibility for Repatriation medical treatment services. Service pensioners are eligible for the same range of pensions and allowances as age pensioners and the rates of benefit are the same.

#### SERVICE PENSIONS — WESTERN AUSTRALIA

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Number of pensions current at 30 June —						
Veterans	13,208	14,460	15,685	17,425	19,149	20,358
Dependants	7,910	9,230	10,409	11,881	13,409	14,455
Act of grace pensioners	13	14	27	40	82	(a) 2
Total	21,131	23,704	26,121	29,346	32,640	34,815
Amount paid in pensions during year	\$'000					
	45,911	59,328	69,549	90,417	110,663	127,841

(a) The majority of former Act of grace pensioners are now treated as members of the forces as defined under the Repatriation Act.

### Payment of Benefits outside Australia

The *Repatriation Act* (No. 2) 1973, which came into operation on 8 May 1973, authorises the payment of a service pension in any country (subject to certain residential qualifications) in which the pensioner may choose to live. This provision had previously applied only to disability pensions.

#### DEPARTMENT FOR COMMUNITY SERVICES, WESTERN AUSTRALIA

The *Acts Amendment (Department for Community Services) Act 1984*, which came into operation on 1 January 1985 renamed the existing Department for Community Welfare as the Department for Community Services.

The new Department is headed by a Director-General, supported by an Assistant Director-General, six regional Directors and four support Directors responsible respectively for Programmes, Human Resources, Community Planning and Public Affairs, and Management and Finance.

The functions of the Department for Community Services, as defined in the *Community Services Act 1972*, are: (a) to promote individual and family welfare in the community; (b) to prevent the disruption of the welfare of individuals and families in the community, and to mitigate the effects of any disruption; (c) to co-ordinate, assist and encourage the provision of social welfare services to the community, and for that purpose to confer and collaborate with other bodies and instrumentalities who offer, or may offer, a social welfare service; (d) to conduct, promote and encourage research into the problems of community welfare; (e) to conduct, promote and encourage programmes of training or rehabilitation, or which are otherwise of a nature that is concerned with the advancement of the welfare of particular individuals or groups in the community who are disadvantaged; (f) to consider and initiate, or to assist in, the provision and development of new or additional welfare services, whether of a general or specific nature, for individuals or groups within the community who are needy or disadvantaged; (g) to encourage the development of the greatest possible degree of service and administration at the local level, and to emphasise the value of preventive measures; (h) to provide assistance, where the Minister considers it to be necessary, when the welfare of any individual, family or group is threatened or in jeopardy; (i) to provide and, where appropriate, to manage facilities, which may include land, buildings and specialized appliances, for specific purposes consistent with the objects of this Act; (j) generally, to administer and give effect to the provisions

of this Act and to carry out such other functions as may be prescribed, or as the Minister may direct'.

The Acts administered by the Director-General of the Department for Community Services, subject to any direction of the Minister, are the Community Services Act, the Child Welfare Act, the Welfare and Assistance Act and the Adoption of Children Act.

#### STATE FINANCIAL ASSISTANCE

Under the provisions of the *Welfare and Assistance Act 1961*, the State Government, through 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.

Although most payments are of a non-continuous nature, the Department still makes some payments on a continuous basis when families or persons have special needs or have no capacity to supply themselves and no entitlement to support from any other source.

Financial aid is provided under certain conditions to persons where travel for specialist medical treatment or other emergency purposes is necessary. This role has expanded considerably since 1 September 1981, when the Department commenced advancing travel assistance to patients from remote areas subject to later recovery through the Commonwealth Department of Health's Isolated Patient's Travel and Accommodation Assistance Scheme.

Financial aid is also provided for the burial of persons who die in indigent circumstances where the body is unclaimed or where kin have no financial capacity to accept responsibility for burial costs.

#### CHILD WELFARE

Under the provisions of the *Child Welfare Act 1947* the State Government, through the Department for Community Services, is responsible for the care of wards and children placed under control and supervision or released on probation by Children's Courts. Under the Act, a child is defined as 'any boy or girl under the age of eighteen years'. Persons may be licensed to care for children and are subject to supervision by the Department. Another function of the Department is the arranging of adoptions. Under the Act, 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.

Children's Courts established at Perth, Fremantle, Midland, Rockingham and Armadale, and at most country towns throughout the State have jurisdiction in all cases where children under eighteen years of age are involved whether as offenders or as being in need of care and protection. The Courts also have jurisdiction to deal with adults committing certain specified offences against children. The public may be excluded from Court hearings and names of juvenile offenders are withheld from publication. Adults charged with certain indictable offences against children may forgo the right to trial by jury and agree to be dealt with summarily by Children's Courts. This power to exercise summary jurisdiction is designed to eliminate as far as possible the necessity for children to appear in open courts as witnesses in cases dealing with sex offences. A Children's Court may commit such offenders for sentence by the Supreme Court of Western Australia or the District Court of Western Australia.

Children guilty of minor offences may be cautioned, fined, placed on probation, ordered to do up to seventy hours of community services or the charge may be dismissed without a conviction being recorded. A Court may declare a child to be in need of care and protection and may order the child to be committed to the care of the Department for Community Services, or placed under the control of the Department. Children found guilty of offences punishable by imprisonment may also be placed under the control of the Department. Those guilty of less serious or first offences are generally placed in the care of their parents or suitable guardians under appropriate supervision by officers of the Department for Community Services. Children aged seven to fifteen years who admit a less-serious first offence may be dealt with by a Panel instead of appearing before a Children's Court. Panels are made up of an authorised officer of the Department and a senior or retired police officer. They may suspend action against children for up to six months. No conviction is recorded

if the children do not re-offend in that period. Children who commit a second offence, or whose conduct is unsatisfactory during the period of suspended action, appear before a Children's Court on the original and subsequent charges. Parents are required to attend with their children. Further reference to Children's Courts appears in the section *Law Courts* in Chapter 9.

## Departmental Expenditure

### DEPARTMENTAL EXPENDITURE (\$'000)

Nature of expenditure	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Administration	4,325	4,871	5,584	r 6,343	r 7,569	8,596
Field services	8,113	9,068	10,072	r 11,956	r 14,168	16,028
Departmental establishments	r 9,003	10,433	11,779	r 13,141	r 12,349	12,395
Maintenance of children	3,149	3,404	3,465	r 3,823	r 3,881	4,176
Financial assistance (a)	7,087	3,164	859	1,611	3,475	5,324
Community Welfare assistance	1,483	1,716	1,810	2,198	2,538	4,418
Reserves (Aboriginal housing)	376	434	497	503	520	596
Residential Child Care (b)	1,657	—	—	—	—	—
Total expenditure	35,192	33,090	34,066	39,576	44,499	51,534
Total revenue	5,386	4,460	2,656	3,714	3,397	4,431
Net expenditure	29,806	28,630	31,410	35,862	41,102	47,103

(a) Income maintenance payments to single parent families were transferred to the Commonwealth from November 1980. (b) Transferred to Treasury 1980-81 to 1984-85, to be resumed in 1985-86.

**Maintenance of Children.** The Department for Community Services makes payments at the rates shown in the table below to foster parents and establishments having children in their care. 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.

### STATE GOVERNMENT MAINTENANCE OF CHILDREN PAYMENTS MAXIMUM WEEKLY RATES (\$)

Subsidy or allowance	Rate current at November —					
	1980	1981	1982	1983	1984	1985
Wards of the State —						
Subsidy						
Placement with family						
Primary school age	22.25	24.00	27.00	(a) 29.50	32.00	37.75
High school age	26.00	28.00	31.50	(a) 34.50	37.50	43.25
Placement in institution (b)						
Primary school age	27.25	29.50	33.25	36.50	39.75	45.50
High school age	30.25	32.75	36.75	40.25	43.75	49.75
Special needs children (c)	42.50	46.00	51.75	56.75	61.75	68.00
Additional allowances (d)						
Pocket money						
Primary school age	0.50	1.00	1.00	1.00	1.00	1.00
High school age years 8-10	2.00	2.50	2.50	2.50	3.00	3.00
High school age years 11-12	3.00	4.00	4.00	4.00	5.00	5.00
Working (awaiting benefits)	—	10.00	10.00	10.00	10.00	10.00
Children not wards of the State —						
Subsidy						
Departmentally arranged placement						
Primary school (b)	24.00	26.00	29.25	32.00	(e) 35.50	45.50
High school	24.00	26.00	29.25	32.00	40.50	49.75
Special needs children (c)	28.00	30.25	34.00	37.25	40.50	49.75
Privately arranged placement						
Near relative (f)	12.85	12.85	12.85	12.85	12.85	12.85
Non-relative	22.25	24.00	27.00	29.50	32.00	32.75

(a) Payable from 1 January 1984. (b) Scatter home rates. (Rates for other forms of care are less). (c) Those having a disability or otherwise requiring additional care. (d) Excludes details of Clothing and Education Allowances which are available to children in institutional care. (e) Group home rate. (f) Sibling or grand-child.

**Supervision of Children.** A child committed to the care of the Department for Community Services becomes a ward of the Department. A ward 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. The *Immigration (Guardianship of Children) Act 1946* (Commonwealth) provides that the Minister for Immigration shall be the guardian of migrant children under the age of twenty-one years who are not in the care of a parent or other relative. In Western Australia this function is exercised, under delegation, by the Director-General of the Department for Community Services.

**Day 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 subject to the Child Welfare (Care Centres) Regulations 1968 which provide for the minimum standards for premises, equipment, staffing and the general conduct of such services. Day Care Services include day care centres both privately owned and government funded, family day care centres and neighbourhood centres. Day care centres provide group care on a full-time, part-time or occasional basis. Family day care is a supervised and co-ordinated system of child care which is conducted by approved and licensed caregivers in their own homes. Neighbourhood centres provide day care and occasional care and other family support services to their communities. The Department for Community Services provides an advisory service to all day care services ensuring the maintenance of minimum standards and promotion of optimum standards. It provides information to parents seeking services and assists community groups in identifying child care needs and assisting in the establishment of new services.

A Child Care Planning Committee responsible to both the State and Commonwealth Governments, undertakes the planning and implementation of new services on a needs basis.

The Commonwealth Government under the provisions of the Children's Services Program and the *Child Care Act 1972* provides Capital and Recurrent Grants to non-profit and community-based organisations for the operation of day care centres and family day care schemes. Recurrent funding includes fee relief for parents subject to a standard means test.

The information presented in the following table is the result of censuses of all day care services registered with the Department for Community Services.

NUMBER OF CHILDREN ATTENDING DAY CARE SERVICES DURING CENSUS WEEK

Type of service	Week ending					
	4 August 1979	2 November 1980	4 October 1981	15 August 1982	2 October 1983	4 November 1984
Day care	3,014	3,786	3,873	4,261	4,425	5,036
Occasional care	1,330	1,365	1,271	1,109	1,208	1,027
Family day care	727	1,190	1,280	1,450	1,761	2,164
Total	5,071	6,341	6,424	6,820	7,394	8,227

**Establishments.** The State Government subsidises private establishments for children in Western Australia. Most of these centres and facilities are conducted by religious organisations. All private establishments having the care of children who are wards, placed under control or private children under six years of age are subject to the supervision of the Department for Community Services.

Departmental establishments provide short-term accommodation for children in need of care and children awaiting proceedings in Children's Courts; assessment facilities for children coming into the care of the Department; treatment centres of a secure nature; and hostel accommodation. Children cared for in these establishments are aged from three years to eighteen years. Children under three years of age requiring short term care are placed either by arrangement at a State run mothercraft home and training centre, or in the care of short term approved foster parents.

**Adoption of Children.** All children eligible 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 may apply direct to the Department or through a solicitor. 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.

**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.

## Chapter 8

### HEALTH

The Commonwealth Government and State Government health authorities, together with Boards of Health under local government administration, co-operate in maintaining health services and in the prevention and control of infectious diseases in Western Australia.

#### COMMONWEALTH GOVERNMENT HEALTH BENEFITS AND ASSISTANCE

##### **Medicare**

The universal hospital and medical benefits scheme known as Medicare was introduced by the Commonwealth Government from 1 February 1984. Health financing arrangements under the Medicare program feature the following major elements: automatic entitlement to medical and optometrical benefits of 85 per cent of the Medical Benefits Schedule fee, with a maximum patient payment for any service of \$10 where the scheduled fee is charged; access without direct charge to public hospital accommodation and to in-patient and out-patient treatment by doctors appointed by the hospital; charges for private treatment in shared wards of public hospitals of \$80 per day; and a daily bed subsidy payable to private hospitals at an average of \$30.

The Medicare program is financed in part by a 1 per cent levy on taxable incomes, with low income cut-off points. The low income cut-off points were set to ensure that no person who, prior to the introduction of the program held a Pensioner Health Benefit Card or a Health Care Card, would pay a levy. Medicare benefits are available to all persons ordinarily resident in Australia with the exception of members of foreign diplomatic missions and their dependants. Short-term visitors to Australia (i.e. less than 6 months) are responsible for the full cost of their medical and hospital treatment.

##### **Medical Benefits**

The *Health Insurance Act 1973* provides for a Medical Benefits Schedule which lists medical services and the Schedule (standard) fee applicable in each State in respect of each medical service. The Schedule covers services attracting Medicare Benefits rendered by legally qualified medical practitioners, certain prescribed medical services rendered by approved dentists in the operating theatres of approved hospitals, and optometrical consultations by participating optometrists. Schedule fees are set and updated by an independent fees tribunal which is appointed by the Government. The fees so determined are to apply for Medicare benefits purposes. Medical services in Australia are generally delivered by either private medical practitioners on a fee-for-service basis, or medical practitioners employed in hospitals.

Where a medical service is provided by a private medical practitioner on a fee-for-service basis, Medicare refunds 85 per cent of the Medical Benefits Schedule fee cost or, the Schedule fee less \$10, whichever is the greater. It is not possible to insure with private health insurance organisations to cover the 15 per cent 'gap' for services other than those provided to private patients in public and private hospitals. However, should an individual accumulate 'gap' payments in excess of \$150 per year, Medicare will pay benefits at 100 per cent of the Schedule fee.

Under Medicare, medical practitioners are able to direct bill for any patient. In such cases, they receive the Medicare benefit as full payment. Previously, direct billing was limited to services rendered to eligible Pensioner Health Benefit and Health Care Card holders, and their dependants.

### **Hospital Care**

From 1 February 1984, basic public hospital services have been 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, charges for private hospital treatment, nor care in a public hospital by a doctor of the patient's choice. It is possible however for persons to take out insurance with private health funds to cover these situations.

Patients who are accommodated in either private or public hospitals for extended periods and who are, in essence, nursing home type patients, are required to make a non-insurable patient contribution in the same way that a patient in a nursing home does. For a private patient in a public hospital, private health fund benefits are reduced to the level of the standard nursing home benefit. In a private hospital, the fund benefits are reduced to \$80 minus patient contribution.

Under Medicare, the period of time of continuous hospitalisation before classification as a nursing home type patient is thirty-five days.

Where a patient's doctor considers that a patient has continuing need for acute hospital care, the doctor may issue a certificate under section 3B of the Health Insurance Act to that effect, and the nursing home type patient arrangements do not apply. The Acute Care Advisory Committee may review such certificates and recommend that they be affirmed, varied or revoked.

### **Private Hospitals**

Since 1 February 1984 both the Commonwealth bed day subsidy and the hospital insurance benefit for private hospital accommodation have been paid according to a system of classification consisting of three categories. Hospitals are categorised according to the services and facilities provided. The Commonwealth bed day subsidies are at the rate of \$40, \$30 and \$20 for categories one, two and three respectively. The basic private fund benefits are at the rate of \$135, \$115 and \$95 for categories one, two and three respectively.

### **Nursing Home Benefits**

Details of nursing home benefits are contained in Chapter 7.

### **Health Program Grants**

Health program grants, authorised under the *Health Insurance Act 1973* are payable to eligible organisations to meet the cost, or such proportion of the cost as the Minister for Health may determine, of approved health services provided outside of hospitals by staff employed on a salaried or sessional basis.

### **Isolated Patients' Travel and Accommodation Assistance Scheme**

Under this scheme financial help is provided to people in isolated areas who need to travel more than 200 kilometres from their home to obtain specialist medical treatment, oral surgery or orthodontic work not locally available. Referral by a medical (or, for oral surgery, a dental) practitioner is an essential part of the scheme.

### **Pharmaceutical Benefits Scheme**

Under the Pharmaceutical Benefits Scheme, assistance is provided towards the cost of a comprehensive range of drugs and medicines to persons receiving treatment from a medical practitioner. From 1 April 1979, the scheme was expanded to allow dentists, who are approved as participating dental practitioners, to prescribe a limited range of drugs for dental treatment of their patients. The drugs and medicines are 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.

### **Tuberculosis Allowances**

The payment of allowances to persons suffering from tuberculosis was phased out after the last allowance payday in October 1984. From the first benefit payday in November 1984, persons not previously receiving allowances who suffer from tuberculosis are granted sickness benefits if they meet the eligibility criteria for these benefits.

Persons in receipt of tuberculosis allowances at the end of October 1984 continue to receive them, if eligible, until such time as the relevant sickness benefit rate exceeds the level of the allowances. At this point the persons concerned will receive sickness benefits instead.

## COMMONWEALTH GOVERNMENT SUBSIDIES AND GRANTS

### General Revenue Grants

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. These arrangements, which are authorised by the *States (Tax Sharing and Health Grants) Act 1981*, are designed to replace previous specific purpose health payments for public hospital operating costs (under expired Hospital Cost Sharing Agreements), community health and school dental service programs and apply fully to all States.

### Medicare Grants to the States

Under the Medicare program, all States and Territories have been 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.

## STATE GOVERNMENT HEALTH SERVICES

The Health Department of Western Australia was established on 1 July 1984 following the amalgamation of three former Departments — the Public Health Department, Hospital and Allied Services and Mental Health Services. The single Department was formed to integrate, co-ordinate and manage health care functions and services.

The Department takes its authority from the *Health Act 1911*, the *Hospitals Act 1927* and the *Mental Health Act 1962*. Apart from these major Acts, the Department administers a wide range of other legislation incorporating matters of individual and community health protection, treatment and regulation.

The Department's organisational structure is based upon an arrangement of three broad service groups developed into seven categories of service, each headed by an Executive Director and co-ordinated by the permanent head of the Department, the Commissioner of Health. The Commissioner and the seven Executive Directors form the Executive Directorate of the Department. The three broad service groups are: Personal Health Services Delivery comprising Personal Health Services, Nursing Services and Administrative Services; Health Services Support comprising Public Health and Scientific Support Services, Health Promotion and Education Services; and Health Resources Support comprising Financial and Management Services and Corporate Services.

The *Health Act 1911*, confers on the Commissioner of Health the powers necessary for the prevention and control of infectious diseases; the enforcement of sanitation, building and pure foods standards; the control of nuisances and offensive trades; the regulation of the sale of pesticides and the manufacture of therapeutic substances; and the registration of private hospitals and the licensing of maternity homes.

The Health Department of Western Australia maintains a pathology laboratory service which 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. A range of reference laboratories is available, some of which serve the whole of Western Australia. A public health epidemiological service is provided for the State; nutritional, health and other surveys are undertaken; and forensic pathology work is done for the Police Department and Crown Law Department.

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. Co-operating dental practitioners assist in the conduct of a subsidised dental program by the Health Department of Western Australia in other areas.

### **Health Advisory Network**

A Health Advisory Network has been established to provide 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; providing effective feedback, from both consumers and providers, about health services.

The basic structure of the Network consists of two councils — one for health care consumers and one for health care providers. These two councils are promoted, developed and supported by a co-ordinating panel which is responsible for liaison between the Health Advisory Network and the Health Department of Western Australia.

### **Health Services for Children**

In addition to measures provided for immunisation against infectious diseases, the Community Nursing, Community Health and Dental Health Branches of the Health Department of Western Australia assist in maintaining the general health and well-being of children in Western Australia.

The Community Nursing Branch comprises nurses who have functions in specialist areas of child health, school health and community health, with medical back-up from Community Child Health medical officers in the Community Health Branch.

Child Health Centres have been 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. This service is also available to children in child care centres in the metropolitan area. It is estimated that 90 per cent of infants in the State are taken to a Child Health Centre at least once in the first year of life.

Expectant parents are offered a variety of education programs both pre-natally and post-natally, and mothers of new-born babies are visited in hospital and at home. A Parenthood program is offered to high school students in Year 9 by invitation of the headteachers. Child health advice is available twenty-four hours a day by telephone, and correspondence support is undertaken as needed.

## CHILD HEALTH CENTRES AT 31 DECEMBER

Particulars		1979	1980	1981	1982	1983	1984
<b>Expenditure (a)</b>							
Salaries and wages	\$'000	1,854	1,983	2,335	2,640	3,066	3,002
Other	'000	254	271	289	302	317	363
Total	\$'000	2,109	2,254	2,624	2,942	3,383	3,365
<b>Number of —</b>							
<b>Staff —</b>							
Medical officers		2	1	2	2	2	2
Nurses		141	137	144	145	144	144
Total		143	138	146	147	146	146
<b>Child health centres</b>							
Mobile clinics		208	213	215	216	217	217
Total		7	7	7	7	6	6
<b>Attendances at centres (b) —</b>							
Individual infants		51,172	54,295	57,169	61,459	64,973	67,569
Total attendances		289,624	296,895	305,213	311,592	311,358	298,496
Home visits by nurses		36,862	36,243	36,103	36,573	36,453	36,897

(a) Year ended 30 June. (b) Year ended 31 December.

School health services are provided by community nurses, again with back-up from the Child Health medical officers. The service undertakes a full health appraisal including vision and hearing screening of every child in preschool or Year 1 at school. Subsequent screening for visual problems is carried out routinely on two further occasions during school life, and a colour vision screening of boys is undertaken in Year 4. Screening for hearing loss and scoliosis is also arranged for older children. School health nurses are based at high schools or in school districts and also provide counselling, first aid and health education services in addition to screening.

Children identified by the screening process for further appraisal are assessed by Child Health medical officers who mainly work in multidisciplinary teams consisting of speech therapists, social workers and guidance officers. Children with possible physical or intellectual disabilities can also be referred by parents, teachers, guidance officers and other professionals. The Child Development Centre in West Perth offers similar services at specialist level for children with more complex problems. Specialist staff at the Centre include psychologists, physiotherapists and occupational therapists.

Community health nurses provide health services to disadvantaged and low socio-economic groups within the community. The nurses in this section have brought a much higher standard of preventive and therapeutic health care to the children and adults of the Aboriginal community, 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.

Under the School Dental Services scheme preventive dentistry centres have been established in strategically placed primary schools. Smaller schools are serviced by mobile dental caravans.

Centres are staffed by dental therapists who, under the direction of dental officers, provide free dental care for preschool and primary school children. Children in remote or isolated areas receive dental care from itinerant dental officers visiting communities on a biannual basis.

The service is offered to approximately 185,000 preschool and primary school children throughout the State with 154,000 receiving regular dental care. In country areas not served by private practitioners school dental officers provide a service for adults as well as for children.

### 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. Isolated townships, mining centres and sheep and cattle stations are usually equipped with two-way radio sets and, by this means, are linked with bases where doctors are available for radio consultation in the event of sickness or accident. In serious cases a doctor flies to the patient, who may then be flown to hospital for treatment. The Service provides, through the Commonwealth Department of Health, standard medical chests with directions for the use of the drugs and medical supplies which they contain.

The radio network of the Royal Flying Doctor Service is regularly used in the work of Schools of the Air conducted by the Education Department, and also for the transmission and receipt of telegrams. In addition, it may be used, as the need arises, in connection with flood relief, in searching for lost parties, during cyclones or other emergencies.

ROYAL FLYING DOCTOR SERVICE OF AUSTRALIA  
OPERATIONS OF WESTERN AUSTRALIAN SECTION

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	
Expenditure (operational)	\$'000	2,359	2,786	3,552	4,337	4,283	4,680
Number of —							
Medical flights		2,107	2,589	2,384	2,512	2,619	2,851
Miles flown		1,168,827	1,221,881	1,363,790	1,224,994	1,215,607	1,200,750
Patients transported		3,758	4,314	3,872	4,155	4,156	4,076
Patients attended		11,619	20,645	16,406	16,022	15,500	13,857
Radio and telephone consultations		1,108	863	838	823	726	690

**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 co-operates 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 Perth metropolitan area is serviced by ambulances staffed by paid ambulance officers. A number of larger country towns are serviced by ambulances staffed by both paid and volunteer officers while the smaller country towns and centres are serviced by ambulances staffed by volunteer officers. Ambulance officers are trained to give emergency care and life support to people who are seriously ill or injured and to provide nursing care when transporting patients to hospitals and medical centres.

First aid courses, taught by paid and voluntary staff, are provided by the Association. Emphasis is laid on practical involvement of students.

The Medic Alert Foundation is administered and serviced by the Association in Western Australia. Medic Alert provides a service which ensures that persons who have a medical problem receive appropriate treatment in the event of accident or collapse.

THE ST JOHN AMBULANCE ASSOCIATION  
WESTERN AUSTRALIA

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Ambulance service (b)						
Patient calls	r 52,000	r 56,100	r 62,700	r 66,300	r 66,900	68,600
Kilometres travelled	1,797,000	1,845,000	2,169,000	2,198,000	2,095,000	2,214,000
First aid classes —						
Certificates issued	r 6,600	r 7,700	r 12,300	r 14,700	r 19,200	19,800

### Miscellaneous Health Services

Other expenditure by the Commonwealth Government on health services includes the cost of district health laboratory services, the free supply of certain prophylactic materials and biological products (e.g. poliomyelitis vaccine), the supply and maintenance of hearing aids for children and pensioners, the supply of artificially produced radio-active isotopes to private medical practitioners and hospitals for medical treatment purposes, and expenses in connection with the blood fractionation plant of the Commonwealth Serum Laboratories.

## COMMUNICABLE DISEASES

### Quarantine

The *Quarantine Act 1908* provides for the quarantine of humans, animals and plants. Human quarantine is concerned primarily with the procedures necessary to exclude quarantinable diseases, namely plague, cholera, yellow fever, typhus fever, lassa fever, Marburg virus disease and such other diseases as may be declared under the Quarantine Act. Animal quarantine regulates the importation of animals and animal products from overseas, and plant quarantine the importation of all plants and plant products, with the object of excluding plant diseases, insect pests and weeds. In respect of interstate movements of animals and plants, the Quarantine Act becomes operative only when it is considered that Commonwealth Government action is necessary for the protection of any State or States, and in general the control of interstate movements of animals and plants is the responsibility of State Governments.

The Commonwealth Department of Health administers the Quarantine Act in matters relating to humans whilst aspects relating to animals and plants are the responsibility of the Department of Primary Industries.

### Infectious Diseases

The *Health Act 1911* provides for the compulsory notification of infectious diseases and for the application of preventive measures. For the purposes of the Act, infectious diseases are those which are specified in the Act, as well as any other diseases which may, from time to time, be declared. The occupier of premises where such a disease occurs is required to notify the local authority forthwith. The medical practitioner who attends a person suffering from an infectious disease must, on the day on which he becomes aware of the nature of the disease, notify the occupier and also the local authority and the Executive Director of Public Health.

On the appearance of any epidemic, endemic or contagious disease, the local authority is required to notify the Executive Director of Public Health immediately and to report periodically on the disease. The Act provides for the disinfection and cleansing of premises and for the disinfection and destruction of bedding, clothing or other articles which have been exposed to infection. Any person suspected to be suffering from, or to be a carrier of, an infectious disease may be required to submit to medical examination.

Leprosy and trachoma are endemic among the Aborigines of the Kimberley Division in the far north of the State, and cases are, with few exceptions, confined to the Aboriginal population. The Health Department of Western Australia and the Northern Territory Medical Service co-operate in the control of these diseases.

The Executive Director of Public Health may compel any person believed to be suffering from venereal disease to undergo examination by a medical practitioner. Any person who is aware or suspects that he or she is suffering from venereal disease is required to consult a medical practitioner and, if found to be infected, must continue treatment until a certificate of cure is issued. Free treatment is available at public hospitals.

The State Government conducts a tuberculosis control program throughout the State. This includes the provision of services for diagnosis and treatment as well as preventive measures. Under the *Health Act 1911*, all persons in Western Australia may be required to undergo X-ray examinations, which are conducted by mobile units of the Chest and Tuberculosis Services and at the Perth and Fremantle Chest Clinics.

## NOTIFIABLE DISEASES (a) — CASES NOTIFIED

Disease type	Year of statutory notification				
	1980	1981	1982	1983	1984
Acquired immune deficiency syndrome (b)	..	..	..	—	2
Amoebiasis (c)	4	4	—	3	7
Ankylostomiasis (c)	—	—	—	1	2
Arbovirus infections (c)	—	1	—	—	2
Bacillary dysentery	87	74	87	89	55
Bilharziasis	—	—	1	—	1
Brucellosis (c)	3	—	—	1	1
Campylobacter infections (c)	—	5	—	—	—
Chancroid (c)	—	1	1	7	6
Cholera	—	—	—	—	—
Diphtheria	—	—	—	—	—
Donovanosis (c)	—	8	8	32	105
Encephalitis, Lethargic	—	1	—	—	—
Gonorrhoea (c)	1,208	1,458	1,420	1,729	1,434
Hepatitis A (infectious)	59	66	64	51	38
Hepatitis B (serum) (c)	16	17	20	16	155
Hepatitis — unspecified	168	77	70	105	28
Hydatid disease (c)	—	—	—	—	1
Leprosy	9	8	14	17	2
Leptospirosis (c)	9	11	5	9	8
Malaria (c) (d)	50	30	20	34	34
Meningococcal infections (c)	—	1	1	2	6
Ornithosis (c)	—	—	—	—	10
Paratyphoid fever	—	3	—	—	1
Polioomyelitis	—	—	—	—	—
Salmonella infections (c)	219	167	97	93	113
Scarlet fever	3	3	2	6	6
Syphilis (c)	184	230	222	287	204
Tetanus	—	—	—	—	—
Trichinosis	1	—	—	—	—
Tuberculosis (all forms) (c)	167	160	137	152	134
Typhoid fever (c)	4	1	2	—	2
Typhus fever (all forms) (c)	—	—	1	—	—

(a) Includes diseases notifiable under Commonwealth legislation. (b) Notifiable from 9 September 1983. (c) Confirmed by appropriate diagnostic test in nominated pathology laboratories. (d) Contracted out of State.

## 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 Forces and certain dependants.

**State Government and Government-assisted Hospitals**

The *Hospitals Act 1927* is administered, subject to the direction of the Minister for Health, by the Health Department of Western Australia. For administrative purposes, a hospital under the direct control of this Department is classified as 'departmental' and is financed from State funds. A hospital classified as a 'Board' hospital has its own board of management and is subsidised by the State Government.

The principal government and government-assisted hospitals in the metropolitan area are the Royal Perth Hospital, Fremantle Hospital, Sir Charles Gairdner Hospital, King Edward Memorial Hospital for Women, Princess Margaret Hospital for Children, the Homes of Peace for the Chronic Sick, the Perth Dental Hospital, and Mount Henry Hospital and Sunset Hospital for long-term patients. Outside the metropolitan area the principal hospitals are located in the regional centres of Albany, Bunbury, Carnarvon, Derby, Geraldton, Kalgoorlie, Narrogin, Northam and Port Hedland.

## DEPARTMENTAL AND BOARD HOSPITALS (a)

Particulars		1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Expenditure —							
Capital funds	\$'000	40,623	36,979	34,817	26,752	19,051	29,454
Hospital Fund —							
Establishment and domestic (b)	\$'000	28,382	17,129	29,777	34,979	37,885	42,159
Salaries and wages	\$'000	227,193	254,889	280,330	327,020	348,566	377,660
Other	\$'000	102,113	134,265	134,007	106,698	120,960	128,436
Total	\$'000	398,311	443,262	478,931	495,449	526,462	577,709
Number of —							
Hospitals (c) —							
Departmental		50	50	49	50	50	50
Board		57	56	60	53	53	52
Total		107	106	109	103	103	102
Beds (d) —							
Departmental		3,429	3,406	3,810	3,340	3,294	3,315
Board		4,639	4,512	4,057	4,450	4,477	4,477
Total		8,068	7,918	7,867	7,790	7,771	7,792
Staff (c) —							
Medical		915	839	978	941	981	992
Nursing		8,228	7,728	8,120	8,088	8,218	8,369
Other		8,833	8,658	9,975	9,356	8,945	9,113
Total		17,976	17,225	19,073	18,385	18,144	18,474
In-patients —							
Admissions		235,544	235,285	233,850	237,398	241,195	243,681
Discharges		231,288	231,551	230,080	233,462	237,799	239,315
Deaths		3,903	3,874	3,790	3,812	3,918	3,964
At end of year		6,088	5,971	5,900	6,024	5,502	5,904
Average daily number resident		5,981	5,837	5,658	5,785	5,756	5,678
Out-patients —							
Treatments		2,980,340	2,635,114	2,363,350	2,335,203	2,581,808	2,862,161

(a) Includes particulars of the Perth Dental Hospital, and Mount Henry Hospital and Sunset Hospital for long-term patients. (b) Maintenance of equipment, furnishings and minor repairs. (c) At 30 June. (d) At 31 July.

As previously indicated, the control of tuberculosis is carried out under the direction of the Commissioner of Health. The principal institution for the treatment of tuberculosis is the Sir Charles Gairdner Hospital at Nedlands.

Leprosy, which is confined almost entirely to the far north of the State, is treated at a leprosarium at Derby in the Kimberley Division, operated by the Health Department of Western Australia.

### 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. These include the Hospitals of Saint John of God at Subiaco, Rivervale, Bunbury and Geraldton; Saint Anne's, Mount Lawley; Bethesda Hospital, Claremont and Saint Joseph's Hospital, Bicton.

At 30 June 1985 there were 126 private hospitals and nursing homes in Western Australia with a total bed capacity of 6,651 at that date.

### Mental Health Institutions

The *Mental Health Act 1962* 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. A person so received into a hospital must be examined within seventy-two hours by the superintendent or another psychiatrist, and admission as a patient is dependent upon the result of the examination. Unless found to be in need of treatment, the person is required to leave the hospital. 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.

## PSYCHIATRIC SERVICES — YEAR ENDED 30 JUNE 1985

Particulars	Approved psychiatric hospitals	Psychiatric outpatient and day patient facilities	Other psychiatric residential units	Psychiatric rehabilitation units	Intellectually handicapped residential units	Intellectually handicapped day facilities	Central services
Expenditure —							
Salaries and wages	\$'000 24,086	5,523	5,157	1,624	19,928	5,314	10,248
Other	\$'000 4,279	1,028	970	632	2,288	844	7,932
Total	\$'000 28,365	6,551	6,127	2,256	22,216	6,158	18,180
Number of (a) —							
Units	3	30	11	6	24	11	..
Beds	532	..	331	..	752	..	..
Staff —							
Medical	27	28	7	..	..	..	11
Nursing	501	37	311	1	265	..	4
Other	355	138	175	74	657	201	568
Total	883	203	493	75	922	201	583
Admissions	2,291	..	485	..	..	..	..
Discharges (b)	2,480	..	322	..	..	..	..
Patients at end of year	401	..	290	..	..	..	..
Attendances	..	240,420	..	104,801	..	43,366	..
Persons attending	..	17,239	..	670	..	1,789	..

(a) At 30 June. (b) Includes deaths.

Except in the case of a person admitted by order of a court or from a prison, a patient may be released on leave or discharged by the hospital superintendent. A Board of Visitors or the Supreme Court of Western Australia may also, after due consideration, order the release of a patient. Where application for the discharge of a voluntary patient is made either by the patient himself or, in the case of a patient under the age of eighteen years, by the parent or guardian at whose request the patient was admitted, he must be discharged within seventy-two hours.

Establishments designated as approved hospitals within the meaning of the Act are Graylands Hospital, Swanbourne Hospital, Lemnos Hospital and Heathcote Hospital.

## 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 Probation and Parole Service, 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 many instrumentalities.

### LAW REFORM COMMISSION OF WESTERN AUSTRALIA

The Law Reform Commission of Western Australia was established by the *Law Reform Commission Act 1972* which came into force on 19 January 1973. The Commission has two full-time members and three part-time members. The full-time members must be or have been legal practitioners in Australia for at least eight years or have other suitable legal qualifications and experience. Of the part-time members one must be a legal practitioner practising as such in Western Australia; one must be engaged in teaching law at a University in Western Australia; and one must be a legal officer of the Western Australian Crown Law Department.

The Commission 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.

During the year ended 30 June 1985 the Commission submitted reports on Recognition of Interstate and Foreign Grants of Probate, and the Pawnbrokers Act, and issued discussion papers on Wills: Substantial Compliance, on the Pawnbrokers Act and on Alteration of Ground Levels.

### PARLIAMENTARY COMMISSIONER FOR ADMINISTRATIVE INVESTIGATIONS

The office of the Parliamentary Commissioner for Administrative Investigations, the first of its kind in Australia, was established in 1972, pursuant to the *Parliamentary Commissioner Act 1971*.

The Commissioner (commonly known as the Ombudsman) is empowered 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.

Following an amendment to the Parliamentary Commissioner Act, the Ombudsman may investigate complaints about the conduct of the police force on or after 1 July 1985. The Commissioner of Police must first have a reasonable opportunity to investigate such a complaint but is required to obtain the consent of the Ombudsman if the investigation is to extend beyond forty-two days from the receipt of the complaint.

Where the Ombudsman is of the opinion, after an investigation is completed, that there has been defective administration, or misconduct in the case of the police force, he informs the responsible Minister and the department or authority concerned, with recommendations where appropriate. In the event of a failure to comply with such recommendations, the Ombudsman may report to the Premier and to the Parliament.

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.

#### PARLIAMENTARY COMMISSIONER FOR ADMINISTRATIVE INVESTIGATIONS COMPLAINTS RECEIVED — YEAR ENDED 30 JUNE

Particulars	1983	1984	1985
Complaints received against —			
Departments	497	515	573
Statutory authorities	362	313	283
Local authorities	248	235	259
Organisations not within jurisdiction	134	130	101
Total	1,241	1,193	1,216

During 1985, of the 1,223 written complaints processed, 13 were sustained. In 130 cases, complaints were not treated as sustained because they were resolved during investigation to the satisfaction of the complainant and the organisation. In 742 of the complaints processed some assistance was given to the complainant by way of resolution or clarification.

### LAW COURTS

The principal courts operating in Western Australia are the High Court of Australia, the Supreme Court of Western Australia, The District Court of Western Australia, the Family Court of Western Australia, the Magistrates' and Coroners' Courts and the Licensing Court of Western Australia. In Chapter 22, 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. Further reference to the Federal Court of Australia may be found in Chapter 25.

#### High Court of Australia

The High Court of Australia is the Federal Supreme Court and its powers are defined in the Constitution Act and in the *Judiciary Act 1903*. The Constitution requires that there shall be a Chief Justice and not less than two other Justices of the High Court. At 31 December 1985 there were six other Justices. Sittings are held in the capital city of each State as occasion may require. 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, as constituted under the *Supreme Court Act 1935*, consisted of a Chief Justice, eight other Judges and two Masters at 31 December 1985. 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. Criminal sittings of the Supreme Court are held at Perth each month from February to December, and also in January if the Chief Justice so directs. Civil sittings and Full Court sittings are held at times fixed by the Court from year to year. There are regular sittings at Albany, Bunbury, Geraldton and Kalgoorlie, and at some other country centres as required.

Any two or more Judges together comprise a Full Court except that when sitting as a court of criminal appeal there must be an uneven number of Judges. 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 lies to the High Court of Australia, subject to the provisions of the *Judiciary Act 1903*.

### **The District Court of Western Australia**

The District Court of Western Australia is constituted under the provisions of the *District Court of Western Australia Act 1969* and at 31 December 1985 consisted of a Chief Judge and eleven 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. Criminal sittings of the District Court are held at Perth each month from January to December, four times a year at Albany, Bunbury, Geraldton and Carnarvon, six times a year at Kalgoorlie, and at other centres when required. Civil sittings are held concurrently with criminal sittings in Perth, and immediately following the criminal sittings at other centres except at Bunbury and Geraldton where special civil sittings are held four times a year, and Kalgoorlie where such sittings are held three times a year.

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 which came into operation on 1 June 1976 is constituted under the provisions of the *Family Court Act 1975*. At 31 December 1985 the Court consisted of a Chairman of Judges and four other Judges. The jurisdiction of the Court is exercisable by one Judge.

The Court has throughout the State the federal jurisdiction with which it is invested by the *Family Law Act 1975* and non-federal jurisdiction conferred on it by, or under any Act of the State.

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.

### **Courts of Petty Sessions**

Courts of Petty Sessions, which are established in terms of the *Justices Act 1902*, are held at centres of population throughout the State. Minor offences are dealt with summarily, but a person charged with an indictable offence may be committed to a higher court for trial or sentence if there is sufficient evidence to justify this course. 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**

The *Child Welfare Act 1947* provides for the establishment of Childrens Courts, and the appointment of special magistrates, to deal with offenders under the age of eighteen years and to hear certain specified cases of offences against children. Certain cases of offences concerning children may be remanded for hearing or committed for sentence before the Supreme Court or the District Court. The public may be excluded from Childrens Court hearings and reports of proceedings containing matters likely to lead to the identification of a child concerned in the proceedings shall not be published; however, in certain cases, a Court may release names for publication. Childrens Courts operate in Perth, and at other centres as required. Further reference to Childrens Courts appears in the section *Child Welfare* in Chapter 7.

### **Local Courts**

Local Courts, established in terms of the *Local Courts Act 1904*, are held throughout the State to determine minor civil issues. Jurisdiction is limited in most cases to claims not exceeding \$6,000. The *Local Courts Amendment Act 1982* established a Small Debts Division of the Local Court to provide a quicker and less expensive means of recovering debts of less than \$2,000.

### **Coroners Courts**

The powers of coroners are derived from the *Coroners Act 1920*. 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 him for trial at a higher court.

### **Licensing Court of Western Australia**

The Licensing Court of Western Australia is established under the provisions of the *Liquor Act 1970*. The Court comprises three members, including a chairman, appointed by the Governor. Except as otherwise provided by the Act, the Court may be constituted, and its jurisdiction may be exercised, by any two members. The Court 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**

The *Small Claims Tribunals Act 1974* provides for the establishment of Small Claims Tribunals and the appointment of referees to 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. Settlements or orders made by a referee are final and binding on all parties to a proceeding. Administration of the Small Claims Tribunals is the responsibility of the Department of Consumer Affairs, the functions of which are described in Chapter 18.

## **CIVIL PROCEEDINGS**

The following table shows particulars of civil cases, with the exception of bankruptcy cases, which are included in Chapter 25.

## COURTS — CIVIL PROCEEDINGS

Particulars	1980	1981	1982	1983	1984	1985
<b>SUPREME COURT OF WESTERN AUSTRALIA —</b>						
Actions —						
Writs of summons issued	1,308	1,618	1,671	1,539	1,378	1,053
Actions listed for trial	225	188	308	221	291	207
Actions settled without trial	90	59	160	85	128	86
Actions heard	135	129	148	136	163	121
Other originating processes —						
Originating summons	188	214	247	195	266	191
Originating motions	96	114	100	170	101	116
Petitions —						
Companies Act	154	111	141	166	187	221
Judgements made	336	346	436	440	415	245
<b>THE DISTRICT COURT OF WESTERN AUSTRALIA (a) —</b>						
Number of —						
Writs commencing actions	4,865	5,377	4,614	4,750	4,679	5,501
Judgements —						
With trial	r 259	291	(b) 178	184	250	228
Without trial	r 2,439	2,464	r (b) 2,432	2,521	1,471	1,425
<b>FAMILY COURT OF WESTERN AUSTRALIA —</b>						
Dissolution of marriage —						
Number of —						
Applications filed	3,363	3,937	3,786	3,761	3,935	n.y.a.
Decrees made	3,073	3,481	3,842	3,822	4,069	n.y.a.
<b>LOCAL COURTS —</b>						
Number of —						
Plaints entered	77,227	70,520	(b) 74,983	77,554	66,665	n.y.a.
Verdicts for plaintiffs	28,080	23,922	(b) 27,426	30,695	28,409	n.y.a.
Amounts awarded	\$'000 16,084	14,783	22,870	28,187	25,467	n.y.a.
<b>CORONERS' COURTS —</b>						
Number of —						
Inquests	n.a.	183	136	95	69	n.y.a.
Inquiries	n.a.	2,025	1,813	1,599	1,781	n.y.a.

(a) From 1982 relates to Perth registry only. (b) The variation between 1981 and 1982 in judgements made in the District Court and in plaintiffs entered and verdicts for plaintiffs in Local Courts is because of a change in the threshold of claims which may be determined in the respective courts.

## CONVICTIONS IN COURTS

## Number of Convictions

It is important to bear in mind when considering the particulars shown in the following table 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.

COURT STATISTICS — NUMBER OF CONVICTIONS: 1983-84  
[Excluding Perth and East Perth Courts of Petty Sessions (a)]

DANCO Code (b)	Description	Supreme and District Courts			Childrens Courts	Total
		District Courts	Petty Sessions	Courts of Petty Sessions		
100	Offences against the person —					
111	Murder		9	—	—	9
112	Attempted murder		3	—	—	3
113	Conspiracy to murder		—	—	—	—
114	Manslaughter (excluding by driving)		8	—	—	8
115	Driving causing death		10	8	2	20
121	Assault occasioning grievous bodily harm		114	34	26	174
122	Assault occasioning actual bodily harm		24	227	66	317
123	Other assault		31	1,444	593	2,068
131	Rape		53	—	—	53
132	Carnal knowledge		7	—	79	86
133	Incest		18	—	—	18
134	Indecent assault		39	1	56	96
135	Other sexual offences		31	12	97	140
141	Kidnapping and abduction		31	—	3	34
142	Ill-treatment of children		—	—	4	4
143	Other offences against the person (including acts of endangering life) n.e.i.		3	174	28	205
	Total		381	1,900	954	3,235

For footnotes, see end of table.

COURT STATISTICS — NUMBER OF CONVICTIONS: 1983-84 — *continued*  
 [Excluding Perth and East Perth Courts of Petty Sessions (a)]

DANCO Code (b)	Description	Supreme and District Courts	Courts of Petty Sessions	Childrens Courts	Total
200	Robbery and extortion —				
211	Armed robbery	83	—	8	91
212	Other robbery	39	—	40	79
221	Extortion	2	—	—	2
	Total	124	—	48	172
300	Breaking and entering, fraud, and other offences involving theft —				
311	Breaking and entering — dwellings	624	159	2,918	3,701
312	Breaking and entering — shops	94	—	14	108
313	Breaking and entering — other buildings	246	510	2,562	3,318
321	Fraud, forgery and false pretences	438	1,180	517	2,135
322	Misappropriation	28	61	53	142
331	Receiving	55	167	342	564
332	Unlawful possession of stolen goods	—	1,522	2,032	3,554
341	Motor vehicle theft	100	509	2,246	2,855
342	Stealing from the person	2	1	6	9
343	Shoplifting	3	9	2	14
344	Other theft	194	1,567	2,257	4,018
	Total	1,784	5,685	12,949	20,418
400	Property damage and environmental offences —				
411	Arson (person not therein)	24	—	28	52
412	Other property damage	8	1,233	1,012	2,253
421	Pollution	—	14	—	14
422	Other environmental offences	—	332	15	347
	Total	32	1,579	1,055	2,666
500	Offences against good order —				
511	Offences against Government security and operations	2	9	—	11
521	Breach of maintenance order	—	—	—	—
522	Offences against enforcement of order	103	3,282	906	4,291
531	Prostitution and related offences	2	7	1	10
541	Offences involving drunkenness	—	13,275	581	13,856
542	Other offensive behaviour	1	430	92	523
551	Unlawful possession of weapons	7	785	158	950
561	Liquor and licensing offences	—	1,219	435	1,654
562	Betting and gaming offences	—	26	—	26
563	Trespassing and vagrancy	—	509	546	1,055
564	Consorting	—	—	—	—
565	Other offences against good order	—	4,619	879	5,498
	Total	115	24,161	3,598	27,874
600	Drug offences —				
611	Possession/use of narcotics	10	23	1	34
612	Possession/use of cannabis/marihuana	4	1,088	318	1,410
613	Possession/use of other drugs	—	89	19	108
621	Dealing and trafficking in drugs	117	43	12	172
631	Manufacturing/growing drugs	13	269	40	322
632	Other drug offences	—	522	188	710
	Total	144	2,034	578	2,756
700	Motor vehicle, traffic and related offences —				
711	Driving under influence of alcohol or drugs	—	6,946	498	7,444
712	Dangerous, reckless, negligent driving (excluding driving causing death or bodily harm)	—	1,188	425	1,613
713	Other offences involving the driving of a vehicle	—	12,971	980	13,951
721	Licence offences	—	6,231	2,448	8,679
722	Registration/insurance offences	—	2,649	481	3,130
723	Roadworthiness and other administrative offences	—	1,944	231	2,175
731	Other motor vehicle, traffic and related offences	—	5,250	412	5,662
	Total	—	37,179	5,475	42,654
800	Other offences	1	3,787	104	3,892
900	Child welfare matters —				
911	Child Welfare matters	—	—	155	155
	GRAND TOTAL	2,581	76,325	24,916	103,822

(a) Approximately 70,000 complaints were finalised in these Courts during 1983-84. (b) Relates to *Draft Australian National Classification of Offences*, ABS Canberra, June 1980.

Under the *Road Traffic Act 1974* fines may be imposed without court action for minor traffic offences. Similar provisions apply under parking facilities legislation and municipal by-laws. These minor offences (which are, of course, excluded from the table relating to court convictions) numbered 333,545 in 1979, 335,241 in 1980, 348,452 in 1981, 358,395 in 1982, 348,009 in 1983 and 373,662 in 1984.

### LIQUOR LICENCES

The following table shows the number of liquor licences of the several types in force in Western Australia under the provisions of the *Liquor Act 1970*.

#### LIQUOR LICENCES IN FORCE

Type of licence	At 30 June —					
	1979	1980	1981	1982	1983	1984
Australian wine	8	6	6	3	2	2
Brewer's	5	4	2	2	2	1
Cabaret	32	35	36	36	37	36
Canteen	32	33	38	38	46	42
Club	316	321	323	328	330	328
Historic inn	—	—	1	1	1	2
Hotel	383	381	380	379	378	377
Limited hotel	24	26	26	29	31	34
Packet	20	21	22	26	26	26
Reception lodge	—	—	—	1	4	5
Restaurant	156	168	201	215	232	251
Store	328	330	333	336	335	333
Tavern	175	184	187	195	199	200
Theatre	5	5	5	5	6	6
Vigneron's	2	4	5	6	6	7
Wholesale	69	73	74	73	67	67
Winehouse	12	15	16	17	16	13
Total	1,567	1,606	1,655	1,690	1,718	1,730

By a provision of the *Government Railways Act 1904*, The Western Australian Government Railways Commission is authorised to lease railways premises for the sale of refreshments, subject to the provisions of the *Liquor Act 1970*.

A licence applying to premises at Perth International Airport is issued in terms of the *Airports (Business Concessions) Act 1959*.

### 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. Persons not qualified to serve as jurors include those who have been convicted of an offence and sentenced to imprisonment for a term exceeding two years and who have not received a free pardon, or within five years prior to receiving a jury summons served any part of a sentence of imprisonment, been on parole, probation or detained in an institution for juvenile offenders. Persons who do not understand the English language or are permanently incapacitated are also not qualified. In addition persons over the age of 65 years, or those in certain occupations are not eligible for jury service, while certain other classes of persons may be excused 'as of right'. Persons may also be excused on the grounds of illness, undue hardship, circumstances of sufficient weight, importance or urgency; or recent jury service. In twelve jury districts the Juror's

Book prepared for 1985-86, records some 49,000 potential jurors; of these, 25,000 are in the Perth Metropolitan District.

During the year ended 30 June 1985, 8,839 jurors attended court for panel selection procedures and of those 6,995 were for the Perth Jury District.

#### **Fees for Jurors**

Regulations provide that a person summoned and attending as a juror shall be paid a fee. If a juror suffers loss of income by reason of jury service, the juror may apply for reimbursement of the loss incurred. A person attending as a juror is also entitled to travelling expenses.

#### **THE LEGAL PROFESSION**

The Barristers' Board, constituted under the *Legal Practitioners Act 1893*, comprises the Attorney General as chairman; the Solicitor General; all Queen's Counsel permanently residing and practising in the State; and seven practitioners of at least three years' standing and practice in the State, elected annually by the practitioners on the roll of the Supreme Court residing and practising in the State.

The 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. The certificate of the Board (known as the Chairman's Certificate) is necessary before any person may be admitted to practice. Applicants for admission having qualifications acquired outside Western Australia must satisfy the Board that they possess qualifications substantially equivalent to those required for the admission of persons who qualify in Western Australia.

In addition to the Chairman's Certificate, practitioners are required to obtain a Practising Certificate, renewable annually, from the Board. At 30 June 1985, 1,331 Practising Certificates had been issued in respect of the 1984-85 year.

#### **Legal Fees**

A scale of costs for legal work is set by legislation. Practitioners may not vary these costs unless prior agreement is reached with respective clients.

#### **LEGAL AID COMMISSION OF WESTERN AUSTRALIA**

The Legal Aid Commission is constituted under authority of the *Legal Aid Commission Act 1976*. It consists of eight Commissioners appointed by the Governor. Five Commissioners (one of whom is the Chairman) are nominated for appointment by the Attorney General. One is nominated by the Minister responsible for the Consumer Affairs Act and one is nominated by the Attorney General of the Commonwealth. The remaining member of the Commission is the Director of Legal Aid. Four of the members nominated by the Attorney General must be legal practitioners.

The Commission functions to provide legal assistance to those who apply for assistance under the Act. The assistance may be provided by Commission staff or by arrangement for the services of private practitioners to be made available at no expense to, or wholly or partly at the expense of, the Commission.

Persons requiring legal advice may obtain it by attending any office of the Commission and paying a nominal fee (\$5 at 30 June 1985) for service provided by a duty solicitor. There is no means test for applicants for legal advice and the fee is readily waived or reduced in cases of hardship. The Commission has offices in Perth, Midland, Fremantle, Broome and Bunbury and a further office is planned to open in Port Hedland during 1986. Through the duty counsel service, in conjunction with private legal practitioners, the Commission provides assistance at many Courts of Petty Sessions and Childrens Courts. A duty solicitor is also available at the Family Court in Western Australia and a 'flying solicitor' provides legal advice to those requiring assistance in a circuit of towns in the Kimberley and Pilbara areas of the State.

During the year ended 30 June 1985 some 54,000 persons sought assistance from the Commission. Duty counsel assisted some 20,200 persons whilst Legal Advice Bureau staff (duty solicitors) assisted more than 18,200 persons. Ongoing legal assistance was granted in 9,841 cases from some 15,000 applications. Staff lawyers employed by the Commission handled over 2,900

of these cases, whilst \$5.3 million was paid to private legal practitioners for cases undertaken by them. Since the Commission started operations in 1978, more than 316,000 persons throughout the State have sought assistance.

### WESTERN AUSTRALIA POLICE DEPARTMENT

The Western Australia Police Department comprises five main branches under the direction of the Commissioner of Police. The Commissioner is appointed by the Governor under the provisions of the *Police Act 1892* and is responsible to the Minister for Police.

The main branches of the Department are the General Uniformed, Criminal Investigation, Liquor and Gaming, Firearms and Traffic Branches. Other specialised units operating in different fields of law enforcement are: the Tactical Response Group, the 79 Division, the Scientific Branch, the Water Police, the Mounted Police, the Prosecuting Branch, Management Services, Community Affairs, Crime Prevention, Community Education, Missing Persons, Coronial Inquiry, Communications Branch, Recruitment, Training, Police and Citizens' Youth Clubs and Information and Management Services (Computing).

#### **The Uniformed Branch**

The Uniformed Branch comprises the main body of the Police and is responsible for the routine maintenance of law and order throughout the State. For the administration of the Branch, the State is divided into three metropolitan regions, five metropolitan divisions, eight country regions and one country division, each under the direction of a commissioned officer. Where required, officers of the Branch act as Clerks of Courts and perform special duties for other government authorities.

#### **The Criminal Investigation Branch**

Investigation of serious crimes and the apprehension of offenders is the main concern of the Criminal Investigation Branch which is centred in Perth, with several sub branches in the metropolitan area and the principal country towns.

**The Commercial Agents Squad.** Uniformed officers and plain clothes officers, comprise the Commercial Agents Squad element of the Criminal Investigation Branch. This squad investigates matters relating to land agents, auctioneers, money lenders, inquiry agents, employment brokers, debt collectors, security agents and guards, and installers and technicians of intruder alarm systems and security devices.

#### **The Tactical Response Group**

The Tactical Response Group, which commenced operations on 1 July 1985, comprises selected officers equipped and trained to combat violence; handle incidents where firearms are suspected; control crowd situations where force is envisaged; and to undertake disaster rescues.

#### **The 79 Division**

The 79 Division squad, inaugurated in the sesquicentennial year of the founding of Western Australia, comprises uniformed officers and detectives who provide a 24 hour mobile patrol service in the Perth Metropolitan area. Ready response is given to any situation with priority going to emergency and criminal matters.

#### **The Community Affairs, Crime Prevention and Community Education Branches**

These Branches are responsible for maintaining satisfactory relationships with the public and the news media. Learning situations are created for children and students from early childhood to tertiary education level and also for minor offenders against traffic and liquor laws. Public relations are an integral part of all operational and administrative functions and every endeavour is made to promote good relationships. Public education services also include appraisals and advice on matters of home and business security.

## POLICE FORCE — NUMBER AND CLASSIFICATION

Date of classification	Branch and number of officers						Total (b)
	General Uniformed Branch	Criminal Investigation Branch	Liquor and Gaming Branch	Firearms Branch	Traffic Branch (a)	Other Branches	
At 30 June —							
1980	1,331	380	51	12	572	291	2,643
1981	1,355	358	51	12	575	299	2,656
1982	1,484	369	55	12	396	377	2,703
1983	1,609	394	57	12	407	334	2,823
1984	1,675	404	59	12	400	330	2,895
1985 —							
Superintendent	21	4	1	1	3	5	35
Senior Inspector	22	4	1	—	4	7	38
Inspector	14	2	—	—	9	12	37
Sergeant	317	146	8	5	79	125	680
Constable	1,359	260	51	6	308	186	2,170
Total	1,733	416	61	12	403	335	(c) 2,975

(a) Traffic Branch was re-established on 2 February 1982 when the former Road Traffic Authority was amalgamated with the Police Department. (b) Total numbers at 30 June include the Commissioner, Assistant Commissioners and Chief Superintendents not incorporated in Branch totals. There were 6 of these officers in 1980 and 1981, 10 in 1982 and 1983 and 15 in 1984 and 1985. (c) Includes 99 women police officers.

## PRISONS

Under the provisions of the *Prisons Act 1903*, the Director of the Prisons Department is responsible, subject to the control of the Minister, for the administration of prisons in Western Australia. In addition to the prisons there is a police gaol at East Perth administered jointly by the Prisons Department and the Police Department.

The police gaol at East Perth holds 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.

The following table shows the daily average number of prisoners held in Western Australia during each of the six years to 30 June 1985.

## NUMBER OF PRISONERS — DAILY AVERAGE: YEAR ENDED 30 JUNE

Institution	1980		1981		1982		1983		1984		1985	
	Males	Females										
Prisons	1,371.8	65.4	1,364.8	62.8	1,288.1	61.7	1,397.7	72.2	1,383.3	62.9	1,393.5	70.7
Police gaol — East Perth	15.6	—	15.3	—	12.8	—	12.5	—	13.6	—	13.7	—
Police lock-ups	51.0	17.2	66.1	20.1	57.0	16.9	66.7	24.1	68.7	17.9	81.4	22.7
Public hospitals	3.3	—	3.7	0.3	3.8	0.6	2.6	0.4	4.2	0.4	2.2	0.6
Total	1,441.7	82.6	1,449.9	83.2	1,361.7	79.2	1,479.5	96.7	1,469.8	81.2	1,490.8	94.0
Persons	1,524.3		1,533.1		1,440.9		1,576.2		1,551.0		1,584.8	

The main metropolitan prison is at Fremantle. In addition, the Metropolitan Prison Complex contains the Canning Vale prison, a major receiving prison, and the C.W. Campbell Remand Centre. The major women's prison is Bandyup. Outside the metropolitan area is Barton's Mill Prison and also the prison farms at Karnet, Wooroloo and Pardelup. There are regional prisons at Albany, Bunbury, Eastern Goldfields, Greenough, Roebourne, Broome and Wyndham. The Regional Prison at Roebourne was opened in March 1984. Greenough Regional Prison, replacing the Geraldton Regional Prison, opened in October 1984. Since April 1983 the West Perth Work Release Hostel has catered for male and female work release prisoners. Most remand prisoners are held in the C.W. Campbell Remand Centre.

## PRISON RECEIVALS 1984-85

Institution	Prisoners received (a)				Distinct persons		
	Penal		Other (b)	Total Persons	Males	Females	Persons
	Males	Females	Persons				
<b>Prisons —</b>							
Albany Regional Prison	92	—	12	104	79	—	79
Bandyup Women's Prison	—	304	101	405	—	289	289
Barton's Mill Prison	70	—	—	70	50	—	50
Broome Regional Prison	239	17	27	283	177	9	186
Bunbury Regional Prison	218	—	22	240	180	—	180
Canning Vale Prison	569	—	—	569	418	—	418
C. W. Campbell Remand Centre	312	—	524	836	634	—	634
Eastern Goldfields Regional Prison	436	63	90	589	342	45	387
Fremantle Prison	461	—	215	676	476	—	476
Greenough Regional Prison (c)	269	32	25	326	217	23	240
Karnet Prison Farm	90	—	1	91	67	—	67
Pardelup Prison Farm	17	—	—	17	7	—	7
Roebourne Regional Prison	267	54	28	349	178	26	204
Woorlooloo Prison Farm	738	—	—	738	603	—	603
Wyndham Regional Prison	201	21	20	242	144	12	156
Police gaol — East Perth	62	—	—	62	54	—	54
<b>Total</b>	<b>4,041</b>	<b>491</b>	<b>1,065</b>	<b>5,597</b>	<b>3,626</b>	<b>404</b>	<b>4,030</b>

(a) Refers to the total number of prisoners received — an individual may be received more than once during the year. (b) Debtors and remand inmates and those awaiting extradition or deportation. (c) Includes Geraldton Regional Prison.

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 employment and some training in such areas as carpentry, sheetmetal work, welding and motor mechanics. The farms provide employment and some training in various aspects of agriculture. Full or part-time educational facilities are available at all prisons with the exception of the West Perth Work Release Centre.

## PROBATION AND PAROLE SERVICE

The Probation and Parole Service, a sub-department of the Crown Law Department, is constituted under the provisions of the *Offenders Probation and Parole Act 1963*. Parole was brought into operation on 1 October 1964, probation on 1 January 1965 and community service orders on 1 February 1977.

Probation is an alternative to imprisonment; it consists of the conditional suspension of punishment while the offender is placed under the personal supervision of a probation officer and is given guidance, counselling and assistance for the offender's rehabilitation in the community. Parole is the conditional release of selected prisoners under the personal supervision of a parole officer after the offender has served part of the sentence in a penal institution. A Community Service Order is a non-custodial order of the court. It entails the offender consenting to spend some leisure time in projects which will benefit the community. In this way the offender repays to the community a debt incurred through the offending act.

One of the main functions of the Probation and Parole Service is to provide pre-sentence reports on convicted persons to the sentencing authorities. The purpose of the report is 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. An aim of the Service has been to decentralise its activities. The first country office was opened in October 1973 at Albany. The following additional country offices have since been opened: Geraldton (1976); Kalgoorlie (1977); Bunbury (1978); Port Hedland (1978); Broome (1979) and Northam (1985). In the metropolitan area there are District Offices at Fremantle, Bentley and Mirrabooka and sub-offices at Midland, Rockingham and the Central Law Courts complex.

The Act establishes a Parole Board of seven members comprising a Judge of the Supreme Court as Chairman, the Director of the Prisons Department, and three men and two women appointed by the Governor. Female prisoners are dealt with by a Board comprising five of the Parole Board members.

The Act requires that where a person is sentenced to imprisonment for twelve months or longer the court shall, unless special circumstances make it inappropriate, fix a minimum term during which the convicted person is not eligible to be released. The court is given discretionary power to fix a minimum term where the sentence is for less than twelve months. Provision is made for remission of up to three days per month on the minimum term, as a reward for good conduct or industry. Where no minimum term has been fixed or where parole has not been granted, remission of up to one third of the sentence may be allowed for diligence and good conduct.

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.

The Governor may, on the recommendation of the Parole Board, direct the release on parole of a prisoner sentenced to imprisonment for life, or an unconvicted person held in custody during the Governor's pleasure following acquittal because of unsoundness of mind. The Parole Board is required to submit to the Minister, at prescribed intervals, a report and a recommendation concerning such prisoners.

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.

#### PROBATION AND PAROLE SERVICE — YEAR ENDED 30 JUNE

Particulars	1980	1981	1982	1983	1984	1985
PROBATION (a)						
Number of probation orders —						
Issued during period		1,112	1,252	1,344	1,663	1,773
Terminated by compliance		891	802	941	1,121	1,216
Terminated — breach action taken	n.a.	282	342	361	369	385
Current for all or part of period		2,835	2,914	3,114	3,475	3,758
Current at end of period		1,662	1,770	1,812	1,985	2,157
Number of persons —						
Under supervision at end of period (b)		1,538	1,613	1,699	1,953	2,096
PAROLE						
Number of persons —						
Released on parole during period	340	362	440	462	487	568
Completion of parole	303	281	308	295	344	373
Cancellation of parole	64	76	85	135	117	144
Under supervision during period	865	860	943	1,012	1,069	1,176
Under supervision at end of period	498	503	550	582	608	659

(a) Figures for 1981 to 1984 have been revised.

(b) Includes persons subject to interstate orders and Commonwealth Crimes Act bonds.

## PUBLIC SAFETY

### National Safety Council

The National Safety Council of Western Australia was founded in January 1946 following discussions among office bearers and senior officials of the Royal Automobile Club of Western Australia and police and education authorities about the creation of an organisation for the prevention of accidents.

Although the Council has been primarily concerned with road traffic safety and training courses associated with it, a Home Safety Division was established in 1963 and a Water Safety Division in 1965 and these also conduct a wide range of practical training courses.

The National Safety Council of Western Australia is the State member division of the National Safety Council of Australia and is also represented on the Federal Advisory Committee on Promotion and Education for Road Safety.

The Council aims at the prevention of accidents by the co-ordination of the efforts of relevant organisations and by an educational program in accident prevention techniques. It pursues its objectives through the voluntary service of executive members, the financial support of the

Government, and the staff and facilities of the Safety Instructional Centre at Mount Lawley. This Centre, situated on about seven and one-quarter hectares of land close to Perth, comprises a complete road system and a comprehensive office complex including a projection theatre and lecture rooms.

### Industrial Foundation for Accident Prevention

The Industrial Foundation for Accident Prevention was established in 1962 as the Industrial Division of the National Safety Council of Western Australia. Since 1972, the Foundation has operated as a separate organisation, although it is affiliated with the Council. The Foundation is also represented on the Executive Committee of the National Safety Council of Australia.

The Foundation 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. Corporate membership fees and other charges are set in relation to the operating costs of the Foundation. 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.

### Fire Protection

**Western Australian Fire Brigades Board.** The *Fire Brigades Act 1942* constitutes the Western Australian Fire Brigades Board of eleven members. The Board comprises three members appointed by the Governor, of whom one is Chairman and another is Chief Officer of the Board; three members elected by the insurance companies carrying on business in the State; one member elected by the Council of the City of Perth; three members elected by other local government authorities; and one member elected by the registered volunteer fire brigades. The general duties of the Board are to take, superintend and enforce 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 of all fire brigades.

### WESTERN AUSTRALIAN FIRE BRIGADES BOARD — CALLS RECEIVED

Year	Number of fire calls						Number of calls for special services (a)	Total calls
	False alarms	Fires causing negligible damage	Other fires causing damage estimated at —					
			Less than \$250	\$250 to \$10,000	\$10,001 to \$250,000	More than \$250,000		
<b>METROPOLITAN FIRE DISTRICT (b)</b>								
1979-80	3,402	3,013	513	721	74	2	404	8,129
1980-81	3,116	3,389	536	722	65	5	457	8,290
1981-82	3,011	2,852	497	770	88	2	397	7,617
1982-83	3,266	3,430	343	778	107	4	380	8,308
1983-84	3,305	3,550	252	619	114	4	425	8,269
1984-85	3,598	3,966	325	805	128	3	530	9,355
<b>OTHER FIRE DISTRICTS</b>								
1979-80	185	693	165	231	41	3	79	1,397
1980-81	219	810	116	213	40	3	110	1,511
1981-82	260	831	186	196	39	5	115	1,632
1982-83	353	979	81	177	55	—	123	1,768
1983-84	385	1,051	75	220	47	3	156	1,937
1984-85	318	1,042	53	187	53	2	169	1,824
<b>WESTERN AUSTRALIA</b>								
1979-80	3,587	3,706	678	952	115	5	483	9,526
1980-81	3,335	4,199	652	935	105	8	567	9,801
1981-82	3,271	3,683	683	966	127	7	512	9,249
1982-83	3,619	4,409	424	955	162	4	503	10,076
1983-84	3,690	4,601	327	839	161	7	581	10,206
1984-85	3,916	5,008	378	992	181	5	699	11,179

(a) Includes rescue, assistance with hazardous conditions and salvage operations.

(b) As defined in the Fire Brigades Act.

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 1985, the Board had 853 employees and there were 2,075 volunteer brigade officers and firemen.

**Bush Fires Board.** The Bush Fires Board, which is constituted under the *Bush Fires Act 1954*, consists of sixteen members appointed by the Governor on the recommendation of the Minister. It comprises the Under Secretary for Lands as chairman; six persons nominated by the Country Shire Councils' Association of W.A.; three persons nominated by the Minister for Conservation and Land Management and one person nominated by each of the following: the Minister for Agriculture, The Western Australian Government Railways Commission, the Insurance Council of Australia, the Commissioner of Police, the Forest Products Association (W.A.) and the State Regional Director of the Bureau of Meteorology. The principal functions of the Board are to administer the Bush Fires 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. During 1984-85, 1,191 kilometres of firebreaks were constructed and prescribed burning was undertaken on 13,477 hectares of vacant Crown land.

The Board operates through its staff of liaison officers based in country centres. These officers promote fire protection by the exercise of co-ordination, liaison and advisory functions.

Local authorities throughout the State handle local administration of the Bush Fires Act.

# Chapter 10

## EDUCATION

### PRIMARY AND SECONDARY SCHOOL STATISTICS

The Australian Education Council comprising Federal and State Ministers established the Australian Education Council School Statistics Committee in 1979 to improve the quality of education statistics relating to government and non-government primary and secondary education. Concepts, definitions and classifications to achieve improvements and uniformity and consistency of statistical standards throughout Australia have been developed by the Committee in conjunction with the Australian Bureau of Statistics. Collections of data using the new concepts and standards are referred to as the National Schools Statistics Collection. Statistics presented in this Chapter are compiled by the Education Department of Western Australia and minor differences occur between these data and statistics published for the National Schools Statistics Collection because of minor variations in the concepts, classifications, definitions and coverage of the respective series. Wherever possible, these differences are explained in footnotes to affected statistical tables.

### PRIMARY, SECONDARY AND TECHNICAL EDUCATION

In Western Australia, education at primary and secondary levels is provided at government schools administered and staffed by the Education Department and at non-government schools, most of which are conducted by the principal religious bodies. Reference to the Technical Education Division of the Education Department will be found later in this Chapter.

#### Primary and Secondary School Students

The following tables give a classification according to age of students enrolled at government and non-government schools.

GOVERNMENT AND NON-GOVERNMENT SCHOOLS  
FULL-TIME STUDENTS CLASSIFIED ACCORDING TO AGE (a): AT 1 JULY

Age last birthday (years)	Government schools (b)						Non-government schools					
	1980	1981	1982	1983	1984	1985	1980	1981	1982	1983	1984	1985
Under 6	8,898	8,935	9,023	8,905	8,588	8,733	1,572	1,662	1,804	1,831	1,888	1,907
6	18,408	18,373	18,324	18,096	18,321	17,780	3,360	3,426	3,659	3,872	4,025	4,143
7	19,516	18,671	18,578	18,507	18,000	18,208	3,372	3,500	3,664	3,801	3,972	4,205
8	21,068	19,626	18,929	18,546	18,520	18,123	3,660	3,623	3,838	3,837	3,950	4,101
9	21,585	21,135	19,783	18,860	18,520	18,450	3,790	3,900	3,914	4,171	4,092	4,267
10	20,215	21,654	21,193	19,850	18,768	18,483	3,889	4,210	4,344	4,188	4,394	4,347
11	19,823	20,143	21,500	21,130	19,422	18,699	3,832	4,133	4,684	4,641	4,594	4,649
12	18,048	19,251	19,598	20,639	20,479	18,767	4,396	4,786	5,125	5,676	5,657	5,450
13	17,439	17,645	18,530	18,812	19,912	19,387	4,886	5,126	5,634	5,938	6,372	6,530
14	16,845	17,106	17,722	18,628	18,759	19,861	4,855	4,953	5,175	5,609	5,989	6,421
15	13,476	13,367	13,662	14,547	15,368	15,615	4,118	4,411	4,588	4,672	5,098	5,353
16	7,810	7,598	7,614	8,337	8,985	9,753	3,124	3,102	3,429	3,673	3,721	4,174
17	3,186	3,267	3,199	3,495	3,989	4,316	1,611	1,550	1,570	1,740	1,835	1,913
18 and over	317	355	773	895	1,435	1,390	130	125	110	178	174	153
Total	206,634	207,126	208,428	209,247	209,048	207,565	46,595	48,507	51,538	53,827	55,761	57,613

(a) Excludes children attending pre-school centres and children attending pre-primary grades in other schools. Includes special schools and classes. Excludes Technical Schools and Colleges. (b) For 1981 and 1982 includes some students out of scope of the National Schools Statistics Collection. For 1983 onward excludes some students in scope of the National Schools Statistics Collection.

GOVERNMENT AND NON-GOVERNMENT SCHOOLS  
FULL-TIME STUDENTS CLASSIFIED ACCORDING TO AGE AND SEX: AT 1 JULY 1985 (a)

Age last birthday (years)	Government schools (b)			Non-government schools			All schools		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Under 6	4,492	4,241	8,733	911	996	1,907	5,403	5,237	10,640
6	9,141	8,639	17,780	2,069	2,074	4,143	11,210	10,713	21,923
7	9,538	8,670	18,208	2,118	2,087	4,205	11,656	10,757	22,413
8	9,354	8,769	18,123	2,058	2,043	4,101	11,412	10,812	22,224
9	9,504	8,946	18,450	2,128	2,139	4,267	11,632	11,085	22,717
10	9,493	8,990	18,483	2,184	2,163	4,347	11,677	11,153	22,830
11	9,666	9,033	18,699	2,358	2,291	4,649	12,024	11,324	23,348
12	9,769	8,998	18,767	2,694	2,756	5,450	12,463	11,754	24,217
13	10,012	9,375	19,387	3,307	3,223	6,530	13,319	12,598	25,917
14	10,340	9,521	19,861	3,221	3,200	6,421	13,561	12,721	26,282
15	8,097	7,518	15,615	2,569	2,784	5,353	10,666	10,302	20,968
16	5,030	4,723	9,753	1,983	2,191	4,174	7,013	6,914	13,927
17	2,272	2,044	4,316	952	961	1,913	3,224	3,005	6,229
18 and over	748	642	1,390	80	73	153	828	715	1,543
Total	107,456	100,109	207,565	28,632	28,981	57,613	136,088	129,090	265,178

(a) See footnote (a) to previous table. (b) See footnote (b) to previous table.

School censuses conducted annually at or about the beginning of August prior to 1980 are now held in July in all States and the internal Territories of Australia. The Distance Education Centre, special schools and classes, schools in institutional homes, hospitals and similar establishments, and pre-school centres are included in the census. Institutions such as business colleges and coaching establishments are excluded.

### THE EDUCATION DEPARTMENT

The Education Department is responsible for the organisation and management of the State Government's education programme and is controlled by a Director-General of Education responsible to the Minister for Education. The administrative structure of the Department provides for four Directorates in the administrative area (Administration, Building Services, Finance and Management Services), five Directorates in the professional area (Schools, Educational Services, Staffing, Planning, and Educational Support) and a Technical Education Division. Special Branches attached to relevant Directorates are concerned with such activities as Aboriginal education, physical education, music, drama, art and crafts, audio-visual education, publications, guidance, library services, curriculum development, teacher development, schools computing, planning, buildings and educational research. In addition there is provision for a number of other services which are concerned with particular aspects of the education and welfare of school children, including the School Medical and Dental Service conducted in collaboration with the Health Department of Western Australia.

The Education Department has developed a policy of regionalisation. For administrative purposes there are four metropolitan and nine country regions. Regional directors interpret and implement broad government and departmental policies within their regions and act as channels of communication between the central administration, the teachers and the community in general.

#### Primary and Secondary Schools

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 compulsory from the age of six years 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 high school. A High School gives instruction in the first three years of the secondary school curriculum only, whilst a Senior High School provides five years tuition. A District High School is one which provides primary schooling and the first three years of secondary schooling. At some centres where there is no high school, post-primary subjects are taught at the primary school. Special schools provide assistance to handicapped children. Senior Colleges provide secondary education for those people who have left the school system before achieving their goals.

The Secondary Education Authority approves courses of study and issues certificates recording student achievement in secondary education in Western Australia. A Certificate of Secondary Education recording achievement is issued to each student when they leave school. Details of the Secondary Education Authority are to be found later in this Chapter.

**Primary and Secondary Curriculum.** The curriculum 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. From the beginning of primary school to the end of Year 10, all students study at least one subject from each of the seven study areas each year.

Advisory teachers working from the central and regional offices, and specialist teachers based in schools, under the direction of the regional superintendents and the specialist superintendents, assist teachers in art and crafts, physical education, music, speech, drama, science, English, social studies and mathematics.

To ensure a general and balanced education throughout Years 8 to 10, the minimum required time of study in each of the study areas is specified. This minimum required time of study gradually decreases as students progress from Year 8 through to Year 10. This allows those Year 10 students proceeding to Year 11 to tailor their studies in preparation for upper school and those students planning to leave school at the end of Year 10 to devote increasing amounts of time to vocationally-orientated subjects.

#### GOVERNMENT SCHOOLS: AT 1 JULY

Particulars	1980	1981	1982	1983	1984	1985
NUMBER OF SCHOOLS						
Primary schools	531	529	537	540	534	532
Special schools	29	31	36	39	40	53
District high schools	53	55	56	57	58	58
High schools	9	10	10	9	7	4
Senior high schools	68	70	71	72	74	79
Senior colleges	—	—	2	2	2	2
<b>Total</b>	<b>690</b>	<b>695</b>	<b>712</b>	<b>719</b>	<b>715</b>	<b>728</b>
NUMBER OF TEACHERS (a)						
Engaged in teaching duties —						
Primary (b)	6,618	6,532	6,611	6,697	6,615	6,688
Secondary	4,958	5,078	5,153	5,394	5,710	5,849
On special duties	517	512	500	540	533	577
On leave —						
Paid	97	84	83	85	179	176
Unpaid	658	710	755	732	837	1,088
<b>Total</b>	<b>12,848</b>	<b>12,916</b>	<b>13,102</b>	<b>13,448</b>	<b>13,874</b>	<b>14,378</b>
Males	5,631	5,720	5,848	5,934	6,131	6,187
Females	7,217	7,196	7,254	7,514	7,743	8,191
NUMBER OF FULL-TIME STUDENTS (c)						
Grade of education —						
Primary (b)	141,701	141,123	140,171	137,317	133,279	130,549
Secondary —						
Years 8, 9 and 10	50,058	51,282	53,016	54,912	56,442	56,711
Years 11 and 12	14,239	14,046	14,006	15,647	17,289	18,498
Senior colleges	—	—	512	539	1,014	1,044
Ungraded or special classes	636	675	723	832	1,024	763
<b>Total</b>	<b>206,634</b>	<b>207,126</b>	<b>208,428</b>	<b>209,247</b>	<b>209,048</b>	<b>207,565</b>
Males	106,425	106,674	107,634	108,114	108,213	107,456
Females	100,209	100,452	100,794	101,133	100,835	100,109

(a) Includes the number of full-time teachers plus full-time equivalent units of part-time teachers based on proportion of full-time salary paid. Excludes persons teaching pre-primary grades. (b) Includes special schools. (c) Excludes students enrolled in pre-primary grades. See also footnote (b) to the table on page 205.

The figures shown under the heading 'On special duties' represent teachers engaged in activities associated with the specialist branches of the Department, and include all advisory staff referred to above.

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.

**Audio-visual Materials, Radio and Television.** Schools are equipped with projectors, tape-recorders, radios, television sets and sound-reproduction systems. Most secondary schools have video-recording equipment and this has also been supplied to remote and other disadvantaged schools. The Audio-Visual Education Branch, which operates through a number of decentralised outlets, supplies a wide variety of learning materials on loan and for purchase. The Branch produces many requisites for use in schools, and also obtains materials from commercial sources. The Australian Broadcasting Commission liaises with the Education Department through the Audio-Visual Branch in providing an extensive range of educational radio and television broadcasts for schools.

**Student Counselling and Vocational Guidance.** Guidance Officers counsel pre-primary children and school-age students and their parents where the children are experiencing emotional/social problems or learning difficulties, and give career guidance to secondary school students.

In district high schools teachers have been appointed as Careers Advisers to provide career services to country students.

The Department also employs nurses and social workers to provide additional assistance.

**Education Support.** The Education Support Branch provides assistance to handicapped children. This includes special schools, centres and units for physically handicapped, hospitalised, and intellectually handicapped children. A kindergarten and junior school for deaf children is maintained and classes are conducted for older students. A Rural Children's Education Support Unit and Chidley Education Centre provide education for rural and isolated children with learning difficulties. The Department co-operates with the Crippled Children's Society, the Spastic Welfare Association, the Slow Learning Children's Group and other agencies in providing support for education programs.

**Academic Extension.** All schools are expected to challenge their most able students by providing them with work in advance of the average. The Academic Extension Branch provides curriculum support and advisory services for schools seeking to organise and implement extension programs. In addition, a specialised counselling service is available to parents, teachers and students.

A network of Primary Extension and Challenge centres assists schools to provide for students in Years 5, 6 and 7. Twenty of these centres are located in the metropolitan area with a further ten in country towns.

An annual talent search, conducted on a statewide basis, results in 300 students entering the Secondary Special Placement Program each year. Students commence in Year 8, with the opportunity to remain in the program to Year 12. Ten senior high schools are involved.

The Secondary Extension and Challenge Cluster Program now links a further eighteen senior high schools in four clusters. The schools in each cluster combine resources in a scheme of joint provision for their more able students. In addition, over twenty other secondary schools have developed their own extension programs.

**Distance Education.** The Distance Education Centre was formed in 1981 as the result of the amalgamation of the Western Australian Correspondence School and the Isolated Students Matriculation Scheme. It also includes the Isolated Family Correspondence Scheme which supports pre-primary education in the home. The service covers the kindergarten to Year 12 curriculum and supports students who cannot receive an education in the traditional classroom because of isolation, itinerant parents or for social and medical reasons.

The five Schools of the Air located at Carnarvon, Derby, Kalgoorlie, Meekatharra and Port Hedland maintain a close liaison with the Distance Education Centre and use prepared correspondence material to support the broadcast lessons.

Where required, support will be given by the Distance Education Centre to small rural primary and secondary schools where special needs are identified.

An expanding feature of the service offered by the Distance Education Centre is the field support given to students by visiting tutors and teaching staff. Associated with this service are the itinerant teachers who are based at the Schools of the Air.

Every opportunity is taken to provide isolated students with the opportunity of attending major or mini camps to afford some compensation for the lack of social interaction found in the normal classroom situation. Seminars are also conducted annually to support home-based supervisors.

**Senior Colleges.** The Education Department operates two senior colleges, Tuart Senior College and Canning Senior College. These colleges provide an opportunity for those students who have previously been unable to achieve their education goals while passing through the normal school system. Special attention is given to courses leading to tertiary studies.

**Aboriginal Education.** In most cases Aboriginal children work in mainstream educational programs. However, where the need is apparent a practically orientated course with a firm academic base is offered to students.

The Aboriginal Education Branch is involved in 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 February 1985 there were 10,496 Aboriginal children attending Government pre-primary, primary and secondary schools, and 2,301 at non-government schools.

Instruction for adult Aboriginals is available under the Adult Aboriginal Education program conducted by the Technical Education Division.

**Agricultural Education.** Agricultural education is provided at a number of government schools. Full-time residential courses in agriculture are available at the Cunderdin and Narrogin Agricultural Colleges, the Harvey Agricultural Senior High School and the Denmark and Morawa Agricultural District High Schools. The residential accommodation at the Cunderdin College has been designed to accommodate both male and female students. Residential accommodation for students taking courses in agriculture is also available at the agricultural school at Gnowangerup. The two-year curriculum is designed as a continuation of general education to standards equivalent to Years 11 and 12 at other types of schools. Vocational agriculture subjects are studied under the auspices of the Secondary Education Authority towards the Certificate of Secondary Education. The aim is to produce people capable of becoming leaders in rural communities as well as being successful farmers with an appreciation of the value of scientific methods in agriculture. To be eligible for selection, students must have successfully completed Year 10 and gained a satisfactory report from their previous school concerning their participation in various school activities. Although some preference is given to students who can demonstrate likely ownership-access to farming land, this is not essential.

Day instruction in agricultural subjects is provided at an increasing number of senior and district high schools. In Years 9 and 10 Horticulture, Animal Care and Farming Skills are taught as optional subjects. In Years 11 and 12 Agriculture, which makes provision for practical activities, is taught in addition to Agricultural Studies for the Certificate of Secondary Education. In addition, some schools are operating Year 11 school-based agricultural courses.

While the schools at Denmark, Harvey and Morawa are administered in conjunction with their associated high schools, Cunderdin and Narrogin Agricultural Colleges are autonomous. Narrogin Agricultural College offers short courses for farmers in addition to its other courses, and similar courses are planned for Cunderdin in the future.

Most schools providing agricultural instruction have agricultural land attached to them. Advisory committees in these schools, appointed by the Minister, offer advice concerning management and development of the land.

Diploma and certificate courses in agriculture are provided by the Technical Education Division at Albany, Bunbury, Fremantle and Geraldton Technical Colleges by means of class tuition, or by correspondence through the Technical Extension Service.

In addition to the activities of the Education Department in agricultural education, some private schools offer courses in agriculture.

### Technical and Further Education

The Technical and Further Education Division of the Education Department is the main provider of technical and further education (TAFE) in Western Australia, although three independent colleges operating at South Hedland, Karratha and Kalgoorlie also offer these facilities (details of their operations are shown later in this Chapter).

The Technical and Further Education Division trains managers, supervisors, technicians, skilled tradesmen, professionals and para-professionals, semi-skilled personnel and other kindred support staff required by industry and commerce.

The Division also provides programs alternative to those of the upper secondary school. These include vocationally related courses, and bridging and second-chance courses for young people from 15 to 19 years of age. Further services are cultural, recreational and leisure programs for the adult population, and specialist and mid-career or re-training programs in a wide variety of forms.

### TECHNICAL AND FURTHER EDUCATION

Particulars	1979	1980	1981	1982	1983	1984
NUMBER OF INSTITUTIONS (a)						
Colleges (b)	15	18	18	17	16	16
Evening technical schools	11	8	8	9	10	8
Technical centres	92	85	86	94	100	93
Other services (c)	3	3	3	3	3	3
<b>Total</b>	<b>121</b>	<b>114</b>	<b>115</b>	<b>123</b>	<b>129</b>	<b>120</b>
NUMBER OF TEACHING POSITIONS (d)						
Full-time —						
Colleges (b)	1,193	1,228	1,278	1,277	1,390	1,401
Evening technical schools	12	9	9	10	19	12
Technical centres	5	5	6	—	—	—
Other services (c)	37	51	66	65	73	93
<b>Total</b>	<b>1,247</b>	<b>1,293</b>	<b>1,359</b>	<b>1,352</b>	<b>1,482</b>	<b>1,506</b>
Part-time —						
Colleges (b)	2,071	2,169	2,450	2,364	2,311	2,017
Evening technical schools	833	681	609	750	731	710
Technical centres	990	902	884	711	734	711
Other services (c)	279	308	322	283	286	303
<b>Total</b>	<b>4,173</b>	<b>4,060</b>	<b>4,265</b>	<b>4,108</b>	<b>4,062</b>	<b>3,741</b>
<b>TOTAL STAFF</b>	<b>5,420</b>	<b>5,353</b>	<b>5,624</b>	<b>5,460</b>	<b>5,544</b>	<b>5,247</b>
NUMBER OF STUDENT ENROLMENTS (e)						
Colleges (b)	83,591	93,203	83,296	86,820	91,521	89,318
Evening technical schools	35,572	31,404	25,285	27,492	30,715	31,549
Technical centres	26,449	22,080	18,712	20,264	23,181	20,453
Other services (c)	4,737	2,884	6,281	6,420	11,726	10,723
<b>TOTAL</b>	<b>150,349</b>	<b>149,571</b>	<b>133,574</b>	<b>140,996</b>	<b>157,143</b>	<b>152,043</b>

(a) At 31 December. (b) Includes Technical Extension Service. (c) Aboriginal Access, Counselling Service and Adult Migrant Education. (d) At 1 July. A teacher may occupy teaching positions at more than one institution; the number of individual teachers is not available. (e) From 1981 student enrolments include only those students who attended at least one class or, in the case of external students, returned at least one assignment.

Because the State is so large, and its population so unevenly and widely dispersed, the Technical Education Division has developed a variety of ways to make its programs accessible to students. Some of these are:

#### Technical Colleges

The Division has sixteen technical colleges: thirteen in the metropolitan area and three in the country. Although these colleges offer a wide range of day and evening courses, each has developed its own special areas of study.

**Evening Technical Schools**

Unlike colleges, the Division's ten evening technical schools make use of local community facilities including high schools, community halls, company premises and old buildings. Though some day-time classes are available, evening technical schools cater mainly for part-time evening students. Certificate and diploma subjects are provided in some evening technical schools, but complete certificate and diploma courses are not provided.

**Technical Centres**

The Division has 100 technical centres distributed throughout country and metropolitan areas. Making use of a variety of facilities, these centres serve the needs of local communities by providing classes whenever there are sufficient students and staff.

**Rural Co-ordination Scheme**

This scheme provides officers who are based at Broome, Kununurra, Kellerberrin, Manjimup and Wagin to co-ordinate the expertise and resources of the local communities. This has led to the provision of many useful programs of technical and further education of immediate relevance to these communities and offers greater access than is available through technical centres and the Technical Extension Service.

**External Studies**

External studies are available through the Division's Technical Extension Service for students who, because of remoteness or individual limitations (such as physical disabilities) are unable to attend courses at technical colleges, evening technical schools or technical centres. In some cases, these studies may be supplemented by short, intensive courses or attendance at local study centres.

**Non-Institutionally-Based Provision**

Short intensive courses to meet vocational, small business management and specific industrial training and retraining needs are conducted as required in various locations including company sites. These courses run for periods ranging between one day and eight weeks. The Division is currently developing new forms of delivering these courses in order to meet more effectively the needs of people living in country areas, and also the specific, rather than general, needs of particular companies.

**Counselling Service**

The Counselling Service, which is open all year round, provides educational, vocational and general guidance to students and prospective students of the Division. It also provides limited consultant services to industry and commerce on the subjects of staff selection, training, evaluation, and related matters.

**Adult Migrant Education**

The Division co-operates with the Commonwealth Departments of Immigration and Ethnic Affairs, and Education to provide courses in the English language for adult migrants.

**Aboriginal Access Program**

The Division conducts an Aboriginal Access Program which, although designed mainly to develop literacy among Aboriginal people, includes classes in community obligations, home skills, employment skills and leisure-time activities.

The Division's organisation is a network similar to that of a multi-campus institution. Staff and resources are in large measure movable; that is to say, not permanently dedicated to specific locations. This permits greater use of resources by the public and helps to alleviate the disadvantages of personal immobility and remoteness resulting from the pattern of industrial development in Western Australia.

## EARLY CHILDHOOD EDUCATION

Pre-primary and pre-school centres are established by the Education Department and by local parent committees respectively. Attendance is optional at all centres. A year of free voluntary pre-primary education for children aged four and five years has been introduced into the government education system.

The *Education Act 1928*, requires that every person conducting a pre-school centre shall hold a permit issued by the Minister for Education and that every authorised pre-school centre shall be subject to inspection by an officer of the Education Department.

The Early Childhood Branch of the Department is responsible for the co-ordination of early childhood education, the overall administration of pre-primary centres attached to government primary schools, the appointing of staff and the maintenance of advisory services to pre-primary and pre-school centres.

## PRE-SCHOOL EDUCATION: AT 1 JULY

Particulars	1980	1981	1982	1983	1984	1985
Number of centres —						
Government						
Pre-primary (a)	395	(b) 419	(b) 440	(b) 457	(b) 460	(b) 466
Pre-school	205	193	177	169	159	156
Non-government						
Pre-primary	49	{ 53	61	67	73	76
Independent pre-school (c)		15	17	21	23	22
Total	649	680	695	714	715	720
Number of staff (d) —						
Teachers	579	607	568	591	628	n.y.a.
Teacher aides	591	576	500	508	548	n.y.a.
Total	1,170	1,183	1,068	1,099	1,176	n.y.a.
Number of children —						
Government						
Pre-primary	14,186	14,972	15,248	16,179	17,499	17,978
Pre-school	9,678	8,966	7,896	7,615	7,754	7,666
Non-government						
Pre-primary	1,768	{ 1,522	1,689	1,946	1,920	2,096
Independent pre-school		650	930	1,022	1,056	1,013
Total	25,632	26,110	25,763	26,762	28,229	28,753

(a) Schools administering pre-primary facilities. (b) Includes schools with combined pre-primary/primary classes. (c) Centres which are run neither by the Education Department nor by non-government schools. (d) Number of full-time staff plus full-time equivalent units of part-time staff based on proportion of full-time salary paid.

## NON-GOVERNMENT SCHOOLS

The non-government schools, which are conducted mainly by religious organisations, provide education from pre-school to the end of secondary school. The curriculum at the primary and secondary levels is substantially the same as that in the government schools, and covers the same number of years.

## Schools, Teachers and Students

## NON-GOVERNMENT PRIMARY AND SECONDARY SCHOOLS: AT 1 JULY

Particulars	1980	1981	1982	1983	1984	1985
NUMBER OF SCHOOLS						
Denomination of school —						
Anglican	9	10	10	10	10	10
Roman Catholic	147	143	143	145	143	145
Uniting Church	5	5	5	5	5	5
Other denominations	13	13	14	14	14	14
Non-denominational	24	35	41	42	49	51
Total	198	206	213	216	221	225

NON-GOVERNMENT PRIMARY AND SECONDARY SCHOOLS:  
AT 1 JULY — *continued*

Particulars	1980	1981	1982	1983	1984	1985
NUMBER OF TEACHERS (a)						
Denomination of school —						
Anglican	311	350	370	386	(b) 426	n.y.a.
Roman Catholic	1,677	1,684	1,799	1,900	(b) 2,191	n.y.a.
Uniting Church	269	279	297	294		
Other denominations	67	62	68	73	(b) 685	n.y.a.
Non-denominational	87	111	156	166		
Total	2,411	2,486	2,690	2,819	(b) 3,301	n.y.a.
NUMBER OF STUDENTS						
Denomination of school —						
Anglican	4,589	5,010	5,403	5,750	6,212	6,593
Roman Catholic	35,266	36,255	38,104	39,487	40,391	41,362
Uniting Church	4,196	4,254	4,418	4,443	4,490	4,556
Other denominations	1,205	1,191	1,275	1,340	1,351	1,342
Non-denominational	1,339	1,797	2,338	2,807	3,317	3,760
Total	46,595	48,507	51,538	53,827	55,761	57,613
Grade of education —						
Primary	25,855	26,998	28,568	29,427	29,909	30,534
Secondary — Years 8, 9 and 10 (c)	14,574	15,314	16,343	17,210	18,350	19,012
Years 11 and 12	6,166	6,195	6,627	7,190	7,502	8,067
Total	46,595	48,507	51,538	53,827	55,761	57,613
Males	22,734	23,884	25,380	26,743	27,791	28,632
Females	23,861	24,623	26,158	27,084	27,970	28,981

(a) Excluding persons on leave without pay and persons teaching part-time. (b) Source — National Schools Statistics Collection. Includes the number of full-time teachers plus full-time equivalent units of part-time teachers based on the proportion of full-time hours worked. (c) Includes students in upgraded classes.

### SECONDARY EDUCATION AUTHORITY

The Secondary Education Authority was established on 1 February 1985 under the *Secondary Education Authority Act 1984*. This Act abolished the Board of Secondary Education and provided that its statutory functions be absorbed by the Secondary Education Authority. The Act also transferred the public examining function from the Tertiary Institutions Service Centre (Incorporated) to the new Authority.

The Authority comprises twenty-eight appointed members. Two of the members, the Director General of Education and the Director of the Authority, are *ex officio*. Each of the other twenty-six members is nominated by a particular educational or community group and appointed by the Minister for Education. Two major committees within the Authority are the Tertiary Entrance Subject Committee and the Curriculum and Assessment Policy Committee.

The Secretariat is headed by the Director. The various functions are divided into Units such as the Moderation Unit and the Curriculum and Research Unit.

The Secondary Education Authority is responsible to the Minister for Education for the accreditation and registration of courses of study for Years 9 to 12; the moderation of school assessments to ensure comparability among schools; the issue of certificates of achievement; and the administration and conduct of the Tertiary Entrance Examination.

The Tertiary Entrance Examinations are held in November. The Tertiary Entrance Score is calculated as an average of the students best three, four or five subject scores which consist of the external examination results and moderated school assessments.

The 1986 Year 10 students will be the last group to receive the Achievement Certificate. Students in Years 9, 11 and 12 will be working towards the Certificate of Secondary Education which is awarded following the students exit from the secondary system. The certificate also contains reference to the achievement of Secondary Graduation in the upper school (Years 11 and 12).

## POST-SECONDARY EDUCATION

Post-secondary education in Western Australia is provided through the two Universities (Murdoch University and the University of Western Australia), the two Colleges of Advanced Education (The Western Australian College of Advanced Education and the Western Australian Institute of Technology), the regional colleges (Hedland College, Kalgoorlie College and Karratha College) and the technical colleges and centres of the Education Department.

### THE WESTERN AUSTRALIAN POST-SECONDARY EDUCATION COMMISSION

The Western Australian Post-Secondary Education Commission was established under the terms of the *Western Australian Post-Secondary Education Act 1970*, to advise the Government, post-secondary education institutions and the Commonwealth Tertiary Education Commission on the planning, co-ordination, development and financing of post-secondary education. Specific matters on which the Commission provides advice include establishment and location of new post-secondary education institutions; acquisition and reservation of sites; levels of financial support requested by the institutions; assessment of proposals for the introduction of new courses of study; accreditation of new and existing courses; salaries and other conditions of employment of academic and non-academic staff of the institutions; and criteria for entrance to the institutions.

The Commission consists of a Chairman and eleven other members appointed by the Governor on the recommendation of the Minister for Education. The Chairman is appointed for a term not exceeding seven years, and the other members for terms not exceeding four years. At least three, but not more than four, of these members are to be members of staff, whether academic or otherwise, of a post-secondary education institution.

### THE TERTIARY INSTITUTIONS SERVICE CENTRE (INCORPORATED)

The Tertiary Institutions Service Centre (Incorporated) was set up in 1975 by agreement between the tertiary institutions. The Centre processes applications for admission to the institutions and carries out such other functions as agreed by the institutions. Under the terms of the agreement a management committee comprising representatives of the tertiary institutions is responsible for the activities of the Centre.

Applicants seeking admission to a first year undergraduate course (or later years in the case of Murdoch University and the Western Australian Institute of Technology) or to a Diploma in Education course apply through a joint system operated by the Centre. Applicants list four preferences from all the tertiary courses available and offers are then made by the institutions for each course on the basis of a ranked order.

### 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, under the provisions of the *Colleges Act 1978*. Such colleges may, with the Minister's approval, provide advanced education, technical and further education, and education at other levels in specified circumstances.

#### **Western Australian College of Advanced Education**

On 1 January 1982 the four metropolitan colleges — Churchlands, Claremont Teachers, Mount Lawley and Nedlands, were amalgamated to form the Western Australian College of Advanced Education with each as a campus. During 1984 a fifth campus, Joondalup, was established in temporary accommodation in the Wanneroo Shire Offices and a sixth campus opened in the beginning of 1986 at the Bunbury Institute of Advanced Education. In April 1985 the total enrolment was 10,090, comprising 4,714 full-time, 4,110 part-time and 1,266 external students.

Since 1985 the organisational structure of the Western Australian College has been based on five schools and an academy comprising thirty-five teaching departments. The School of the Arts and Applied Sciences, The School of Business, The School of Community and Language Studies, The School of Education and The School of Nursing together offered the following courses in 1985:

Associate Diploma	Applied Arts and Science, Community Language Studies, Community Studies (Instructional Management, Social Administration, Social Trainers or Youth Work), Computing Studies, Health Education, Library Media, Recreation
Diploma	Nursing, Teaching (Early Childhood, Primary, Secondary or Conversion Courses)
Bachelor's Degree	Applied Science (Recreation), Business (Accounting, Administration, Finance, Information Processing or Personnel Management and Industrial Relations), Education (Early Childhood, Primary or Secondary), Information Science, Interpreting and Translating
Graduate Diploma	Accounting, Business Computing, Career Studies, Children's Literature, Education (Primary, Secondary, Post Graduate Specialist Studies), Early Childhood Studies, Educational Technology, Finance, Intercultural Studies, Language Studies, Management, Marketing, Media, Reading Studies, Recreation, Secretarial Studies, Speech and Drama, Teacher Librarianship, Translating/Interpreting

#### **Western Australian Academy of Performing Arts**

The Western Australian Academy of Performing Arts, now incorporating the Western Australian Conservatorium of Music and the School of Dramatic Arts, was established in 1979 as a result of the Western Australian Post Secondary Education Commission inquiry into education in the performing arts.

The Academy of Performing Arts was established under the aegis of the Mount Lawley College of Advanced Education. Following the amalgamation of the former colleges at Churchlands, Claremont, Mount Lawley and Nedlands, the Academy is now part of the Western Australian College of Advanced Education. The Academy enjoys a wide and semi-autonomous brief in the Western Australian College, though it is conceived administratively as a school of the Western Australian College, and has access to the substantial resources and facilities of the larger organisation.

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 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. Recently, a music centre was established in the Pilbara region, in conjunction with the Hedland College. A similar centre for music, in conjunction with the Kalgoorlie College, was established in 1984 and a third centre was established in Esperance in 1985. In the area of dance, music and theatre, the Academy offers frequent in-service and professional refresher programmes, both on campus and throughout selected centres in Western Australia.

In 1985 the Academy had approximately 250 full-time students and some 150 part-time students enrolled in its music, theatre, dance, arts management and media 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, Academy students currently undertake courses with Perth Technical College. In turn, 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 and theatre 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 programme.

The Academy offered the following courses in 1985:

Certificate	Dance, Music, Music Teaching (Country Teachers), Preparatory Music
Associate Diploma	Performing Arts (Arts Management, Dance, Jazz, Media, Music or Musical Theatre)
Diploma	Music Teaching, Performing Arts (Dance, Music, Stage Management or Theatre)

### The Regional Colleges

In the country, 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. Hedland College and Karratha College commenced operations in 1980, and provide courses mainly in the technical and further education sector, but also provide higher education for local students in co-operation with institutions based in the Perth metropolitan area. Kalgoorlie College commenced operations in 1983 and provides courses in the Technical and Further Education sector and, under contract to Perth-based institutions, courses in the Advanced Education sector of Post Secondary education. 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.

**Hedland College.** Hedland College was established in 1980 to serve the Post Secondary Education needs of the Eastern Pilbara. This includes Technical and Further Education (TAFE) and the provision of local assistance to students studying advanced education.

The following courses were offered in 1985:

Certificate or Diploma	Accounting, Art, Catering and Hospitality, Computer Usage, English, Human Biology, Machine Shop Practice, Management, Mathematics, Music Teaching (for country teachers), Office Studies, Rigging, Shotfiring, Supervision, Yachtmaster. In addition to these, a Certificate may also be taken in Pre-apprenticeship Studies and Admission Studies (Year 10 and Year 12 equivalent)
Tertiary Admissions Examination (TAE)	English, Human Biology, Mathematics 1
Apprenticeship	Automotive Mechanics, Electrical Fitting, Fitting and Machining, Mechanical Fitting, Metal Construction
Post Trade Certificate	Engineering, Industrial Electronics, Welding (various)

The College, in conjunction with the Commonwealth Employment Service, provided the Participation Equity Program. This transition program was available to 15-24 year olds who had been unemployed for at least three months. The program provided a mix of classes and work experience designed to assist the participants to enter the workforce.

In 1985, the College also provided teaching and tutorial assistance in the following Advanced Education courses: Associate Diploma in Engineering (Mechanical or Electrical), Bachelor of Applied Science (Nursing), Business, Education (Computing), Graduate Diploma in Computing Education.

In 1984 the College enrolled 2,943 students of whom 2,005 were enrolled at Hedland, 815 at Newman and 123 at other centres in the Eastern Pilbara.

<b>Karratha College.</b>	Karratha College, established in 1980, offered the following courses in 1985:
Certificate	Accounting, Admission Studies (Technology), Art Studies, Commercial Practice, Creative Arts, Engineering (Civil, Electrical, Electronic or Mechanical), Laboratory Practice, Secretarial Studies, Welfare Studies
Diploma	Accounting, Commercial Practice, Creative Arts, Engineering (Civil, Electrical, Electronic or Mechanical), Management, Secretarial Studies, Welfare Studies
Bachelor's Degree	Applied Science, Business, Engineering
Pre-apprenticeship	Automotive Trades, Electrical Trades, Fitting and Machining Trades, Metal Construction Trades
Apprenticeship	Covering the above trades.
Post Trade Certificate	Automotive Diesel, Industrial Electronics, Welding AS 1796 Certificate 3E

The College also conducted Participation and Equity Programs in Karratha and Roebourne, an Adult Migrant English Program, Tertiary Admissions Examination classes in a number of subjects and provided ongoing tutorial assistance and counselling support to external students in Technical and Further Education, Advanced Education and University programs of study. Throughout the year the College offered a range of short general interest programs in a wide variety of subjects.

Karratha College conducts classes at Wickham, Pannawonica, Paraburdoo and Tom Price, as well as at its main Campus, and in 1985 enrolled a total of 1,745 students.

**Kalgoorlie College.** Kalgoorlie College was established in 1983 to offer a range of courses in the Technical and Further Education sector as well as in the Advanced Education sector of Post-Secondary Education. Most courses in the Advanced Education sector are offered specifically under contract to other Institutions.

In 1985, the College offered the following courses:

Certificate	Accounting, Art Studies, Commercial Studies, Computing, Electronics, General Studies, Laboratory Practice, Music, On Glaze Painting, Secretarial Practice, Vocational Studies
Diploma	Accounting, Art Studies, Commercial Studies, Computing, Drafting, Engineering, Local Government, Management, Vocational Studies
Bachelor's Degree	Applied Science (Nursing), Business, Education (Computing and Art units)
Graduate Diploma	Computer Education
Apprenticeship	Automotive, Carpentry and Joinery, Electrical Fitting and Machining, Metal Construction
Other	Aboriginal Access, Foundation for Employment, Migrant Education, Underground Workers, TAE (various), Pre-apprenticeships (various)

Under contract to the Western Australian Institute of Technology, the College offered the Bachelor of Business (Accounting) degree and provided assistance to other students studying advanced education courses in the external studies mode.

During 1984, the College enrolled 2,426 students.

### THE WESTERN AUSTRALIAN INSTITUTE OF TECHNOLOGY

The Western Australian Institute of Technology is a college of advanced education, established in terms of the *Western Australian Institute of Technology Act 1966* as an autonomous body under the control of a governing council. The main functions of the Institute, as set out in the Act, are to provide facilities for higher specialised instruction and to advance training in the various branches of technology and science; to aid the advancement, development and practical application to industry of science or any techniques; and to encourage and provide facilities for the development and improvement of tertiary education whether on a full-time or part-time basis to meet the needs of the community.

The Institute is located on a site of about 109 hectares at Bentley, approximately eleven kilometres from the Perth city centre. The initial group of buildings was officially opened in 1966 and the administration and associated buildings were officially opened in 1968.

### Finance

#### THE WESTERN AUSTRALIAN INSTITUTE OF TECHNOLOGY — FINANCE (\$'000)

Particulars	1979	1980	1981	1982	1983	1984
INCOME						
Income for specific capital purposes (a) —						
Commonwealth Government grants	1,444	613	789	1,989	360	502
Total	1,444	613	789	1,989	360	502
Income for other purposes —						
Commonwealth Government grants	32,912	35,958	42,477	45,230	48,590	52,684
State Government grants	—	—	—	—	—	—
Donations and endowments	107	158	318	835	374	484
Other	7,388	6,408	6,868	11,083	9,535	11,673
Total	40,407	42,524	49,663	57,148	58,499	64,841
TOTAL INCOME	41,851	43,137	50,452	59,137	58,859	65,343
EXPENDITURE						
Salaries and wages	24,144	26,841	29,995	34,453	35,742	39,416
Library	564	598	528	664	794	526
Buildings, grounds and equipment	2,429	2,387	3,793	5,582	4,685	5,612
Sundry auxiliary expenditure	14,961	11,448	12,315	15,881	17,442	17,454
TOTAL EXPENDITURE	42,098	41,274	46,631	56,580	58,663	63,008

(a) Income received specifically for new buildings, major alterations and additions to buildings, installation of services, purchase of land and buildings and major equipment.

### Courses

The Institute conducts courses leading to an associate diploma, diploma, bachelor's degree, graduate diploma or master's degree qualification. The courses vary in duration according to the level and may be undertaken by full-time or part-time studies. It is also possible to study some courses on an external (correspondence) basis. The minimum entrance requirements for undergraduate courses are that students: subject to a number of constraints, achieve a specified minimum Tertiary Entrance score based on the best average of scores in three, four or five subjects; achieve a satisfactory performance in the grades of the six subjects taken in Year 12; hold a Secondary Graduation Certificate and have a suitable literacy standard as demonstrated by a satisfactory performance in English or English Literature.

Holders of other qualifications which are assessed as equivalent to the Tertiary Entrance score with evidence of adequate literacy may be considered for selection. Mature Age provisions provide for alternative assessment methods for applicants at least twenty years of age.

The teaching work of the Institute is organised under four Divisions namely Arts, Education and Social Sciences; Business and Administration; Engineering and Science; and Health Sciences.

The principal campus at Bentley includes the administrative centre and a wide range of teaching facilities. Specialist campuses are located at Kalgoorlie and Collie for mining and related courses; at Muresk for agriculture courses; at Shenton Park for occupational therapy and physiotherapy courses; and in West Perth for the podiatry course.

The Institute offers many undergraduate programmes principally at bachelor degree level but also at associate diploma and diploma level. In addition it has developed a range of graduate diploma and masters' degree programs in the disciplines of Art and Design, Business and Administration, Chemistry, Computing, Education, Engineering, English, Health Sciences, Library and Information Studies, Maritime Archaeology, Medical Radiography, Metallurgy, Natural Resources, Physics, Pharmacy, Planning, Science and Mathematics Education, Social Sciences and Surveying and Mapping.

### Teachers, Students and Courses Completed

The following table gives particulars of teaching staff in each of the years 1980 to 1985. The number of students taking and completing courses is also shown.

THE WESTERN AUSTRALIAN INSTITUTE OF TECHNOLOGY						
Particulars	1980	1981	1982	1983	1984	1985
NUMBER OF TEACHING STAFF (a)						
Full-time —						
School and department heads	41	46	46	48	53	56
Senior lecturers	142	148	144	153	158	149
Lecturers	267	273	263	263	264	276
Assistant lecturers, tutors, demonstrators, etc.	104	98	78	88	85	74
Total, Full-time	554	565	531	552	560	555
Part-time (b)	147	103	123	155	125	124
NUMBER OF STUDENTS IN APPROVED COURSES (a)						
Full-time	5,024	5,106	5,265	5,678	5,622	5,960
Part-time —						
Internal	5,140	5,428	5,173	5,254	4,988	4,931
External	1,333	1,351	1,406	1,330	1,188	1,131
Total	11,497	11,885	11,844	12,262	11,798	12,022
Males	6,909	7,090	7,053	7,229	6,853	6,860
Females	4,588	4,795	4,791	5,033	4,945	5,162
NUMBER OF STUDENTS WHO COMPLETED COURSES						
Field of study —						
Agriculture	41	31	36	37	56	
Architecture	98	87	96	106	114	
Arts	489	420	447	500	490	
Business Studies	407	392	436	477	528	n.y.a.
Education	359	296	354	358	332	
Engineering	162	164	163	198	176	
Health	344	386	377	380	434	
Science, Pure and Applied	138	129	159	152	185	
Total	2,038	1,905	2,068	2,208	2,315	n.y.a.

(a) At 30 April. (b) Full-time equivalent units of part-time teachers based on number of hours worked.

### School of Mines of Western Australia

The School of Mines of Western Australia was established at Coolgardie in 1902 and was transferred to Kalgoorlie in the following year. Control of the School of Mines, formerly part of the Department of Mines, passed to The Western Australian Institute of Technology in January 1969 and formed the nucleus of the School of Mining and Mineral Technology established in 1975.

Undergraduate courses are available in Mining Geology, Mining Engineering and Extractive Metallurgy, all of which extend over three or four years of full-time study. Graduate programs of study are also available, leading to the awards of Graduate Diploma in Extractive Metallurgy and Master of Applied Science in Mining and Mineral Technology. There is also an Associate Diploma program in Mining and Mineral Technology with options in Mine Surveying, Coal Mining Technology and Underground Metalliferous Mining being available at Kalgoorlie or Collie.

Locally based students who wish to study undergraduate programs in Civil, Electrical or Mechanical Engineering can complete the first year of their studies at the School before transferring to the Bentley Campus to complete their course. In 1985 there were 209 students enrolled at the school.

The regional office of the Geological Survey and the Metallurgical Laboratory of the Mines Department are also located on the School campus.

The School has a geological museum which is open to the public and contains rocks and minerals from many parts of Australia and elsewhere.

### **Muresk Institute of Agriculture**

Muresk Institute of Agriculture, situated about thirteen kilometres south of Northam in the Avon Valley, was established by the Department of Agriculture in 1926. Control of the Muresk Agricultural College, as it was originally named, transferred to the Western Australian Institute of Technology from the Department of Agriculture in January 1969. In 1985 it was renamed the Muresk Institute of Agriculture.

Muresk offers three tertiary level courses. There is an Associate Diploma (Agriculture) course, with an emphasis on Farm Management. The course is of two years duration and is fully residential. The other two courses, a Bachelor of Business in either Agriculture or Horticulture are full-time and of three and a half years duration. These courses are designed to give a sound scientific, technical and managerial training suitable for those wishing to become farm owners or managers, or to work in industries servicing agriculture and horticulture. The subjects studied are Plant Science and Husbandry, Animal Science and Husbandry, Farm Management, Farm Mechanisation, Soil Science, Humanities and Practical Farm Work.

Instruction is given by means of lectures, assignments, laboratory and workshop practical work, demonstrations, tutorials, day tours to farms and research stations, extended tours into the agricultural areas, and practical farming on the Muresk estate.

The estate of some 1,640 hectares is devoted to mixed farming and provides the students with an opportunity to gain a considerable amount of practical experience by observation, demonstration and actual participation in a wide variety of farming activities. Use is made of the College facilities for various research projects.

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 1985 was 299.

### **THE UNIVERSITY OF WESTERN AUSTRALIA**

University education first became available in Western Australia in 1898, with the formation of the Extension Committee of the University of Adelaide by which facilities were provided for external studies in courses for degrees in Arts and Science. The first step towards the establishment of a university in Western Australia was taken in 1904, when a University Endowment Act providing for the incorporation of a trust to administer funds for the purpose was passed by the State Parliament. Following a favourable report made by a Royal Commission under the chairmanship of Dr J. W. (later Sir Winthrop) Hackett, the University was established by the *University of Western Australia Act 1911*. Teaching began in 1913 in subjects related to the Faculties of Arts, Science and Engineering. Additional Faculties established since that time are those of Law (1927), Agriculture (1936), Dental Science (1946), Education (1947), Economics (1954), Medicine (1956) and Architecture (1966). The Faculty of Economics was reconstituted as the Faculty of Economics and Commerce in 1961.

## Staff, Students and Students Completing Courses

THE UNIVERSITY OF WESTERN AUSTRALIA						
Particulars	1980	1981	1982	1983	1984	1985
NUMBER OF STAFF (a)						
Teaching —						
Full-time —						
Professors	76	71	73	73	69	70
Associate professors, readers	80	89	92	90	87	89
Senior lecturers	198	190	191	198	203	201
Lecturers, teaching registrars	146	127	119	119	123	132
Senior tutors and demonstrators, assistant lecturers	90	86	86	77	83	78
Demonstrators, tutors, teaching fellows	18	17	24	31	34	34
Total	608	580	585	588	599	604
Part-time (b)—						
Lecturing	11	11	9	10	14	11
Tutoring/demonstrating	75	76	79	71	72	74
Total (b)	86	87	88	81	86	85
Research —						
Full-time	122	147	163	188	190	211
Other —						
Full-time	1,376	1,427	1,372	1,368	1,382	1,370
Part-time (b)	76	79	111	146	128	122
Total Staff	2,268	2,320	2,319	2,371	2,385	2,392
NUMBER OF STUDENTS (a)						
Internal —						
Full-time	6,548	6,502	6,564	6,651	6,768	6,702
Part-time	3,191	3,280	3,052	3,093	2,981	2,700
External	52	53	44	64	61	63
Total	9,791	9,835	9,660	9,808	9,810	9,465
Males	5,858	5,673	5,512	5,621	5,531	5,294
Females	3,933	4,162	4,148	4,187	4,279	4,171
NUMBER OF STUDENTS WHO COMPLETED COURSES (c)						
Field of study —						
Agriculture	31	33	38	50	39	41
Architecture, building	14	16	18	18	17	17
Dentistry	25	24	37	25	27	21
Economics, commerce, government	259	250	290	300	334	373
Education	289	324	251	272	289	305
Engineering, technology	106	95	101	118	124	145
Fine arts	13	14	10	14	17	19
Humanities	291	294	238	244	231	260
Law	182	171	167	165	174	163
Medicine	164	138	157	153	157	141
Natural sciences	303	306	314	339	333	325
Social and behavioural sciences	310	264	270	280	214	219
Total	1,987	1,929	1,891	1,978	1,956	2,029

(a) At 30 April. (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. (c) Year ended 30 June.

## Admission Requirements

An applicant for admission to the University is required to take subjects at the Tertiary Entrance Examination selected in accordance with the Matriculation Regulations of the University of Western Australia, and to obtain a sufficiently high score to gain a place in a course. The marks included in the score must normally have been obtained in a single year. Individual faculty prerequisites must also be satisfied and school-leaver applicants must complete the requirements for Secondary Graduation.

Entry may also be offered to an applicant who has satisfied the admissions requirements of another university in Australia or of an overseas university in which there is a reasonable correspondence between the admission requirements and those of the University of Western Australia.

The regulations also provide that persons of at least twenty years of age may be admitted to a degree course if they are able to demonstrate that there is a reasonable prospect of their being able to assimilate and benefit from their course. Some faculties use the University's Mature Age Examination while others accept other evidence.

### **Degrees**

Degrees are granted in the Faculties of Agriculture, Architecture, Arts, Dentistry, Economics and Commerce, Education, Engineering, Law, Medicine and Science.

Courses for the pass degrees of Bachelor of: Arts, Economics, Commerce, Physical Education and Science extend over a period of three years; pass and honours courses for the degrees of Bachelor of: Music, Music Education, Education, Engineering and Science in Agriculture over four years; and that for the degree of Bachelor of Architecture, over five years. The course for the degree of Bachelor of Dental Science extends over four years after successful completion of one year's study, including certain compulsory units, in another faculty; the course for the degree of Bachelor of Jurisprudence extends over three years, following successful completion of the first year of a course in any other faculty and that for the degree of Bachelor of Laws over one further year. Honours degree courses in Arts, Commerce, Economics, Physical Education and Science are usually of four years' duration. The course in the Faculty of Medicine for the degrees of Bachelor of Medicine and Bachelor of Surgery extends over six years. The medical and dental courses may be interrupted to permit selected students to take a one-year course for the honours degree of Bachelor of Medical Science or Bachelor of Science in Dentistry respectively. The course for the degree of Bachelor of Psychology occupies at least one year after completion of three years of a course for the degree of Bachelor of Arts or Bachelor of Science. The course for the postgraduate degree of Bachelor of Social Work extends over a period of at least two years after successful completion of a first degree course.

Master degrees conferred by the University are those of Master of: Accounting, Architecture, Arts, Building Science, Business Administration, Commerce, Dental Science, Economics, Education, Engineering, Engineering Science, Engineering Studies, Industrial Relations, Japanese Studies, Laws, Medical Science, Music, Music Education, Philosophy (Australian Studies or Women's Studies), Physical Education, Psychology, Science, Science Education, Science in Agriculture, Science in Horticulture, Science in Natural Resource Management, Social Work and Surgery. Doctorates conferred are of: Dental Science, Engineering, Laws, Letters, Medicine, Music, Science and Science in Agriculture. The degree of Doctor of Philosophy is given for research in all faculties.

### **Diploma Course**

In addition to the above degree courses, a postgraduate Diploma in Education course is available.

### **University Government**

The original Act provided that the Senate and Convocation should constitute the governing authority with power to make statutes for 'the management, good government and discipline of the University'.

The Senate consists of twenty-five members, of whom six are appointed by the Governor, six are elected by Convocation, four are elected by the full-time teaching staff, two are elected by students, three are *ex officio* members (the Vice-Chancellor of the University, the Director-General of Education or his appointee and the President of the Guild of Undergraduates), and four are co-opted members. Convocation consists of graduates of the University and such other persons as are eligible for membership under the provisions of the University of Western Australia Act.

Since an amendment to the Act in 1944 the Senate alone has been the governing authority and is responsible, subject to the Act and the statutes, for the entire control and management of the University. Statutes approved by the Senate are submitted to Convocation for its consideration, but although Convocation may suggest amendments the Senate is not bound to accept them. The Act requires that statutes shall be submitted to the Governor for approval, after which they have the force of law.

The Chancellor is the titular head of the University. He is elected annually by the Senate from among its members and presides over its meetings. The Vice-Chancellor is the chief executive officer of the University and is appointed by the Senate for a period not exceeding ten years, at the end of which term he is eligible for reappointment. At meetings of Convocation the chairman is the Warden who is elected annually by Convocation from among its members.

The Guild of Undergraduates is constituted under the Act as a voluntary association of the University students 'for furthering of their common interests, and shall be the recognised means of communication between the students and the governing authority of the University'. The government of the student Guild is vested in its Council, to which members are elected in accordance with regulations made by the Guild.

## Finance

### THE UNIVERSITY OF WESTERN AUSTRALIA — FINANCE (\$'000)

Particulars	1979	1980	1981	1982	1983	1984
INCOME						
Income for specific capital purposes (a) —						
Commonwealth Government grants	117	274	285	300	662	2,062
Total	117	274	285	300	662	2,062
Income for other purposes —						
Commonwealth Government grants	41,564	45,659	53,106	58,269	62,776	68,713
State Government grants	521	856	1,020	966	1,223	1,344
Donations and endowments	3,851	4,372	5,187	6,267	7,617	7,292
Other	3,916	4,599	5,443	6,066	6,969	6,034
Total	49,852	55,486	64,756	71,568	78,585	83,383
TOTAL INCOME	49,969	55,760	65,041	71,868	79,247	85,445
EXPENDITURE						
Teaching and research	34,410	38,734	44,161	49,441	55,524	59,251
Administration and general overhead	4,669	5,449	6,026	7,213	7,357	8,369
Libraries	3,086	3,399	3,768	4,132	4,381	4,756
Buildings, premises, grounds	4,127	4,839	5,531	5,452	5,381	7,587
Sundry auxiliary expenditure	2,072	2,427	2,647	2,484	3,233	3,653
TOTAL EXPENDITURE	48,364	54,848	62,133	68,722	75,876	83,616

(a) Income received specifically for new buildings, major alterations and additions to buildings, installation of services, purchase of land and buildings and major equipment.

## Student Fees, Allowances and Scholarships

The Royal Commission appointed to inquire into the establishment of a University recommended that teaching should be free and suggested that 'if fees are found to be necessary, they should be on the lowest possible scale'. This policy was adopted and tuition fees were not charged, except in the case of a limited number of students, until 1962 when fees were introduced to assist in meeting the increasing costs of operation resulting from a rapidly growing student enrolment and to enable the University to take full advantage of financial aid available under Commonwealth legislation. The Commonwealth Government assumed full financial responsibility for tertiary education with effect from 1 January 1974 and tuition fees were abolished. However, all students of the University, except those who are also full-time staff members, must pay an annual Guild subscription or donate the equivalent amount to an authorised charitable body.

Financial assistance is given to students by the Commonwealth Government under the Tertiary Education Assistance Scheme and by means of postgraduate awards, to which reference is made later in this Chapter. In addition, the University makes awards, from its own funds, of research studentships for postgraduate study which are competed for by students holding no other award and having an honours degree of second class (Division A), or higher, standard. Graduates may also apply for Hackett Studentships for overseas study which, in addition to other financial benefits, carry a travel grant. Some large private industrial concerns also make awards for study at postgraduate level.

### **Colleges and Hall of Residence**

There are five residential colleges within the University. Four of the colleges take both men and women students; these are Kingswood and St Columba Colleges, both conducted by the Uniting Church of Australia, St Thomas More College, a foundation of the Roman Catholic Church and St George's College which is conducted by the Anglican Church. St Catherine's College is a non-denominational college for women students.

Currie Hall is a non-denominational hall of residence for men and women students.

### **Tuition**

In addition to the normal lectures and tutorials for full-time students, courses for part-time students are offered in the Faculties of Arts, Education, Economics and Commerce, Science and Law (Bachelor of Jurisprudence only). Certain education subjects may be taken at the Murdoch University under affiliation arrangements with the University.

### **Research**

Some \$14.5 million was spent on research at the University during 1985. This sum comprised funds provided by the Commonwealth Government through the Tertiary Education Commission, grants from agencies such as the Australian Research Grants Committee and the National Health and Medical Research Council, and bequests and benefactions from private industry and members of the public. Of the total figure, \$4.0 million was applied to general support of research activities, \$9.5 million to particular research projects financed by outside agencies, and \$1.0 million to projects covered by bequests. Salaries of staff engaged in research and the overheads involved are not included in these figures.

For the most part the research undertaken is 'pure' research, that is, research aimed simply at deepening and broadening man's knowledge of himself and his world: this is a fundamental and normal activity of a university which can very often lead to significant practical applications.

### **University Extension**

University Extension is responsible for community education activities, of which the annual Summer School, with a long tradition, is an important component.

The policies of the Extension Policy Board are implemented by the Director of University Extension.

## **MURDOCH UNIVERSITY**

Murdoch University is established under the provisions of the *Murdoch University Act 1973*, which came into operation on 1 July 1973. The University is named in honour of the distinguished Australian essayist and biographer, Sir Walter Murdoch (1874-1970), foundation Professor of English at The University of Western Australia (1912-1939) and later Chancellor (1943-1948). A ceremony to mark the inauguration of the University was held on 17 September 1974, the centenary of his birth.

The University site comprises 230 hectares of undulating land south of the Swan River about thirteen kilometres from the Perth city centre and eight kilometres from Fremantle. An area of approximately 175 hectares was formerly part of the Somerville Pine Plantation and was given to Murdoch University by the University of Western Australia.

### **Admissions**

The University 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. However, in some courses, particularly in the physical and biological sciences and in mathematics, some prior knowledge of certain subjects is considered necessary.

In April 1985 the total enrolment was 3,987, comprising 1,697 full-time, 877 part-time and 1,413 external students. The full-time academic staff numbered 188.

### **Schools of Study**

The University is organised on the basis of schools of study which have both academic and administrative responsibilities. The following schools have been established: Education; Environmental and Life Sciences; Human Communication; Mathematical and Physical Sciences; Social Inquiry; and Veterinary Studies.

### **Programs of Study**

Degree programmes offered in 1986 are in Applied Veterinary Medicine, Asian Studies, Biology, Chemistry, Commerce, Communication Studies, Computer Science, Economics, Education Studies, English and Comparative Literature, Environmental Science, General Studies, History, Horticultural Science, Literature and Communication, Mathematics, Mineral Science (Extractive Metallurgy), Physics, Population and World Resources, Psychology, Social and Political Theory, Teacher Education, Theatre and Drama, Theology, Veterinary Biology and Women's Studies.

Undergraduates proceeding to a degree must participate in one of four 'trunk' courses: Australian Studies; Energy and Life Systems; Evolution and Change; Structure, Thought and Reality. In addition to a trunk course, students are given the opportunity to explore areas outside their specific interests. Students are not required to settle the selection of their degree programs until the end of their first year.

### **Awards**

Studies in appropriate programs will lead to pass or honours degrees in Arts, Commerce, Education, Psychology, Science, Theology, and Veterinary Medicine and Surgery. The Bachelor of Literature and Communication is available by external study to graduates.

The higher degrees offered by the University are the research degrees of Master of Philosophy and Doctor of Philosophy. Course-work masters' degrees are offered in Applied Psychology, Education and Public Policy. A Master of Arts in Literature and Communication is available by external study.

Courses for the degree of bachelor are of the following duration: for the ordinary degree of Bachelor of Arts, Bachelor of Commerce, Bachelor of Divinity (for holders of a recognised degree) or Bachelor of Science, three years, and for the corresponding honours degree, four years; for Bachelor of Education, Bachelor of Psychology or Bachelor of Theology, four years; and for Bachelor of Education (Honours) and Bachelor of Veterinary Medicine and Surgery, five years.

### **External Studies**

Special provision has been made for external students, and a substantial and innovative program of external studies has been developed. External tuition is the responsibility of staff of the schools of study, but the external studies program as a whole is co-ordinated by a Director of External Studies.

Beginning in 1975 with a small pilot scheme, Murdoch University in 1976 assumed full administrative responsibility for all university external studies in Western Australia. The external studies programs are equally available to residents in the Perth metropolitan area and to those living outside Perth including interstate and overseas.

### **Extension Service**

The University provides, by co-operation with University Extension, community education programs for all ages.

### **Student Housing**

The University has on campus accommodation for 96 students. Student House provides self service accommodation with each student having a single study/bedroom. Groups of eight students share common kitchen, dining and lounge areas.

## Research

In addition to moneys from the University's recurrent budget, finance for research amounting to almost \$1.8 million was received in 1984 from various government authorities and private organisations. Current major research projects include solar energy; the solvation of ions aimed at use in the processing of minerals; solar energy storage batteries; trace element nutrition; marine biology; biotechnology; motor vehicle fuel economy and emissions; industrial pollution; surface science; neurological research; developmental psychology; energy policy in Western Australia; childrens perception of television; the provision of animal health and production programs; and hydatid disease. The Australian Research Grants Committee provided \$390,000 for research in the physical, chemical, biological, veterinary and social sciences during 1984. The National Health and Medical Research Council and the National Energy Research Development and Demonstration Council also provided substantial grants.

The Mineral Chemistry Research Unit at Murdoch University, established in 1974, receives grants from private enterprise to continue research into minerals processing and other fields of chemistry. The University has received substantial funding for solar energy research from both State and Federal sources.

The University also has an Institute for Social Programme Evaluation, an Institute for Environmental Science, a Foundation for Continuing Veterinary Education and a Foundation for Companion Animals.

## University Government

The governing body of the University is the Senate. It consists of twenty-five members, comprising the Chancellor, the Vice-Chancellor, the Director-General of Education or his deputy, the President of the Students' Guild, four members of the academic staff, one member of the non-academic staff, two students elected by the students, six members appointed by the Governor, two persons who are not Members of Parliament nominated by the Premier and the Leader of the Opposition, three persons elected by Convocation, and three co-opted members. Under the Murdoch University Act the Senate has established an Academic Council, its principal functions being 'the discussion and submission to the Senate of opinions and recommendations on academic policy, academic development, the admission of students, instruction, studies and examination, research, the admission to degrees, the discipline of the University and any other matters which in the opinion of the Academic Council are relevant to the objects of this Act'.

The Murdoch University Guild of Students was established as a body corporate on 1 September 1976, with subsequent statutory approval on 9 February 1977. The Guild, a voluntary organisation established to represent and provide for the needs and interests of all students, is the recognised channel of communication between the students and the Senate. The executive consists of a President and eight secretariat members (all elected from and by the student body). The Guild provides a wide range of services, entertainment and alternative activities to academic life on the campus.

## Student Fees, Allowances and Scholarships

All students of the University pay an annual Guild fee.

Financial assistance is given to students by the Australian Government under the Tertiary Education Assistance Scheme and by means of postgraduate awards. The University offers postgraduate scholarships and private organisations also offer awards for postgraduate studies.

## 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 States 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.

There are two national education commissions which advise the Commonwealth Government on the needs of educational institutions throughout Australia for the purposes of financial assistance: the Commonwealth Schools Commission and the Commonwealth Tertiary Education Commission.

### The Commonwealth Schools Commission

In December 1973 the Schools Commission was established by the *Schools Commission Act 1973* to advise the Commonwealth Minister for Education on the needs of government and non-government primary and secondary schools and to administer programs of assistance designed to address those needs in schools in the States and Territories.

The Commission currently administers a wide range of specific purpose programs which have as their objectives: making provision for students with special needs arising from such causes as socio-economic, cultural and gender differences, geographic isolation and intellectual and physical disabilities; helping schools to respond to transitional changes of national importance, such as technological changes; investigating and reviewing educational issues of national significance and interest. These specific purpose programs include: the Participation and Equity Program, Disadvantaged Schools Program, English as a Second Language Program, Multicultural Education Program, Ethnic Schools Program, Special Education Program, Computer Education Program and Country Areas Program.

Recurrent funding of both government and non-government schools is on a per student basis linked to a community standard recommended by the Commonwealth Schools Commission. Non-government schools are placed into twelve funding categories on the basis of relative needs.

### The Commonwealth Tertiary Education Commission

The *Commonwealth Tertiary Education Commission Act 1977* established the Commonwealth Tertiary Education Commission to promote the balanced and co-ordinated development of tertiary education throughout Australia.

The Commonwealth Tertiary Education Commission comprises a Commission and three councils on universities, advanced education and technical and further education.

Relevant programs of assistance to the States and the Northern Territory for tertiary education are administered by the Commission and are currently authorised under the *States Grants (Tertiary Education Assistance) Act 1984*.

#### COMMONWEALTH GOVERNMENT ASSISTANCE FOR EDUCATION WESTERN AUSTRALIA (\$'000)

Nature of assistance	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Assistance of a revenue nature —						
Universities	48,318	53,190	59,443	68,290	73,385	79,172
Colleges of advanced education (a)	49,560	53,290	60,064	64,706	72,626	78,064
Technical education	5,160	4,780	9,032	8,899	10,617	11,805
Schools	38,741	44,019	51,656	r 66,663	81,852	90,749
School-to-work transition	—	482	2,567	2,717	3,535	2,253
Child migrant education	140	125	367	242	—	—
Aboriginal education	1,996	2,047	2,218	2,295	2,573	2,750
Pre-schools and child care (b)	6,379	4,860	4,860	4,860	4,860	4,860
Educational research	74	111	99	79	29	—
Total	150,368	162,904	190,306	r 218,751	249,477	269,653
Assistance of a capital nature —						
Universities	5,185	3,006	3,199	3,212	3,515	5,812
Colleges of advanced education (a)	5,863	3,044	2,773	4,474	3,584	3,494
Technical education	3,726	10,481	9,148	12,644	12,136	8,065
Schools	20,971	11,011	14,079	16,039	16,045	18,366
Aboriginal education	159	23	21	r 23	21	—
Pre-schools and child care (b)	218	—	—	—	—	—
Video facilities	—	—	—	174	240	108
Total	36,122	27,565	29,220	r 36,566	35,541	35,845
GRAND TOTAL	186,490	190,469	219,526	r 255,317	285,018	305,498

(a) Including teachers colleges. (b) From 1979-80 the child care component of the grants has been included in 'Social security and welfare'.

## Assistance for Students

The Commonwealth Department of Education administers several schemes of student assistance:

**Tertiary Education Assistance Scheme.** Full-time Australian students enrolled in an approved course at a university, college of advanced education, teachers college, technical college or agricultural college and some non-government institutions may apply for a living allowance subject to a means test. Dependants' allowances are also payable. Students who qualify for the payment of a living allowance may be entitled to two other types of benefit, an incidentals allowance and a fares allowance.

**Aboriginal Study Assistance Scheme.** The Aboriginal Study Assistance Scheme provides assistance on a full-time or part-time basis to Aboriginal students who have left school and are undertaking further education such as business college courses, courses in creative arts and culture, and courses in domestic crafts, as well as more formal tertiary and post-secondary courses. Allowances for dependants, text books and equipment, travel, clothing and other items are also payable. Part-time students receive an allowance to help meet expenses associated with their course and for those students who undertake their courses by correspondence, assistance with travel and accommodation costs at residential schools is also provided. For both full-time and part-time students, all compulsory fees are met.

**Aboriginal Overseas Study Awards Scheme.** The Aboriginal Overseas Study Awards Scheme was introduced in 1975 to enable leaders or potential leaders of the Aboriginal community who already have considerable experience in their occupational or professional fields to add to their skills and experience by means of short-term programs of study, observation and discussion overseas. Allowances payable include: travelling allowance, fares allowance, equipment allowance and additional allowances if the award holder's normal income is discontinued.

**Postgraduate Awards.** Holders of Postgraduate Awards are paid allowances to assist them to study for higher degrees at universities or colleges of advanced education. Dependants' allowances and establishment allowances may also be payable.

**Secondary Allowances Scheme.** The Secondary Allowances Scheme assists families with limited financial resources to maintain children at school for the final two years of secondary education. Benefits are subject to a means test.

**Adult Secondary Education Assistance Scheme.** The Adult Secondary Education Assistance Scheme provides benefits comparable to those available under the Tertiary Education Assistance Scheme to adult students undertaking full-time studies in the final year of secondary schooling.

**Aboriginal Secondary Assistance Scheme.** The Aboriginal Secondary Assistance Scheme provides financial assistance to encourage Aboriginal children to remain at school for as long as they can benefit from it. The Scheme includes all Aboriginal children attending secondary schools and classes, as well as those attending primary school who are aged fourteen years or over. Benefits include a living allowance or assistance with boarding costs, a contribution towards fees and expenditure on books, uniforms and other school-related expenses, and a personal allowance paid to students.

**Migrant Adults.** Migrants who are full-time students in the Migrant Advanced English (MAE) or Job-Oriented Migrant English (JOME) courses run by TAFE are eligible for means-tested living allowances paid by the Commonwealth Government. Similar courses are provided on a part-time basis, but do not attract any allowance.

**Assistance for Isolated Children Scheme.** This scheme of allowances was introduced to assist in the education of children who, because of their geographic isolation, are without reasonable daily access to a government school providing courses at the appropriate level. Benefits payable in respect of children living away from home to attend school comprise: a basic boarding allowance (free of means test) and an additional allowance dependent on boarding costs payable and a means test. For isolated children who study at home by correspondence there is an allowance free of means test. Assistance is also made available where a family, in preference to boarding the children away from

home, sets up a second home to enable the children to attend school on a daily basis.

In certain cases assistance may also be available to students who suffer from a disability or handicap which prevents them living at home and attending school daily. It may also be available to students who have to live away from home to undertake remedial or special courses, and to students from itinerant families.

**Soldiers' Children Education Scheme.** The Department of Veterans' Affairs administers the Soldiers' Children Education Scheme. Under this scheme, assistance is provided by way of living allowances and other benefits for the schooling, tertiary education and training of children of veterans who died as a result of war service or who are either blind or totally and permanently incapacitated. Benefits are generally free of income test although a student's own earnings may be taken into account.

#### EXPENDITURE ON EDUCATION BY STATE AND LOCAL AUTHORITIES

State and local authorities comprise the State government, statutory authorities, boards, commissions and corporations, and incorporated bodies in which the State government or its agencies have a controlling interest (other than financial enterprises) together with municipal governments constituted under local government legislation.

Over recent years a range of new and revised classifications has been developed for use in the compilation and presentation of government finance statistics. The following table presents statistics compiled on the basis of these new classifications. For details of the new classification refer to *Classifications Manual for Government Finance Statistics, Australia* (Catalogue No. 1217.0), published by the Australian Statistician, Canberra.

STATE AND LOCAL GOVERNMENT AUTHORITIES (a):  
OUTLAY ON EDUCATION (b)  
(S'000)

Particulars	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Primary and secondary education —						
Current	278,632	319,001	362,110	396,125	484,380	535,662
Capital	43,068	30,463	30,500	27,421	33,210	27,055
Tertiary education —						
Technical and further education						
Current	40,832	47,579	57,186	65,749	82,104	91,944
Capital	10,448	13,936	11,223	20,798	15,712	13,775
Other higher education						
Current	50,071	54,841	59,801	65,530	73,840	78,143
Capital	5,838	3,746	3,051	4,360	4,174	4,823
University education						
Current	50,263	55,127	60,333	69,359	74,433	80,215
Capital	5,195	3,016	3,210	3,223	3,526	5,919
Preschool education (c) —						
Current	13,019	14,680	16,604	27,665	33,743	37,121
Capital	415	60	59	43	40	68
Transportation of students —						
Current	11,899	13,909	17,013	18,919	20,958	23,669
Capital	—	—	—	—	—	—
Education n.e.c. —						
Current	17,625	19,852	22,213	34,421	12,830	15,612
Capital	890	448	180	2,973	1,441	1,043
<b>Total</b>	<b>528,195</b>	<b>576,658</b>	<b>643,483</b>	<b>736,586</b>	<b>840,391</b>	<b>915,049</b>
Current	462,341	524,989	595,260	677,768	782,288	862,366
Capital	65,854	51,669	48,223	58,818	58,103	52,683

(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 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 as such is based on the Commonwealth Schools Commission's twelve-point classification system. Separate rates apply to primary and secondary schools.

Assistance is given to private schools by way of reimbursement of interest paid, up to a prescribed maximum rate, on moneys borrowed for 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 26th Parallel.

At the beginning of the 1976 school year, the State Government introduced a boarding-away-from-home allowance, free of means test, to supplement the isolated children's allowance paid by the Commonwealth Government. The allowance of up to \$250 per annum ensures a combined minimum payment of \$1,177 per annum for a child who is obliged to live away from home to attend school.

School Book Assistance is available to indigent parents who have children in Years 8 to 10. This scheme aims to assist parents who are unable to meet the cost of their children's books.

## Chapter 11

# CULTURE, SCIENCE AND RECREATION

## Culture

Responsibility for cultural activities in Western Australia rests with the State Government Minister for the Arts.

During the decade from the mid seventies, to the mid eighties, the arts underwent unprecedented growth in every State in Australia; and Western Australians responded to the increased opportunities for participation in cultural development and expression this growth offered.

Tangible evidence is apparent in the reconstruction of major facilities for the arts. The concept to link the State's central art institutions into a unified complex, to be known as the Perth Cultural Centre, first planned in 1967, is now being realised. The Perth Cultural Centre reached Stage One when the gallery complex to house the Art Gallery of Western Australia was opened in 1979. In 1985 Stage Two was completed, with the closure of a section of James Street and the opening of the Alexander Library Building, to house the State Library collection. By the end of the decade, it is planned to have the precinct landscaped, performance spaces constructed, the Western Australian Museum facilities refurbished, and the Centre fully established.

The Crafts Council Centre is established on the first floor of the Perth Railway Station and the Film and Television Institute is based in the historic building that housed the former Fremantle Boys School. The Film and Television Institute provides training, screenings and production facilities for the Western Australian public and filmmakers whilst the Crafts Council Centre provides the State's craftspeople with an exhibition gallery devoted exclusively to their use and a number of studios for short term residencies. Visual arts, crafts and literature are further served by the Fremantle Arts Centre, which maintains an annual program of exhibitions, residencies and workshops. The Centre also houses the Fremantle Arts Centre Press, funded to publish Western Australian writing in areas such as short fiction, poetry and social history. The Praxis Group, also based in Fremantle, is funded as the State's contemporary art space, and sees itself as having both a supportive and an educative role in this area.

The development of regional arts facilities has accelerated, with increased State Government assistance. In 1984 the Geraldton Art Gallery was opened; construction work began in 1985 on a performing arts facility at Karratha and an art gallery at Bunbury, and major facilities are planned in several other country centres. At the same time, an increased demand from non-metropolitan regions for professional arts tuition and services is being met in a number of ways, from short-term artist-in-residence programs to permanent appointments through the Western Australian Academy of Performing Arts. There has also been a steady flow of country touring activity by professional performing companies, whether arranged by the Western Australian Arts Council or by the groups themselves. During 1985, the Western Australian Arts Council arranged tours comprising: 101 evening performances to mixed audiences, 411 performances for schools, 72 days of exhibition touring, 53 workshops and 4 teacher in-service courses.

International Youth Year was marked in the arts by a number of special projects, including the 'Art Attack' research and performance program in November 1985, and by the provision for the first time of a financial subsidy to two youth theatre companies and the youth orchestra. This brings the total of the State's major subsidised performing arts organisations to nine — the West Australian Ballet Company, the Western Australian Arts Orchestra, the Western Australian Opera Company, the Western Australian Theatre Company, the Western Australian Youth Orchestra, Deck Chair Theatre Company, the Hole in the Wall Theatre, Spare Parts Puppet Theatre and Swy Theatre Company. These organisations performed to audiences totalling some 320,000 patrons in 1985. Youth was also a special focus in the annual Festival of Perth, which in 1985 attracted audiences exceeding 150,000, earned a box office income of \$1.4 million, and featured twenty international attractions during a three and a half week period.

Theatre in Western Australia has already felt the impact of the first graduates from the Academy of Performing Arts, and the music world can look forward to similar input from the newly created Western Australian Conservatorium of Music.

In October 1985 the State Government introduced two schemes of great significance for the arts: the Creative Development Fund, providing grants to assist the individual artist in the creation of original works and exploration of new forms; and triennium funding for the major subsidised arts organisations, permitting them greater stability and an increased capacity for effective forward planning. These programs, like the bulk of grants for arts projects and organisations, are administered by the Western Australian Arts Council (details of which appear later in this Chapter).

## PUBLIC LIBRARIES

### **The Library Board of Western Australia**

The Library Board of Western Australia is constituted under the provisions of the *Library Board of Western Australia Act 1951*. It was set up as an independent statutory authority in 1952.

The Board consists of twelve members. The Director-General of Education is an *ex officio* member and the eleven other members are appointed by the Governor. Five members are nominated by the Minister and the other six are selected by the Minister. Of these six members, one represents the Library Association of Australia, Western Australian Branch, and the other five represent local government interests throughout the State.

The Board's main responsibilities are 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 Alexander Library Building, a part of the Perth Cultural Centre and housing all the divisions of the Library Board, was opened in 1985, and the administrative structure re-named the State Library Service of Western Australia. The governing body continues to be called the Library Board of Western Australia.

A computer system was introduced in July 1983 to automate the central services of the organisation — book acquisition, cataloguing and the control of the movement of books to and from public libraries, as well as enabling direct on-line enquiry by public libraries to the central data base.

The State library service comprises: The State Reference Library of Western Australia which includes the Central Music Library; the J. S. Battye Library of West Australian History including the State Archives; the State Bibliographical Centre; the State Film Centre; and local public libraries throughout the State. These units are co-ordinated by the Board to provide an integrated and comprehensive library and information service throughout the State.

## THE LIBRARY BOARD OF WESTERN AUSTRALIA

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
<b>Expenditure —</b>						
Salaries and wages	\$ 2,765,304	3,126,809	3,448,598	4,413,487	4,698,760	5,288,379
Books, periodicals and binding	\$ 2,356,378	2,165,454	2,598,748	3,468,779	2,984,235	4,170,405
Other (a)	\$ 649,208	854,216	955,200	1,354,241	1,800,197	6,281,328
Total	\$ 5,770,890	6,146,479	7,002,546	9,236,507	9,483,192	15,740,112
<b>Number of —</b>						
<b>Staff (b) (c) —</b>						
Librarians	78	83	83	83	83	87
Student librarians and cadets	9	8	7	—	—	—
Other	148	144	145	157	157	171
Total	235	235	235	240	240	258
<b>Associated public libraries (b) —</b>						
Perth Statistical Division	47	49	52	54	55	57
Other statistical divisions	137	147	152	154	153	158
Total	184	196	204	208	208	215
<b>Books —</b>						
<b>Reference and Central Music Library stock —</b>						
Bound volumes (b)	336,398	341,462	351,040	365,244	376,399	387,953
Periodical and serial titles received	8,307	9,535	10,173	10,581	11,314	11,567
Music scores	21,191	22,765	23,703	24,693	25,880	26,590
<b>Circulation stock —</b>						
Books processed for circulation	230,932	212,541	185,094	205,407	205,871	210,488
Total stock (b)	1,397,701	1,474,958	1,536,627	1,625,310	1,684,150	1,715,834
Volumes in public libraries (b)	1,197,599	1,225,210	1,309,049	1,397,804	1,474,879	1,524,256
Received and dispatched in the exchange programme with local libraries	608,230	666,498	690,644	757,938	765,292	741,560
Inter-library requests received	101,510	109,839	107,552	112,194	116,952	102,054

(a) Includes microfilm and ancillary expenditure. From 1983-84 includes loan repayments associated with the Alexander Library building. For 1984-85 includes expenditure on government funded grants. The increase in 1984-85 was a result of the opening of the Alexander Library building. (b) At 30 June. (c) Number of full-time staff plus full-time equivalent units of part-time staff.

### The State Reference Library of Western Australia

The origins of the State Reference Library date from 1886 when the Government resolved to establish a library to mark the Golden Jubilee of Queen Victoria. In 1911 this library became the Public Library of Western Australia and is now The State Reference Library of Western Australia.

The State Reference Library differs from other libraries in that its function is not principally to supply books but to provide information in answer to inquiries. It handles over a hundred serious or research inquiries per day, and for this purpose is divided into specialised subject units, each of which has staff experienced in the subject matter concerned.

**Commerce and Technology Division.** The Commerce and Technology Division provides the business and industrial community, and the tradesman and handyman with the latest technical information and also makes available older material of research value and general works intended for the non-specialist. It comprises the Library of Business, Science and Technology and the Business Information Centre. The Centre provides immediate answers to quick reference questions in the commercial and business field. It has telephone directories, business directories, financial services, newspapers and similar material from many parts of the world.

**Humanities Division.** The Humanities Division covers a wide field in the arts and social sciences, and includes comprehensive sets of the official publications of the Commonwealth Government, State Governments, and selected overseas governments. The Division caters for the personal needs of the individual seeking information and for the needs of organisations and other bodies concerned with, for example, social welfare, industrial relations and public administration. Economics, politics, law, statistics, education, sociology, history and geography are some of the major areas well represented in the social sciences collection. In the humanities, the collection of works about art and artists is significant and material dealing with other aspects of the fine arts such as architecture, sculpture, furniture, porcelain and china is also held.

The State Reference Library is equipped with microfilm, microfiche, photocopy and tape-recording apparatus. Photocopies of material are available to the extent permitted by the *Copyright Act 1968* (Commonwealth), on payment of an appropriate fee.

In addition to providing reference facilities in the metropolitan area, the service of the library extends throughout the State, through the agency of local public libraries.

**The Central Music Library.** This is the principal music library of the State. It offers a full reference service in the field of music, and scores are available on loan.

#### **The J. S. Battye Library of West Australian History**

This Library covers all aspects of the history and development of Western Australia. It has a very large collection of historical documents and papers, including the State Archives (see below). It also records and holds oral history tapes and is responsible for the State Film Archives which is a collection of cinematograph film and associated material relating to Western Australia. The library has the latest information on State developments. It receives the Government Gazette of Western Australia on the day of issue, all Royal Commission and similar reports on the day that they are tabled in Parliament, proposed amendments to town planning schemes as soon as they are issued, and all current Western Australian publications received under copyright. Environmental Impact Statements are obtained immediately on release.

**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. So long as they are in current use they remain the responsibility of the department or body concerned, but when they cease to be in current use they become the responsibility of the Board and their destruction is prohibited without the approval of the Board.

#### **The State Bibliographical Centre**

The function of the State Bibliographical Centre is to encourage and facilitate co-operation between all libraries in Western Australia, so that the total resources in the State may be made available to all library users.

The Centre operates the Request and Information Service provided by the Board for all public libraries, organises inter-library loans for, or between, any other approved libraries in the State or elsewhere, and offers bibliographical assistance to any library and to users of the State Reference Library. For these purposes it is equipped with catalogues of the whole stock of the Library Board and with union catalogues of both monographs and journals in over 200 other libraries ranging from those of the University of Western Australia to highly specialised collections held by private concerns or government departments. It also has a large range of published bibliographies from many parts of the world. The Centre is connected by telex to all major libraries of the world.

### The State Film Centre

The State Film Centre offers a free 16 mm film lending service to groups and organisations throughout Western Australia.

Some 7,500 films, selected in response to user demand, cover hundreds of different subjects and a catalogue of these is available in every public library in the State.

Responsibility for classroom teaching films is carried by the Education Department, however, films from the State Film Centre are also available as required.

### Local Public Libraries

The books in all public libraries in the State are supplied by the Board and remain its property. The Board's policy is to supply books on a minimum basis of 1.25 volumes per head of the population served by the library concerned. At least one-quarter of the books in each library are withdrawn each year and replaced by a corresponding number of fresh volumes.

Any non-fiction book in the State-wide stock is available at any public library if requested by a reader. A printed subject catalogue of the stock is supplied free to every library each year. In the metropolitan area the Board provides a delivery van service to libraries.

Prior to dispatch, all books supplied to public libraries are fully catalogued and prepared for use by the Board, which also maintains central stock and location records.

As far as possible, selection of books for each library is carried out by the local librarian but the Board's staff makes the selection for those libraries which are unable to do so.

The Board is not responsible for the provision of local premises nor the employment of local staff, which are provided by the local authority concerned. However, professional advice on library design is available to architects and local authorities.

All 139 local authorities in Western Australia have established one or more public libraries.

## THE WESTERN AUSTRALIAN MUSEUM

The Western Australian Museum, founded in 1891 and constituted under the *Museum Act 1969*, has its headquarters and principal display galleries in Perth, with branches in Fremantle (Fremantle Museum and Western Australian Maritime Museum), Albany (Albany Residency Museum) and Geraldton (Geraldton Museum).

The Museum is governed by seven Trustees appointed by the Governor. Under the *Museum Act 1969* they are given wide responsibilities and considerable independence in the management of the Museum's affairs. The branches are governed by Committees of Management appointed by the Trustees.

Under the *Aboriginal Heritage Act 1972* the Museum has responsibilities for Aboriginal material, including sites, and under the *Maritime Archaeology Act 1973* for historic shipwrecks. Under the Commonwealth *Historic Shipwrecks Act 1976* the Director has delegated powers in respect of wrecks and material under Commonwealth control.

Displays in Perth concentrate on Aboriginal matters, natural history and the history of settlement. At the Fremantle Museum they include Dutch and colonial wreck material and the history of Fremantle. The Western Australian Maritime Museum was established specifically to house a portion of the hull of the Dutch wreck *Batavia*, and supporting displays. (A special article on the Maritime Museum appears on the next page.) Regional displays, particularly on the local environment and Dutch wrecks, are featured at Albany and Geraldton respectively.

Most staff and collections are housed at the headquarters in Perth; maritime archaeology and conservation/restoration staff are housed in the Western Australian Maritime Museum. The staff is grouped functionally within Divisions of Natural Science, Human Studies and Professional Services, a Department of Aboriginal Sites and an Administration Unit.

The following table includes details for all branches of the Museum.

THE WESTERN AUSTRALIAN MUSEUM						
Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Expenditure —						
Salaries and wages	\$ 2,380,526	2,756,085	3,101,770	3,758,242	3,856,369	4,043,540
Other	\$ 1,082,146	1,154,594	1,297,271	1,325,747	1,723,126	1,554,756
Total	\$ 3,462,672	3,910,679	4,399,041	5,083,989	5,579,495	5,598,296
Square metres of —						
Display area (a)	4,590	4,797	4,797	4,797	4,797	5,733
Storage area (a)	3,381	3,472	3,472	3,472	3,472	3,381
Total	7,971	8,269	8,269	8,269	8,269	9,114
Number of —						
Staff (a) —						
Professional	57	59	59	59	60	61
Technical	51	48	48	48	49	49
Administrative and clerical	30	33	33	33	32	32
Attendant-receptionist	47	49	49	49	46	46
Total	185	189	189	189	187	188
Man-days spent on field work	4,513	5,873	3,651	3,692	3,494	3,466
Public attendance —						
Western Australian Museum Perth —						
General public	134,761	137,392	156,039	156,134	r 186,725	253,743
Children — school visits	28,266	22,526	23,162	22,597	24,699	27,736
vacation activities	6,297	5,767	5,512	5,649	r 5,098	3,374
Total	169,324	165,685	184,713	184,380	216,522	284,853
Fremantle Museum —						
General public	89,445	76,702	72,878	66,845	r 75,212	77,664
Children — school visits	20,590	19,686	17,437	17,519	r 18,319	17,310
vacation activities	4,215	4,434	3,827	3,522	3,426	3,425
Total	114,250	100,822	94,142	87,886	96,957	98,399
Western Australian Maritime Museum (Fremantle) (b) —						
General public	18,973	21,728	29,957	32,049	41,981	39,992
Children — school visits	—	—	—	—	—	198
Albany Residency Museum —						
General public	55,395	50,181	48,779	53,315	66,528	59,460
Children — school visits	2,858	3,468	2,939	2,695	3,236	3,037
Total	58,253	53,649	51,718	56,010	69,764	62,497
Geraldton Museum (c) —						
General public	—	10,327	r 12,291	r 11,967	r 15,055	19,561
Children — school visits	—	2,677	r 3,433	3,796	2,778	3,147
vacation activities	—	—	—	2,193	1,700	2,480
Total	—	13,004	17,625	17,956	19,533	25,188
GRAND TOTAL	360,800	354,888	378,155	378,281	444,757	511,127

(a) At 30 June. (b) Opened 5 September 1979. (c) Established as a branch on 1 December 1980; 1980-81 figures are for the full year's operations.

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. Research within the Division of Natural Science is related specifically to marine fauna, mammals, birds, reptiles, insects and fossils of the State. The Division of Human Studies is concerned with Aboriginal archaeology and rock art, prehistoric archaeology, Aboriginal material culture, social history, maritime history, underwater archaeology, industrial and agrarian technology, and arms and armour. The Division of Professional Services co-ordinates the work of departments responsible for display, material restoration and conservation, children's educational services, publications, assistance to local museums and the research library. The Department of Aboriginal Sites carries out a programme of site recording and protection.

underway of a section of the hull of the Dutch vessel *Batavia*, wrecked on the Abrolhos Islands in 1629.

photograph: Douglas Elford, Western Australian Museum

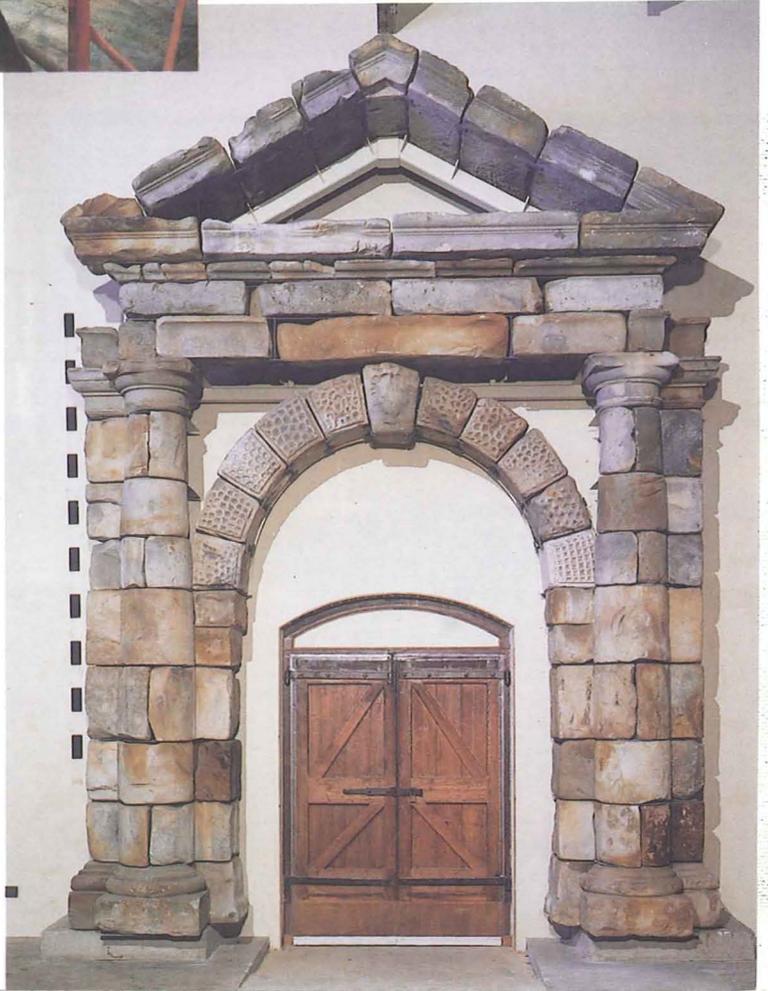


PLATE 2 — A prefabricated building facade originally designed for Batavia Castle in Java has been recovered from the wreck of the *Batavia* and re-assembled in the Museum.

photograph: Douglas Elford, Western Australian Museum



PLATE 3 — Success (upper), Fishing Boat (middle) and Challenger (lower) Harbours at Fremantle will provide bases for the syndicates challenging for and defending the America's Cup in 1986-87.

*photograph: Richard Woldendorp; Photo Index*

PLATE 4 — Fishing Boat Harbour provides a wide range of support facilities for Western Australia's fishing fleet and can berth 450-550 vessels.

*photograph: Ian Johnson; Western Australian Tourism Commission*



The Trustees 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 the various departments of tertiary educational organisations. Educational Centres, staffed by teachers provided by the Education Department, 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.

Under the provisions of the *Museum Act 1969* all meteorites are declared to be the property of the Crown and are vested in the Museum.

#### WESTERN AUSTRALIAN MARITIME MUSEUM

The Western Australian Maritime Museum is located in the old Commissariat Store and Offices in Cliff Street, Fremantle. It consists of a large main building facing Marine Terrace and a smaller building opening on to Cliff Street. Since 1979 it has housed displays principally based on material retrieved from wrecks along the Western Australian coast, together with the Western Australian Museum's Departments of Maritime Archaeology and Conservation.

The Commissariat Store and Offices were built following the decision by the British Government to send convicts to Western Australia. The earliest sections date from 1851, with a substantial addition in 1862; there were further extensions in the post-convict era around the turn of the century. The Store, although originally designed to contain three floors, was actually built with only two.

At the time of construction the Store was close to the point where goods were brought ashore. Large sailing vessels anchored offshore in Gage Roads until the construction of Fremantle Harbour in the 1890s. Goods and passengers were ferried ashore to jetties which have now been replaced by fish markets and boat harbour constructions. Stores for the convict establishment were brought into the Commissariat, or taken by horse-drawn tram to the prison. Goods intended for Perth were carried down Cliff Street, loaded on river boats at a jetty now occupied by the harbour, and shipped up the Swan River.

Once Fremantle Harbour had been built, the area which included the Commissariat Store was peripheral to the centre of activities, but with the mining boom of the 1890s, the Government needed storage and office space, and added wings to the Stores building and to the Offices. Parts of the Offices were also used as a Post Office and Customs Building, but after the First World War, there was less use for the facilities which gradually deteriorated. Alterations to the Stores included the replacement of the entrance doorway with a large squared opening for motor vehicle access, replacement of brick columns with steel, and of the wooden block floor with cement. As the complex is built on low ground, saline water permeated the lower parts of the walls, and as the salt crystallized, it caused considerable damage to both the limestone and brickwork. When, in 1977, the Government built a new Government Store and the Commissariat was handed to the Western Australian Museum, the buildings were generally in a dilapidated condition. A restoration program, completed in 1985, has aimed at restoring the buildings to their original appearance.

The Western Australian Museum has a unique collection of material retrieved by its maritime archaeologists from wrecks off the Western Australian coast. The earliest known wreck is that of the English East India Company's ship *Trial*, 1622. Few relics survive, but the second oldest wreck, the Dutch East Indiaman, *Batavia*, which ran onto an Abrolhos Islands reef in 1629, has proved a very rich site, containing remains of the ship and a wide range of artifacts. Of particular interest is an arched portico 6.2 metres high, carried as stone blocks. This has been reconstructed, and is now on display. It was intended as a gateway to the fort at the town of Batavia (modern Jakarta) which the Dutch were developing as their administration centre.

During excavations by the Museum's archaeologists between 1972 and 1975, substantial remains of the *Batavia's* hull were located. Having been photographed and plotted they were raised and brought to Fremantle for conservation treatment. Reconstruction of a section of the *Batavia* is underway, and scheduled for completion in a specially controlled environment in the eastern wing of the Museum at the end of 1986. The section includes part of the stern and port side up to the waterline. In the process of reconstruction, new light has been thrown on Dutch shipbuilding techniques of the early 17th century.

Displays currently on view include material from the other Dutch shipwrecks, the *Vergulde Draeck* (wrecked 1656), *Zuytdorp* (1712) and *Zeewijk* (1727), as well as material both from pre-settlement wrecks (*Lively* c. 1810, and *Rapid* 1811) and from the colonial period. By 1988, an early steam engine from the wreck of the *Xantho* (1873) should be on display; it is of a type first constructed during the Crimean War.

The smaller building facing onto Cliff Street was initially constructed as offices; its restoration mainly for use as a Children's Activity Area, with facilities for children's classes and for holiday activities, was completed in 1985. Inquiries related to maritime archaeology and history can be made at the office situated in that building.

In the areas reserved for staff activities, the building complex houses the Museum's Departments of Maritime Archaeology and Conservation. The Maritime Archaeology Department implements the provisions of legislation intended to protect shipwrecks of historic significance. The Department has its own boats and diving equipment and has an international reputation; staff members regularly advise on overseas and interstate projects.

The Conservation Department has special expertise in the treatment of material raised from shipwrecks, particularly organic and metallic remains. It is the most advanced laboratory of its kind in the southern hemisphere.

## THE ART GALLERY OF WESTERN AUSTRALIA

The Art Gallery of Western Australia is under the control of a Board of seven members appointed by the Governor under the provisions of the *Art Gallery Act 1959*.

The Art Gallery building, a major element of the Perth Cultural Centre, was opened on 2 October 1979. The building is designed on an hexagonal form to allow maximum use of space and flexibility of display. It incorporates seven major galleries, an auditorium, conservation laboratories, a prints and drawings study room, a restaurant and a bookshop. Storage areas, mechanical and electrical plant, packing rooms and a workshop are located in the basement area. The building is fully airconditioned and humidified. The Gallery Administration Centre, linked to the Art Gallery via a walkway, incorporates a library, a theatre and the Art Gallery Society rooms. The Art Gallery Complex also includes the restored Beaufort Street Court. Built in 1905, the building housed the Perth Police Courts until its closure in 1982. The building, which lends itself to exhibitions of an historical nature, will house the Gallery's furniture collection.

As well as exhibiting works from the permanent collection, activities of the Gallery involve the presentation of important exhibitions from overseas, and lectures and exhibitions by visiting artists.

### The Art Gallery Society of Western Australia

The Art Gallery Society was re-formed in 1974. It comprises a council of twenty persons, one of whom is Director of the Gallery, and some one thousand members. The 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.

### Voluntary Gallery Guides

The Voluntary Gallery Guides, comprising students of art and people interested in the history of art, form a valuable link between professional staff and the public by conducting tours of exhibitions for adults, students and school children.

#### THE ART GALLERY OF WESTERN AUSTRALIA

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
<b>Expenditure —</b>						
Salaries and wages	\$ 708,373	798,610	1,029,834	1,187,747	1,258,707	1,378,355
Acquisition of exhibits	\$ 608,002	614,118	666,297	581,539	610,322	514,959
Exhibitions, lectures and films	\$ 94,039	62,992	86,614	79,448	109,092	159,515
Loan redemption and building costs	\$ 662,161	962,898	509,382	518,767	497,552	502,728
Other expenses	\$ 709,386	723,550	562,583	655,735	835,757	945,129
<b>Total</b>	<b>\$ 2,781,961</b>	<b>3,162,168</b>	<b>2,854,710</b>	<b>3,023,236</b>	<b>3,311,430</b>	<b>3,500,686</b>
<b>Number of —</b>						
<b>Staff (a) —</b>						
<b>Full-time —</b>						
Professional	17	18	18	18	20	21
Administrative and clerical	13	14	14	14	15	16
Attendants and other support staff	31	31	29	30	30	30
<b>Part-time</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>
<b>Total</b>	<b>66</b>	<b>68</b>	<b>66</b>	<b>67</b>	<b>70</b>	<b>72</b>
<b>Exhibits for display (a) —</b>						
Paintings — Oil and other media	721	735	751	778	946	966
Watercolour paintings	453	459	462	465	504	527
Engravings, prints and woodcuts	3,294	3,432	3,555	3,679	4,155	4,199
Sculpture	116	132	137	144	147	153
Craft items	1,548	1,642	1,742	1,878	2,108	2,174
Photography	16	20	82	94	102	104
Tribal art	499	499	499	499	503	508
<b>Total</b>	<b>6,647</b>	<b>6,919</b>	<b>7,228</b>	<b>7,537</b>	<b>8,465</b>	<b>8,631</b>
Exhibitions for year	29	45	51	50	41	43
Visitors' attendances	211,521	228,553	222,059	210,973	335,814	(b) 173,448

(a) At 30 June. (b) Concourse construction work within the Perth Cultural Centre complex to link the new Alexander Library with the Art Gallery caused a drop in visitor attendances for 1985.

#### THE WESTERN AUSTRALIAN ARTS COUNCIL

The Western Australian Arts Council was established by the *Western Australian Arts Council Act 1973*, operative from 1 December 1973. The Council took over the functions of the Western Australian Arts Advisory Board. In terms of the Act, 'It shall be the general duty of the Council to encourage, foster, and promote the practice and appreciation of the arts in Western Australia'. The Council may make grants to arts organisations or individuals engaged in activities consistent with this duty. Subject to the provisions of the Act, the Council may 'generally do whatever it considers necessary or expedient in order to stimulate artistic or cultural activity'.

The Council is charged with three specific functions: to enhance the standards of performance and execution in all aspects of the arts; to make accessible to the public of Western Australia forms of artistic and cultural work; and to foster and maintain public interest in the arts and culture of the State.

The Council undertakes these functions through the funding of arts organisations and events which could not operate or take place without financial support; through a statewide touring programme which includes performances, exhibitions and tutors; and through a development and advisory service which encourages self-help whilst providing assistance from a central source.

Funds available to the Council to enable it to exercise its functions include amounts appropriated by the State Parliament or made available by the Minister for the Arts from the proceeds of Instant Lotteries conducted by the Lotteries Commission of Western Australia, and amounts made available by the Commonwealth Government, amounts borrowed by the Council under the provisions of the Act, and moneys which may be advanced by the Treasurer.

The Council also administers the distribution of Instant Lottery funds approved by the Minister for the Arts for cultural purposes.

The Council is affiliated with the Arts Council of Australia and through its touring and development activities acts as the Western Australian Division of that body.

### **The Aboriginal Arts Board**

The Aboriginal Arts Board is constituted under the *Australia Council Act 1975*. The Board comprises a chairman and between nine and fourteen members, the majority of whom practise or are otherwise associated with the arts.

The Aboriginal Arts Board 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.

Aboriginal Arts Board grants for arts programs in Western Australia increased in 1984-85 with thirty-three grants awarded totalling \$342,665. This compares with twelve grants amounting to \$85,000 awarded for Western Australian Aboriginal arts projects in 1983-84.

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## Science

### STATE GOVERNMENT OBSERVATORY

The Perth Observatory was originally established near Kings Park, in 1896. The present buildings, near Bickley in the Darling Range, 390 metres above sea level, were officially opened on 30 September 1966.

The primary instruments are: the 61 cm Lowell Cassegrain reflector, a 33 cm Astrographic refractor and the 19 cm Meridian Transit Circle. Other telescopes at the Observatory 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 a 20 cm portable Meade Cassegrain reflector.

The 61 cm Lowell telescope was originally used in an international project, which was funded by the National Aeronautics and Space Administration of the United States of America and co-ordinated by the Lowell Observatory, in Flagstaff, Arizona, U.S.A. to observe selected major planets. Several observatories, well distributed in longitude, participated using identical cameras and optical systems. The purpose of the programme was to compile an extensive data base pertaining to atmospheric and surface features of these planets. Space probes have now made much of this work unnecessary. The telescope is also equipped with a photoelectric photometer to measure the brightness of celestial objects, and a plate camera for direct photographs. The Perth Observatory was involved in the original discovery of the rings of Uranus.

The Astrographic telescope is used to investigate photographically the motion of stars over long periods of time; observation of minor planets; observation of comets (including recovery of periodic comets) enabling orbits to be computed and for securing photographs of the southern skies.

The Meridian Transit Circle is a fundamental telescope for measuring star positions. It has only one axis, aligned east-west, so that the telescope can traverse only the Celestial Meridian. As the Earth rotates, the planets, stars, Sun and Moon appear to revolve from east to west across the sky. By observing the precise times that they cross the Meridian, the astronomer can measure their positions very accurately, ultimately building a fundamental reference frame of stars.

The computers at the Perth Observatory have been updated in recent years, facilitating fast processing of the numerous observations made.

The Perth Observatory co-operates directly with other observatories in the area of astrometric research. It provides astronomical information for the State and is open to visitors on Sundays and Public Holidays (Christmas Day and Good Friday excepted) or by appointment for school groups (children aged 11 years and over) or other groups and clubs.

### STATE GOVERNMENT CHEMICAL LABORATORIES

In 1922 the various chemical services of the State Government were amalgamated to form the Government Chemical Laboratories, primarily for the performance of chemical work required by government departments. In addition, the Laboratories serve government instrumentalities and semi-government authorities and undertake some chemical work for the general public. The activities of the Laboratories which are a division of the Department of Mines, are organised under seven Branches, the separate functions of which are described briefly in the following summary.

#### **Agricultural Chemistry**

The Agricultural Chemistry Laboratory provides chemical expertise to government departments, farmers, industry and private individuals relating to the chemistry of plants, soils, feeding stuffs and fertilisers and its application to agricultural research, including plant nutrition, crop and pasture production, soil fertility, efficient use of fertilisers, animal nutrition, animal health and meat production. Other activities include studies of effects of environmental pollution, regulatory work on fertilisers and oilseed quality, physical characteristics of materials used for dam construction and use of a computer for automatic chemical analysis.

### **Engineering Chemistry**

The Engineering Chemistry Laboratory works on research and development aspects of the utilisation of the State's mineral resources. Specific technological problems are investigated at the Laboratory's own initiative and at the request of government departments. Companies and individuals can request confidential investigations which are charged at cost. Facilities are available for small and large scale testwork on ore dressing, mineral processing and associated metallurgical techniques. Technical advice on these topics is provided as a consultative service.

### **Food and Industrial Hygiene**

The Food and Industrial Hygiene Laboratory is primarily concerned with food quality, working environments and pesticide residues. Foods are examined with respect to their nutritional value, adulteration, possible contamination, compliance with the appropriate regulatory Acts and suitability for human consumption. In the field of industrial hygiene the Laboratory conducts monitoring programs and inspections of industrial working conditions with respect to levels of toxic gases, liquids, metals and hazardous chemicals. Recommendations are made to eliminate, or reduce to acceptable levels, potential health hazards in the work place. Biological specimens are examined to determine possible exposure to toxic substances. Pesticide residues are determined in foods, water supplies, crops and stock in order to assess their compliance with prescribed legislation and acceptability for human consumption. Samples of water, marine life and wildlife are analysed to determine and monitor the impact of pesticides and other pollutants on the environment. The Laboratory also examines changing industrial activities with a view to their possible consequences on human health and on the environment.

### **Forensic Science**

The Forensic Science Laboratory undertakes the forensic chemical investigations in this State and provides scientific support services for the criminal investigations of and law enforcement by Police. Its activities include toxicological examinations relating to deaths involving drugs or poisons, identification and analysis of illicit drugs, scientific examination of exhibits from scenes of crime to assist in criminal investigations, analysis of blood and urine samples for alcohol and drugs in connection with drink-driving offences and fatal traffic accidents and also for their control and misuse within the prison system. The Laboratory also provides an advisory and analytical service to the racing, trotting and greyhound organisations in connection with doping control.

### **Kalgoorlie Metallurgical Laboratory**

The Kalgoorlie Metallurgical Laboratory functions as a section of the main Engineering Chemistry Laboratory in providing a regional service to government, the mining industry and prospectors; services include metallurgical investigations, analyses of ores and minerals, and advisory services. The laboratory specialises in ore dressing techniques and all aspects of gold metallurgy.

### **Materials Science**

The Materials Science Laboratory provides technical information and advice on industrial and chemical products for all government departments and instrumentalities, industry and the general public. Areas of particular interest are building materials including all kinds of floor coverings, plastics, paints and chemical specialities, such as detergents, polishes, adhesives and textiles. Facilities are provided for the testing of these materials. Technical evaluation of industrial processes (excepting minerals and fuels) is also undertaken, with the provision of advice on the potential for new chemical manufacturing operations, improvements in existing processes, and environmental considerations. Related experimental investigations up to pilot plant scale can be undertaken.

### Mineral Science

The Mineral Science Laboratory uses the chemical, analytical and mineralogical expertise of its staff to analyse and characterise minerals, ores, rocks and their products associated with the exploration, mining and processing of Western Australian minerals. This expertise is also used to examine, analyse and characterise dusts from mining and quarrying operations, nuisance dusts, dusts which are potentially an occupational hazard, forensic samples and asbestos in insulation materials. The Laboratory provides a service to identify possible deleterious components in construction materials and advice on problems associated with inorganic building and construction materials. The laboratory maintains the most comprehensive collection of Western Australian minerals in this State. This indexed collection contains nearly 12,000 specimens, over 10,000 of which are from Western Australia.

### Water Science

The Water Science Laboratory interprets and advises on the chemistry of waters, their treatment, use, disposal, analysis, purification, and materials used in or affected by water such as metals and alloys (and their corrosion) and plastics.

Studies are undertaken on lakes and estuaries, dams and underground waters to understand natural processes and the effects of pollution.

The following table provides a summary of the analytical work of the laboratories.

GOVERNMENT CHEMICAL LABORATORIES  
SAMPLES SUBMITTED FOR EXAMINATION

Laboratory	1980	1981	1982	1983	1984	1985
Agricultural Chemistry	26,623	24,727	33,222	35,139	47,208	51,592
Engineering Chemistry	204	311	361	371	386	179
Food and Industrial Hygiene	5,023	5,129	6,112	6,632	7,847	5,230
Forensic Science	7,115	7,144	7,626	7,757	8,237	9,300
Kalgoorlie Metallurgical Laboratory	1,297	1,268	1,144	1,289	2,159	3,007
Materials Science	380	292	376	242	240	380
Mineral Science	4,110	3,323	3,302	4,750	4,856	4,511
Water Science	8,424	9,535	11,813	12,967	16,865	16,472
Total	53,176	51,729	63,956	69,147	87,798	90,671

### COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION

The Commonwealth Scientific and Industrial Research Organization (CSIRO) is the largest scientific research organisation in Australia; it is a statutory body established by the *Science and Industry Research Act* 1949. Some 7,500 staff are employed in more than 100 laboratories and field stations throughout Australia.

CSIRO is governed by an Executive comprising two full-time members, including the Chairman, and six associate members. An Advisory Council and advisory committees in each State and the Northern Territory are established to facilitate the work of the Organization. The Western Australian committee, comprising representatives of State Government, tertiary institutions, agriculture, business and community interests, acts as an interface between the State and CSIRO through the Advisory Council. It also maintains an interest in the Organization's activities, particularly with respect to research programs within the State.

The work of CSIRO is carried out within five Institutes: Animal and Food Sciences, Biological Resources, Energy and Earth Resources, Industrial Technology and Physical Sciences. Each Institute consists of several Divisions. Of these Divisions, two, Groundwater Research and Minerals and Geochemistry, have their headquarters in Perth. Divisional groups from Forest Research, Entomology, Animal Production, and Plant Industry and Soils, are represented in the Laboratory for Rural Research (Perth), while several other Divisions utilise laboratories or field stations in Perth and in other parts of Western Australia.

A Technical Information and Liaison Office, located in West Perth, handles general inquiries on CSIRO research and represents Divisions not having a presence in Western Australia. The facility was established primarily to enable industry to be put in touch with scientists or experts who can assist with technical queries and advise firms on research topics.

#### **Institute of Animal and Food Sciences**

**Division of Animal Production.** The Division of Animal Production has established a unit in Western Australia. The research covers a wide range of activities aimed at understanding the nutritional and physiological limitations of wool and meat production and at providing new and improved techniques relevant to livestock production. The greater part of the work is in mineral nutrition; emphasis is now upon the diagnosis and correction of sub-optimal trace mineral deficiencies and their interaction with other dietary nutrients including the use of minerals as fertilisers. Research in livestock reproduction is principally concerned with investigating the reproductive losses in sheep with particular reference to the problem of clover infertility and the interaction between nutrition and reproduction. Pasture production, particularly subterranean clover and crop residues and their nutritive value, is also studied. The unit also serves to provide a link between the livestock industry and the Division's research workers throughout Australia.

**Division of Fisheries Research.** The Division of Fisheries Research is studying the biology of the Western Rock Lobster, the basis of Western Australia's most valuable fishery. In support of this programme, the ecology of the coastal limestone reefs and associated waters of the southern part of the State is being studied. The principal field study is conducted in the Dongara area, about 300 kilometres north of Perth.

The Division is undertaking a major study of the fishery potential of the North West Shelf. It includes research into the biology of the fishes, the identification and study of the organisms of the supporting food chains, and the investigation of the water movements in the area. Many of the management strategies developed for single-species fisheries do not apply in this tropical, multi-species situation. The Division aims to explore the full potential of the North West Shelf fishery and to formulate new strategies for managing it efficiently. A study has also been made of scampi resource in the waters beyond the North West Shelf.

**Division of Food Research.** The Meat Research Laboratory of the Division of Food Research has an extension officer located in the laboratories of the Western Australian Department of Agriculture at South Perth. He is a member of the Meat Research Laboratory's Industry Section which is responsible for service, investigation, liaison and extension work in meatworks and meat processing establishments, to ensure that the results of investigations by the Commonwealth Scientific and Industrial Research Organization are made known and to encourage their application by the meat industry. The extension officer services processing plants in Western Australia and the Northern Territory and gives a limited extension liaison service to other food processing industries.

#### **Institute of Biological Resources**

**Division of Entomology.** A research group is studying the role of native and introduced dung beetles in burying accumulations of cattle dung and in reducing the abundance of the dung breeding bushfly in the south-west of Australia. Studies on the ecology of the bushfly will provide an estimate of the effectiveness of beetles introduced from overseas in reducing numbers of flies, as new beetles become established in different areas and their populations build up.

Jarrah, an important forest tree in Western Australia, is attacked by the larva of a small moth, Jarrah Leaf Miner. Long-term ecological studies of factors affecting the abundance of the pest and that of its natural enemies have shown that outbreaks of the Leaf Miner are most likely to occur in situations where part clearing, thinning and burning have made the forests more attractive to the moths. The findings are consistent with the historical records showing that outbreaks first occurred in the coastal jarrah affected by settlement in the early 1900s and spread to the inland forest between Mount Barker and Manjimup in the 1950s. Management techniques to convert the present susceptible forest to one that is unattractive to moths are being investigated in co-operation with the Department of Conservation and Land Management.

A program for the biological control of weeds of South African origin is being carried out. A range of agents which attack doublegee have been found in South Africa and their biology is being studied so that the most promising species can be selected for testing for host specificity.

The Division is also studying a number of pests of crops, pastures, orchards and livestock, and the biological control of weeds, in collaboration with the Western Australian Department of Agriculture.

**Division of Forest Research.** The headquarters of the Division are in Canberra and it is represented in the State by a research group with a staff of eighteen. The major research area is a program to provide an understanding for management authorities, conservation authorities and forest industries, of the biological processes involved in maintenance of native forest and ecological aspects of reforestation of mined lands. Studies of the effects of management practices, such as prescription burning, thinning, clearfelling and fertilising, on forest ecology and nutrition, involve research specialists in soil science, plant nutrition and microbiology. The Division also has a eucalypt taxonomist studying the very large number of *Eucalyptus* species unique to Western Australia.

**Divisions of Plant Industry and Soils.** These two Divisions are jointly involved in the drylands crops and soils research program based at the Floreat Park laboratories of CSIRO. The aim of the program is to provide understanding of and management options for crop production, particularly wheat and lupins, in the coarse textured and texture contrast soils in the Mediterranean climatic zone of Western Australia. Utilising a blend of field and laboratory studies, the research team is studying the nitrogen and water movement and utilisation in three situations: a continuous cereal rotation, a wheat/lupin rotation and a wheat/pasture rotation.

**Division of Tropical Crops and Pastures.** The Division has a research program, on the breeding and genetics of tropical grain sorghum, located at the Kimberley Research Station. This is concerned with the development of well-adapted high-yielding material which incorporates disease resistance. The objectives include both the production of cultivars for release to growers, and the distribution of lines containing particular characteristics to other sorghum breeders for use in their programs.

**Division of Wildlife and Rangelands Research.** The Division of Wildlife and Rangelands Research has a laboratory at Helena Valley. Since the European settlement of Australia, massive changes have been imposed on the environment. One of the most obvious is the clearing of native vegetation to make way for agriculture. This has produced a fragmented series of uncleared remnants of the original flora which are isolated to varying degrees. The continued survival of the native flora and fauna is dependent on the retention and management of these preserves, particularly in areas like the wheat belt of Western Australia, where less than 2.5 per cent of the land area is covered by nature reserves.

The research group at Helena Valley is studying the dynamics of the flora and fauna in remnants of natural vegetation with the aim of understanding those processes which may be manipulated by suitable management procedures. These processes will include changes in the floristics and structure of vegetation, changes in animal communities and the effects of fire and invasion of species from surrounding lands.

#### **Institute of Energy and Earth Resources**

**Division of Groundwater Research.** Adequate supplies of water of suitable quality are vital to human life and the functioning of almost all the processes on which we depend. In Western Australia groundwater resources are assuming an increased importance. The Division of Groundwater Research was established to study processes affecting the quality and quantity of groundwater and in particular the responses of groundwater systems to human activities such as mining, waste disposal, agriculture, artificial recharge and pumping.

Studies are in progress to estimate the rate of recharge from rainfall on the Gnangara Mound, a major aquifer on Perth's northern outskirts. In this area the vegetation is of various types, from native *Banksia* woodland to softwood plantation. Recharge is also studied near Collie in relation to the development of salinity after clearing for agriculture. The results of a long-term experiment in that area are being examined to determine details of the mechanisms of salt leaching which affects both soil and water salinity. Studies are continuing into the use of various native trees to lower water tables and thereby reduce the discharge of saline groundwater.

Together with other bodies, the Division is studying the movement of phosphate from farmland on the coastal plain south of Perth into the Peel-Harvey inlet where serious algal problems have developed.

The movement of pollutants from waste disposal sites can be significant in some situations. At two sites in Perth's suburbs, the Division has used geophysical and gas-sniffing techniques to map the extent of the pollutant plume. Work is continuing to estimate the present and likely future movement of pollutants and the transport characteristics of specific chemicals in aquifer materials.

A major study of the water use by domestic consumers in Perth is concluding. This work has involved very close collaboration between CSIRO researchers and staff of the Water Authority of Western Australia.

Remote sensing is another important activity within the Division. This technique involves using images of the earth's surface reflected from satellites to study aspects of the environment. The emphasis is on development of new techniques, equipment and computer software for a range of applications extending beyond groundwater into geology, geomorphology, fisheries and oceanography.

**Division of Minerals and Geochemistry.** The role of the Division is to contribute to the improvement of productivity and competitiveness in exploration, mining and processing industries through the greater use of science and technology. The research aims to develop new or improved exploration concepts and techniques, and to improve existing processing operations; new processes or new end products may also result from the research. The Division has expertise in the fields of chemistry, geology and metallurgy which it maintains to provide core areas of research which can interact through collaborative programs with industry and with State and Federal Government departments and academic institutions. The Division provides technical advice and consultancy services in its areas of expertise.

Mineral exploration in Australia has entered a new and more difficult phase in which advanced concepts and techniques are required to discover buried, blind or deeply weathered deposits. Research on Western Australian ore deposits and host rocks is integrated with relevant laboratory studies to provide criteria for assessing the potential of poorly exposed terrain and to improve techniques for interpretation of geochemical and geophysical data from both drill holes and surface sampling. Studies of the chemical and physical processes of weathering and element dispersal are leading to improved concepts for ore formation in the near-surface environment. These studies are closely integrated with research based on the use of multi-element geochemical techniques within the regolith which is the fragmented and unconsolidated rock material, whether residual or transported, that nearly everywhere forms the surface of the land and overlies the basic rocks.

Mineral processing is directed towards the beneficiation and processing of ores with a view to improving the application of existing technology and also to develop new processing techniques for the treatment of complex ores. Processes for the production of high value end products are being developed and emphasis is placed on the processing of alumina and rare-earth-containing minerals.

The Division has its headquarters at Floreat Park and a laboratory located on the West Australian Institute of Technology campus.

### **Institute of Industrial Technology**

**Division of Building Research.** The Melbourne-based Division of Building Research collaborates with and assists the building, construction and timber industries of Western Australia in many areas. These include thermal insulation and energy conservation, durability of materials, and systems for building, planning and design. Research is also in progress on computer programs for local government planning and management, information technology for the construction industry, and management programs for the restoration and maintenance of buildings and structures.

**Division of Chemical and Wood Technology.** The Melbourne-based Division of Chemical and Wood Technology was responsible for the invention and development of several water purification processes which utilise magnetic reagents. At the Water Authority of Western Australia's treatment works at Mirrabooka a Sirofloc demonstration plant, commissioned early in 1981, has been producing water of acceptable quality. The demonstration plant is designed to produce 35 megalitres per day, and follows successful pilot plant studies on the site by the Division, the Australian Mineral Development Laboratories, and the Water Authority of Western Australia. The process produces purified water from turbid bore water which contains contaminants such as hydrogen sulphide and organically-bound iron. A magnetic Sirotherm demonstration plant capable of desalting 1 megalitre per day of brackish bore water has been installed at Leederville and is currently being commissioned. A third water treatment demonstration plant, initially tested in the Hunter Valley in New South Wales, has been constructed as a portable unit. The testing of this magnetic de-alkalisation process for the removal of hardness and alkalinity from bore water is complete. The process is of relevance to the Pilbara region of Western Australia.

The demonstration of the three CSIRO inventions follows from the invitation by the Commonwealth Department of Industry, Technology and Commerce for private industry, through the Australian Industrial Research and Development Incentives Board, to assist Government in the development of the new treatment methods.

An officer of the Division is now stationed in the premises of the Division of Groundwater Research at Floreat Park and he is engaged on investigations relating to the development of the woodchip export industry and a possible pulping industry in Western Australia.

The Division also includes groups which collaborate with the building and timber industries in Western Australia in areas such as weathering of materials, the use of mill wastes, milling and seasoning of timber and the preservation of rail sleepers.

### **Institute of Physical Sciences**

**Division of Mathematics and Statistics.** The Division of Mathematics and Statistics is concerned with the statistical and mathematical analysis of scientific problems arising from other Divisions of CSIRO and research arising from these problems. Current main areas of application and research are in remote sensing, growth of lobsters, modelling of dung beetle populations and other ecological studies. The Division's officers also collaborate with industry and other Government instrumentalities through the commercial consulting firm Siromath.

**Division of Oceanography.** Research on physical oceanography of the Western Australian coastal waters is undertaken from the Division of Fisheries Research Laboratory at Marmion. This includes studies of circulation and hydrology of inner Continental Shelf waters between Cape Leeuwin and Shark Bay, the ground truth validation and interpretation of satellite radiometer images of sea surface temperature (in collaboration with the Western Australian Institute of Technology and the CSIRO Division of Groundwater Research), research on the dynamics of the Leeuwin current, and observations in conjunction with the North West Shelf Fisheries research program.

## DEPARTMENT OF AGRICULTURE

Reference to the scientific work of the Department of Agriculture appears in the section *The Department of Agriculture* in Chapter 14, and also in Chapters 12 and 13.

### BOTANIC GARDEN

The Botanic Garden was established in Kings Park in 1962 and is under the control of the Kings Park Board (see following section *Public Parks and Reserves*). The Botanic Garden is the counterpart of The Western Australian Museum in the botanical field and complements the State Herbarium by maintaining collections of living plants for scientific and educational purposes. Its official objects are to foster public interest in the conservation and cultivation of the Western Australian flora; to contribute to public education in this field; to become a centre for botanical and horticultural research in the flora of Western Australia; and to provide a major tourist attraction. The education centre established in the Park caters for more than ten thousand school children each year.

The Garden, which was officially opened in October 1965, extends over thirty-four hectares, made up of the Western Australian collection (seventeen hectares), Californian, South African and Mediterranean collections (three hectares), and an arboretum of native trees (fourteen hectares). The indigenous flora of the State is represented in the Western Australian collection by approximately 1,200 species. Trees grown as specimens in the arboretum are mainly those which are native to the southern half of the State. The Display Glasshouses completed in 1985 extend the range of plants exhibited with species unsuited to cultivation in the open ground of the Botanic Garden. These include plants from the drier inland parts of the Pilbara and Kimberley regions and saltbushes and other succulents. Plants requiring humid conditions, such as carnivorous plants and ferns, are kept in separate collections. In the central courtyard is a collection of cycads and a pool with aquatics.

Parties from the Botanic Garden are regularly in the field for the collection of propagating material. Special attention is devoted to the preservation of rare species or species threatened with extinction. Seed of native plants collected is distributed from surplus stocks to botanical institutions throughout the world. A seed list, which normally offers from 1,000 to 1,300 species, is published annually, and more than 10,000 packets of seed are distributed each year.

Experimental work in propagation of native plants is carried out and a native plant display is held in the Park each spring. Lectures are given by members of the staff to interested societies and to students engaged in related courses of study. The public may also, by arrangement, consult the Horticultural Adviser particularly for advice on the cultivation of native plants. Facilities are provided for the employment and training of students enrolled in the three-year course for the Certificate in Horticulture, which is conducted by the Technical Education Division of the Education Department.

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## Recreation

### PUBLIC PARKS AND RESERVES

It is within the power of the Governor to dispose of, in any manner which serves the public interest, lands which are vested in the Crown and, in terms of this authority, Crown land is frequently reserved by order of the Governor for a variety of public purposes. Some of this land is reserved for public recreation and amusement, national and other public parks, or flora and fauna sanctuaries and the reserves are controlled by statutory bodies, the more important of which are dealt with in this section.

#### **Department of Conservation and Land Management**

The Department of Conservation and Land Management assumed legislative and management responsibilities for National Parks on 22 March 1985; it is to manage these public lands and waters for the benefit of present and future generations of Western Australians. The essence of National Parks management is to encourage 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 under the *Conservation and Land Management Act 1984* responsible to the Minister for Conservation and Land Management. A majority of the Authority's members represent community interests.

The Act ensures that there is considerable public involvement in the management of National Parks. Management plans are to be drafted for all lands, and the public notified and invited to make written submissions about the plans. Participation has also been actively encouraged through meetings, workshops and surveys during the drafting process. The management plans cannot exceed ten years, and until they are approved, the Department's Park management must be limited to 'necessary operations'.

The Department of Conservation and Land Management caters for a wide variety of outdoor recreation activities and pursuits. The State's 4.4 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 park system is complemented by 2 million hectares of State forest, which offers opportunities for picnicking, camping, backpacking, canoeing, fishing, marroning, orienteering and other pursuits. Within certain specified areas, other activities including horse and trail bike riding are permitted subject to certain management controls.

Detailed information and maps about Western Australia's National Parks and State forest areas and the numerous recreational attractions and facilities they provide can be obtained from the Department's Operations Headquarters at Como or from any of its regional and district offices situated throughout the State.

NATIONAL PARKS AND RESERVES VESTED IN  
THE NATIONAL PARKS AND NATURE CONSERVATION AUTHORITY (a)

National Park or Reserve	Area	National Park or Reserve	Area
	hectares		hectares
Alexander Morrison	8,501	Matilda Bay Reserve	25
Araluen-Canning Dam Reserve	20	Millstream — Chichester	199,710
Avon Valley	4,368	Moore River	17,543
Badgingarra	13,121	Nambung	17,491
Boorabbin	26,000	Neerabup	1,078
Cape Arid	279,415	Nowergup Lake	117
Cape Le Grand	31,390	Peak Charles	39,959
Cape Range	50,581	Pemberton	3,141
Charles Gardner Flora Reserve	792	Penguin Island Reserve	13
Collier Range	277,841	Porongurup	2,401
D'Entrecasteaux	36,599	Porongurup Range Reserve	61
Drovers Cave	2,681	Rudall River	1,569,459
Drysdale River	435,591	Scott	3,273
East Perth Cemetery Reserve	5	Serpentine	635
Eucla	3,342	Sir James Mitchell	1,087
Fitzgerald River	242,739	Stirling Range	115,671
Frank Hann	61,420	Stockyard Gully	1,406
Geekabee Hill Flora Reserve	4	Stokes	9,493
Geikie Gorge	3,136	Tathra	4,323
Goongarrie	49,878	Torndirrup	3,868
Gooseberry Hill	33	Tunnel Creek	91
Greenmound	57	Walpole-Nornalup	18,789
Hamersley Range	617,606	Walyunga	1,811
Hassell	1,264	Watheroo	44,324
Hidden Valley	1,817	William Bay	1,902
John Forrest	1,580	Windjana Gorge	2,134
Kalamunda	375	Wolf Creek Crater	1,460
Kalbarri	186,076	Yalgorup	11,466
Keane's Point	2	Yanchep	2,799
Leeuwin — Naturaliste (b)	15,493	Yanchep Flora Reserve	113
Lesmurdie Falls	56		
Total area of National Parks and Reserves		4,427,426	

(a) At 30 June 1985. (b) Portion of unsurveyed coast not included.

The Department manages fifty National Parks and a number of reserves. While there were no major additions to the estate in 1984-85 several new vestings are imminent — D'Entrecasteaux National Park, Marmion Marine Park, Bungle Bungle National Park and Ningaloo Marine Park. Also two major reserves have been set aside in State forest to be managed as if they are National Parks — Lane-Poole Reserve (49,200 ha) and the Shannon Reserve (52,000 ha).

The level of visits to National Parks continues to increase as tourism in Western Australia expands. For instance, the number of tourists taking boat tours in Geikie Gorge National Park increased by 23 per cent and the number of campers in Hamersley Range National Park increased by 43 per cent, from the winter of 1983 to 1984.

### **Kings Park**

The Kings Park Board administers an area of almost 401 hectares close to the centre of Perth. Part of this area was dedicated in 1872 'for the purpose of a public park and recreation ground' and was enlarged in 1890. Beautification commenced in 1896 under the presidency of Sir John Forrest, and the name was changed in 1901 from Perth Park to The King's Park in honour of the accession of King Edward VII. In addition to its original function as park and recreation ground, The King's Park (now referred to as Kings Park) has over the years gradually developed two other important functions, as a National Shrine and as a Botanical Reserve. In the former case it houses the State's most important monuments and commemorative features of a military and historical nature. A memorial to the South African war was built in 1901, and the State War Memorial to the fallen of both world wars was erected on a commanding position on Mount Eliza in 1929 and extended in 1952. 'Honour Avenues' of trees dedicated to individual fallen servicemen were planted in 1919 and later, and another avenue commemorates the State Centenary of 1929. There are smaller memorials erected by individual regiments or other military units, and a number of monuments to important historical personages.

The concept of the botanical reserve grew from the fact that four-fifths of the Park's area remained undeveloped under a natural bushland which contained many native wildflowers. Increasing urbanisation and the loss of natural sites in and close to Perth made the retention of this bushland area a matter of scientific and aesthetic value. This function was strengthened from 1962 onwards by the establishment in the Park of a botanic garden and arboretum of thirty-four hectares for the cultivation and display of Western Australian native plants.

Developments have continued to contribute to the Park's aesthetic and recreational functions. A fully-equipped modern restaurant was erected in 1956, close to such features as a floral clock, a wishing well, a giant karri log and an observation platform. There are several public barbecue sites and many kilometres of pedestrian paths and tracks. The original twenty hectares of lawns and shrubberies have been materially extended by the Botanic Garden development. Four new lawns have been added within the Garden, one of which encircles a landscaped water garden with four pools, two cascades and a waterfall, one pool featuring an illuminated fountain dedicated to the pioneer women of the State. Nearby the Women's Commemorative Pavilion and Wall records 150 years of achievement of women in Western Australia and provides a venue for band concerts. A pioneer women's roll is housed in the Administrative Centre. A picnic lawn, refreshment kiosk, and children's nature playground have been established around an artificial lake at the western end of the park and linked to older-developed areas by a mile-long vista leading to a viewing tower. The lawns and pine plantations near the Subiaco entrance have been reshaped as a family recreation area with a variety of play equipment, barbecues, and a small amphitheatre for outdoor performances.

The Lawrence Pavilion has been redeveloped as a kiosk and public amenities. The surroundings have been landscaped to provide a feature garden and a playground for small children, including some equipment suitable for use by handicapped persons. The Hale Recreation Area provides for physical exercise and family recreation.

**The Kings Park Guides.** The Kings Park Guides were formed in 1984 and comprise some fifty volunteer members. They conduct regular tours on various aspects of Kings Park and the Botanic Garden, especially during the period April to November. Special tours can be arranged upon request with adequate prior notice. An information centre is operated by the Tour Guides at Minmara Gun Gun near the Pioneer Women Memorial Fountain. The centre is open on Wednesdays and Sundays.

### **Perth Zoological Gardens**

The Zoological Gardens Board administers the Zoological Gardens at South Perth; eighteen hectares of beautiful gardens established in 1898 and displaying a wide range of animals in natural settings. The Board's four main objectives are conservation, education, research and recreation.

Perth Zoo is the third largest in Australia and 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 1985, 104 species of mammals, 217 species of birds and 44 species of reptiles were exhibited.

Sixty-eight full time staff operate the Zoo and special features are free school holiday activities and guided tours by trained Docents.

Principal attractions of the Zoo are a house for nocturnal animals, a well established breeding colony of orang utans, attractive botanic gardens and waterfowl lakes, a large collection of Australian native birds and a natural landscaped walkthrough aviary. Other features are the landscaped great cats enclosure and the lesser primates exhibit.

Future plans for development include an open range area for Asian elephants, an exhibition area for koalas and large exhibit areas for animals from Asia and Africa.

The Perth Zoo, which is open to the public every day of the year, ranks as one of the State's major tourist attractions and some 406,000 people visited it during the year ended 30 June 1985.

**The Docent Association.** The Docent Association was formed in 1982 and comprises some ninety members. All volunteers, the Docents conduct tours of the Zoological Gardens for school groups, social clubs, business and sporting groups and for the aged and infirm patients of Perth's hospitals and nursing homes. The Animal Contact Area is staffed by Docents to allow special groups, including children participating in the school holiday activities, the pleasure of touching the animals.

**Zoo Holiday Activity Programme.** Each year during extended school holiday periods the Education Department of Western Australia in conjunction with Zoological Gardens staff conducts a Zoo Holiday Activity Programme for school aged children (and parents, grandparents and friends). Work sheets are provided for display areas such as Waterbirds, Hawks, Aviaries, Orang Utans and Contact. Children answer questions about animals and birds and receive recognition for success through stamp imprints and certificates. During 1985 in the holiday periods of January, May and August over 48,000 work sheets were issued. Each year a panel of the most successful of the child participants in the activities are invited to have the special privilege of a passport to the Zoo for a year and a visit to the operational areas of the Zoo. A club has been formed to retain contact with these children under the auspices of the Gould League. The Western Australian Gould league, founded in 1939, encourages the study, appreciation, preservation and conservation of the environment.

### **Rottneest Island**

The Rottneest Island Board 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. There are two settlements. One at Thomson Bay contains 176 cottages and bungalows to let, a hotel, lodge, restaurant, camping areas and all services. Recreational facilities include a golf course, tennis courts and a bowling green. The second settlement is at Geordie Bay — Longreach and provides an additional one hundred cottages, all with ocean views. This settlement is self-contained and provides all back-up facilities. The coastline is ringed by a road system with access to the various swimming and fishing areas. There is a land-backed wharf and three jetties in Thomson Bay and jetties at Geordie Bay and Green Island. Special features of the island include the marsupial known as the Quokka and the Rottneest Island Daisy. During the year ended 30 June 1985, some 193,000 persons visited the island by the daily commercial air and sea transport services.

### Other Reserves

**Caves Reserves.** Extensive limestone caves have been discovered at several places in the south-west part of the State. Some of them, 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, notably at Yanchep, Yallingup, Margaret River and Augusta.

**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, when subdividing land into residential lots in order to provide recreational areas for the holders of lots in the subdivision. The reserves are frequently developed as public parks or to provide facilities for sports or camping.

## THE DEPARTMENT FOR SPORT AND RECREATION

The Department for Sport and Recreation is responsible to the Minister for Sport and Recreation for matters relating to recreation and sport.

Throughout the State, the Department works closely with all levels of government and the private sector to influence the planning and provision of community leisure needs. To assist this work, the Department has specialist branches relating to sport, youth, special populations (for example the disabled), older adults, community and occupational fitness and outdoor recreation. In addition, a comprehensive regional service ensures provision of services in many country locations.

Research and planning personnel provide technical information and planning advice on the development of recreation areas and design of facilities.

The Department makes recommendations to the Minister concerning Sports Culture Instant Lottery funds and other government grants to local government authorities and community groups for capital works; for special development projects; for training courses for coaches, leaders, officials and administrators; for salary subsidies to sporting and youth associations; for travel subsidies for selected persons travelling to national championships; for the purchase of items of equipment and for the establishment of regional equipment hire centres; hosting national and international championships and regional games; single and multi-sport camps; establishment of new sporting activities or clubs; innovative projects; resource development and long-term development sports plans.

The twelve recreation camps administered by the Department provide low cost accommodation and recreation facilities for youth, sporting, recreational organisations and family groups.

The Department conducts training courses, education programs and seminars for people working in a voluntary capacity in youth, sport and recreation. A number of services which relate specifically to sport are conducted by the Department. Of particular significance are the Coaching Accreditation Scheme which trains over 1,000 sports coaches each year, and the national coaching journal *Sports Coach*. In addition, the Department works closely with the Youth Affairs Bureau, agencies and individuals serving the needs and assisting with the personal development of young people. The Department places high priority on services relating to recreation opportunities for disabled people and has initiated a number of activity programs, seminars, courses and information services which aim at improving the recreational opportunities and choices of elderly people.

The Department has an extensive equipment hire centre at its headquarters at Perry Lakes Stadium, west of Perth. A comprehensive selection of books, leaflets and other resource material is kept to assist people providing or conducting recreation programs. A technical advice service is available to local government authorities, sporting and recreation organisations and private developers.

A 'Community and Occupational Fitness' branch promotes health and fitness in the community. The branch offers a fitness assessment and counselling service, regular publications on health and fitness and particularly emphasises and promotes the value of occupational fitness programs within the workplace.

## Chapter 12

### LAND SETTLEMENT

An outline of the origin and development of the land tenure system in Western Australia from the early years of settlement is given in Chapter VII of the *Official Year Book of Western Australia*, Nos. 1 and 2 (New Series).

The growth of land settlement in relation to particular agricultural and pastoral activities is dealt with in the relevant sections of Chapter 14 and in the *Statistical Summary* appearing after Chapter 25.

#### LEGISLATION AND ADMINISTRATION

By the *Land Act 1898*, earlier legislation relating to the sale, occupation and management of Crown lands was consolidated and amended. Under a series of Agricultural Lands Purchase Acts which were passed between 1896 and 1904 and consolidated by the *Agricultural Lands Purchase Act 1909*, provision was made for the repurchase by the Crown of land suitable for closer settlement. The principal criteria applied in the purchase of such land were suitability for wheat or mixed farming and proximity to transport, especially the railways.

The operation of subsequent legislation has not greatly changed the pattern of land development which was created by the *Land Act 1898* and the *Agricultural Lands Purchase Act 1909*. The *Land Act 1933* is now the basic statute controlling the leasing and disposal of Crown land. Crown land is also leased under the Mining Act, the Petroleum Act and the Conservation and Land Management Act but no alienations are made under these Acts. In most freehold or leasehold titles of a residential, agricultural or pastoral nature the mineral rights and petroleum rights are reserved to the Crown.

The Department of Lands and Surveys is responsible for the leasing and alienation of Crown land, except where mining and forestry tenures are involved, and is under the control of the Minister for Lands and Surveys. In certain instances, advisory or partly-executive boards have been created to assist in administration. These include the Land Board, which deals with general applications for land, and the Pastoral Board. A Government Property Unit also exists, with responsibility for management decisions on high value metropolitan property.

Permits and leases for mining purposes are issued by the Department of Mines and those for forestry and timber milling by the Department of Conservation and Land Management.

#### METHODS OF LAND ALIENATION

The principal methods of alienation provided for in the *Land Act 1933* are conditional purchase, the sale of town and suburban land by either auction or inviting applications, selection under Part VIII which superseded the Agricultural Lands Purchase Act and reservation for public purposes, including Crown grants in trust for the purpose of the reserve. In addition to these normal methods of alienation there is provision in the Land Act for the release of land under special circumstances where particular development projects are envisaged. In such cases any agreement must be ratified by the State Parliament.

##### **Conditional Purchase**

Titles secured by this method originally take the form of conditional purchase leases, on the satisfactory conclusion of which Crown grants may be obtained. The Act provides that a person

may not acquire, either as lessee or transferee, an area of land exceeding in the aggregate 2,023 hectares; but on the recommendation of the Minister and with the approval of the Governor, a person may acquire an area of land in one or more parcels exceeding 2,023 hectares, but not in any event exceeding 4,046 hectares, in any case where the Minister is satisfied that a holding requires an area greater than 2,023 hectares in order to be of a standard deemed by the Minister an economic farm unit. Lessees must progressively sow to pasture or crop, areas of land which must aggregate 50 per cent of the total area of the land at the end of the eleventh year.

The maximum period allowed for completion of purchase under an ordinary conditional purchase lease ranges from twenty-five to thirty years, with a possible extension of ten years in certain cases. There is, however, provision for conditional purchase by means of accelerated payments under which a 10 per cent deposit is lodged and the balance of the purchase price paid in four quarterly instalments. The improvement conditions for accelerated-payment leases require the land to be fenced within three years of the commencement of the lease and improvements, equal in value to the purchase money, to be effected within seven years. Unlike the ordinary conditional purchase lease, which cannot be converted to a Crown grant until the expiry of at least five years from the date of commencement, an accelerated-payments type of lease can be converted to a Crown grant at any time after the conditions have been met. Residential conditions, requiring the lessee or a near relative to reside on the property within two years from commencement of the lease and make it his habitual residence during at least six months of each year for the following three years, apply to ordinary conditional purchase leases but are not obligatory under accelerated-payment leases. Restrictions on transfers are imposed in each case.

Where circumstances so dictate, the Governor may define any Crown lands as special settlement lands. On such lands standard conditions relating to occupation, development and utilisation, and repayment of purchase money may be varied to suit the circumstances of the particular release. In order to minimise environmental hazards consequent to clearing and cultivation of virgin land, releases routinely require the preparation of Initial Development Plans.

Release of special settlement land may be arranged on the basis of sale by public auction or public tender, where standard procedures previously described are inappropriate.

#### **Sale of Town and Suburban Land**

The general conditions governing the sale to the public by auction of town and suburban land are set out in Part IV of the Land Act. Lands may be offered for sale at auction by order of the Minister at such times and places as he may think fit and notice of forthcoming sales must be published in the *Government Gazette of Western Australia* and in a newspaper. Ten per cent of the purchase money must be paid at the time of sale and the balance is payable over a period as stipulated at the time of sale, in any event not exceeding two years. The purchaser is normally required to erect a residence or business premises within a specified period, usually two or four years, from the date of payment. Town or suburban land acquired is held under a licence until such time as the development requirement as specified in the conditions of sale has been fulfilled, after which a grant in fee simple may be issued. In some instances special additional conditions may be imposed. In certain circumstances the Governor may dispense with the requirements as to the sale of town and suburban lands by public auction and may approve of any such land being offered for sale in fee simple or for leasing.

#### **Reservation for Public Purposes**

The Governor may dispose of, in any manner which serves the public interest, lands which are vested in the Crown. Crown land is frequently reserved by order of the Governor and the purpose for which any such lands are so reserved or disposed of shall be specified in the reservation or disposition. Where alienation is ultimately required for certain of such purposes the necessary land is granted in fee simple in trust for the purpose of the reserve. Reserves may be of Class 'A', which by proclamation of the Governor are reservations that must remain dedicated to the purpose declared in their proclamation until by Act of Parliament it is otherwise enacted, Class 'B', which also by Proclamation of the Governor are to remain dedicated to the purpose declared until cancelled by

similar Proclamation and Class 'C', which are created and terminated by the Governor by notice in the *Government Gazette of Western Australia*. Common uses of Class 'A' reserves are for public recreation, national parks, conservation of flora and fauna, for major public buildings, and for areas of particular historical importance.

The Land Act provides that, when any reserve is not immediately required for the purpose for which it was made, the Governor may grant a lease for a period not exceeding ten years at such rents and subject to such conditions as he may think fit. Land reserved for parks or recreation grounds may be leased for the depasturing of stock even though the land is being used for the purpose for which it is reserved.

Other methods of alienation comprise mainly reservations of land for housing projects.

### **State Forests and Timber Reserves**

Special provision is made in the Conservation and Land Management Act for the Governor, by Order in Council, to dedicate Crown land as a State Forest or to reserve Crown land as a Timber Reserve. While the reservation of a Timber Reserve may be revoked in whole or in part by the Governor in Council, following a report by the Executive Director of the Department of Conservation and Land Management, the dedication of a State Forest may not be revoked except with the consent of both Houses of Parliament. The use of such Forests and Reserves comes within the administration of the Executive Director of the Department of Conservation and Land Management.

## METHODS OF LEASING

Brief reference was made earlier to the work of the Department of Lands and Surveys, the Department of Mines and the Department of Conservation and Land Management in granting leases of Crown lands in Western Australia. The activities of each Department in this field are now described in greater detail.

### **Department of Lands and Surveys**

Approximately 99 per cent of the Crown land held under lease is covered by tenures granted by the Department of Lands and Surveys under the Land Act, and consists mainly of pastoral leases, special leases, leases of reserves and leases of residential and industrial lots. In addition, areas of perpetually-leased farming land have been made available to ex-servicemen under War Service Land Settlement Acts.

**Pastoral Leases.** The *Land Act 1933* provides that the maximum area held under pastoral lease by one person, or by two or more persons jointly, or by any association of persons incorporated shall not exceed 500,000 hectares, and that no person shall become beneficially interested in leases of pastoral land to an extent whereby the aggregate area of pastoral land in which such person is beneficially interested would exceed 500,000 hectares. Where an area of pastoral land is worked in association with another area as one separate and distinct station, the maximum area which may be so worked is 500,000 hectares. The minimum requirement for the grant of a pastoral lease is that the land shall, in the opinion of the Pastoral Board, be capable when fully developed of carrying such numbers of sheep or cattle as to enable it to be worked as an economically viable pastoral unit.

Pastoral leases are granted for a term expiring on 30 June 2015, and the annual rent payable is determined by the Minister for Lands acting on the advice of the Pastoral Board. Rents are subject to reassessment at statutory intervals. A lessee may, at any time, within three months of a notice of reassessment in the case of leases surrendered under the provisions of Section 114 of the Land Act or at any time not less than two, nor more than three years after the date on which the reassessment became effective on leases issued pursuant to Section 98, apply to the Minister to have the rent reviewed by the Board. Provision is made for total or partial relief from payment of rent in respect of any year during which, by drought, cyclone, fire or flood, a lessee suffers serious loss of stock, or wool production is adversely affected.

The holder of a pastoral lease is required to effect improvements of a specified nature and in accordance with a plan approved by the Minister on the advice of the Board. A lease is liable to forfeiture if the land is not stocked or kept stocked with such number of sheep or cattle, or both sheep and cattle, as the Board considers appropriate having regard to circumstances such as seasonal conditions affecting the land and the period since the commencement of the lease. Other conditions attaching to pastoral leases provide safeguards against the deterioration of land due to excessive grazing and to the unauthorised ring-barking of trees.

**Special Leases.** Section 116 of the Land Act specifies a variety of industrial and other purposes for which the Minister may grant special leases of Crown land. The yearly rental must be not less than \$50 and the period of the lease must not exceed fifty years. Upon compliance with the prescribed conditions of leasing and payment of the purchase price a lessee may surrender his lease and obtain in lieu a grant in fee simple. It is further provided that, in all cases where the intended period of leasing exceeds ten years, prior notice must be inserted in the *Government Gazette of Western Australia*. Section 116 is modified in certain cases by provisions contained in special Acts to enable the granting of leases for varying terms and conditions for specific projects.

The Minister may lease any town or suburban lands on such terms as he may think fit, under section 117 of the Land Act.

**Leases of Reserves.** As stated earlier in this Chapter in the section *Methods of Land Alienation* the Governor may grant a lease of any reserved land which is not immediately required for the purpose intended at the time of reservation, but the period of the lease may not exceed ten years. By a further provision of the Land Act, no lease for a term exceeding one year shall be granted unless applications are called by notice in the *Government Gazette of Western Australia*. With the consent of the Governor, such land may be sub-leased. When land is reserved for parks or for recreation or amusement, if the land is not placed under the control or management of any person, the Governor may, even though the land is being used for the purpose for which it is reserved, grant a lease or licence for one year for the purpose of depasturing stock. The Governor may insert in the lease or licence such conditions as he may think fit to ensure that the land is available for the purpose for which it is reserved and he may renew any lease or licence for a further period of one year. The *Land Act 1933* also provides that the Governor may direct that the reserve may be leased for the purpose for which it is reserved.

**Perpetual Leases** were authorised under the War Service Land Settlement legislation, which provided that ex-servicemen who had been allotted farms under this joint Commonwealth-State scheme and who met the requirements of the appropriate agreement might enjoy perpetual leases. The lessee, on payment of such purchase price for the fee simple as was fixed by the Minister, might obtain the freehold of the property after the expiration of ten years from the commencement of the term of the perpetual lease or after such shorter period as the Commonwealth and the State determined or might determine where special circumstances existed.

### **Department of Mines**

The *Mining Act 1978*, operative from 1 January 1982 repealed the *Mining Act 1904*.

With the repeal of the old Mining Act, applications relating to Miner's Homestead Leases, Residential Leases, Residence Areas, Business Areas and Garden Areas lapsed along with all other pending applications.

Holders of existing mining tenements under the repealed Act have varying periods of up to five years to convert to an appropriate title under the new Mining Act.

Tenements available under the new Mining Act are as follows:

**Prospecting Licence.** The area of land for any one prospecting licence shall not exceed 200 hectares with the right to remove up to 500 tonnes of ore. The 500 tonne limit can be increased with the necessary approval. The term of a prospecting licence is for an initial period of two years with extension provisions for a further two years. Expenditure conditions provide that \$2,000 (or \$40 per hectare, whichever is greater) be expended on the licence during a twelve month period. The

rental charge is \$1 per hectare with a minimum of \$10 per year. The prospecting licence, when granted, authorises the holder to prospect for all minerals other than iron, although the Minister may authorise the inclusion of iron. A security for compliance with the conditions is required in respect to each licence held.

When a licensee ceases to hold ground under the licence, the licensee is not permitted to re-apply for another licence over the ground for a period of three months. He may however apply for a mining lease or leases over the ground.

A special prospecting licence for gold or precious stones or both not exceeding ten hectares in area may also be marked out on a prospecting licence or an exploration licence after the expiration of twelve months from the date of approval of the prospecting or exploration licence.

**Exploration Licence.** The area of land for an exploration licence shall be 'neither less than ten square kilometres nor more than 200 square kilometres . . .' with the right to remove up to 1,000 tonnes of ore, although this limit can be increased after the necessary approval. An exploration licence shall remain in force for a period of five years, however, the Minister may, in exceptional circumstances, extend the term for a further period or periods of one year. At the end of the third year of the licence, the area must be reduced by fifty per cent with a further fifty per cent reduction at the end of the fourth year of the licence.

Expenditure conditions provide for \$20,000 (or \$300 per square kilometre, whichever is greater) to be expended on the licence during a twelve month period. The fees for an exploration licence are \$500 application fee and \$20 per square kilometre per year rental.

The exploration licence, when granted, authorises the prospecting or exploring for all minerals other than iron, however, the Minister may authorise the inclusion of iron. A security for compliance with the conditions is required in respect to each licence held. When the licensee ceases to hold ground under the licence, the licensee is not permitted to re-apply for another licence over that ground for a period of three months. The holder of the exploration licence has, whilst the licence remains in force, the right to apply for and have granted one or more mining leases or general purpose leases for any part or parts of the land being the subject of the exploration licence.

**Mining Lease.** The area of land in respect of any one mining lease shall not exceed ten square kilometres and the lease shall remain in force for twenty-one years, renewable for periods of twenty-one years for all minerals other than iron. The Minister may include iron or restrict the lease to specified minerals.

The lessee may work and mine the land, take and remove minerals and do all things necessary to effectively carry out mining operations in, on or under the land.

Expenditure conditions provide that \$10,000, \$5,000 if the area of land is five hectares or less, (or \$100 per hectare, whichever is greater) be expended on the lease during a twelve month period. The fees for a mining lease are \$100 application fee and \$6 per hectare per year rental.

**General Purpose Leases.** These may be granted to the holder of a mining lease and each lease shall not exceed 250 hectares in area. The general purpose lease is for operating machinery and depositing or treating tailings. The term of the lease is linked to the term of the mining lease and remains in force for as long as the mining lease. The fees for a general purpose lease are \$100 application fee and \$6 per hectare per year rental.

**Miscellaneous Licences.** These may be granted to the holder of a prospecting licence, exploration licence or mining lease for various purposes, e.g. road licence, water licence or a combination of such purposes. The fees for a miscellaneous licence are \$100 application fee and \$6 per hectare per year. The term of the licence is linked to the term of the prospecting licence, exploration licence or mineral lease and remains in force for as long as that tenement.

**Tenures under Special Acts.** Because of the amount of finance involved in large-scale development of iron ore, bauxite, nickel, salt and various other mineral deposits the Government has made special

agreements with various companies for the working of such deposits. The agreements are ratified by an Act of Parliament and mineral rights are granted to the lessee to carry out large-scale development and mining operations, subject to the varying obligations including the payment of royalties.

**Tenures under provisions of the *Petroleum Act 1967*.** This Act came into operation on 5 September 1969 and governs the exploration for and exploitation of the petroleum resources within Western Australia. It is basically similar to the Petroleum (Submerged Lands) Act, the principal tenures available being Permits and Licences.

A permit grants to the holder petroleum exploration rights over an area of up to 200 contiguous blocks (a block is a graticular section being five minutes of arc of latitude by five minutes of arc of longitude) which is valid for a term of five years and renewable for terms of five years over progressively reduced areas. Initially, areas are made available for application as exploration permits by advertisement in the *Government Gazette of Western Australia*. If several applications are received for a particular area, each is evaluated on its individual merits and a decision as to the grant of a permit is made accordingly. Applicants are required to submit details of their proposed exploration work and expenditure for the initial term, together with particulars of their technical qualifications and financial resources. An application fee of \$3,000 is payable. The successful applicant is required to enter into a \$15,000 security for due compliance with the conditions of the permit and observance of the provisions of the Act. Annual rental is payable, calculated at \$15 per block, with \$300 being the minimum rental payable.

Upon the discovery of petroleum within a permit area, a 'location' of up to nine blocks including the discovery block is declared. The establishment of a location is a means of setting aside and identifying a specific number of blocks from which a Production Licence can be selected.

The holder of a permit has two years from the date the location is declared in which to apply for a Production Licence. This period may be extended for a further two years at the discretion of the Minister for Mines.

There is a specific requirement that the licensee shall carry out approved works within the licence area to the value of not less than \$100,000 per block per year. This figure may be offset in subsequent years by the value of petroleum produced in the preceding year. The term of a licence is for twenty-one years with renewal provisions. Annual rental is calculated at \$9,000 per block and a security of \$150,000 may be required.

**Petroleum Exploration and Exploitation, Offshore.** On 14 February 1983, new arrangements were brought into effect whereby the State has exclusive rights for petroleum exploration and exploitation in respect to the area of the territorial sea adjacent to Western Australia. The area beyond the territorial sea is now solely regulated by the Commonwealth legislation which has been amended for this purpose. However the State shall administer activities in the Commonwealth area through a Joint Authority which consists of the State Minister and his Commonwealth counterpart.

Similar arrangements also exist between the Commonwealth and the other States and Territories.

The new State legislation for the territorial sea is the *Petroleum (Submerged Lands) Act 1982* which provides for an identical system of tenure to the amended Commonwealth Act, as well as transitional provisions for tenements which straddle the outer boundary of the territorial sea.

In all, the system of tenure has not changed apart from an increase in fees which have now been brought into line with the onshore legislation described in the previous section.

#### **Department of Conservation and Land Management**

A number of licences, permits and leases are issued under the provisions of the Conservation and Land Management Act.

**Sawmilling.** Permission to cut timber in State Forests and Timber Reserves is authorised by the Executive Director in the form of a Forest Produce (Sawmilling) Licence or a Sawmilling Permit. A Sawmilling Permit entitles the holder to sole cutting rights at a stipulated rate per year in respect of certain classes of timber within a defined area and for a specified period. The Forest Produce (Sawmilling) Licence differs from the Permit in that the licence does not provide for sole cutting

rights to the area. The Executive Director may also contract for the sale of forest produce. This applies to both hardwood and softwood operations. The Department contracts to supply hardwood logs from State forests and timber reserves, and pine logs from State plantations to the mill. Log sales are determined initially by tender or auction. Where appropriate resources are available, these licences and permits are normally renewed on an annual basis.

Each licence or permit holder is required to maintain an efficient operation and to supply the Department with details of the logs taken into the mill. With regard to hardwood, a royalty is charged on the quantity of log timber which is delivered to the mill. With contractual sales, the purchaser is charged at a rate for stumpage and a cost of delivery to the mill.

The Department of Conservation and Land Management ensures that cutting programmes make the best use of available forest resources and that provision is made for forest regeneration. The Department maintains close liaison with the licence and permit holders and stipulates the areas where the cutting may be undertaken. Licence for woodchip logs is an example where the removal of other than millable timber assists in the process of forest regeneration.

**Other licences, permits and leases.** A number of other licences, permits and leases are issued by the Department of Conservation and Land Management.

Forest Produce Licences are issued for the collection of various types of forest produce including fencing material, firewood and mining timber. There are also special provisions for the control of sandalwood operations. Some Forest Leases are granted by the Department for bush grazing and other purposes not opposed to the interests of forestry. These leases may be issued for any term not exceeding twenty years.

Permits are granted for apiary sites of an area not exceeding 1.25 hectares. They are issued to persons who are actively engaged in beekeeping and who have at least twenty-five hives of bees in the State. A permit may not be issued for an apiary site on Crown land if it is within three kilometres of a site already granted to another apiarist, and not more than four permits may be held for every fifty hives of bees owned.

#### LAND INVESTIGATION AND ASSESSMENT

Large scale as well as detailed land investigation measures have been developed progressively in Western Australia since the early days of settlement. Soil mapping of Crown lands has always been carried out as a function of the Department of Lands and Surveys, and more recently in collaboration with the Department of Agriculture. In the early years of land settlement the Staff Surveyors, when marking parcels of land for agricultural development, submitted classifications and commented generally on the probable yield and carrying capacity of the land, as a guide to pricing. Modern techniques enable much use to be made of photogrammetric methods in the mapping and presentation of the soil survey, particularly in definition of vegetation and topographic detail.

In recognition of the need to determine a broader basis for land assessment which would incorporate consideration of additional factors such as climatic influences, environmental aspects and alternative potential uses, an Agricultural Land Release Review Committee comprising the Ministers for Lands, Agriculture and Conservation and Environment, together with their respective Departmental heads, was established in 1983. The Committee was supported by a Working Party with representation from the several Departments referred to above, as well as the CSIRO Division of Groundwater Research. In March 1985, after absorbing a broad level of public input, the Committee's report and recommendations were accepted by the Government. Principal recommendations related to requirements for climatic data to support subdivision and release proposals, and the preparation of Initial Development Plans for all parcels for release.

A Working Group on Land Releases, with a similar composition to the Working Party referred to above, now processes specific land investigations. Its procedure is to effect an initial assessment of available information such as climatic data, soil surveys and the potential for agriculture or other

purposes, for submission to the Environmental Protection Authority. If that Authority decides that further investigations are required a Land Use and Environment Impact assessment would then be prepared.

If the decision favours agricultural development, a design of subdivision giving due regard to the agricultural potential of various soil types demonstrated in the area, and defining areas of natural vegetation and features requiring protection, would then be prepared by the Department of Lands and Surveys. Land release details would include outline proposals for development plans in respect of each holding, and upon allocation, Initial Development Plans would be prepared in consultation between the landholder and the Department of Agriculture. Following acceptance of the plan by the Minister for Lands and Surveys, the document would be adopted as the basis for future development of the property.

### OCCUPATION OF LAND

The following table shows, for a selection of years during the period from 1900 to 1984, the areas of land absolutely alienated or in process of alienation and of Crown land held under certain types of lease or licence. For the years 1900, 1910 and 1920 the basis of classification according to Department has been made to conform to current practice in the issue of leases and licences. For example, tenures relating to forests, which were originally issued by the Department of Lands and Surveys and later by the Department of Mines, have been shown for those years under the heading of Department of Conservation and Land Management. For 1930 and later years the figures are as recorded by the Departments concerned. The types of tenure included under the several departmental headings are indicated in the footnotes to the table.

#### LAND ALIENATED AND LAND HELD UNDER LEASE ( '000 hectares)

At 31 December —	Area absolutely alienated	Area in process of alienation	Area of leases or licences in force on Crown land and issued by —			
			Department of Lands and Surveys		Department of Mines (b)	Department of Conservation and Land Management (c)(d)
			Pastoral leases	Other leases (a)		
1900	1,401	1,278	34,977	4	34	345
1910	1,835	5,551	67,203	224	43	522
1920	3,623	5,958	104,420	999	42	664
1930	5,937	8,610	90,693	358	34	539
1940	7,408	5,602	82,875	843	38	954
1950	8,727	4,788	(e) 79,212	1,400	41	1,448
1960	11,158	5,185	88,301	2,685	37	1,617
1970	13,929	5,832	98,982	2,548	49	1,377
1979	16,519	2,386	93,865	2,233	142	833
1980	16,807	2,151	95,066	2,097	142	833
1981	17,112	1,958	95,117	2,096	158	616
1982	17,281	1,810	95,734	2,089	(f) 253	(g) 32
1983	17,452	1,699	95,548	2,140	230	(g) 28
1984	17,449	1,520	96,956	2,161	302	(g) 25

(a) Comprises special leases, leases of reserves, leases of residential lots and perpetual leases. (b) Comprises gold-mining leases, mineral leases and miners' homestead leases. (c) From 1984, The Department of Conservation and Land Management has incorporated The Forests Department. (d) Predominantly sawmilling permits. Includes permits for cutting wandoo for tannin extraction, but excludes permits and licences for cutting timber and firewood in Goldfields areas. (e) Apparent decrease in area due mainly to revision in the records of the Department of Lands and Surveys. (f) Apparent increase in area due mainly to Transitional Provisions of the *Mining Act 1978*. (g) Predominantly areas cut over under sawmilling licences.

Land which is shown as 'absolutely alienated' consists mainly of farming areas, acquired originally as conditional purchase leases and subsequently alienated under Crown grant. While held under lease prior to alienation they account for most of the land shown as 'in process of alienation'. These two sets of figures taken together consequently give a broad indication of the

increased use of land for agricultural purposes during the period under review. Similarly, variations in the area occupied as sheep and cattle stations may be gauged by reference to the area of pastoral leases issued by the Department of Lands and Surveys.

The passing of the Homesteads Act in 1893 and of a comprehensive Land Act in 1898 provided the basis for a rapid increase in the settlement of agricultural land. Under the Homesteads Act, any man over the age of eighteen years who did not already own an area of 40.5 hectares or more in this State could apply for a free homestead farm of 64.7 hectares, on condition that he resided on his land during at least six months of each of the first five years and carried out prescribed improvements. With a lower minimum age of sixteen years, a similar provision is contained in the *Land Act 1933*, and this provision, operating in conjunction with the conditional purchase lease system, has also been a factor in the increase in land settlement, particularly in the wheat-growing areas.

About 1905 the Department of Lands and Surveys, by implementing a system of survey and subdivision before selection, partially checked the indiscriminate selection of land by inexperienced farmers. A further stabilising influence on agricultural development was the introduction in 1909 of a system of grading Crown lands into classes, First, Second and Third according to suitability for farming.

The movement of population from the goldfields to the wheat belt contributed to the increase in the area of land in process of alienation from 1,277,512 hectares in 1900 to 5,550,573 in 1910. The ultimate alienation of about one-third of this land by Crown grant is reflected in the greatly increased figures for 'absolutely alienated' land in 1920. Settlement of the wheat belt developed rapidly during and after the period 1910 to 1920, in spite of serious droughts which occurred in 1911 and 1914. Although the increased totals at 31 December 1930 were principally due to this development, they resulted in part from the acquisition during the previous ten years of farmland, mainly for dairying, in the south-west of the State under the Group Settlement Scheme. These holdings were individually much smaller than those in the wheat-growing districts, because of the type of farming and the heavy clearing costs, but the numbers involved made the total area taken up under the Scheme of some significance.

Pastoral leases, which comprise the greatest proportion of Crown land held under lease or licence, increased threefold between 1900 and 1920. The area actually held under pastoral lease conditions represents approximately one-third of the whole State. The aggregate area of gold-mining leases, mineral leases and miners' homestead leases, appearing in the table under the heading of Department of Mines, shows comparatively little variation since 1900. However, in recent years very large areas have been included in tenures issued under the provisions of the Petroleum Act and in temporary reserves under the Mining Act.

From 1930 the demand for land for agricultural purposes declined considerably, the principal reason being the lower farm commodity prices which prevailed for several years prior to the second World War. After 1945, however, the demand for land again increased, stimulated by the sharp rise in export prices, notably of wheat and wool, and later by the War Service Land Settlement Scheme. The area conditionally alienated in any one year reached a post-war peak of 691,161 hectares in 1953. During the next decade the area fluctuated between 285,657 hectares in 1956 and 499,591 hectares in 1962. The area then declined and by 1972 the area conditionally alienated was only 4,176 hectares, owing to restrictions imposed on the release of Crown land by conditional purchase. Although there has been a slight recovery in areas alienated in subsequent years, a moratorium on agricultural land release has meant virtually no alienation during the past two years.

The following table gives details of areas of land for which applications were approved, during each of the years 1978 to 1983, by the Department of Lands and Surveys for conditional alienation or allocation under lease or licence. The figures shown for any year do not necessarily represent land allotted for the first time, as they may include land previously held under any of the several forms of land tenure.

CROWN LANDS — AREA OF ALLOCATIONS  
APPROVED BY DEPARTMENT OF LANDS AND SURVEYS  
(Hectares)

Particulars	1978	1979	1980	1981	1982	1983
Conditional alienations —						
Conditional purchase	55,378	89,279	47,278	54,935	14,672	58,404
Town and suburban lots	140	271	205	337	809	198
Miscellaneous (a)	811	859	1,144	(b) 25,599	938	745
Total	56,329	90,409	48,627	80,871	16,419	59,347
Leases and licences —						
Pastoral leases and licences	1,004,166	196,350	248,690	319,118	1,276,139	1,125,919
Special leases	344,779	14,292	49,887	15,421	20,701	70,897
Miscellaneous leases (c)	14,114	184,555	32,179	47,578	10,737	2,334
Total	1,363,059	395,197	330,756	382,117	1,307,577	1,199,150

(a) Comprises free homestead farms and reserves. (b) Includes 21,130 hectares reserved for the Derby Airfield Defence Area. (c) Comprises perpetual leases, leases of reserves and leases of town and suburban lots.

### GOVERNMENT LAND SETTLEMENT SCHEMES

Although, generally, the method of land alienation and settlement in the agricultural areas of Western Australia has been by independent applications by individual settlers for conditional purchase leases, there has also been a series of government land settlement schemes. The more important of these are the Soldiers' Settlement Scheme following the 1914-18 war, the Group Settlement Scheme introduced in 1921, the War Service Land Settlement Scheme which was initiated in 1945 and other lesser schemes for the settlement of civilians. An outline of each of these schemes appears in Chapter VII of the 1976 issue of the Year Book.

No government land settlement schemes are currently in operation. Activities in respect of the most recent of the schemes, the War Service Land Settlement Scheme, were officially terminated on 31 August 1966 when the main developmental work was completed.

## Chapter 13

### WATER

The Water Authority of Western Australia controls the majority of water-related services in Western Australia. It was constituted under the provisions of the *Water Authority Act 1984*, and was formed on 1 July 1985, by merging the water-related sections of the Public Works Department and the Metropolitan Water Authority.

The Water Authority is responsible, under the control of the Minister for Water Resources, for the general administration of the Act. A nine-member Board of Management controls the Authority's operations and reports to the Minister. The Board consists of a Chairman and five members appointed by the Governor, plus the Managing Director of the Water Authority, the Chairman of the Western Australian Water Resources Council, and an elected employee representative of the Water Authority. A Corporate Executive comprising the Managing Director and seven Directors is responsible to the Board for day-to-day management.

The Water Authority 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 serving a population of 960,000.

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 varies from place to place and much of it is too saline for irrigation or even for stock. Both artesian and nonartesian 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 Porth 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 are also using 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 basins 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.

Surface storages in Western Australia include the South Dandalup Reservoir, Serpentine Reservoir, Wellington Dam and Canning Reservoir. Mundaring Weir, which is the source for the Goldfields and Agricultural Water Supply, is linked to Kalgoorlie by pipeline and serves the more populous parts of the Eastern Goldfields as well as certain towns and farming areas north and south of the main pipeline. As occasion arises, Mundaring Weir supplies to or draws from the Metropolitan Water Supply. Stirling Dam, upstream of the Harvey Weir, is used to augment this weir which

is principally used for irrigation but is also used by the Harvey Water Board for domestic use in the town of Harvey. Similarly, Samson Brook Dam is mainly used for irrigation purposes, but water is drawn from a pipehead dam near the town of Waroona for the town water supply. Wellington Dam, on the Collie River, supplies water to the southern part of the irrigation area, as well as to towns and farmlands in the Great Southern Towns Water Supply Area.

The table below shows the principal water storages in Western Australia.

DAMS AND RESERVOIRS — STORAGE CAPACITY (a)  
(<sup>000</sup> kilolitres)

Dam or reservoir	Storage capacity	Dam or reservoir	Storage capacity
Canning Reservoir	90,500	Ord River Dam (Lake Argyle)	5,797,000
Churchman Brook Reservoir	2,200	Samson Brook Dam	9,170
Drakes Brook Dam	2,290	Serpentine Pipehead Reservoir	2,640
Fitzroy Dam	4,650	Serpentine Reservoir	194,500
Glen Mervyn Dam	1,490	17-Mile Dam (d)	5,489
Harding Dam	63,800	South Dandalup Reservoir	208,200
Harvey Weir	9,126	Stirling Dam	56,123
Kununurra Diversion Dam (b)	97,400	Victoria Reservoir	860
Logue Brook Dam	24,300	Waroona Dam	14,954
Mundaring Weir	77,000	Wellington Dam	184,900
North Dandalup Pipehead Dam	(c)	Wungong Reservoir	60,000

(a) At 30 June 1985. (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, 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. Groundwater used to augment hills supplies amounted to 61,413,000 kilolitres in 1984-85 and represented 33 per cent of the total output from all sources, compared with 55,454,000 kilolitres and 33 per cent during 1983-84.

METROPOLITAN WATER SUPPLY — QUANTITIES OF WATER DRAWN (a)  
(<sup>000</sup> kilolitres)

Source	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Canning Reservoir	24,563	13,851	27,502	19,148	37,414	36,722
Churchman Brook Reservoir	1,889	2,407	2,147	2,120	2,752	2,155
Mundaring Weir	1,247	1,641	9,523	6,105	7,909	6,085
North Dandalup Pipehead Dam	5,701	11,586	13,394	9,476	21,156	11,563
Serpentine Reservoir (b)	32,068	31,538	22,562	35,808	18,061	39,046
South Dandalup Reservoir	16,226	14,780	12,277	20,221	14,280	4,995
Victoria Reservoir	578	2,855	3,600	2,477	2,650	2,939
Wungong Reservoir (c)	—	11,359	16,360	14,559	15,587	19,175
Metropolitan bores (d)	60,522	60,770	48,886	59,396	55,454	61,413
Total	142,797	150,788	156,251	169,304	167,354	184,053

(a) Including supplies to railways and shipping. (b) Includes water drawn from Serpentine Pipehead Reservoir. (c) Wungong was developed as a pipehead dam prior to the building of Wungong Dam. (d) Includes shallow underground water.

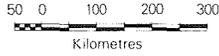
Victoria Reservoir, which was completed in 1891 with a capacity of 860,000 kilolitres, was the first of the existing water conservation projects to be completed in the Darling Range. In 1921 a 104,500 kilolitre reservoir, which is no longer used for water supply, was constructed at Bickley Brook to replace a pipehead dam, and in 1928 one with a capacity of 2,200,000 kilolitres was completed at Churchman Brook. During the same period pipehead dams were built across the upper course of the Canning River and its tributary, Wungong Brook, preliminary to the construction of Canning Reservoir, which was begun in 1933 and completed in 1940. Canning Reservoir has a storage capacity of 90,500,000 kilolitres retained by a concrete wall 66 metres high and 468 metres long at the



Water Authority  
of Western Australia

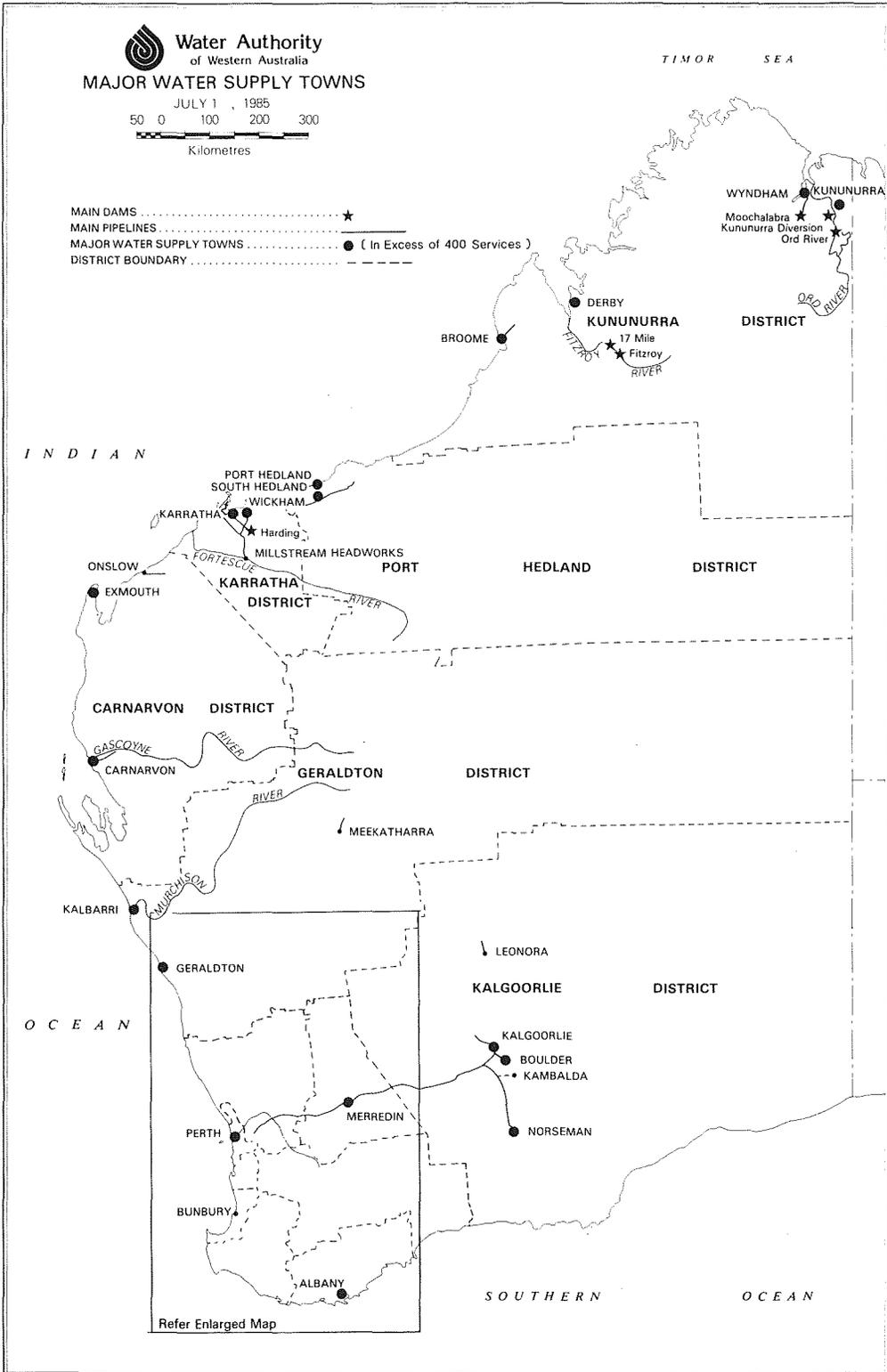
MAJOR WATER SUPPLY TOWNS

JULY 1, 1985

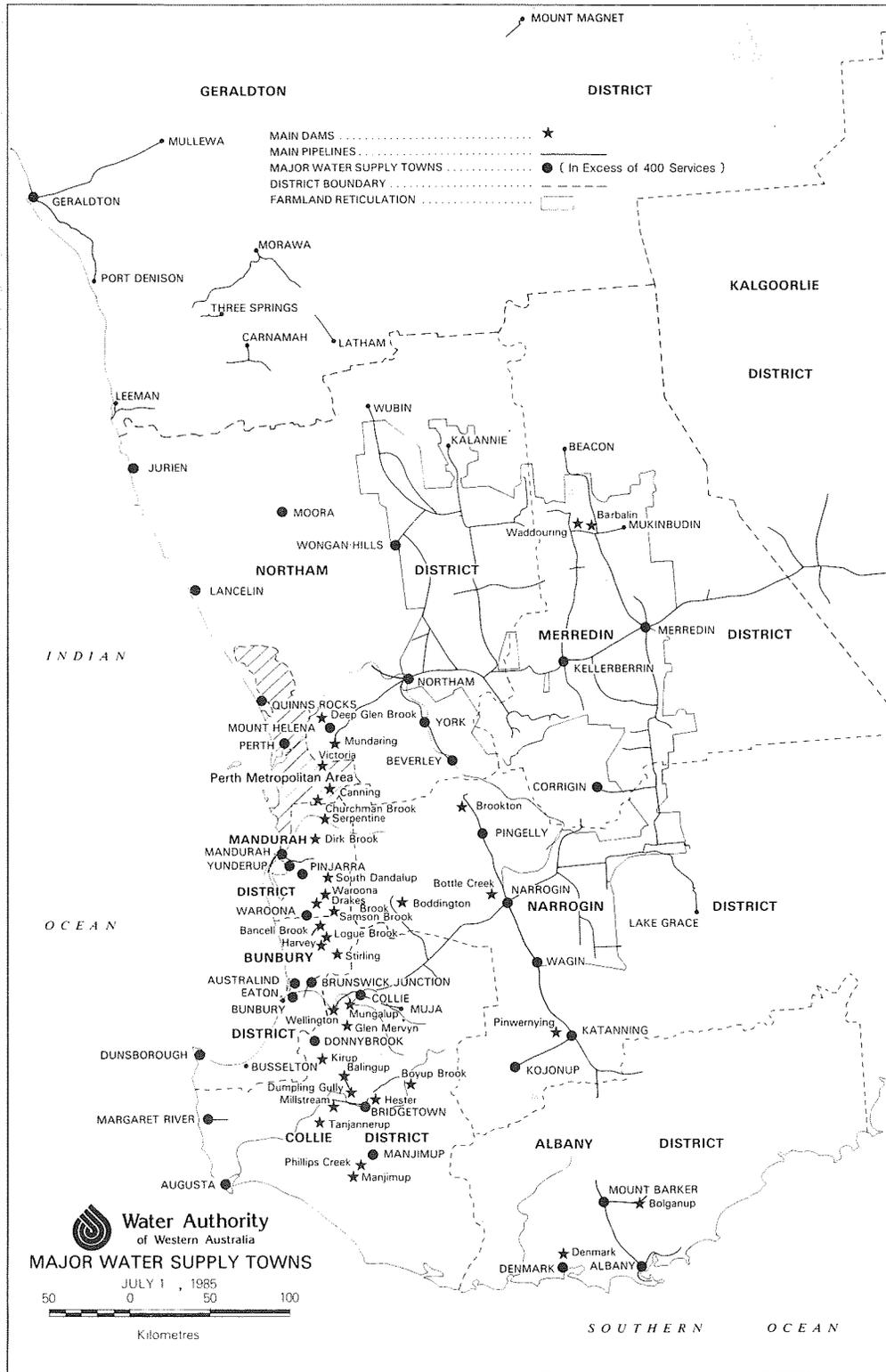


TIMOR SEA

- MAIN DAMS ..... \*
- MAIN PIPELINES .....
- MAJOR WATER SUPPLY TOWNS ..... ● ( In Excess of 400 Services )
- DISTRICT BOUNDARY .....



Refer Enlarged Map



crest. Serpentine Pipehead Reservoir was completed in 1957 and Serpentine Reservoir, commenced in 1957, was completed in 1961. Serpentine Reservoir is constructed of rolled earth fill and the embankment rises 52 metres above the stream bed, the length at the crest being 424 metres. Its capacity, which is slightly less than that of Wellington Dam on the Collie River, is 194,500,000 kilolitres. Supplies to the metropolitan system are augmented by the North Dandalup Pipehead Dam which is the first stage of the Dandalup Rivers Scheme and was completed in December 1970. The major storage component of the scheme, the 208,200,000 kilolitres capacity South Dandalup Dam, was completed in late 1973. Wungong Reservoir, with a capacity of 60,000,000 kilolitres, was completed in 1980. The dam was built near the site of the old pipehead dam.

Water from storages in the Darling Range is conveyed to the metropolitan area by the Canning Tunnel, which was commissioned on 17 January 1975, 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 from shallow confined and unconfined aquifers, north and south of the Swan River, is distributed, after treatment, into the supply system. The groundwater is treated at water treatment plants situated at Gwelup, Mirrabooka, Wanneroo and Jandakot. To meet the peak demand during the summer months, supplies from these sources are supplemented from a system of artesian bores.

### **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.

**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), Limeburner's Creek, and bores which are located on the west of Princess Royal Harbour. Water is pumped to the Mount Barker service tank via a thirty kilometre supply main from where it serves the town of Mount Barker and then gravitates to Kendenup via an eighteen kilometre supply main.

**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, which has a capacity of 185 million kilolitres, 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.

Water is taken through Narrogin to Wickepin by means of a main pipeline 171 kilometres long. In addition to the pumping installation at the dam site, there are stations at a point forty-five kilometres east of the dam, as well as at Williams and Narrogin. A pipeline eighteen kilometres long can supply water to a power station constructed for the State Energy Commission at Muja, south-eastward from Collie. However, this is only used in emergencies to supplement the cheaper groundwater supplies.

Details of the number of services, length of water mains and consumption for the years 1979-80 to 1984-85 are given in the following table.

#### GREAT SOUTHERN TOWNS WATER SUPPLY

Year	Number of services	Length of water mains (kilometres)	Consumption ('000 kilolitres)					Other	Total
			Domestic	Com-mercial	Industrial (including railways)	Mining	Farms and market gardens		
1979-80	12,167	2,136	2,785	290	507	5	976	643	5,206
1980-81	12,824	2,294	2,748	306	374	—	981	721	5,130
1981-82	12,933	2,305	2,773	303	343	8	997	506	4,930
1982-83	13,106	2,311	3,115	336	472	20	2,037	660	6,640
1983-84	13,256	2,338	3,084	372	238	23	830	582	5,129
1984-85	13,670	2,339	3,350	325	269	59	1,025	692	5,720

**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).

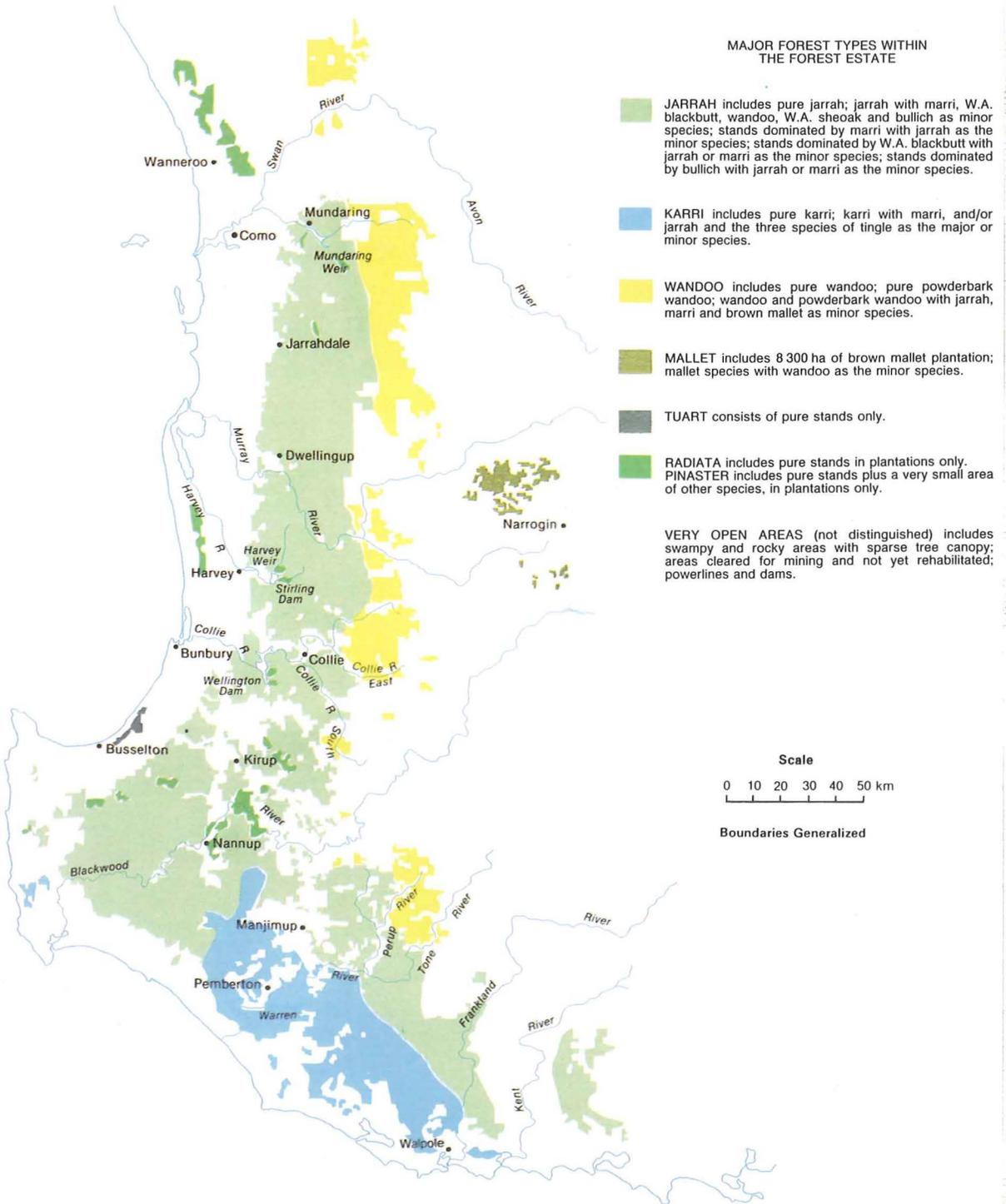
Approximately 90 per cent of the water consumed is supplied by gravity from the South Dandalup Dam with the remainder being injected into the supply main from bores at Ravenswood. At present the scheme supplies some 10,000 services and is the most rapidly growing scheme in the State.

**Goldfields and Agricultural Areas Water Supply.** This scheme provides water to consumers in the Central Agricultural Areas and Eastern Goldfields. During 1984-85 water was supplied to 93 towns and to 2,650,000 hectares of farmland in the central and north-eastern wheatbelt. The original purpose of this undertaking, which was formerly known as the Goldfields Water Supply, was to supply water for the Coolgardie and the Kalgoorlie-Boulder areas. To provide conservation, the Helena River was dammed near Mundaring, and on completion of the reservoir in 1902 it had a capacity of 21 million kilolitres. The increasing demand for water in the area served made it necessary to augment supplies. This was achieved by raising the wall 9.8 metres to a height of 40.2 metres, and when the work was completed in 1951, the enlarged capacity of the reservoir was 68.9 million kilolitres. The capacity has since been further increased to 77.0 million kilolitres by the erection of adjustable steel crest gates 1.2 metres in height. In 1972 the Lower Helena Pipehead Dam, some eight kilometres below Mundaring Weir, was brought into operation, water being pumped from this source to augment the supply from Mundaring reservoir. The main pipeline between Mundaring and Kalgoorlie is 554 kilometres long. It is for the most part 762 millimetre diameter steel but has 1,219 millimetre, 1,067 millimetre and 914 millimetre pipe in the western portion with some duplication of the 762 and 914 millimetre pipe. There are eighteen pumping stations along the main pipeline. The maximum pumping capacity from Mundaring Weir is 134,000 kilolitres per day. The operation of the Mundaring Weir is integrated with the metropolitan system. This allows supplementation of the reservoir during periods of low storage, and contribution to the metropolitan system at times of excess storage, thus raising the safe long-term draw from Mundaring Weir during the year. The total capacity of all receiving, regulating, standby and service tanks (including four standby reservoirs at Kalgoorlie with a combined capacity of 336,000 kilolitres) is 1.2 million kilolitres.

Extensions to country towns and agricultural areas have been made at several points along the main pipeline.

Details of the number of services, length of water mains and consumption for the years 1979-1980 to 1984-1985 are given in the following table.

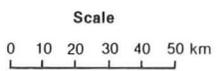
# THE FOREST ESTATE



MAJOR FOREST TYPES WITHIN THE FOREST ESTATE

- JARRAH** includes pure jarrah; jarrah with marri, W.A. blackbutt, wandoo, W.A. sheoak and bullich as minor species; stands dominated by marri with jarrah as the minor species; stands dominated by W.A. blackbutt with jarrah or marri as the minor species; stands dominated by bullich with jarrah or marri as the minor species.
- KARRI** includes pure karri; karri with marri, and/or jarrah and the three species of tingle as the major or minor species.
- WANDOO** includes pure wandoo; pure powderbark wandoo; wandoo and powderbark wandoo with jarrah, marri and brown mallet as minor species.
- MALLET** includes 8 300 ha of brown mallet plantation; mallet species with wandoo as the minor species.
- TUART** consists of pure stands only.
- RADIATA** includes pure stands in plantations only. **PINASTER** includes pure stands plus a very small area of other species, in plantations only.

**VERY OPEN AREAS** (not distinguished) includes swampy and rocky areas with sparse tree canopy; areas cleared for mining and not yet rehabilitated; powerlines and dams.



Boundaries Generalized



PLATES 6 AND 7 — The West Pilbara draws its water supply from the Millstream aquifer (above) and the Harding River Dam (below).  
*photographs: Des Birt; Water Authority of W.A.*



## GOLDFIELDS AND AGRICULTURAL AREAS WATER SUPPLY

Year	Number of services	Length of water mains (kilometres)	Consumption (a) ('000 kilolitres)					Other	Total
			Domestic (including special agreement domestic) (b)	Commercial	Industrial (including railways)	Mining (including special agreement mining) (b)	Farms and market gardens		
1979-80	28,889	8,052	7,218	847	712	2,809	4,989	1,571	18,147
1980-81	27,849	7,922	7,283	922	667	3,661	4,573	1,706	18,812
1981-82	28,618	7,931	7,164	965	539	4,360	4,179	1,537	18,744
1982-83	28,901	7,947	9,527	1,036	391	4,405	4,986	1,736	22,081
1983-84	29,050	7,038	9,872	1,011	523	5,153	4,083	1,271	21,913
1984-85	30,807	7,061	8,036	1,101	520	5,898	4,080	1,903	21,538

(a) Figures include amounts consumed from local supplies at Waddouring-Barbalin-Knungajin, Bruce Rock, Naremben and Kondinin. (b) Special agreement consumption was previously included with 'Other' consumption.

**Geraldton Regional Water Supply.** The Geraldton Regional Water Supply serves consumers in the towns of Geraldton, Dongara, Port Denison, Mullewa, Walkaway, 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 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.

To date, the sole source of the West Pilbara Water Supply has been the Millstream aquifer, but planning for an additional source commenced many years ago and culminated in the opening of the Harding River Dam on 28 May 1985. The dam and aquifer will be operated in conjunction, with water being drawn from the Millstream aquifer only when the dam is empty. Operation in this manner will ensure that the fragile Millstream environment is not damaged.

**Supplies to other Country Towns.** One hundred and forty-four 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.

## LOCAL AND REGIONAL SCHEMES

Year	Number of services	Length of water mains (kilometres)	Consumption ('000 kilolitres)					Other	Total
			Domestic	Commercial	Industrial (including railways)	Mining (including special agreement mining) (a)	Farms and market gardens		
1979-80	54,171	3,348	20,032	4,420	2,873	10,313	411	3,596	41,673
1980-81	57,201	3,450	20,395	4,430	2,609	9,850	440	3,693	41,491
1981-82	59,810	3,649	21,180	4,253	2,423	9,186	560	3,804	41,414
1982-83	62,300	3,817	22,746	5,145	2,210	7,115	543	4,067	41,826
1983-84	64,654	3,875	23,463	5,055	2,124	8,833	771	4,582	44,287
1984-85	68,368	4,130	23,530	5,377	1,872	7,642	482	4,495	43,937

(a) Special agreement consumption was previously included with 'Other' consumption.

**Aboriginal Communities.** At the request of the Department of Aboriginal Affairs, the Water Authority undertook a detailed investigation of fifty-eight remote Aboriginal communities to ascertain the requirements of providing these communities with adequate water supply and sewerage facilities.

The Department of Aboriginal Affairs is providing funds for the progressive upgrading of these facilities at nominated communities. The necessary investigation, design and upgrading works were commenced during 1984-85.

Under an arrangement with the Department of Aboriginal Affairs, the Water Authority also assisted twenty-nine Aboriginal communities in the operation and maintenance of their water supply schemes and in the training of operators from within the communities.

## WATER RESOURCES ASSESSMENT AND MANAGEMENT

### **Water Resources Assessment**

Work on the measurement and evaluation of the water resources of Western Australia, both surface and underground, has continued in recent years with the support of the Australian Water Resources Council, which was established by joint action of the Commonwealth Government and State Government in 1962. The Council comprises Commonwealth Government and State Government Ministers primarily responsible for water resources.

The primary objective of the Council is the provision of a comprehensive assessment on a continuing basis of Australia's water resources, and the extension of measurement and research so as to provide a sound basis for the planning of future development.

In terms of its main objective, the Council in 1964 recommended, and the Commonwealth Government and State Governments agreed, that there should be an accelerated program of establishment of stream gauging stations and investigation of groundwater. Financial assistance to the States was rendered by the Commonwealth Government under the *States Grants (Water Resources) Act 1964*, subject to certain qualifying expenditure by each State. Under various States Grants (Water Resources Measurement) Acts and the *States Grants (Water Resources Assessment) Act 1976*, financial assistance to the States was continued to 30 June 1979. Since then financial assistance has been provided through the *National Water Resources (Financial Assistance) Act 1978*.

The measurement and evaluation of the water resources of Western Australia has been a long-term continuing program. It has progressed satisfactorily through 1984-85 with funding assistance from the Commonwealth Government under the Federal Water Resources Assistance Program. The information provided by this program is vital to the current and future management and utilisation of the State's water resources.

During 1984-85 the surface water measurement network grew marginally with twenty new stations being constructed and five closed. The growth was mainly related to an increased role in bauxite mining related hydrologic research, and in the monitoring of flows in catchments near Perth, to aid the planning of metropolitan water supplies.

An important part of the assessment of water resources has been groundwater monitoring. Some 2,800 bores throughout Western Australia have been regularly monitored. Another aspect of the Water Resources Assessment Program has been extensive water quality sampling of surface and groundwater resources. Over 22,000 samples were collected and analysed for chemical constituency in 1984-85.

**State Water Resources Information System.** The State Water Resources Information System contains the major portion of the information for Western Australia on water quantity and water quality for both surface and groundwater resources. Redevelopment of this system from the Main Roads Department computer to the Water Authority's computer continued during the year.

**Hydrology.** A significant component of the hydrologic work done during the year was performed to support the flood plain mapping program.

The yield hydrology for the design of the Harris River dam was completed during the year. The work involved was considerable and required a complete reassessment of the existing yield of Wellington Dam, the conjunctive use operation and the modelling of colour within the dam itself. This work formed an essential component of the Environmental Review and Management Program for the dam.

Simulations of the behaviour of the Ord River main dam were carried out to assess the impact of different scales of development of hydro-power generation for Kununurra. This work was carried out for the State Energy Commission.

**Land Use Research.** Research investigations continued into the effect of different land management practices on the quality and quantity of streamflow in the south-west of Western Australia. These investigations covered the effects of agriculture, reforestation, the woodchip industry, bauxite mining, pine plantations and forest management. These are long-term studies which involved co-operation with the Department of Conservation and Land Management, the Mines Department, the Department of Agriculture, the Department of Conservation and Environment and the CSIRO.

**Groundwater Investigation.** Groundwater basins utilised for irrigation and public water supplies continued to be investigated and studied to ensure that they were developed and managed responsibly. Detailed reviews of the water supply borefields at Albany, Hopetoun and the De Grey River (Port Hedland Water Supply) were completed. These included consideration of both aquifer and borefield performance together with review and reformulation of management strategies. This work was in addition to the continuing review of the performance of the Gascoyne River groundwater system and the less detailed reviews of a number of other borefields.

The performance of groundwater systems being exploited by private organisations and individuals was also assessed and management strategies formulated to preserve these groundwater resources. A major study of groundwater availability, level of utilisation and management of the groundwater resources of the Swan Valley has been carried out to ensure that these resources are not being overdrawn through uncontrolled private abstraction.

Close interest was taken in more than ninety existing basins or borefields, with seventy-eight of these being utilised for public water supply purposes.

## **Water Resources Management**

**Surface Water Management.** Nineteen streams and stream systems of Western Australia have been proclaimed under Part III of the *Rights in Water and Irrigation Act 1914* dealing with the control of surface waters. Private diversion of surface supplies and drinking water for stock has been permitted only under licence. The issuing and administration of these licences are the responsibility of the Water Authority.

Increasing irrigation in the south-west of the State has placed a heavy demand on the summer flow of perennial streams. Increasingly intensive management of water use has been required to ensure that available water is being allocated to the best advantage. Advisory committees, which have local citizens as members, have assisted in policy formulation and management in six proclaimed areas. Nevertheless, considerable Government support has been necessary to regulate and manage the use of the streamflow and to arbitrate on disputes between landowners.

Amendments to the Rights in Water and Irrigation Act passed during the year allow the Minister for Water Resources to control the taking of water from all streams in Western Australia and allow him to prevent interference to watercourses on Crown Land. Several disputes over water use from unproclaimed streams were resolved through the exercise of these powers without the need for court action.

**Groundwater Control.** All artesian bores in Western Australia must be licensed, as must all groundwater wells in proclaimed groundwater control areas. Thirty-two groundwater control areas were administered by the Water Authority at 30 June 1985. Advisory Committees comprising Government officers and local citizens have assisted in management of three of these areas.

Total control has been exercised over groundwater usage in the Broome, Gascoyne, Swan and South-West Coastal Groundwater Areas while the control of other areas has been tailored to suit the specific problems known to exist and to the staff resources available.

Further amendments to the Rights in Water and Irrigation Act passed during the year provide for exemption from licensing of stock and domestic bores in selected groundwater areas. These amendments also shift the responsibility for notification of bore log details from the owner to the driller.

The Busselton, Capel and the Peel Groundwater Areas were proclaimed during the year. Groundwater use surveys were carried out in the Swan, Broome and Bindoon Groundwater Areas and commenced in the Peel Area.

A total of 2,226 groundwater well licences have been issued with 314 of these being issued in 1984-85.

**Effluent Disposal Licensing.** Protection of the State's water resources from pollution by industrial discharges is provided by Part 111A of the Rights in Water and Irrigation Act. The Water Authority administers this part of the Act in all country areas. At 30 June 1985, 130 disposal situations in country areas were being monitored, with 72 of these having a current licence.

**Effluent Disposal from SCM Chemicals Ltd, Australind.** The State has an obligation, under the *Laporte Industrial Factory Agreement Act, 1961*, to dispose of the effluent resulting from the titanium dioxide plant at Australind. It was the responsibility of the Water Authority to meet this obligation. However, from 1 January 1985, the Department of Resources Development assumed responsibility for management and funding of the disposal scheme.

**Consultant Advice to Other Authorities.** The Department provided advice to government departments and local authorities on suitable treatment and management methods for industrial, municipal and domestic wastes. This advice was aimed at protecting the State's water resources.

**Collie River Salinity Control.** An extensive reforestation program was commenced in the eastern portion of the catchment area of Wellington Dam. Approximately 9,000 hectares of reforestation is currently thought to be required to reduce the salinity level in Wellington Reservoir to about 750 milligrams per litre total solids. To date 3,372 hectares have been reforested. An area of 735 hectares was prepared for planting during the 1985 winter.

In recent years strategically placed properties have been purchased to permit the continuation of the program. It is considered that, with these properties, reforestation of up to 8,300 hectares will be possible by planting on the lower slopes of the properties purchased and by negotiating to exchange mid-slope cleared areas for salt affected lower slopes in adjoining farms.

**Catchment Clearing Controls.** In November 1976 clearing controls were introduced on the catchment of the Wellington Dam followed in December 1978 by the extension of these controls to cover the Mundaring Weir and Denmark River Catchment Areas and the Warren and Kent River Water Reserves. These controls, which were at first unpopular in the farming community, appear now to have been accepted.

During the last financial year, 93 licences were issued permitting the clearing of 1,348 hectares of vegetation. Applications for licences to clear a further 3,389 hectares were refused.

During the year, land values in the affected catchments continued to fall while development costs maintained a steady upwards trend. The net effect of this is a reduced value to the farmer of this compensable bush. This has had a marked effect on the level of claims for compensation. During the year 27 claimants were granted compensation claims totalling \$1,869,000.

Statistics for the last three years are given in the following table.

CATCHMENT CLEARING CONTROLS:  
CLAIMS FOR COMPENSATION

Year	Applications	Licences	Hectares	
			Area of vegetation licenced for clearing	Area refused
1982-83	123	73	1,102	6,157
1983-84	96	81	692	2,187
1984-85	127	93	1,348	3,389

## IRRIGATION SCHEMES

The Water Authority is responsible for the operation and maintenance of seven irrigation and fifteen drainage schemes throughout the State, from Albany in the south to Kununurra in the north.

**South-West Irrigation Schemes.** Irrigation schemes have been established by the State Government on the coastal plain south of Perth in the Waroona, Harvey, Collie River and Preston Valley Irrigation Districts between Waroona and Donnybrook, the water being channelled from dams in the adjacent Darling Range.

Specialist advice on irrigation farming methods is available through the Department of Agriculture and the properties are watered according to requirements and water availability.

The Harvey Irrigation District, opened in 1916, was the first large-scale project. Harvey Weir, with a capacity of 2.36 million kilolitres on completion, was constructed as the source of water supply and the service initially provided was for 1,215 hectares of land for citrus growing.

The success of dairying and stock raising and to a lesser extent vegetable growing, which have replaced citrus culture, has led to gradual but substantial extensions of the south-west irrigation area. The damming of Drakes Brook in 1931 and Samson Brook in 1941 provided a storage capacity of 10.37 million kilolitres which, by alterations to Samson Brook Dam in 1960, has been increased to 11.46 million kilolitres and is used for the irrigation of 1,515 rated hectares in the Waroona Irrigation District. In 1966 a third storage to serve the Waroona District, known as Waroona Dam, was completed on Drakes Brook about five kilometres up-stream from the existing Drakesbrook Dam. Its capacity is 14.90 million kilolitres. In 1931 the capacity of Harvey Weir was enlarged to 9.13 million kilolitres (including flashboard storage) and in 1948 Stirling Dam, with an original capacity of 54.83 million kilolitres (increased to 57.00 million kilolitres by alterations in 1958), was completed further up-stream on the Harvey River. These works enabled the Harvey Irrigation District to be extended northward to link with the Waroona District. Logue Brook Dam, with a capacity of 24.30 million kilolitres, was completed in 1963 and provides additional supplies for the Harvey Irrigation District, the rated area of which is 5,584 hectares.

The following table shows details of irrigation in each district in the years 1983-84 to 1984-85.

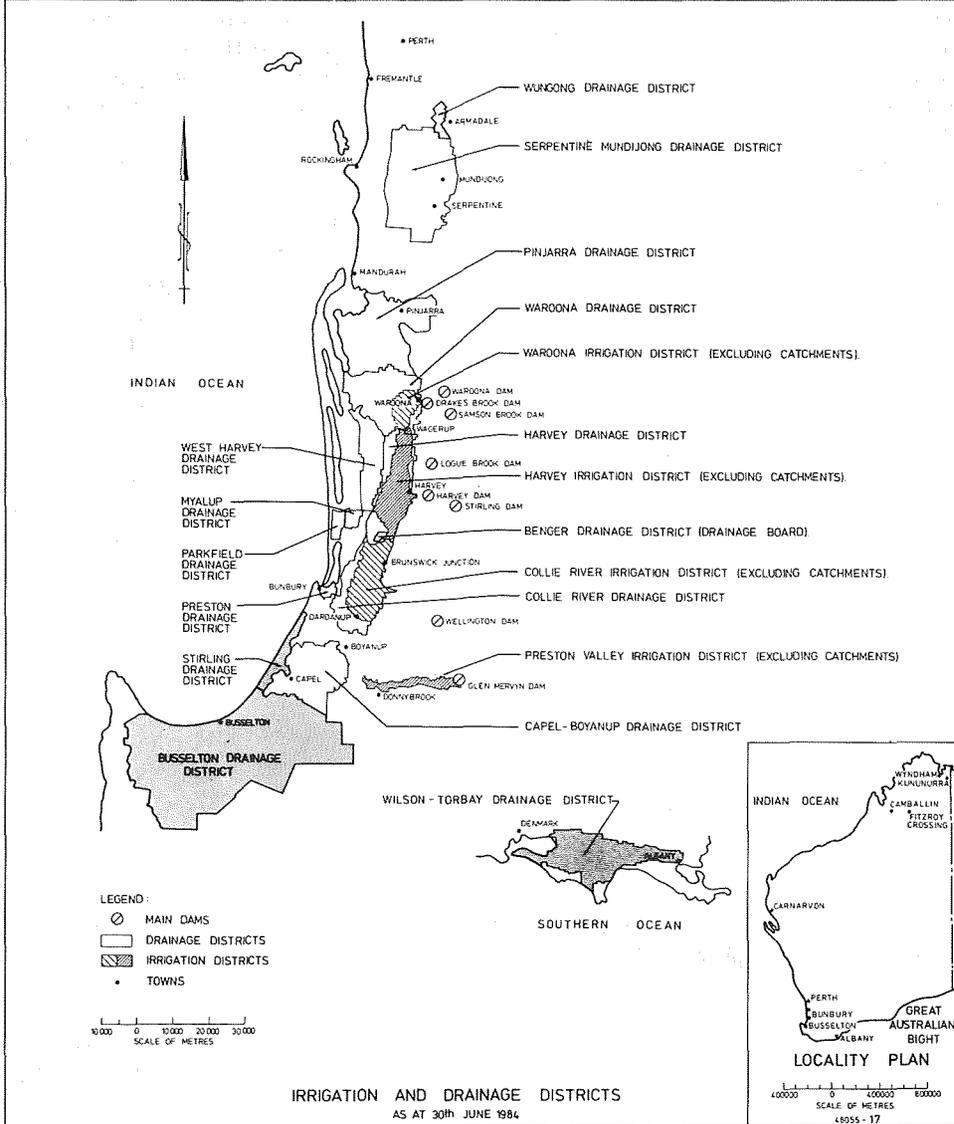
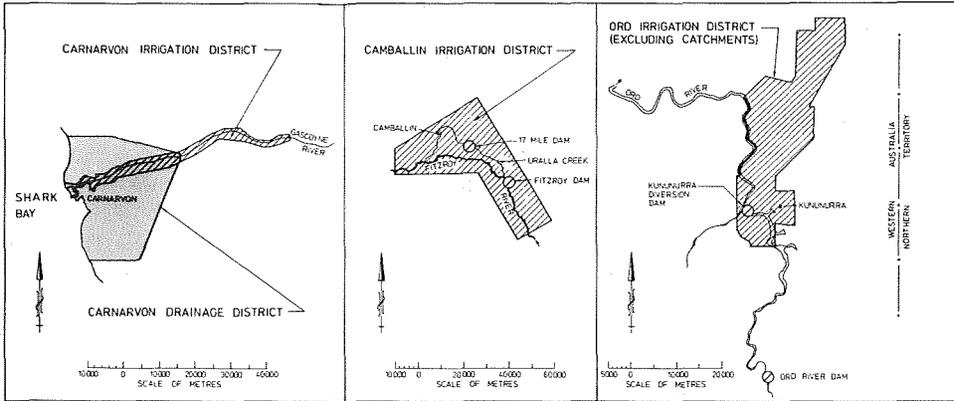
IRRIGATION: SOUTH-WEST SCHEMES

Particulars	Irrigation district (a)									
	Waroona		Harvey		Collie River		Preston Valley		Total	
	1983-84	1984-85	1983-84	1984-85	1983-84	1984-85	1983-84	1984-85	1983-84	1984-85
Area watered hectares	2,097	1,758	6,330	5,763	5,927	5,799	390	202	14,744	13,522
Pasture "	1,294	1,306	5,918	5,442	5,753	5,513	20	2	12,985	12,264
Fodder crops "	240	206	304	193	148	240	—	—	692	639
Potatoes "	—	—	2	10	4	11	47	50	53	71
Other vegetables "	562	32	36	22	14	23	5	4	617	81
Orchards "	—	318	70	96	8	12	318	145	396	253
Hectare waterings (b)	14,982	10,880	47,952	39,145	45,029	40,878	1,449	648	109,412	91,551
Average number of waterings (c)	7.1	6.2	7.6	6.8	7.6	7.0	3.7	3.2	7.4	6.7
Total water gauged at entry to district '000 kl	19,582	13,929	68,234	54,342	70,584	58,132	1,063	832	159,463	127,235
Dam capacity (d) "	26,360	26,414	89,549	89,549	184,900	184,900	1,490	1,490	302,299	302,353
Length of channels km	76	76	261	270	267	267	—	—	604	613

(a) See map: Irrigation and Drainage Districts. (b) Area watered multiplied by number of waterings. Figures are the sum of hectare waterings for individual holdings in each district. (c) Total hectare waterings divided by total area watered. (d) Includes flashboard storage.

During 1969 construction of the Glen Mervyn Dam on a tributary of the Preston River near Mumballup was completed. Water from this dam is made available each summer for controlled release into the Preston River when the natural stream flow is insufficient for the irrigation of orchards downstream from Donnybrook.

Concurrently with developments in the Harvey and Waroona Irrigation Districts, action was taken to conserve water for the Collie River Irrigation District and Wellington Dam on the Collie River was completed in 1933. In view of its importance, not only to irrigation projects but also



to the Great Southern Towns Water Supply, the wall of this reservoir has been raised and when work was completed in 1960 its capacity of 36.37 million kilolitres was increased to 185 million kilolitres. It serves an area of 4,940 rated hectares in the Collie River Irrigation District, which extends from Brunswick Junction to Dardanup.

### **Northern Irrigation Schemes**

**Carnarvon.** A thriving plantation industry has developed at Carnarvon which is situated near the mouth of the Gascoyne River. This centre is one of the major producers in Western Australia of tomatoes, watermelons, pumpkins, cucumbers, capsicums and runner beans. Carnarvon also exports capsicums, zucchinis and pumpkins to the Eastern States. It produces over half the bananas consumed in Western Australia as well as limited supplies of citrus fruit, mangoes and avocados.

The rainfall at Carnarvon is extremely variable and averages little more than 230 millimetres per annum. Agricultural development has been made possible only by irrigation. Water is obtained from the growers' own irrigation pumping plants and from the Government-controlled Carnarvon Groundwater Supply Scheme which is supplied from bores along the Gascoyne River extending between points twenty kilometres and fifty-two kilometres upstream from the mouth of the river. More than 60 per cent of water used for irrigation is now supplied from this Scheme. Usually the river bed is exposed, as surface flows of the Gascoyne River do not occur regularly each year. Wells and bores are sunk into the river sands and the water obtained is pumped either into storage tanks or direct to plantation channels and pipes from which it is distributed to the growing plants by bays or furrows. Microsprinkler irrigation of bananas and trickle irrigation of vegetable row crops are also used. Limitation of supply from the river sands has led to the State Government instituting control over the quantity and quality of water pumped, and the up-river sources have been developed to bring additional supplies of water into the irrigation area.

**Ord River.** The Ord River in the Kimberley Division traverses a tropical area which receives monsoonal rains of irregular incidence and quantity, varying from an annual mean of 510 millimetres in the south to 760 millimetres in the north. Investigations at the Kimberley Research Station, established in 1945, showed that the climate and soil conditions were favourable for the cultivation of a wide range of crops. Following these investigations the State Government, with Commonwealth Government financial assistance, embarked on a project to provide water supplies for irrigation in the area.

The Ord Irrigation Project provides for the development of 72,000 hectares of clay soils and additional areas of sandy soils adjoining the clays. The project comprises four stages: the first was the construction of a diversion dam to supply water for an area of 12,100 hectares and the second, the building of a main storage dam with a capacity of 5,720 million kilolitres. The other stages are the progressive development of the whole 72,000 hectares and the construction of a hydro-electric power station.

The Kununurra Diversion Dam, situated at Bandicoot Bar near the township of Kununurra, and forty-eight kilometres downstream from where the Ord River Dam now stands, was officially opened on 20 July 1963. The capacity of the diversion dam is 97.4 million kilolitres and irrigation from the dam commenced in April 1963. Its storage is named Lake Kununurra.

The Ord River Dam was constructed over three dry seasons, 1969 to 1971 and was officially opened on 30 June 1972. A pump station and irrigation supply facilities to bring 2,020 hectares of new irrigation farmland into production on Packsaddle Plain was completed in December 1973. An extension of the scheme covering 770 hectares on Ivanhoe Plain was completed in 1974.

Maize, soybeans, sorghum, mangoes, mung beans, peanuts, wheat, bananas and cucurbits are all being grown commercially on the Ord, as well as irrigated pastures and hay crops. Most crops rely on limited local markets such as Perth. Cucurbits grown in the dry season find excellent out-of-season markets in all Australian capital cities. Backfreighting by road provides transport at reasonable rates.

In recent years, a double cropping system based on soybeans in the wet season and maize, sorghum or sunflowers in the dry season has been developed. This rotation of legume and grass species has minimised insect problems. Biological control, based on the introduction of parasites of the most common insect pests, has resulted in a very much reduced level of insecticide application particularly against pod sucking insects affecting wet season crops.

Soybeans are grown for the Northern Territory and Western Australian feed market. Sunflowers are used for oil extraction and birdseed. Peanuts are successfully grown commercially on areas of lighter sandy soil using supplementary sprinkler irrigation and a peanut mill operates at Kununurra.

**Fitzroy River.** The Camballin irrigation area is situated on the Liveringa flood plain, 105 kilometres south-east of Derby. Irrigation water from the Fitzroy River is diverted by means of a weir with a capacity of 4.7 million kilolitres into Uralla Creek, an anabranch, for twenty-seven kilometres to another dam with a storage of 5.5 million kilolitres constructed on Uralla Creek.

Some 100,000 hectares of irrigable black soil plain are available in the Fitzroy basin. Water to irrigate this area could be provided by building up to four dams on the Fitzroy and its tributaries. No commercial crops are at present being grown at Camballin.

### 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 the Perth 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 co-ordinating 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 thirteen 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. A limited number of urban drainage schemes in country towns are also operated and maintained.

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.

The map on page 274 illustrates irrigation and drainage districts in Western Australia.

### 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**

There are seven sewerage catchments within the metropolitan area administered by the Water Authority.

Wastewater from the major catchments either gravitates or is pumped through the pipe systems to treatment plants at Point Peron, Subiaco, Westfield, Woodman Point and Beenyup. After treatment the effluent is discharged into the Indian Ocean, some distance from the coast, under a substantial depth of water.

Two smaller catchments are served by treatment plants at Canning Vale and Kwinana where the treated effluent is disposed of in sandy soil in the vicinity of the plant sites.

In addition, the Authority is operating temporary extended aeration plants at Two Rocks and Yankep and is also operating an extended aeration package plant on behalf of the Kalamunda Hospital Board.

## METROPOLITAN SEWERAGE SYSTEMS

At 30 June —	Number of sewered assessments (number)	Length of sewers (kilometres)
1980	214,493	3,749
1981	232,986	3,868
1982	244,488	4,054
1983	246,393	4,183
1984	251,217	4,357
1985	261,770	4,552

## Country Towns Sewerage

At 30 June 1985 fifty-six towns outside the metropolitan area had sewerage schemes which were constructed pursuant to the *Country Towns Sewerage Act 1948*. In addition, a further nineteen schemes have been provided by local government authorities under provisions of the Health Act, and eleven as private development in mining areas by mining companies. Several other local government authorities have reached an advanced stage of planning to commence schemes in future years.

The following table shows the number of towns seweraged, the area seweraged and the number of services controlled by the Public Works Department at 30 June for each of the years 1980 to 1985. Details of the individual towns serviced are given in the succeeding table.

## COUNTRY SEWERAGE SYSTEMS

At 30 June —	Number of towns sewered	Area sewered (hectares)	Length of sewers (kilometres)	Services (number)
1980	44	6,313	748	23,353
1981	45	6,821	815	25,586
1982	46	7,383	895	27,432
1983	54	7,798	939	28,911
1984	56	8,485	984	31,234
1985	56	8,886	1,036	34,968

## COUNTRY SEWERAGE SYSTEMS: AREA SEWERED, SEWERS AND NUMBER OF SERVICES

Town	At 30 June 1984			At 30 June 1985		
	Area sewered (hectares)	Length of sewers (kilometres)	Services (number)	Area sewered (hectares)	Length of sewers (kilometres)	Services (number)
Albany	838	117.0	3,899	915	126.4	3,862
Australind	52	8.2	55	60	9.9	93
Bootenall	20	3.5	6	20	3.5	7
Brunswick Junction	41	5.6	108	41	5.7	147
Bunbury	713	86.5	3,298	742	89.6	3,637
Busselton	328	14.9	229	340	16.3	349
Broome	39	6.1	132	65	9.1	213
Collie	472	63.4	1,968	485	65.0	2,075
Corrigin	77	10.5	300	77	10.5	309
Cunderdin	34	7.2	148	34	7.2	149
Dampier	—	—	54	—	—	438
Denmark	33	3.9	97	54	6.6	116
Derby	96	9.2	312	128	14.1	359
Dunsborough	30	3.4	35	49	6.1	77
Eaton	26	4.8	105	29	5.5	135
Eneabba	37	2.7	71	37	2.7	80
Esperance	84	10.2	180	142	15.6	243
Exmouth	85	11.4	589	86	11.6	596
Geraldton	117	11.3	262	123	12.4	333
Gnowangerup	91	9.7	288	94	9.8	277
Halls Creek	41	3.8	112	43	4.0	115
Harvey	200	20.1	567	200	20.2	597
Kalbarri	54	4.3	34	54	4.3	55
Karratha	581	58.9	2,273	581	58.9	2,304
Katanning	326	38.5	1,148	329	38.8	1,176
Kellerberrin	115	11.1	219	115	11.1	226
Kojonup	120	12.0	261	129	13.2	273
Kununurra	160	17.2	593	163	17.4	679

## COUNTRY SEWERAGE SYSTEMS: AREA SEWERED, SEWERS AND NUMBER OF SERVICES

— *Continued*

Town	At 30 June 1984			At 30 June 1985		
	Area sewered (hectares)	Length of sewers (kilometres)	Services (number)	Area sewered (hectares)	Length of sewers (kilometres)	Services (number)
Lake Argyle	—	1.1	16	—	1.1	16
Laverton	47	5.5	222	47	5.5	223
Leeman	12	1.9	66	12	1.9	70
Mandurah	711	85.4	2,058	765	93.7	2,378
Manjimup	160	15.6	318	175	17.9	408
Margaret River	18	1.7	11	18	1.8	34
Meckering	25	2.5	38	25	2.5	39
Merredin	221	26.4	809	221	26.4	857
Mount Barker	72	9.5	142	72	9.5	143
Mukinbudin	45	3.2	135	45	3.2	140
Narembeen	57	4.8	153	57	4.8	158
Narrogin	344	41.4	1,486	344	41.4	1,516
Northam	471	64.5	2,235	473	64.9	2,246
Paraburdoo	—	—	116	—	—	644
Pingelly	96	10.5	189	96	10.5	192
Pinjarra	183	18.5	631	188	18.9	653
Port Hedland	85	13.0	534	85	13.0	537
South Hedland	476	44.7	2,045	476	44.7	2,080
Roebourne	55	6.1	179	55	6.1	197
Three Springs	59	4.9	216	59	4.9	217
Tom Price	—	—	279	—	—	1,127
Wagin	113	15.1	456	113	15.1	464
Wickham	124	20.8	631	124	20.8	651
Wongan Hills	87	10.0	264	87	10.0	270
Wundowie	41	7.1	246	41	7.1	246
Wyalkatchem	50	5.6	178	50	5.6	183
Wyndham	123	8.8	238	123	8.8	243
Total	8,485	984.0	31,234	8,886	1,035.6	34,852

# Chapter 14

## AGRICULTURE, FORESTRY AND FISHING

### INTEGRATED AGRICULTURAL STATISTICS

Information from all units operating within the agricultural sector was obtained at a special census conducted in 1974 and used to create an additional data base, using the methodology of the Australian Standard Industrial Classification (ASIC) and compatible definitions with those of the Integrated Economic Censuses for Establishments, Enterprises and Enterprise Groups.

The identification of economic units within the agricultural sector has allowed the production of more meaningful statistics of economic size and industry classification. It has also provided some insight into the activities of other sectors of the economy in the agricultural sector.

For those units within ASIC Subdivision 01: Agriculture, which operate land, industry classifications are determined annually by applying unit prices to each agricultural activity undertaken by individual units and by then assessing the predominant activity according to the estimated values derived. For units that do not operate land (e.g. beekeepers), industry classifications are determined by each operator's description of his activities.

For enterprise and establishment units which are predominantly engaged in activities covered by ASIC Subdivision 01: Agriculture, referred to respectively as agricultural enterprises and agricultural establishments, the procedure for determining industry classification is also used for size classification purposes. For each unit, an 'estimated value of operations' (which includes both agricultural and non-agricultural operations) is calculated.

The following tables show the number of establishments with agricultural activity classified according to industry and estimated value of operations and by industry and size of establishment.

NUMBER OF ESTABLISHMENTS WITH AGRICULTURAL ACTIVITY —  
INDUSTRY AND ESTIMATED VALUE OF AGRICULTURAL OPERATIONS: 1983-84

ASIC code	Industry of establishment Description	Estimated value of agricultural operations (\$'000)						
		Less than 3	3-9	10-19	20-29	30-39	40-49	50-59
0124	Poultry for meat	1	1	1	1	3	4	—
0125	Poultry for eggs	2	6	5	4	3	4	4
0134	Grapes	32	69	56	24	7	7	4
0135	Plantation fruit	—	2	5	11	7	12	13
0136	Orchard and other fruit	23	141	149	72	58	47	27
0143	Potatoes	—	2	5	9	15	18	10
0144	Vegetables (except potatoes)	10	104	101	75	58	38	25
0181	Cereal grains (incl. oilseeds n.e.c.)	9	47	40	21	34	54	51
0182	Sheep — cereal grains	2	43	76	99	118	144	203
0183	Meat cattle — cereal grains	—	2	4	4	4	3	1
0184	Sheep — meat cattle	15	70	123	117	98	72	48
0185	Sheep	65	283	265	197	174	163	144
0186	Meat cattle	96	627	472	202	114	75	53
0187	Milk cattle	9	14	19	18	19	37	56
0188	Pigs	6	39	36	19	18	14	6
0191	Sugar cane	—	—	—	—	—	—	—
0192	Peanuts	—	—	—	—	—	—	—
0193	Tobacco	—	—	—	—	—	—	—
0194	Cotton	—	—	—	—	—	—	—
0195	Nurseries	23	44	54	22	38	4	5
0196	Agriculture n.e.c.	29	167	125	55	41	20	16
	Total (ASIC code 01)	322	1,661	1,536	950	809	716	666
	Other industries	17	50	42	16	11	2	3
	Total, all industries	339	1,711	1,578	966	820	718	669

NUMBER OF ESTABLISHMENTS WITH AGRICULTURAL ACTIVITY —  
INDUSTRY AND ESTIMATED VALUE OF AGRICULTURAL OPERATIONS: 1983-84 — *continued*

ASIC code	Industry of establishment Description	Estimated value of agricultural operations (\$'000)					Total establishments
		60-74	75-99	100-149	150-199	200 and over	
0124	Poultry for meat	3	12	10	4	8	48
0125	Poultry for eggs	4	6	22	9	40	109
0134	Grapes	—	4	—	2	2	207
0135	Plantation fruit	19	21	12	2	2	106
0136	Orchard and other fruit	42	40	41	9	22	671
0143	Potatoes	24	38	26	26	17	190
0144	Vegetables (except potatoes)	30	37	55	11	38	582
0181	Cereal grains (incl. oilseeds n.e.c.)	75	149	411	437	2,000	3,328
0182	Sheep — cereal grains	373	637	1,161	744	1,250	4,850
0183	Meat cattle — cereal grains	2	4	10	6	5	45
0184	Sheep — meat cattle	60	72	67	22	47	811
0185	Sheep	178	196	224	105	128	2,122
0186	Meat cattle	48	53	44	26	75	1,885
0187	Milk cattle	97	145	139	48	29	630
0188	Pigs	20	18	26	11	29	242
0191	Sugar cane	—	—	—	1	—	1
0192	Peanuts	—	—	—	1	—	1
0193	Tobacco	—	—	—	—	—	—
0194	Cotton	—	—	—	—	—	—
0195	Nurseries	16	11	13	2	15	247
0196	Agriculture n.e.c.	19	12	13	7	5	509
Total (ASIC code 01)		1,010	1,455	2,274	1,473	3,712	16,584
Other industries		6	5	7	1	6	166
Total, all industries		1,016	1,460	2,281	1,474	3,718	16,750

NUMBER OF ESTABLISHMENTS WITH AGRICULTURAL ACTIVITY —  
INDUSTRY AND AREA OF ESTABLISHMENT: 1983-84

ASIC code	Industry of establishment Description	Area of establishment (hectares)						
		0-49	50-99	100-499	500-999	1,000-2,499	2,500-4,999	5,000-9,999
0124	Poultry for meat	47	1	—	—	—	—	—
0125	Poultry for eggs	92	9	6	1	1	—	—
0134	Grapes	176	12	17	2	—	—	—
0135	Plantation fruit	104	1	1	—	—	—	—
0136	Orchard and other fruit	497	70	100	3	1	—	—
0143	Potatoes	39	34	104	10	3	—	—
0144	Vegetables (except potatoes)	497	33	44	5	3	—	—
0181	Cereal grains (incl. oilseeds n.e.c.)	14	24	135	356	1,584	967	212
0182	Sheep — cereal grains	16	20	419	1,242	2,380	643	112
0183	Meat cattle — cereal grains	2	1	11	12	14	4	1
0184	Sheep — meat cattle	37	62	400	145	95	22	10
0185	Sheep	149	175	755	411	334	59	7
0186	Meat cattle	264	383	880	120	63	12	2
0187	Milk cattle	24	65	483	49	8	—	—
0188	Pigs	103	44	51	25	14	2	1
0191	Sugar cane	—	—	1	—	—	—	—
0192	Peanuts	—	—	1	—	—	—	—
0193	Tobacco	—	—	—	—	—	—	—
0194	Cotton	—	—	—	—	—	—	—
0195	Nurseries	233	4	7	1	2	—	—
0196	Agriculture n.e.c.	308	71	107	10	8	2	—
Total (ASIC code 01)		2,602	1,009	3,522	2,392	4,510	1,711	345
Other industries		76	27	36	7	8	2	—
Total, all industries		2,678	1,036	3,558	2,399	4,518	1,713	345

NUMBER OF ESTABLISHMENTS WITH AGRICULTURAL ACTIVITY —  
INDUSTRY AND AREA OF ESTABLISHMENT: 1983-84 — *continued*

ASIC code	Industry of establishment Description	Area of establishment (hectares)						Total establishments
		10,000- 24,999	25,000- 49,999	50,000- 99,999	100,000- 199,999	200,000- 499,999	500,000 and over	
0124	Poultry for meat	—	—	—	—	—	—	48
0125	Poultry for eggs	—	—	—	—	—	—	109
0134	Grapes	—	—	—	—	—	—	207
0135	Plantation fruit	—	—	—	—	—	—	106
0136	Orchard and other fruit	—	—	—	—	—	—	671
0143	Potatoes	—	—	—	—	—	—	190
0144	Vegetables (except potatoes)	—	—	—	—	—	—	582
0181	Cereal grains (incl. oilseeds n.e.c.)	27	6	1	1	1	—	3,328
0182	Sheep — cereal grains	12	—	2	4	—	—	4,850
0183	Meat cattle — cereal grains	—	—	—	—	—	—	45
0184	Sheep — meat cattle	2	—	2	13	22	1	811
0185	Sheep	5	13	52	93	68	1	2,122
0186	Meat cattle	2	4	13	32	106	4	1,885
0187	Milk cattle	1	—	—	—	—	—	630
0188	Pigs	1	—	—	1	—	—	242
0191	Sugar cane	—	—	—	—	—	—	1
0192	Peanuts	—	—	—	—	—	—	1
0193	Tobacco	—	—	—	—	—	—	—
0194	Cotton	—	—	—	—	—	—	—
0195	Nurseries	—	—	—	—	—	—	247
0196	Agriculture n.e.c.	1	—	—	1	1	—	509
	Total (ASIC code 01)	51	23	70	145	198	6	16,584
	Other industries	2	—	2	3	3	—	166
	Total, all industries	53	23	72	148	201	6	16,750

The following table shows estimates of turnover, expenditure, cash operating surplus, capital expenditure and indebtedness of agricultural enterprises for the years 1977-78 and 1980-81. The data are obtained from Agricultural Finance Surveys which are conducted by the Australian Bureau of Statistics. They contain economic statistics relating to agricultural industries which are comparable with those from the manufacturing, mining and retailing sectors of the economy. They differ from *value of agricultural commodities produced* data in the following ways:

- (a) Data relate only to enterprises whose predominant activity is agriculture, whereas *value of agricultural commodities produced* data relate to the value of the total recorded production of commodities in a given year regardless of the predominant activity of enterprise.
- (b) The information relates to transactions on a cash rather than an accrual basis for agricultural enterprises during specific financial years. It does not therefore relate to one specific crop, season, etc.

Separate sample estimates have been calculated for components and totals at all levels. Users should exercise care when using the data, as the sample estimation methods used may result in the aggregate of the component estimates not necessarily being the same as the separate estimates of the total. Since the standard errors are, in general, lower for totals than for individual components, the totals can be taken to be a more reliable estimate than the addition of the component items.

Sample estimates may differ from results which have been obtained from a comparable complete collection. A measure of the likely difference is given by the standard error of the estimates. There are about two chances in three that a sample estimate will differ by less than one standard error from the figures that would have been obtained from a comparable complete collection, and about nineteen chances in twenty that the differences will be less than two standard errors. For example, if a sample survey gives an estimate of \$4,000 million and the standard error of this estimate is 2 per cent i.e. \$80 million, then there would be two chances in three that a comparable complete collection would give a figure within the range of \$3,920 million to \$4,080 million, and nineteen chances in twenty that the figure would be within the range of \$3,840 million to \$4,160 million.

For a more detailed explanation of the methodology and terminology used the reader is referred to the bulletin *Agricultural Sector, Part IV, Financial Statistics 1980-81* (Catalogue No. 7507.0) published by the Australian Statistician, Canberra.

ESTIMATES OF TURNOVER, EXPENDITURE, CASH OPERATING SURPLUS, CAPITAL EXPENDITURE AND INDEBTEDNESS OF AGRICULTURAL ENTERPRISES

Item	1977-78		1980-81	
	\$ million	Standard error %.	\$ million	Standard error %.
Sales from crops	342.7	4	710.6	3
Sales from livestock	200.3	5	372.1	5
Sales from livestock products	280.8	3	407.9	4
Rent and leasing revenue (other than land)	(a)		(a) 7.4	14
Other miscellaneous revenue	30.0	12	39.0	14
<i>Turnover</i>	854.7	2	1,536.9	2
<i>Less</i> Marketing expenses	85.9	3	201.0	3
Purchases of livestock	53.5	10	81.9	16
Payments for seed	8.4	29	8.0	9
Payments for fodder	20.1	7	35.1	9
Payments for fertiliser	82.4	3	149.1	4
Payments for crop and pasture chemicals	7.2	10	16.9	9
Payments for veterinary supplies and services	9.7	5	15.7	6
Payments for electricity	5.0	7	6.8	8
Payments for fuel	39.3	3	79.1	3
Water and drainage charges	1.4	15	3.8	11
Payments to contractors	36.8	5	55.3	7
Repairs and maintenance	61.9	4	94.6	4
Rent and leasing expenses (other than land)	(a)		(a) 29.0	12
Other selected expenses	15.2	8	24.5	10
<i>Purchases and selected expenses</i>	426.9	3	800.8	3
<i>Value added (b)</i>	400.0	5	727.7	5
<i>Less</i> Rates and taxes	12.7	4	19.1	4
Insurance payments	11.6	4	17.0	4
Other expenses	22.5	5	32.4	5
Rent and leasing expenses (other than land)	(a) 5.2	25	(a)	
Rent and leasing revenue (other than land)	(a) 2.7	14	(a)	
<i>Adjusted value added (b)</i>	350.6	5	659.3	5
<i>Less</i> Wages, salaries and supplements	57.0	7	89.6	7
<i>Gross operating surplus (b)</i>	293.6	6	569.7	6
<i>Less</i> Interest, land rent paid	46.6	7	88.1	7
<i>Plus</i> Interest, land rent received	12.8	16	24.1	19
<i>Cash operating surplus (c)</i>	287.7	6	514.0	5
<i>Total net capital expenditure</i>	133.7	7	200.2	7
Loans by banks, pastoral and insurance companies	351.7	8	580.3	7
Loans under hire purchase and other instalment credit	67.9	11	91.4	14
Other amounts owing	132.9	15	198.9	19
<i>Gross indebtedness</i>	552.4	7	870.6	8

(a) 'Rent and leasing' was not included in *Turnover* or *Purchases and selected expenses* prior to 1980-81. (b) Includes estimate for increase in value of livestock. (c) Excludes estimate for increase in value of 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.

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.

Gross values of the principal items are shown in the next table for each of the years 1978-79 to 1983-84.

Wheat was the most important item in 1983-84 with a gross value of \$702.3 million, followed by wool (including fellmongered and exported on skins) with \$407.5 million.

AGRICULTURAL COMMODITIES PRODUCED  
GROSS VALUE OF PRINCIPAL ITEMS  
(\$'000)

Commodity group and commodity	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
<b>Crops —</b>						
Barley	69,141	74,178	71,164	74,316	103,830	112,299
Oats	30,319	28,817	46,980	55,378	67,128	48,371
Wheat	546,827	571,158	508,734	762,706	982,505	702,330
Hay (all kinds)	18,085	18,915	24,806	29,415	37,385	27,247
<b>Pasture seed —</b>						
Barrel medic	371	141	58	223	149	120
Subterranean clover	2,202	3,510	3,493	3,474	4,327	4,469
Nursery products (a)	10,475	10,209	12,048	12,138	r 15,345	23,516
<b>Vegetables —</b>						
Cauliflowers	4,060	3,393	4,910	7,150	7,745	7,856
Lettuce	2,054	2,128	2,022	2,799	3,758	4,507
Onions	2,324	2,716	3,265	7,211	2,952	4,232
Potatoes	12,875	14,839	16,616	16,773	18,242	20,427
Tomatoes	3,629	4,269	3,331	3,504	4,206	4,753
<b>Fruit —</b>						
Apples	16,464	17,968	18,335	17,152	20,438	16,910
Bananas	5,049	2,101	4,380	5,571	6,327	6,551
Oranges	1,612	1,909	2,302	2,073	2,352	2,634
Pears	1,729	2,085	2,101	2,607	2,190	2,882
Plums and prunes	1,958	2,092	2,089	2,710	2,898	2,793
Vine fruits	3,362	3,437	3,046	3,524	4,855	4,374
<b>Livestock slaughterings —</b>						
Cattle and calves	101,398	149,165	177,382	125,145	138,131	130,482
Sheep and lambs (b)	49,888	71,812	86,466	60,402	54,815	44,967
Pigs	21,500	27,205	35,944	39,279	39,938	36,128
Poultry	22,536	26,274	30,244	30,395	37,332	37,582
<b>Livestock products —</b>						
Wool (shorn and dead)	285,852	347,466	400,235	377,228	391,659	403,094
Whole milk (c)	36,549	41,865	44,136	46,606	51,710	52,493
Eggs	16,310	17,283	20,409	20,567	23,050	23,963
Honey	1,418	1,837	1,474	1,746	2,244	1,824

(a) Value of seedlings, cut flowers, bulbs, trees, etc. produced. (b) Less the value of fellmongered wool and wool exported on skins. (c) Includes Commonwealth Government subsidy.

SUMMARY OF AUSTRALIAN STATISTICS

The following table contains a selection of the principal statistics of agricultural production in each of the Australian States for 1983-84.

PRINCIPAL STATISTICS OF AGRICULTURAL PRODUCTION  
AUSTRALIA: 1983-84

Particulars	Unit	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	Australia (a)
<b>Agricultural establishments —</b>								
Area	'000 ha	63,957	14,255	158,110	62,063	114,287	2,162	486,559
<b>Principal crops —</b>								
Wheat for grain —								
Area	'000 ha	3,999	1,614	1,006	1,564	4,746	1	12,931
Production	'000 tonnes	8,961	3,971	1,922	2,590	4,316	3	21,764
Barley for grain —								
Area	'000 ha	554	403	261	1,104	771	15	3,109
Production	'000 tonnes	941	758	542	1,817	797	34	4,890
Oats for grain —								
Area	'000 ha	813	324	19	153	448	14	1,772
Production	'000 tonnes	1,120	495	19	180	456	25	2,296
Hay all types —								
Area	'000 ha	428.2	717.6	42.1	258.7	238.2	66.2	1,758.3
Onions —								
Area	hectare	794	474	705	1,002	349	475	3,807
Production	tonne	13,654	11,210	18,607	34,320	15,043	22,996	115,925
Potatoes —								
Area	hectare	6,807	13,497	6,254	4,154	2,008	5,203	37,945
Production	tonne	129,564	362,379	123,983	120,748	69,566	213,090	1,019,840
Other vegetables —								
Area	hectare	14,778	12,049	23,492	2,873	4,252	10,478	68,136
Apples —								
Number of trees	'000 trees	1,411	1,387	919	490	692	1,163	6,066
Production	'000 tonnes	63.8	64.4	24.7	19.1	38.2	56.8	267.0

(a) For footnotes, see end of table.

PRINCIPAL STATISTICS OF AGRICULTURAL PRODUCTION  
AUSTRALIA: 1983-84 — *continued*

Particulars	Unit	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	Australia (a)
Pears —								
Number of trees	'000 trees	141	1,105	91	106	108	34	1,584
Production	'000 tonnes	7.6	97.2	2.8	6.7	6.2	1.6	122.1
Oranges —								
Number of trees	'000 trees	3,285	901	230	1,778	203	—	6,397
Production	'000 tonnes	168.7	47.6	20.8	147.0	7.8	—	391.8
Vineyards —								
Area	hectare	12,849	20,142	1,549	27,886	2,101	(b)	64,589
Grapes (all purposes)	tonnes	171,311	342,133	6,569	311,111	12,052	(b)	843,340
Livestock numbers, 31 March								
1984 —								
Sheep and lambs	'000	50,997	24,632	13,033	16,368	29,518	4,583	139,242
Cattle	'000	5,036	3,487	9,154	813	1,730	542	22,161
Pigs	'000	799	404	556	417	300	48	2,527
Livestock slaughtered for human consumption —								
Sheep	'000	1,880	1,831	428	1,091	2,485	419	8,142
Lambs	'000	6,231	6,013	882	1,754	1,040	757	16,914
Cattle	'000	1,391	1,189	2,178	396	496	154	5,999
Calves	'000	188	767	207	51	21	46	1,280
Pigs	'000	1,106	1,236	921	550	479	80	4,400
Wool production	mil. kg	248.9	142.1	65.6	108.6	144.7	21.9	732.3
Whole milk production —								
All purposes	mil. litres	940	3,400	629	382	232	340	5,923
Gross value of agricultural production	\$m	4,594.8	3,436.6	3,111.8	1,785.9	1,940.8	351.7	15,317.2

(a) Includes Northern Territory and Australian Capital Territory. (b) Not available separately. Included in Australian total.

The gross value of agricultural commodities produced for Australia in 1983-84 amounted to \$15,317.2 million, of which Western Australia contributed \$1,940.8 million or 12.7 per cent of the total. The major contributor was New South Wales with \$4,594.8 million or 30.0 per cent.

The total area of agricultural establishments in Australia was 486,559,000 hectares. Agricultural establishments in Queensland occupied the largest area (158,110,000 hectares), followed by Western Australia (114,287,000 hectares). Western Australia, with 4,746,000 hectares, had the largest area under wheat for grain in 1983-84.

### SEASONAL CALENDAR

The following calendar is intended to show the main periods when principal agricultural and pastoral activities are carried out in Western Australia. Operations are generally confined to the periods shown but are subject to variation according to such factors as geographical location within the State, the variety of seed sown (or trees and vines planted) and exceptional seasonal conditions.

### SEASONAL CALENDAR

Item	Period	
	Sowing or planting	Harvesting
Pastures —		
Clovers	April to June	December to April
Medics	April to June	December to April
Grain —		
Wheat	May to mid-July	November to January
Oats	May and June	November and December
Barley	May to July	November and December
Rye	May and June	November and December
Crop Lupins	April to June	November to January
Hay —		
Wheaten	May and June	October and November
Oaten	April to June	October and November
Linseed	May to July	December and January

SEASONAL CALENDAR — *continued*

Item	Period	
	Sowing or planting	Harvesting
Vegetables —		
Beans, Runner —		
Carnarvon area	March to September	May to November
Perth Division	August to March	November to June
Green Peas —		
For processing	May to September	October to December
Fresh	May to September	August to December
Potatoes —		
Early planting —		
Perth and South-West	June and July	October to December
Mid-season planting —		
Perth, South-West and Lower Great Southern	July to November	November to March
Late planting —		
South-West and Lower Great Southern	November to February	February to June
Onions	March to November	September to April
Tomatoes —		
Carnarvon and Geraldton areas	February to August	May to December
Other areas	June to February	October to June
Fruit —		
Apples	June to August	February to June
Apricots	June and July	December and January
Bananas	September to March	July to June
Lemons	July and August	July to June
Mandarins	July and August	May to November
Nectarines	June and July	January and February
Olives	July and August	March and April
Oranges, Navel	July and August	May to September
Oranges, Valencia	July and August	August to February
Peaches	June and July	December to March
Pears	June and July	February and March
Plums	June and July	December to March
Grapes —		
For table use	July to September	January to May
For wine making	July to September	February to April
For drying	July to September	February
Shearing and lambing —		
Shearing —		
Pastoral areas	March to August	
Agricultural areas	February to November	
Lambing —		
Pastoral areas	April to July	
Agricultural areas	April to September	

LAND UTILISATION ON AGRICULTURAL ESTABLISHMENTS

In 1983-84 there were 17,200 agricultural establishments in the State, comprising 114 million hectares of land or about 45 per cent of the total area of Western Australia.

In recent years, the Australian Bureau of Statistics has been gradually excluding from the statistics those establishments which make only a small contribution to overall agricultural production.

Since 1976-77, establishments with agricultural activity have been included in the statistics if the operating enterprise had, or was expected to have an estimated value of agricultural operations of \$1,500 or more. In 1981-82, this figure was raised to \$2,500.

While these changes have resulted in some changes in the counts of numbers of establishments, the effect on the statistics of production of major commodities is small. Statistics of minor commodities normally associated with small scale operations may be affected to a greater extent.

Of the total area of agricultural establishments, 6.5 million hectares were used for crops and 7.5 million hectares were under sown pasture (including lucerne) in 1983-84. The balance consists mainly of uncleared land (most of which is pastoral leases held by sheep and cattle stations), but it also includes cleared land which was used for grazing or which was resting during the season, fallowed areas and newly cleared land.

Land development in the post-war period was stimulated by generally favourable prices for agricultural and pastoral commodities. Special concessions to primary producers under the provisions of the taxation legislation also contributed to the increased capital investment in primary

industry. This development, undertaken principally by established farmers and by the War Service Land Settlement Board, was aided by the introduction of modern mechanical methods of land clearing. As a result, the area of land used for crops increased from 1.4 million hectares in 1946-47 to 6.5 million hectares in 1983-84. This is the largest area of crops recorded in Western Australia. The area under sown pastures (including lucerne) expanded each year, from 0.8 million hectares in 1946-47 to 7.0 million hectares in 1970-71. Since then, the area under pasture has fluctuated, with the highest ever area of 7.8 million hectares being recorded in 1974-75. The 1983-84 area stands at 7.4 million hectares.

Details of land utilisation in the six years to 1983-84 are given in the next table together with the number of active agricultural establishments. When examining the following tables the effect of the change in definition explained above should be borne in mind.

#### LAND UTILISATION

Season	Active 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)	Balance of establishments	
1978-79	17,747	4,993	7,523	10	103,721	116,247
1979-80	(a) 18,395	5,280	7,133	9	102,502	114,923
1980-81	(a) 18,165	5,546	6,933	7	103,337	115,823
1981-82	(a) 17,552	5,963	7,919	5	99,627	113,514
1982-83	(a) 16,918	6,379	7,184	6	98,443	112,012
1983-84	(a) 17,200	6,526	7,448	6	100,307	114,287

(a) Includes beekeepers without land.

The following table shows a classification of agricultural establishments according to size of establishment for 1983-84.

#### CLASSIFICATION OF AGRICULTURAL ESTABLISHMENTS ACCORDING TO SIZE OF ESTABLISHMENT: SEASON 1983-84

Area of establishments hectares	In agricultural areas		In pastoral areas		Whole State	
	Number of establishments	Area	Number of establishments	Area	Number of establishments	Area
0 (a)	—	—	—	—	143	—
1 — 4	4	767	26	0.1	793	2.0
5 — 9	9	426	71	0.5	497	3.4
10 — 19	19	396	49	0.6	445	6.0
20 — 29	29	284	19	0.4	303	7.2
30 — 39	39	219	5	0.2	224	7.6
40 — 49	49	423	2	0.1	425	18.2
50 — 74	74	605	2	0.1	607	37.5
75 — 99	99	475	4	0.3	479	41.1
100 — 124	124	433	1	0.1	434	48.8
125 — 149	149	378	—	—	378	51.7
150 — 199	199	561	3	0.5	564	97.6
200 — 249	249	511	1	0.2	512	113.6
250 — 299	299	394	8	2.1	402	109.9
300 — 399	399	683	4	1.4	687	236.7
400 — 499	499	682	2	0.9	684	302.8
500 — 749	749	1,194	3	1.7	1,197	744.6
750 — 999	999	1,242	5	4.2	1,247	1,080.8
1,000 — 1,999	1,999	3,652	7	9.1	3,659	5,249.6
2,000 — 2,999	2,999	1,591	3	6.5	1,594	3,872.2
3,000 — 3,999	3,999	749	1	3.5	750	2,574.3
4,000 — 4,999	4,999	317	—	—	317	1,399.7
5,000 — 9,999	9,999	343	2	14.9	345	2,239.1
10,000 — 19,999	19,999	43	7	105.3	50	657.2
20,000 — 29,999	29,999	5	5	133.4	10	260.3
30,000 — 49,999	49,999	6	10	402.2	16	648.9
50,000 and over	50,000 and over	29	409	89,237.3	438	94,476.7
Total	16,551	24,361.8	649	89,925.5	17,200	114,287.3

(a) Comprises beekeepers without land.

For the State as a whole, just over half of the establishments are less than 750 hectares. These account for only 1.6 per cent of the total area of all agricultural establishments. Over 10 per cent of establishments are under 20 hectares in size, and make up only 0.1 per cent of the State's agricultural establishments. In contrast, the 438 establishments with an area of 50,000 hectares or more account for only 2.5 per cent of the number of establishments, but 83 per cent of the total area of agricultural establishments in Western Australia.

The agricultural areas comprise the Perth, South-West, Upper Great Southern, Lower Great Southern and Midlands Statistical Divisions and the Sub-divisions of Dundas and Greenough. The pastoral areas comprise the Kimberley and Pilbara Statistical Divisions and the Sub-divisions of Lefroy, Gascoyne and Carnegie.

In the agricultural areas there were 16,551 establishments for a total area of 24,361,800 hectares of land. In the pastoral areas there were 649 establishments comprising an area of 89,925,500 hectares. Further details of pastoral areas appear later in this Chapter.

In the next table details of rural land utilisation according to statistical division are given for 1983-84. The statistical divisions (and their component local government areas) were revised with effect from 1 January 1976. Maps showing the boundaries of the statistical divisions appear inside the back cover.

LAND UTILISATION IN EACH STATISTICAL DIVISION: 1983-84

Statistical division	Active agricultural establishments (number)	Land use during the season ('000 hectares)				Total area of establishments ('000 hectares)
		Used for crops (a)	Under sown pastures	Lucerne (all purposes)	Other	
Perth	2,014	8.7	59.0	0.2	49.3	117.2
South-West	3,375	52.3	625.5	2.6	232.3	912.7
Lower Great Southern	2,918	692.4	1,803.7	0.9	420.3	2,917.3
Upper Great Southern	2,191	1,184.4	1,591.7	0.7	693.1	3,469.9
Midlands	3,863	2,899.0	1,818.9	1.1	2,812.4	7,531.4
South-Eastern	895	452.9	839.0	0.9	17,342.8	18,635.6
Central	1,735	1,233.8	708.4	0.1	38,771.5	40,713.8
Pilbara	74	—	—	—	15,212.6	15,212.6
Kimberley	135	3.0	1.8	—	24,772.1	24,776.9
Total	17,200	6,526.3	7,447.9	6.5	100,306.6	114,287.3

(a) Excludes areas of sown pastures and of lucerne cut for hay or harvested for seed.

## AGRICULTURE

### Wheat

#### WHEAT FOR GRAIN — AREA AND PRODUCTION

Season	Area	Production		
		Total	Average yield per hectare	Gross value
	'000 hectares	'000 tonnes	tonnes	'000
1900-01	30	21	0.70	310
1910-11	236	161	0.68	2,162
1920-21	516	333	0.65	11,023
1930-31	1,601	1,456	0.91	12,201
1940-41	1,062	573	0.54	8,648
1950-51	1,289	1,358	1.05	65,328
1960-61	1,627	1,739	1.07	92,290
1970-71	2,361	2,957	1.25	153,227
1978-79	3,706	4,400	1.19	546,827
1979-80	4,121	3,739	0.91	571,158
1980-81	4,333	3,315	0.77	508,734
1981-82	4,593	4,803	1.05	762,706
1982-83	4,865	5,534	1.14	982,505
1983-84	4,746	4,189	0.88	702,330

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 1983-84, 4.75 million hectares were sown. This was slightly 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.

**Size Classification of Farms with Wheat.** In 1965-66, of the 22,853 agricultural establishments in the State, wheat for grain was grown on 9,267 or 40.6 per cent of the total. For 1968-69, the percentage decreased slightly to 40.1 per cent. In 1974-75 wheat for grain was grown on 7,899 or 38.5 per cent of the 20,500 agricultural establishments in the State.

Of the 17,200 agricultural establishments in the State in 1983-84, wheat for grain was grown on 7,381 or 42.9 per cent of the total. Establishments growing between 1 and 399 hectares of wheat for grain accounted for 48 per cent of the establishments but only 13 per cent of the total area, whereas establishments growing 400 or more hectares accounted for 52 per cent of establishments but 87 per cent of the total area sown to wheat for grain.

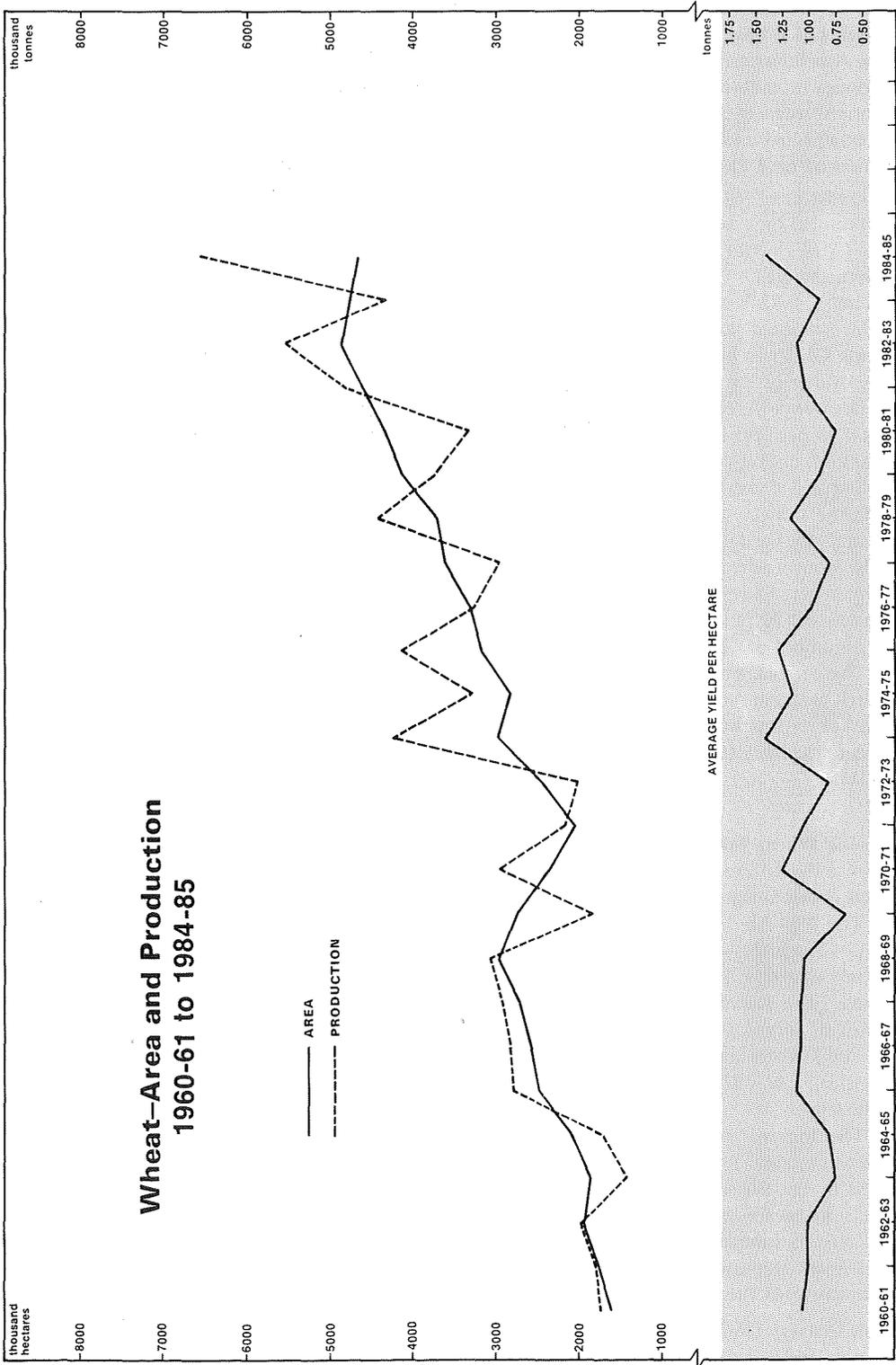
ESTABLISHMENTS GROWING WHEAT FOR GRAIN  
CLASSIFIED ACCORDING TO AREA SOWN  
SEASON 1983-84

Area of wheat for grain hectares	Number of establishments	Total area sown to wheat for grain '000 hectares
1 — 9	123	0.6
10 — 19	118	1.6
20 — 29	122	2.7
30 — 39	115	3.8
40 — 49	143	6.0
50 — 74	223	13.7
75 — 99	229	19.3
100 — 149	491	58.8
150 — 199	404	68.1
200 — 249	491	107.3
250 — 299	335	90.5
300 — 399	730	249.1
400 — 499	658	287.4
500 — 999	1,672	1,186.2
1,000 — 1,499	813	970.7
1,500 and over	714	1,680.1
Total	7,381	4,746.2

**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. 21 — 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.

Under the 1984 Act, the Commonwealth Government continues to underwrite 95 per cent of wheat returns on a net basis through a Guaranteed Minimum Price (GMP) for Australian Standard White (ASW) wheat, although the method of calculating and the timing of payment of the GMP has been changed. The ASW GMP is to be set at 95 per cent of the average of the estimated return per tonne for ASW wheat from the subject season and the lowest two of the previous three seasons, less the estimated pool costs per tonne for the subject season. There is provision in the Act for separate GMPs to be established for specified categories other than ASW, based on the expected market value of the wheat in those categories relative to ASW.

Growers will receive a split first advance payment. Upon delivery of his wheat, a grower will be paid 90 per cent of the estimated GMP for the relevant category less contributions to research (wheat tax), dockages for non-preferred varieties and for defects (if any), and allowances for storage, handling and transportation charges. When the final GMP has been determined (before 1 March during the subject season), the grower will receive the final GMP, increased or decreased by an allowance for the quality of his wheat (in addition to the deductions made at the time of delivery), less the interim advance payment he has received. Initial allowances may be adjusted by the Board at a later date to reflect actual costs and returns. If the net return per tonne exceeds the GMP, the excess will be returned to growers by way of a final payment, which may be made by instalments over a number of years.

These arrangements provide the industry with support from the Government that is designed to help it overcome any short-run down-turn 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 GMP.

**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 Tasmanian freight levy now applies to all domestic wheat sales and is used to meet the cost of shipping wheat from the mainland to Tasmania each season.

The 1983-84 season price for Australian Standard White wheat for human consumption sold domestically, was \$219.41. This amount includes a \$4.57 per tonne component as the Tasmanian freight levy.

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.

**Wheat Delivery Quotas Plan.** The Australian Wheat Grower's Federation put forward proposals, in March 1969, for the allotment of quotas on deliveries of wheat to the Australian Wheat Board. The

Federation's proposals were mainly designed to bring marketable supplies of wheat more into line with available outlets, following the record Australian and State harvests in 1968-69. Seasons from 1975-76 to 1980-81 were declared non-quota years and the Wheat Delivery Quotas Act was repealed in 1981.

Further details of the State's wheat quotas and of the method of allocation are given on pages 346-7 of the *Western Australian Year Book*, No. 17 — 1979.

### Exports of Wheat

#### EXPORTS OF WHEAT AND FLOUR

Year	Wheat	Flour (a)	Estimated
			total wheat equivalent
	tonnes	tonnes	tonnes
1929-30	679,116	62,659	767,466
1939-40	417,226	83,159	534,344
1949-50	585,417	105,065	733,558
1959-60	999,173	79,697	1,111,546
1969-70	1,814,774	31,173	1,858,727
1978-79 (b)	2,208,985	6,146	2,217,651
1979-80 (b)	4,205,774	4,342	4,211,896
1980-81 (b)	2,634,933	4,948	2,641,910
1981-82 (b)	3,826,760	1,578	3,828,985
1982-83 (b)	5,034,153	1,032	5,035,608
1983-84 (b)	3,637,624	3,118	3,642,020

(a) Ships' stores are excluded from figures for 1959-60 and subsequent years. (b) Excludes interstate details.

Most of Western Australia's wheat production is exported as grain and flour and in the above table the fluctuations which have occurred in exports since 1929 are shown, together with figures giving the estimated total wheat equivalent. Before the early 1970s the United Kingdom had been a most consistent purchaser of the State's wheat but, since 1973-74 no significant exports to the United Kingdom have been recorded. In recent years, Japan and China have generally been the major customers, although Egypt accounted for the greatest volume of purchases in 1982-83. Principal buyers in 1983-84 were, in order of importance; Japan, Egypt, China, Iran, Indonesia and Iraq. In the same year the principal customer for flour was Mauritius. Further details of exports appear in Chapter 21.

Wheat breeding has been a major activity of the Department of Agriculture for many years and in recent years a stepped-up programme of breeding and testing has resulted in more new varieties being released. In 1982, five new wheats, Jacup, Canna, Bodallin, Eradu and Wialki were released for special areas and uses. Wialki is a hard grain suited to the Australian Hard (W.A.) grade, while the others are suited to the Australian Standard White (W.A.) grade. Bodallin is restricted at present to a specific area of the central eastern wheatbelt subject to review of its quality application. All are higher yielding than established varieties in the areas for which they have been released. Another new hard wheat, Gutha, was registered in 1982 and released in 1983 to northern hard wheat areas.

### 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. The area sown to oats for grain increased from 78,000 hectares in 1920 to a peak of 538,000 in 1960. The fluctuations which have occurred in the area sown to oats for grain in recent years are shown in the table below.

Locally bred varieties of oats feature prominently in the industry. West is still the most widely sown variety followed by Swan and to a lesser extent Moore and Irwin.

Usually 50 to 75 per cent of oats produced is retained on farms for stock feed and a new high yielding oat, Lort, was released in 1983 for producing on-farm feed grain in high and medium rainfall areas.

In addition to their importance as local stock feed, oats are exported in substantial quantities. In 1983-84, 121,172 tonnes of oats were exported overseas, principally to Japan (73,175 tonnes) and the Netherlands (36,750 tonnes).

#### OATS FOR GRAIN — AREA AND PRODUCTION

Season	Area	Production		
		Total	Average yield per hectare	Gross value
		'000 tonnes	tonnes	\$'000
1978-79	427	491	1.15	30,319
1979-80	370	399	1.08	28,817
1980-81	382	384	1.00	46,980
1981-82	432	442	1.02	55,378
1982-83	461	534	1.16	67,128
1983-84	448	456	1.02	48,371

#### 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. With the introduction of wheat delivery quotas, and because barley was a suitable alternative crop, the area of barley sown for grain rose to a record 911,000 hectares in 1971-72 but the relaxation of wheat quotas in the following years caused a contraction in the area sown to barley.

Both 'two-row' and 'six-row' barley are grown and, while a large amount of the grain produced is retained on farms for stock feed, much of the crop is now exported. In 1983-84 the quantity exported overseas was 471,862 tonnes, the principal buyers being Singapore and Japan. For many years sales of 'two-row' barley were mainly to local maltsters. However, since 1968-69 exports of 'two-row' barley have become increasingly important. Most 'six-row' barley sold continues to be marketed overseas.

The varieties Clipper and Stirling are recommended for all areas for producing 'two-row' malting and feed grades of barley. Alternative acceptable varieties are Dampier for 'two-row' manufacturing and feed and the Beecher variety for 'six-row' feed. Dampier is lower yielding than Clipper in most areas and is not sought by overseas markets to the same extent as Clipper.

Forrest variety was registered in 1980 for release as a feed barley for farmers in south coastal areas. It is scald, net blotch and mildew resistant with markedly reduced head loss in comparison to Clipper.

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.

#### BARLEY FOR GRAIN — AREA AND PRODUCTION

Season	Two-row				Six-row			
	Area	Production			Area	Production		
		Total	Average yield per hectare	Gross value		Total	Average yield per hectare	Gross value
	'000 hectares	'000 tonnes	tonnes	\$'000	'000 hectares	'000 tonnes	tonnes	\$'000
1978-79	544	698	1.28	62,239	72	81	1.12	6,902
1979-80	467	583	1.25	69,013	56	49	0.87	5,166
1980-81	474	469	0.99	66,730	61	35	0.58	4,434
1981-82	508	508	1.00	66,191	71	69	0.97	8,126
1982-83	512	624	1.22	92,634	91	92	1.02	11,196
1983-84	667	710	1.06	100,589	104	88	0.84	11,711

## Lupins

The large-scale growing of lupins for processing has been undertaken in Western Australia from about 1971-72, mainly in the areas from Geraldton to Watheroo and from Bridgetown to Kojonup. In later years, with the development of new strains, lupins have spread into drier parts of the wheat belt. The industry is based largely on white-seeded, white-flowered varieties of the narrow-leaved lupin (*Lupinus angustifolius*). The area planted to lupins for grain expanded each year until almost 122,000 hectares were recorded in 1975-76 but severe drought conditions from 1976-77 to 1979-80 in the main growing areas restricted both the area sown and the yield of lupins. With the return of better seasonal conditions, the release of several new varieties and experimentation with lupins in rotation with cereal crops, the area planted to lupins increased significantly as shown in the following table.

LUPINS FOR GRAIN — AREA AND PRODUCTION

Season	Area	Production		
		Total	Average yield per hectare	Gross value
	'000 hectares	'000 tonnes	tonnes	\$'000
1978-79	39	24	0.61	3,868
1979-80	46	25	0.55	3,364
1980-81	55	48	0.88	8,269
1981-82	97	83	0.85	11,217
1982-83	197	180	0.91	26,653
1983-84	319	314	0.99	53,174

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.

## Other Grains and Oilseeds

There has always been interest in alternative cash crops, and following the introduction of the Wheat Delivery Quotas plan in 1969-70 (which remained operational until 1974-75), considerable interest was shown in rape seed production, as an alternative to wheat. The area sown to rape expanded rapidly to a peak of 42,000 hectares in 1972-73 but in that season the average yield dropped to 0.21 tonnes per hectare owing to the spread of blackleg disease. Consequently the area planted to rape fell dramatically in 1973-74 to 2,000 hectares and current plantings are insignificant.

Triticale, a wheat/rye cross, is gaining in popularity as a potential stockfeed for local use and its prospects have improved with the availability of adapted varieties. Triticale appears to have application for more sandy, erosion prone soils in higher rainfall areas. It was first reported in the 1978-79 Agricultural Census by one grower and in the 1983-84 Census some 16,506 hectares were reported by 225 growers.

The area sown to linseed is small although the yield and quality is sound. Tests carried out have indicated that Western Australian linseed compares favourably with the top North American grades.

Grain sorghum, 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 1983-84 being 335,000 tonnes from 108,000 hectares. The principal cereal hay crop is oats and 255,000 tonnes of oaten hay were cut in 1983-84 from 90,000 hectares. Wheat is the only other cereal crop which is used extensively for this purpose and in 1983-84 the production was 66,000 tonnes from 30,000 hectares. Barley, vetches, rye and lupins are also used for hay making but they are of minor importance only.

## HAY — AREA AND PRODUCTION

Season	Pasture (a)		Oaten		Wheaten		Other (b)		Total	
	Area	Production								
	'000 hectares	'000 tonnes								
1978-79	79	251	81	270	21	57	3	7	184	586
1979-80	94	303	88	270	23	56	3	7	208	636
1980-81	108	345	98	288	29	58	5	12	240	703
1981-82	107	319	107	297	33	79	8	16	255	711
1982-83	102	309	108	341	34	85	9	18	249	748
1983-84	108	335	90	255	30	66	10	19	238	676

(a) Includes lucerne. (b) Mainly barley, vetch, rye, lupins and rape hay.

### Pastures

Of the 7.4 million hectares of improved pastures in the south-west region some 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.

The use of legumes and fertilisers quickly raises the nutritional status of the soil. Within 2-4 years other species, particularly grasses and herbs, volunteer in the pasture. Appropriate management regarding grazing, fertiliser application and cropping is necessary to maintain a satisfactory balance between the species. Excessive cropping of pasture paddocks, poor grazing management — usually undergrazing, or a series of successive drought years can result in the legume being almost eliminated in low rainfall areas. Reseeding of the legume may then be required.

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.

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.

Suction harvesting machines have been developed to harvest most of the important small-seeded legume species. The large, open and gently undulating paddocks generally used are well suited to the operation of the modern harvesting machines. Very little rain falls during the summer months which is ideal for harvesting the seed.

Seed certification schemes are operated by the Department of Agriculture for the main species of pasture seed. These schemes ensure that buyers are in a position to obtain good quality seed, of the cultivar they require, free from undesirable weed seeds. Certification schemes have assisted greatly in marketing and in allowing the development of an export trade.

## PASTURE SEED HARVESTED

Season	Principal pasture seed						Total pasture seed (a)
	Subterranean clover		Lupins		Barrel medic		Area harvested
	Area harvested	Pro- duction	Area harvested	Pro- duction	Area harvested	Pro- duction	
	'000 hectares	tonnes	'000 hectares	tonnes	'000 hectares	tonnes	'000 hectares
1978-79	14	2,936	1	122	2	246	18
1979-80	25	4,619	2	232	1	82	28
1980-81	24	4,260	2	519	1	58	29
1981-82	21	2,959	3	755	1	104	26
1982-83	21	3,408	1	280	1	84	24
1983-84	19	3,075	4	763	1	70	26

(a) Includes lucerne harvested for seed.

## Crops for Green Feed

Large areas of oats are grown for use as green feed for stock. Among other crops which are cultivated for this purpose, but to a far lesser extent, are lupins, barley, wheat, field peas, rye and forage sorghum.

CROPS FOR GREEN FEED — AREA GRAZED OR CUT  
('000 hectares)

Season	Oats	Lupins	Barley	Wheat	Field peas	Forage sorghum	Rye	Other (a)	Total
1978-79	52	5	8	2	2	1	1	1	72
1979-80	55	5	11	5	3	1	1	1	80
1980-81	55	5	12	9	2	1	1	2	86
1981-82	58	4	12	4	2	2	—	3	84
1982-83	48	4	10	4	1	1	—	1	71
1983-84	38	3	13	5	1	2	1	5	68

(a) Mainly vetches, millet, grain sorghum and maize.

## 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.

The average yield of potatoes per hectare in Western Australia is consistently greater than that for Australia as a whole, and in 1983-84 comparative yields were 34.64 tonnes and 26.88 tonnes per hectare. This is due mainly to the favourable climatic conditions in Western Australia and the use of sprinkler irrigation. Delaware, the principal variety grown in the State, gives high yields under a wide range of growing conditions. Occasionally there is an exportable surplus, which is marketed overseas or in other Australian States. The principal overseas markets are the Republic of Singapore, Hong Kong and Mauritius.

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.

## POTATOES — AREA AND PRODUCTION

Season	Area	Production		Gross value
		Total	Average yield per hectare	
	hectares	tonnes	tonnes	\$'000
1978-79	2,039	62,572	30.69	12,875
1979-80	2,039	66,184	32.46	14,839
1980-81	1,920	64,308	33.49	16,616
1981-82	1,995	67,307	33.74	16,773
1982-83	2,029	69,281	34.15	18,242
1983-84	2,008	69,566	34.64	20,427

**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 the last decade the area of onions planted has been steadily increasing. The area planted in 1983-84 was a record 349 hectares.

Onions are imported annually into Western Australia during the winter but a surplus is produced locally during summer months and is exported, in the main, to Singapore and Hong Kong.

## ONIONS — AREA AND PRODUCTION

Season	Area	Production		Gross value
		Total	Average yield per hectare	
	hectares	tonnes	tonnes	\$'000
1978-79	189	8,035	42.51	2,324
1979-80	220	9,404	42.65	2,716
1980-81	232	11,680	50.34	3,265
1981-82	292	15,094	51.72	7,211
1982-83	329	13,978	42.49	2,952
1983-84	349	15,043	43.05	4,232

**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 southern 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 Shire 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.

## TOMATOES — AREA AND PRODUCTION

Season	Area	Production		Gross value
		Total	Average yield per hectare	
	hectares	tonnes	tonnes	\$'000
1978-79	231	7,737	33.49	3,629
1979-80	232	8,390	36.09	4,269
1980-81	244	7,733	31.70	3,331
1981-82	238	6,329	26.54	3,504
1982-83	244	7,525	30.84	4,206
1983-84	279	8,771	31.44	4,753

**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 abundant supply of water

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.

#### SELECTED OTHER VEGETABLES — AREA, PRODUCTION AND GROSS VALUE

Particulars	Unit	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Beans, French and runner —							
Area	hectare	253	264	282	208	207	227
Production	tonne	2,152	2,437	2,773	1,850	1,202	1,646
Gross value	\$'000	1,349	1,653	2,056	1,625	1,306	824
Cabbages —							
Area	hectare	175	146	150	150	144	176
Production	tonne	7,671	6,519	7,685	7,878	6,699	7,510
Gross value	\$'000	1,226	964	1,015	961	1,183	1,105
Carrots —							
Area	hectare	280	292	313	415	426	553
Production	tonne	10,816	11,405	13,016	17,931	16,360	20,758
Gross value	\$'000	2,271	2,167	2,084	4,124	4,514	6,354
Cauliflowers —							
Area	hectare	440	510	555	540	624	685
Production	tonne	9,974	11,241	13,110	15,537	14,208	14,357
Gross value	\$'000	4,060	3,393	4,910	7,150	7,745	7,856
Lettuce —							
Area	hectare	194	193	232	218	276	282
Production	tonne	5,088	4,828	5,981	6,344	8,078	10,157
Gross value	\$'000	2,054	2,128	2,022	2,799	3,758	4,507
Peas, green —							
Area	hectare	755	716	640	569	755	635
Production	tonne	4,770	4,786	4,961	3,237	3,727	1,862
Gross value	\$'000	354	417	357	214	365	558

#### Orchards

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 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.

#### FRUIT (a) — AREA AND GROSS VALUE OF PRODUCTION

Season	Area (b)			Gross value of production					Total
	Orchard fruit	Plantation and berry fruit	Total	Pome (c)	Citrus (d)	Stone (e)	Other (f)		
	hectares	hectares	hectares	\$'000	\$'000	\$'000	\$'000	\$'000	
1978-79	6,368	269	6,637	18,193	2,554	4,072	6,110	30,930	
1979-80	6,412	288	6,700	20,053	2,927	4,173	3,115	30,268	
1980-81	6,443	347	6,790	20,436	3,710	3,990	5,523	33,660	
1981-82	6,445	363	6,808	19,759	3,465	5,039	6,774	35,037	
1982-83	6,458	375	6,833	22,628	4,182	5,527	7,558	39,895	
1983-84	6,274	452	6,726	19,793	4,455	5,286	8,382	37,916	

(a) Excludes grapes. (b) Comprises bearing and non-bearing trees and plants. (c) Apples, pears and quinces. (d) Principally oranges, mandarins, lemons and grapefruit. (e) Plums, peaches, apricots, nectarines and cherries. (f) Bananas, loquats, figs, olives, passion fruit, almonds and other minor fruits.

#### Apples

Apples, which are the principal fruit crop, account for more than half of the total orchard area. Donybrook, Manjimup and the hills area near Perth are the most important centres but other districts in the south-west still produce significant quantities. In 1983-84 the total number of bearing trees was 598,000 which produced 38,167 tonnes, the principal varieties being Granny Smith, Delicious, Jonathan and Yates.

## APPLES — NUMBER OF TREES AND PRODUCTION

Season	Number of trees		Production		
	Bearing	Non-bearing	Total	Average yield per bearing tree	Gross value
	'000	'000	tonnes	kg	\$'000
1978-79	765	83	45,079	59	16,464
1979-80	749	83	53,801	72	17,968
1980-81	721	79	51,157	71	18,335
1981-82	677	86	49,577	73	17,152
1982-83	640	87	53,362	83	20,438
1983-84	598	95	38,167	64	16,910

There is a valuable export trade, with 9,687 tonnes being exported overseas in 1983-84. The Republic of Singapore is the most important market, followed by Malaysia, Hong Kong and Brunei.

**Pears**

Pears are usually grown in conjunction with apples but the number of trees planted and the quantity produced are much less, the total number of bearing trees in 1983-84 being 81,000 and the production 6,247 tonnes. The bulk of the crop is consumed locally but significant quantities were exported in 1983-84, principally to the Republic of Singapore and Malaysia.

## PEARS — NUMBER OF TREES AND PRODUCTION

Season	Number of trees		Production		
	Bearing	Non-bearing	Total	Average yield per bearing tree	Gross value
	'000	'000	tonnes	kg	\$'000
1978-79	67	23	5,179	78	1,729
1979-80	70	21	5,632	80	2,085
1980-81	71	21	5,592	79	2,101
1981-82	77	24	6,004	78	2,607
1982-83	77	25	6,016	78	2,190
1983-84	81	27	6,247	77	2,882

**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 Town 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. In 1983-84 the most important buyers were the Republic of Singapore and Malaysia.

## CITRUS FRUIT — NUMBER OF TREES, PRODUCTION AND GROSS VALUE

Particulars	Unit	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Oranges —							
Trees — bearing	'000	217	210	197	184	178	177
non-bearing	'000	13	18	15	31	28	26
Production	tonne	6,338	8,130	7,303	7,676	7,834	7,782
Gross value	\$'000	1,612	1,909	2,302	2,073	2,352	2,634
Lemons and limes —							
Trees — bearing	'000	33	33	32	34	30	30
non-bearing	'000	6	4	3	3	4	4
Production	tonne	2,532	2,523	2,476	2,180	2,570	2,943
Gross value	\$'000	352	445	441	425	538	640
Mandarins —							
Trees — bearing	'000	37	36	34	34	36	36
non-bearing	'000	8	8	7	11	11	14
Production	tonne	1,358	1,375	1,445	1,465	1,874	1,781
Gross value	\$'000	422	427	795	798	1,103	1,000
Grapefruit —							
Trees — bearing	'000	11	9	9	8	8	8
non-bearing	'000	2	1	1	1	2	2
Production	tonne	359	368	361	347	349	337
Gross value	\$'000	163	146	161	168	173	180

**Stone Fruits**

Plums, peaches, apricots, nectarines and cherries are grown in the hills districts in the Darling Range near Perth, in the Swan Valley and in many districts in the south-west. The number of bearing stone fruit trees in 1983-84 included 72,000 plum and prune trees, 68,000 peach trees, 14,000 apricot trees, 26,000 nectarine trees and 4,000 cherry trees. The bulk of the overall stone fruit crop is consumed locally but a good proportion of the plum crop is sent overseas. In 1983-84 the main markets were the Republic of Singapore, Malaysia and Hong Kong.

STONE FRUIT — NUMBER OF TREES, PRODUCTION AND GROSS VALUE

Particulars	Unit	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Apricots —							
Trees — bearing	'000	11	11	11	13	13	14
non-bearing	'000	5	6	7	7	9	8
Production	tonne	469	573	516	674	714	642
Gross value	\$'000	348	283	294	411	528	504
Nectarines —							
Trees — bearing	'000	9	10	12	14	17	26
non-bearing	'000	5	5	11	16	19	20
Production	tonne	418	565	601	735	820	1,063
Gross value	\$'000	215	299	289	408	410	569
Peaches —							
Trees — bearing	'000	51	55	55	63	69	68
non-bearing	'000	19	21	30	33	24	21
Production	tonne	2,556	2,822	2,819	3,132	3,531	3,151
Gross value	\$'000	1,404	1,432	973	1,087	1,238	1,124
Plums and prunes —							
Trees — bearing	'000	64	66	64	72	72	72
non-bearing	'000	13	16	19	22	24	27
Production	tonne	4,009	3,955	3,885	4,528	4,672	4,229
Gross Value	\$'000	1,958	2,092	2,089	2,710	2,898	2,793

**Bananas**

Production of bananas is mainly confined to a narrow strip of land along the Gascoyne River at Carnarvon, with smaller areas at Kununurra 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 of the plantations and in production. The production of 10,200 tonnes in 1983-84 was slightly below the record production of the previous year.

The crop is transported by road to Perth and sold locally in competition with bananas imported from other Australian States.

BANANAS — AREA AND PRODUCTION

Season	Area		Production		
	Plants of bearing age	Young plants not bearing	Total	Average yield per hectare (a)	Gross value
	hectares	hectares	tonnes	tonnes	\$'000
1978-79	186	53	6,233	33.51	5,049
1979-80	194	62	3,334	17.22	2,101
1980-81	240	66	7,684	31.96	4,380
1981-82	254	59	9,040	35.53	5,571
1982-83	268	63	10,391	38.77	6,327
1983-84	296	103	10,200	34.47	6,551

(a) Calculated on the area of bearing plants only.

**Vineyards**

The area of grapevines in the State continued to decline to 2,086 hectares at 31 March 1984. The reduction occurred mostly in the Swan Valley. The area of vineyards in the Margaret River and Mount Barker/Frankland areas is expected to continue expanding slowly. The tonnage of grapes

for winemaking crushed in 1983-84 decreased by 8 per cent to 7,800 tonnes. Wine production in 1983-84 followed the trend of recent years, with production of unfortified wine showing an increase over the previous year, while fortified wine production fell.

The build up in world stocks of dried vine fruit has depressed the export trade in the past year. Currants are the major item of production in Western Australia; sales on the domestic market have remained firm, and returns to growers should be maintained. Renewed interest in table grapes in the Swan Valley in recent years has caused an upsurge in production while static export sales for table grapes have caused more fruit to be directed to the local fruit market with resulting pressure on prices.

#### GRAPES — AREA AND PRODUCTION

Season	Area		Grapes used for wine making and table use		Dried vine fruits		Wine production	
	Vines of bearing age	Young vines not bearing	Quantity	Gross value	Quantity	Gross value	Beverage (a)	Distillation
	hectares	hectares						
1978-79	2,269	291	8,174	2,755	820	607	3,508	638
1979-80	2,324	229	8,850	2,634	889	802	4,060	414
1980-81	2,212	234	8,832	2,517	529	529	4,707	24
1981-82	2,077	197	r 9,365	2,758	773	766	4,843	262
1982-83	2,042	198	r 10,116	4,096	992	759	4,514	145
1983-84	1,934	152	9,535	3,240	822	1,134	4,559	200

(a) Includes spirit produced from distillation wine and used in fortification.

#### 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 Manjimop and Donnybrook. In 1983-84, overseas exports of flowers were worth \$2.1 million, of which over half went to the Netherlands.

#### NURSERIES (a) — AREA AND GROSS VALUE

Particulars	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Area	hectares	236	240	280	440	514
Gross value	\$'000	10,475	10,807	12,048	12,334	15,345
		23,516				

(a) Excludes non-commercial nurseries and commercial nurseries with total sales of nursery products less than \$1,500 until 1979-80 and those with less than \$2,500 in subsequent years.

#### 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 may require applications of up to 400 kilograms of superphosphate per hectare for satisfactory crop yields, but annual applications can be reduced as the phosphate content of the soil is improved through the residual effect of the added fertiliser. On established land, applications of 100 kilograms to 120 kilograms of superphosphate per hectare are commonly used in wheat growing.

Nitrogen deficiencies are common. Legume pastures and lupins have assisted greatly in increasing soil nitrogen supplies. Where pastures have a low legume content, or where multiple cereal cropping is practised, appreciable yield increases may be achieved by applying nitrogenous fertiliser.

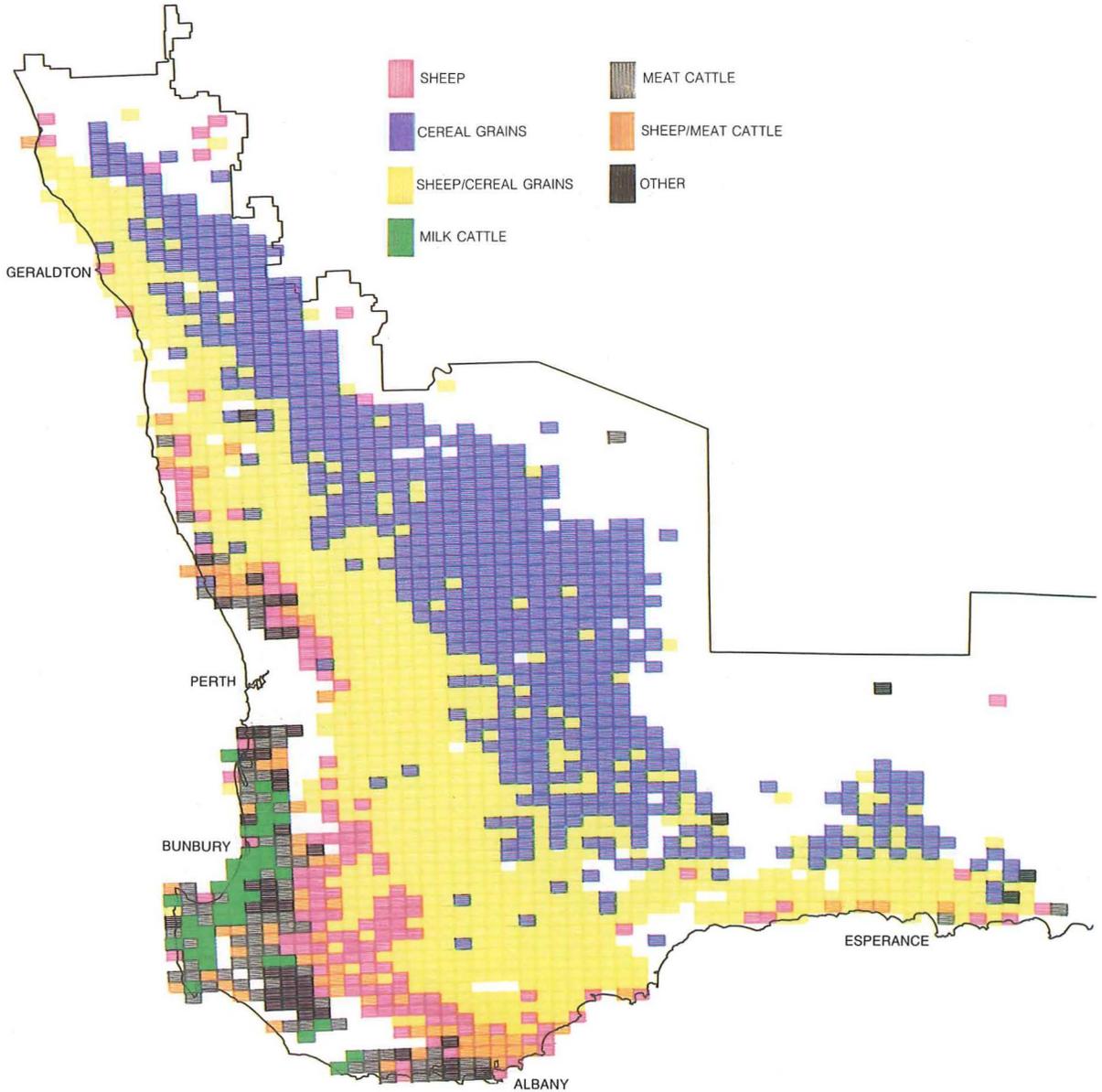
Sandy soils naturally deficient in copper, zinc and molybdenum are widespread. Western Australia has been described as 'the most extensive trace element-deficient province in the world'. Copper, zinc and molybdenum fertilisers are usually applied in the first year new land is brought into agriculture. Repeat applications of copper have not been found to be needed. The zinc impurity

# SOUTH-WEST OF WESTERN AUSTRALIA

SHOWING

## PREDOMINANT AGRICULTURAL ACTIVITIES

(YEAR ENDED 31 MARCH 1985)



Each 10 km by 10 km grid cell has been allocated an industry class according to the Australian Standard Industrial Classification, based on the major agricultural activity (or mix of activities within that cell). Cells within the Perth Statistical Division have not been classified.



PLATE 8 — Healthy jarrah (*Eucalyptus marginata*) forest.

photograph: Cliff Winfield; Department of Conservation and Land Management

INSET — Jarrah forest affected by dieback disease (*Phytophthora cinnamomi*). The Department of Conservation and Land Management is conducting major research programs into this disease which has killed thousands of hectares of forest since 1940.

photograph: Cliff Winfield; Photo Index

in the phosphate fertilisers applied renders repeat application of zinc fertilisers unnecessary except where imported phosphatic fertilisers low in zinc are used. Repeat applications of molybdenum are required on some soils but not on others.

Manganese deficiency occurs in many places, often only in relatively small patches but application of manganese fertiliser is very important for crop lupins grown for grain on leached grey sands where deficiency occurs in large tracts.

Potassium deficiency is important on sands particularly in the higher rainfall areas and is expected to become more widespread in time. Potassium fertilisers are expensive relative to farm product prices.

Sulphur deficiency is widespread but is usually corrected by the sulphur contained in the phosphatic or nitrogenous fertiliser used. However, special high sulphur fertilisers are used in specific situations.

For field crops, foliar applications of nutrients, and nutrients in chelate form, are not cost-effective in most situations and are therefore not commonly employed.

ARTIFICIAL FERTILISER USED ON RURAL HOLDINGS

Season	Crops					Pastures (a)				
	Area fertilised	Quantity used			Average per hectare	Area fertilised	Quantity used			Average per hectare
		Super-phosphate (b)	Other artificial fertilisers	Total			Super-phosphate (b)	Other artificial fertilisers	Total	
	'000 hectares	'000 tonnes	'000 tonnes	'000 tonnes	tonnes	'000 hectares	'000 tonnes	'000 tonnes	'000 tonnes	tonnes
1978-79	4,714	347	219	566	0.12	4,083	457	41	498	0.12
1979-80	n.a.	361	231	592	n.a.	4,831	555	53	607	0.13
1980-81	n.a.	409	213	622	n.a.	4,791	556	49	604	0.13
1981-82	5,587	457	230	687	0.12	4,329	494	42	536	0.12
1982-83	n.a.	437	279	716	n.a.	4,240	467	44	512	0.12
1983-84	n.a.	361	327	688	n.a.	4,051	427	52	479	0.12

(a) Includes lucerne for all purposes. (b) Includes superphosphate with trace elements.

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 Dundas and Greenough.

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 Oakover 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.

The value of production from the pastoral areas for 1983-84 was 3.5 per cent of the total gross value of Western Australian agricultural production.

### Sheep

The following table shows the total numbers of sheep and their distribution between the agricultural and pastoral areas, in each year from 1963 to 1984. Additional details showing the numbers of sheep in the State appear in the Statistical Summary, Chapter 26.

SHEEP NUMBERS AND DISTRIBUTION

At 31 March —	In agricultural areas		In pastoral areas		State total
	Number	Proportion of State total (per cent)	Number	Proportion of State total (per cent)	
	'000		'000		'000
1963	15,404	82.3	3,323	17.7	18,727
1964	16,608	82.4	3,557	17.6	20,165
1965	18,671	83.4	3,721	16.6	22,392
1966	20,695	84.7	3,732	15.3	24,427
1967	23,525	86.0	3,845	14.0	27,370
1968	26,407	87.6	3,754	12.4	30,161
1969	28,888	87.8	4,013	12.2	32,901
1970	29,844	88.7	3,790	11.3	33,634
1971	31,130	89.7	3,579	10.3	34,709
1972	31,050	90.2	3,355	9.8	34,405
1973	27,777	89.8	3,142	10.2	30,919
1974	29,424	90.7	3,027	9.3	32,451
1975	31,473	91.3	3,004	8.7	34,476
1976	31,578	90.8	3,193	9.2	34,771
1977	28,207	90.5	2,952	9.5	31,158
1978	27,622	92.6	2,201	7.4	29,823
1979	28,250	93.3	2,014	6.7	30,265
1980	28,730	94.4	1,701	5.6	30,431
1981	29,002	94.3	1,762	5.7	30,764
1982	28,285	93.5	1,981	6.5	30,266
1983	28,043	93.0	2,122	7.0	30,164
1984	27,494	93.1	2,024	6.9	29,518

The present distribution of sheep in the State is the result of two opposite trends operating over many years. In the pastoral, or station areas where the industry is based on long-term pastoral leases, overuse of the vegetation resource base, severe droughts and reduced profitability have led to a decline in the number of sheep. In the agricultural, or farming areas, however, the sheep population has generally risen. Factors contributing to this rise have been the increasing use of subterranean clover in the cereal growing areas, the provision in many areas of more assured water supplies, a taxation policy which, by the provision of special concessions to primary producers, encouraged farmers to clear and develop new land, the War Service Land Settlement Scheme which developed new areas and the stimulating effect of buoyant wool prices in the post-war period.

The result has been a marked upward trend in sheep numbers particularly during the 1960s. Sheep numbers reached a peak of 34.8 million at 31 March 1976 but declined to 29.8 million at 31 March 1978 mainly as a result of the poor seasonal conditions and the continuing decline in pastoral areas. Numbers in the agricultural areas increased from 7 million or 72 per cent of the State total in 1945, to 27.5 million or 93 per cent at 31 March 1984. Numbers generally increased in pastoral areas after 1945 until they reached more than 4 million in 1969. Since then numbers declined to 1.7 million in 1979-80 and as a percentage of the State total this represents a decline from 28 per cent in 1945 to just under 6 per cent. Although sheep numbers in the pastoral areas have increased slightly since 1980 to reach 2 million at 31 March 1984 this still represents only 7 per cent of the total.

In the following table, sheep flocks at 31 March 1984 are classified according to the size of the flock. Of the 17,200 establishments of all types, sheep were carried on 11,412. Establishments carrying between 1,000 and 3,999 sheep accounted for 54 per cent of the flocks and 46 per cent of the total number of sheep. Those with less than 1,000 sheep accounted for 27 per cent and 4 per cent, respectively, and those with more than 3,999 accounted for 19 per cent and 49 per cent, respectively.

An analysis of collected data relating to breeds of sheep as at 31 March 1983 showed that Merinos accounted for 93 per cent of the total. Corriedales, Polwarths and British breeds, the most important of which are Border Leicester, Dorset Horn, Poll Dorset, Southdown and Suffolk, comprised 2 per cent and 5 per cent was made up of Crossbreds, including Merino Comebacks.

SHEEP FLOCKS AT 31 MARCH 1984  
CLASSIFIED ACCORDING TO SIZE OF FLOCK

Size of flock (numbers)	Number of —	
	Flocks	Sheep ('000)
1 — 99	662	26.5
100 — 499	1,197	333.2
500 — 999	1,287	954.8
1,000 — 1,499	1,451	1,799.6
1,500 — 1,999	1,315	2,273.7
2,000 — 2,999	2,076	5,099.3
3,000 — 3,999	1,311	4,503.0
4,000 — 4,999	732	3,252.7
5,000 — 5,999	447	2,433.0
6,000 — 6,999	291	1,873.4
7,000 — 7,999	181	1,351.2
8,000 — 8,999	126	1,058.7
9,000 — 9,999	84	791.4
10,000 — 14,999	176	2,110.2
15,000 — 19,999	44	744.5
20,000 and over	32	913.1
Total	11,412	29,518.3

### 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.

As provided by the Act, the Lamb Marketing Board consists of five members, four of whom are appointed by the Governor and an *ex officio* member, the manager of the Board, who is its chief executive officer. Of the appointed members, two are elected producer representatives, and two are nominated by the Minister for Agriculture; one of these is a meat trade representative and the other who is neither a producer nor financially interested in the slaughter, distribution or sale of lamb shall be Chairman of the Board. The major aims of the Board are to administer an orderly method of marketing and encourage producer participation in lamb marketing, operate an advance price schedule, and a weight and grade system and 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 thirty-nine world destinations.

The Board now operates a factory for the processing and packing of offal and primal cuts providing diversification, with a wider range of markets for higher priced quality products.

### Wool

Total wool production in 1983-84 amounted to 141,000 tonnes, of which shorn wool accounted for 138,000 tonnes. It was shorn from 34.2 million sheep and lambs, the average weight of wool shorn being 4.0 kilograms. The balance of the 1983-84 production comprised 922 tonnes of dead and fellmongered wool, and 2,936 tonnes of wool exported on skins.

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 steady 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.

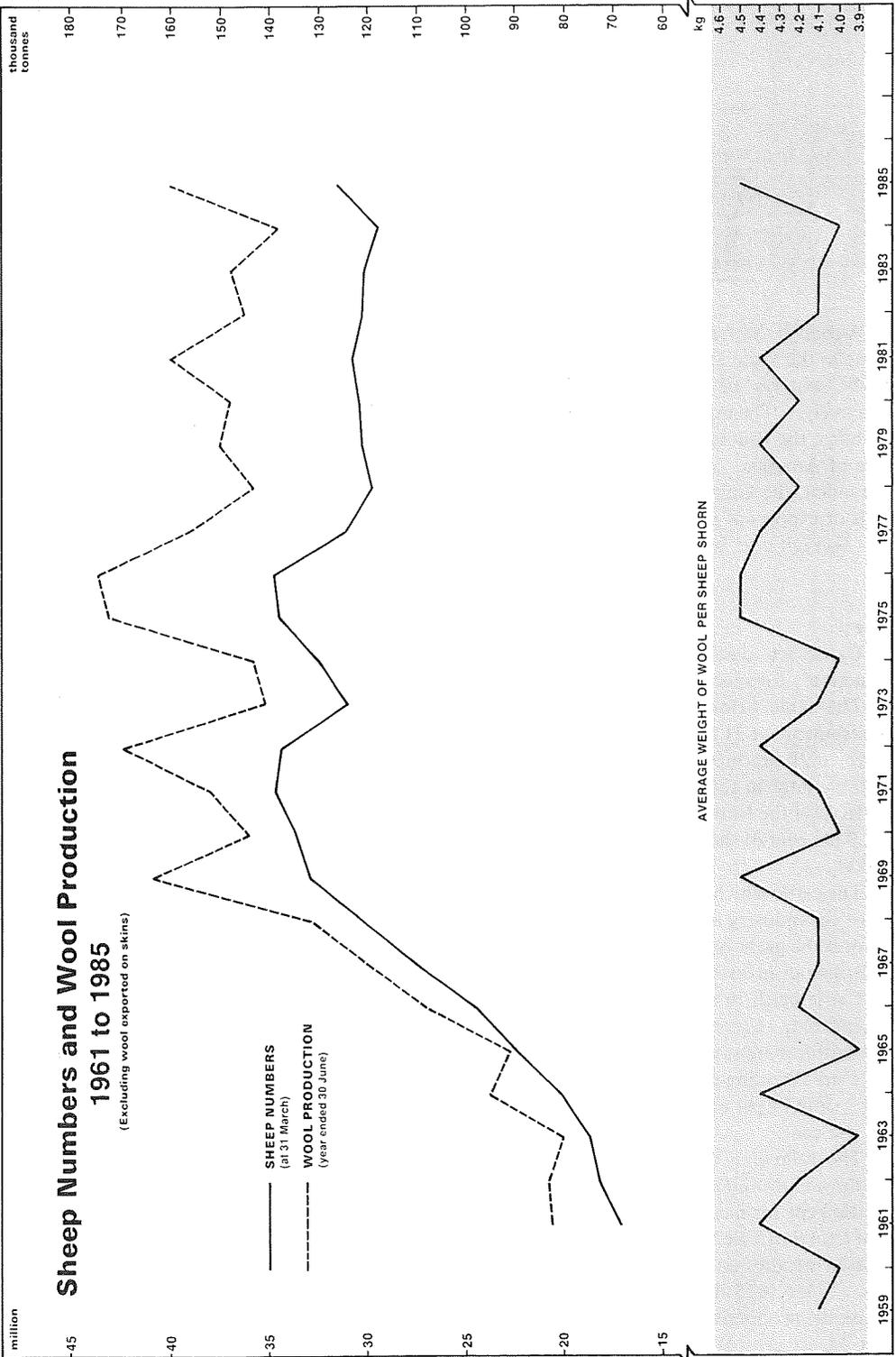
The number of sheep and lambs shorn, the average weight of wool shorn per sheep or lamb, and production of wool are given in the following table.

#### SHEEP SHORN AND WOOL PRODUCTION YEAR ENDED 30 JUNE

Year	Sheep shorn			Average weight of wool shorn kg	Wool production (in the grease)			
	Sheep '000	Lambs '000	Total '000		Shorn '000 tonnes	Dead and fell-mongered '000 tonnes	Exported on skins '000 tonnes	Total '000 tonnes
1978-79	27,321	6,534	33,855	4.4	149	1	5	155
1979-80	27,804	7,091	34,895	4.2	147	1	3	151
1980-81	28,867	7,674	36,541	4.4	159	1	4	164
1981-82	28,367	7,138	35,505	4.1	144	1	4	149
1982-83	27,735	7,849	35,584	4.1	147	1	3	151
1983-84	26,756	7,476	34,232	4.0	138	1	3	141

#### SHEEP AND LAMBS SHORN AND WOOL CLIP IN STATISTICAL DIVISIONS YEAR ENDED 31 MARCH 1984

Statistical division	Sheep and lambs shorn '000	Wool clip '000 kg	Average weight of wool shorn		
			Sheep kg	Lambs kg	Total kg
Perth Statistical Division	430	1,050	2.5	1.4	2.4
Other divisions —					
South-West	1,842	7,183	4.5	1.6	3.9
Lower Great Southern	8,259	34,629	4.9	1.5	4.2
Upper Great Southern	7,555	30,404	4.8	1.3	4.0
Midlands	8,552	32,824	4.6	1.3	3.8
South-Eastern	3,401	14,768	5.1	1.7	4.3
Central	5,525	18,106	4.7	1.4	4.0
Pilbara	362	1,332	4.1	1.4	3.7
Kimberley	—	1	3.5	—	3.5
Total	34,498	139,246	4.7	1.4	4.0
WESTERN AUSTRALIA	34,928	140,296	4.7	1.4	4.0



The next table shows the gross value of wool production for the six years 1978-79 to 1983-84.

GROSS VALUE OF WOOL PRODUCTION  
(\$'000)

Year	Shorn wool	Dead wool and fellmongered wool	Wool exported on skins	Total
1978-79	285,079	1,521	6,169	292,769
1979-80	346,612	1,602	9,061	357,275
1980-81	399,806	1,383	9,427	410,615
1981-82	376,699	1,841	6,275	384,814
1982-83	390,975	1,765	3,156	395,896
1983-84	402,645	1,606	3,200	407,451

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 1983-84 exports of greasy and degreased wool were 107,308 tonnes and 14,195 tonnes, respectively. The most important buyers of greasy wool were Japan, the Union of Soviet Socialist Republics, the Federal Republic of Germany, Italy, France, the Republic of Korea and the United States of America. Principal purchasers of degreased wool were Japan, Italy, the United States of America, the United Kingdom, India, the Federal Republic of Germany and Greece. Further details of exports of greasy and degreased wool, both interstate and overseas, are given in Chapter 21 — *Foreign and Interstate Trade*.

### Cattle

Cattle are classified according to the two main purposes of 'meat production' and 'milk production', irrespective of breed.

The table below shows the numbers of cattle for meat production kept on agricultural establishments at 31 March 1979 to 1984. A later table details, for the same period, the numbers kept for milk production. Cattle numbers in each State and Territory at 31 March 1984 are given in a table later in this Chapter.

In 1984 the Kimberley Statistical Division carried 686,000 head of cattle for meat production, or 42.7 per cent of the State total. Other pastoral areas carried 203,000 head and agricultural areas 716,000.

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.

Cattle herds in the pastoral areas are based on the production of older bullocks — usually 4 or 5 years old. Consequently adult females only constitute some 36 per cent of total numbers, whereas in agricultural areas they represent 42 per cent of total numbers. This difference, when combined with lower branding percentages, is reflected in production, as turn off from the Kimberley pastoral areas is only 14 per cent of herd numbers whereas turn off from beef herds in the agricultural areas is 36 per cent.

The following table shows the numbers and proportions of cattle for meat production in agricultural areas and in pastoral areas at 31 March 1979 to 1984. At 31 March 1966, the proportion of cattle kept for meat production in agricultural areas was only 42.5 per cent, with 451,000 cattle out of a total of 1,062,000. The importance of the agricultural areas as a source of meat production increased steadily until 1975 when 63.7 per cent of cattle kept for meat production were in these areas. Since 1975 this proportion has decreased to 44.6 per cent at 31 March 1984. However, because the productivity of cattle in the agricultural areas is much higher than in the pastoral areas, about 75 per cent of the State's beef is produced in the agricultural areas.

CATTLE FOR MEAT PRODUCTION — NUMBERS AND DISTRIBUTION

Particulars	At 31 March —					
	1979	1980	1981	1982	1983	1984
Number of cattle ('000) —						
In agricultural areas	1,017	986	971	895	770	716
In pastoral areas	947	952	936	923	862	889
Total	1,964	1,938	1,906	1,818	1,632	1,606
	per cent	per cent	per cent	per cent	per cent	per cent
Proportion of total —						
In agricultural areas	51.8	50.9	50.9	49.2	47.2	44.6
In pastoral areas	48.2	49.1	49.1	50.8	52.8	55.4

CATTLE FOR MEAT PRODUCTION AT 31 MARCH 1984  
CLASSIFIED ACCORDING TO SIZE OF HERD AND LOCATION

Size of herd (numbers)	In agricultural areas		In pastoral areas		Whole State	
	Number of —		Number of —		Number of —	
	Herds	Cattle	Herds	Cattle	Herds	Cattle
1 — 29	1,886	'000	21	0.3	1,907	'000
30 — 49	783	30.5	1	—	784	30.6
50 — 69	610	35.7	14	0.8	624	36.5
70 — 99	612	50.8	4	0.4	616	51.1
100 — 149	664	80.4	11	1.3	675	81.8
150 — 199	421	72.4	9	1.6	430	74.0
200 — 299	439	105.7	22	5.3	461	111.0
300 — 399	179	61.8	11	3.9	190	65.6
400 — 499	94	41.6	6	2.7	100	44.3
500 — 699	111	64.6	20	11.2	131	75.9
700 — 999	62	51.0	18	14.5	80	65.5
1,000 — 1,499	32	37.3	10	12.5	42	49.8
1,500 — 1,999	9	14.7	21	36.3	30	51.0
2,000 — 4,999	10	34.4	46	136.0	56	170.4
5,000 — 9,999	2	13.7	28	195.1	30	208.8
10,000 and over	—	—	31	467.4	31	467.4
Total	5,914	716.5	273	889.3	6,187	1,605.8

Slaughtering

Beef from cattle slaughtered at Wyndham and 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, Wooroloo and Katanning. Most of these establishments also slaughter for the export trade. Small establishments operating in country towns also contribute substantially to total production, and most stations and many farms slaughter sufficient for all or part of their own requirements. Some 65 per cent of all exports are destined for the United States of America with China — Taiwan Province only, Malaysia and Saudi Arabia being the next most important markets.

LIVESTOCK SLAUGHTERED AND MEAT PRODUCED

Year	Livestock slaughtered (a)				Meat produced (b)			
	Sheep		Lambs		Cattle and calves		Mutton and lamb	Beef and veal
	Number	Gross value (£)	Number	Gross value (£)	Number	Gross value (£)		
1978-79	'000	\$'000	'000	\$'000	'000	\$'000	tonnes	tonnes
1978-79	2,454	30,575	1,384	19,313	749	101,398	63,272	136,141
1979-80	2,917	47,251	1,556	24,561	613	149,165	73,706	116,199
1980-81	2,969	64,832	1,556	32,014	663	177,382	75,591	126,578
1981-82	2,687	48,074	1,145	19,914	678	125,145	62,928	123,713
1982-83	3,148	40,982	990	13,835	662	138,131	67,779	120,202
1983-84	2,511	32,889	1,041	16,436	518	130,482	59,499	97,637

(a) Mainly slaughterings for human consumption but also includes quantities condemned and small numbers of livestock slaughtered for boiling down. (b) Dressed carcass weight; excludes condemned carcasses and offal. (c) Value 'on hoof' at principal market.

## 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, but these problems were progressively overcome and 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 and fresh dairy products markets.

The following table shows the numbers of cattle kept for milk production on agricultural establishments at 31 March 1979 to 1984. From a total of 240,000 at 31 March 1963 the numbers have declined to 124,000 at 31 March 1984.

CATTLE FOR MILK PRODUCTION  
('000)

Particulars	At 31 March —					
	1979	1980	1981	1982	1983	1984
<b>Bulls of dairy breeds used or intended for service —</b>						
Aged one year and over	1	1	1	1	1	1
Calves (aged under one year)	—	—	—	—	—	—
Total	2	2	2	2	2	1
<b>Cattle used or intended for production of —</b>						
<b>Milk or cream for sale —</b>						
Cows — In milk and dry	72	72	71	70	70	69
Heifers — Aged one year and over	27	28	29	28	27	28
Heifer calves — Aged under one year	23	23	21	22	22	22
<b>Milk or cream for use on agricultural establishments —</b>						
House cows and heifers	4	4	4	3	3	3
Total	126	126	124	123	121	122
Total cattle for milk production	128	128	126	124	122	124

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.

Previous underwriting arrangements, recommended by the Industries Assistance Commission to be maintained on a short term basis, were continued by the Commonwealth Government.

In the 1960s and 1970s all sectors of the Western Australian dairy industry experienced significant structural adjustment, mainly due to adverse cost-price movements, loss of traditional markets, changes in technology and changes in consumption patterns. In the farm sector, the number of dairymen fell by over 70 per cent; total milk production and cow numbers decreased; and manufacturing milk production declined dramatically. In the processing sector some country dairy factories closed while others changed their product lines such as converting from butter to cheese. Consumption changes included per capita reductions in butter and milk consumption and per capita increases in cream and cheese consumption.

These adjustments within the dairy industry have caused almost all of the 600 or so farmers remaining in dairying to share, through quota arrangements, the more profitable milk markets administered by the Dairy Industry Authority (DIA). Contraction of the industry has largely removed low farm income problems evident in the 1960s, though a wide distribution in farm incomes persists.

The major problem confronting the milk industry, leading into the 1980s was the decline in sales of white milk. Apparent per capita consumption of whole market milk dropped from 104.0 litres in 1980-81 to 101.7 litres in 1983-84. The size and distribution of the dairy industry in Western Australia will be influenced by developments at the national level to formulate a new national dairy marketing plan.

In the next table, the number of establishments carrying cattle for milk production at 31 March 1984 are classified by the size of the herds. Herds of less than ten cattle for milk production accounted for 66 per cent of herds but only 3 per cent of the total number of such cattle. Establishments carrying 100 or more cattle for milk production accounted for only 27 per cent of herds but 92 per cent of the total cattle for milk production at that date.

CATTLE FOR MILK PRODUCTION AT 31 MARCH 1984  
CLASSIFIED ACCORDING TO SIZE OF HERD

Size of herd (numbers)	Number of herds	Total cattle
		'000
1 — 9	1,287	3.2
10 — 19	37	0.5
20 — 29	15	0.3
30 — 39	14	0.5
40 — 49	6	0.3
50 — 59	13	0.7
60 — 69	11	0.7
70 — 79	12	0.9
80 — 89	15	1.2
90 — 99	13	1.2
100 — 124	63	7.0
125 — 149	81	11.2
150 — 174	73	11.7
175 — 199	64	12.0
200 — 249	112	24.7
250 and over	134	47.7
Total	1,950	123.8

The quantity and gross value of whole milk produced in each of the years 1978-79 to 1983-84 are given in the following table.

WHOLE MILK PRODUCTION (a)

Particulars		1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Quantity	'000 litres	212,918	216,477	214,000	209,000	221,000	232,000
Gross value (b)	\$'000	36,549	41,865	44,136	46,606	51,710	52,493

(a) Year ended 30 June. Includes milk used for processing into butter, cheese and condensery products. Details of butter production appear in Chapter 17. (b) Includes subsidy paid by the Commonwealth Government.

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 1984, 64 per cent of pigs were within these divisions while the South-West and Perth Statistical Divisions each had 13 per cent.

The principal breeds in Western Australia are the Large White and Landrace. Berkshires, once a major breed, have declined considerably while recently imported Duroc and Hampshire breeds have generated considerable interest. Over the last few years an increasing number of pigs have been sold for slaughter on a weight and grade system based on carcass classification. Pig producers also have the option to catalogue their pigs for auction by classification, or deliver them to the saleyards for the traditional live auction. In auction by classification the pigs are sold on the basis of the description in the catalogue but remain on the farm until after the sale. Although the greater proportion of production is consumed locally, there is some export trade.

In the table below, the numbers of pigs on agricultural establishments at 31 March are shown for each of the years 1979 to 1984.

PIG NUMBERS  
( '000)

At 31 March —	Boars	Breeding sows	Other pigs	Total
1979	4	40	227	271
1980	4	44	245	293
1981	4	44	242	289
1982	3	39	220	263
1983	3	43	253	300
1984	3	41	257	300

The next table shows the numbers and gross value of pigs slaughtered in each of the years 1978-79 to 1983-84, together with the quantity of meat produced. Factory production of bacon and ham is also shown.

## PIGS SLAUGHTERED (a) AND MEAT PRODUCED

Year	Pigs slaughtered		Pigmeat produced (c)	Bacon and ham produced (d)
	Number	Gross value (b)		
	'000	\$'000	tonnes	tonnes
1978-79	329	21,500	17,973	5,604
1979-80	382	27,227	21,285	5,930
1980-81	427	35,843	24,116	6,062
1981-82	409	39,090	23,108	6,074
1982-83	412	39,938	23,281	6,405
1983-84	480	36,128	26,876	6,807

(a) Comprises slaughtering in abattoirs, butcheries and on stations and farms. (b) Value 'on hoof' at principal market or at factory door. (c) Dressed carcass weight; excludes condemned carcasses and offal but includes quantities used to produce bacon and ham. (d) Factory production.

In the following table, pig herds at 31 March 1984 are classified according to the size of the herd. Establishments carrying less than fifty pigs accounted for 45 per cent of the total herds but only 5 per cent of the total number of pigs. Herds containing between fifty and 499 pigs accounted for 48 per cent of herds and 42 per cent of total pigs while those with more than 500 pigs accounted for only 7 per cent of herds but 53 per cent of pigs.

PIG HERDS AT 31 MARCH 1984  
CLASSIFIED ACCORDING TO SIZE OF HERD

Size of herd (numbers)	Number of herds	Total pigs
		'000
1 — 9	193	0.9
10 — 19	179	2.5
20 — 29	144	3.5
30 — 39	145	5.0
40 — 49	88	3.9
50 — 69	188	11.1
70 — 99	166	13.7
100 — 149	141	17.3
150 — 199	100	17.3
200 — 299	118	28.8
300 — 499	93	36.0
500 — 699	45	26.4
700 — 999	30	25.2
1,000 and over	42	108.8
Total	1,672	300.5

## LIVESTOCK IN AUSTRALIA

The following table gives details of livestock numbers in each State and Territory of Australia at 31 March 1984.

LIVESTOCK NUMBERS AT 31 MARCH 1984 — AUSTRALIA  
( '000)

State or Territory	Cattle					Total	Pigs
	Sheep	Bulls (1 year and over) used or intended for service	For production of milk or cream	Mainly for meat production			
New South Wales	50,997	94	460	4,482	5,036	799	
Victoria	24,632	69	1,514	1,904	3,487	404	
Queensland	13,033	172	368	8,615	9,154	556	
South Australia	16,368	18	160	635	813	417	
<b>Western Australia</b>	<b>29,518</b>	<b>37</b>	<b>123</b>	<b>1,570</b>	<b>1,730</b>	<b>300</b>	
Tasmania	4,583	10	146	386	542	48	
Northern Territory	1	35	—	1,355	1,390	3	
Australian Capital Territory	109	—	—	10	10	—	
<b>AUSTRALIA</b>	<b>139,242</b>	<b>437</b>	<b>2,769</b>	<b>18,955</b>	<b>22,161</b>	<b>2,527</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. The Board is responsible for the collection, handling, examination, grading, treatment, storage, distribution and sale of eggs. From time to time the Board fixes the maximum price at which each respective grade of eggs may be sold by retail.

The State's level of egg production is controlled by the licensing of producers. Under the Act it is an offence to keep, for the purpose of producing eggs for sale, more than twenty fowls unless the person is the holder of a licence to keep laying fowls. The licence authorises the number of fowls the holder may keep.

Until recently, egg production has exceeded local requirements and the surplus has been exported overseas, mainly at unprofitable rates. In order to provide a fund with which to equalise returns from local and export sales the Board, prior to 1 July 1965, made a charge on all eggs sold locally. This charge was subsequently replaced by a levy imposed by Commonwealth legislation which came into operation on 1 July 1965. However, since July 1981 a situation of surplus egg production has no longer existed in Western Australia.

The *Poultry Industry Levy Act 1965* provides for the imposition throughout Australia of a levy on hens not less than six months old kept for commercial purposes. Special exemptions are made in respect of 'broiler breeder hens', being hens used to produce chickens for table purposes. The levy, which does not apply to flocks of fewer than twenty-one hens, nor to the first twenty hens in any flock, is payable fortnightly and may not exceed \$1.50 annually per bird. The net levy paid by producers in Western Australia for 1984-85 was 15 cents per bird per year.

Production of chicken meat has increased considerably in recent years. Between 1973-74 and 1982-83 slaughtering of meat chickens rose from 14.0 million to 21.2 million.

Under the *Chicken Meat Industry Act 1977*, a person growing meat chickens in batches of more than one thousand for supply or sale to a processor is required to have a contract or broiler growing agreement with that processor.

The form of the agreement is prescribed by regulation.

This legislation was designed to give growers a security of contract, a fair price and the opportunity to share in expansion of the industry.

The Chicken Meat Industry Committee, constituted under the *Chicken Meat Industry Act 1975* (repealed), is continued under this new Act and in addition to attending to general industry matters is responsible for determining the standard price to be paid to growers for broiler chickens, approving growing premises and settling disputes which may arise out of agreements.

Details of poultry numbers in the State at 31 March of the years 1979 to 1984 are given in the next table. The succeeding table shows eggs sold and poultry slaughtered for table purposes over the six years ended 1984.

POULTRY NUMBERS  
(<sup>'000</sup>)

At 31 March —	Fowls	Ducks	Turkeys
1979	3,778	1	6
1980	3,952	5	1
1981	3,906	5	1
1982	3,606	1	1
1983	4,147	4	1
1984	4,851	3	6

EGG PRODUCTION AND POULTRY SLAUGHTERED (a)  
FOR TABLE PURPOSES

Year ended 30 June —	Egg production (b)		Poultry slaughtered for table purposes	
	Quantity	Gross value	Dressed weight	Gross value
	'000 dozen	\$'000	tonnes	\$'000
1979	15,706	16,310	23,571	22,536
1980	15,724	17,283	24,176	26,276
1981	16,821	20,409	24,082	30,244
1982	15,265	20,567	22,552	30,395
1983	r 16,636	r 23,050	25,715	37,332
1984	16,470	23,963	25,032	37,582

(a) Excludes non-commercial production. (b) Source: Western Australian Egg Marketing Board.

BEEKEEPING

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.

BEEKEEPERS, BEEHIVES AND HONEY PRODUCTION (a) — 1983-84

Classification of hives (a)	Beekeepers (b)		Productive beehives (c)		Honey production	
	Number	Proportion of total (per cent)	'000	Proportion of total (per cent)	Quantity (tonnes)	Proportion of total (per cent)
40 — 99	46	27	2.1	6	77.9	3
100 — 199	37	22	3.6	10	151.5	5
200 — 299	28	17	5.6	15	353.7	12
300 — 499	36	21	12.1	32	1,027.5	36
500 — 799	14	8	6.6	18	675.7	24
800 and over	8	5	7.4	20	558.2	20
Total	169	100	37.4	100	2,844.6	100

(a) Excludes details of beekeepers with less than 40 hives. (b) At 30 June 1984. (c) Represents the number of hives at 30 June 1984 from which honey was taken during the year and excludes hives kept for production but from which no honey was taken, nuclei, pollination hives, etc.

BEEHIVES AND PRODUCTION OF HONEY AND BEESWAX (a)

Year	Beehives (b)		Honey production		Beeswax production	
	Productive (c)	Unproduc- tive (d)	Quantity	Gross value	Quantity	Gross value
	'000	'000	tonnes	\$'000	tonnes	\$'000
1978-79	31	8	1,841	1,418	35	114
1979-80	34	8	2,624	1,837	51	199
1980-81	35	9	2,023	1,474	37	138
1981-82	34	9	2,557	1,746	58	216
1982-83	34	7	3,141	2,244	54	252
1983-84	37	8	2,845	1,824	51	170

(a) Excludes particulars of beekeepers with less than 40 hives. (b) Number at 30 June. (c) Hives from which honey was taken during the year. (d) Includes hives kept for production but from which no honey was taken during the year, nuclei, pollination hives, etc.

In 1983-84 exports of honey totalled 1,591 tonnes, the export value being \$1,947,505. The principal buyers were Malaysia, Singapore, the United Kingdom and the Federal Republic of Germany.

## THE DEPARTMENT OF AGRICULTURE

A Bureau of Agriculture formed in 1894, became the Department of Agriculture in 1898 when the cleared, arable land in Western Australia was less than 1 per cent of present farm land, no superphosphate was used in Western Australian farming and no wheat varieties were available for the drier areas more than 100 kilometres inland.

In the Department's first twenty-five years, development of the wheat belt was the main activity. The area under cereal crop increased from 30,000 hectares in 1900 to more than 1.6 million hectares in 1930 and 5.8 million hectares in 1981-82.

In the Department's first ten or fifteen years, experiment farms, or 'State farms' were established. The first of these had its origin in plots which were established at Hamel in 1896. Valuable work was carried on at this centre for nearly twenty years in connection with growing of potatoes, fruit, cereals, hops, fodder crops and pasture, and some success was achieved with wheat breeding.

Government farms were opened at Narrogin in 1901 and at Nabawa, forty kilometres north of Geraldton, in 1902. In 1907 a farm at Nangeenan, near Merredin, was taken over from the Lands Department and is now the Merredin Research Station. In the same year a farm was established in the south-west at Brunswick in order to provide object lessons in dairying, as it was felt there were great possibilities of expanding the dairying industry. After functioning for several years this farm was closed and the land was subsequently used for closer settlement purposes.

In 1911 a change was made in the policy of the government farms in the wheat belt and their character changed from 'experimental' to 'experiment' farms and ultimately to 'research stations'. Instead of being conducted mainly with the object of producing revenue they were to be used primarily for collecting information concerning local conditions that would be of value to the district. In addition, wheat, oats and barley were bred and pure pedigree seed produced.

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 Agricultural 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 operations of the Department are organised into Divisions, Sections or Branches, the heads of which are responsible to the Director of Agriculture, through the Deputy Director and three Assistant Directors.

The Division of Animal Health comprises field veterinary services, quarantine and export services, laboratory veterinary services, stock branding and stock movement.

The Division of Animal Production has separate Branches or Sections dealing with beef and dairy cattle, sheep and wool, pigs, poultry, carcass classification and apiculture. It is also responsible for the Intensive Industries Research Centre at Medina and the Animal Breeding and Research Institute at Katanning, the quality control of dairy products, and food technology research and extension.

The Division of Plant Research deals with plant nutrition and crop and pasture agronomy and has Branches or Sections for plant pathology, weed agronomy and biometrics. A diagnostic plant analysis service which uses a multi-channel spectrometer is operated by the Division.

Plant breeding, crop variety testing, quality testing of cereals and other grain crops and fertiliser inspection services are included in the function of the Division of Plant Production.

The greater part of the Department's extension activities are carried out by the advisers and veterinary officers stationed at its twenty-four Regional and District Offices. Under the Department's policy of regionalising its activities these offices are autonomous in determining their activities, but are directly responsible to the Assistant Director responsible for regional activities. Regional and District offices are also responsible for thirteen country research stations.

The Division of Resource Management comprises several Branches dealing with rangeland management (the pastoral industries), soil conservation, salinity and hydrology, farm water resources and irrigation and drainage.

The functions of the Division of Horticulture are the responsibility of Sections dealing with fruit, vegetables, viticulture, floriculture, and the plant industries inspection services. The Division also administers several research stations and the Metropolitan Home Garden Enquiry Centre.

The Division of Administration comprises the Branches or Sections of the Western Australian Herbarium, Entomology, Information, Marketing and Economics, and the Library.

Close liaison is maintained with the Agricultural Protection Board.

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. An Animal Breeding and Research Institute was established at Katanning in 1980 and the Vasse Research Station in 1982.

### **Research Activities**

Investigation and research work is a major function of the Department and has meant much to the State's farming. Cereal breeding and economic assessment of varieties is a continuing process in which more than 6,000 trial plots are planted each year. Cereal varieties bred by the Department have increased the incomes of farmers by many millions of dollars in the years they have been grown. The introduction of new plant species and varieties (including rust-resistant types), the determination of crop rotations for improving yields and maintaining soil fertility, as well as ways to improve district performance and profitability are all part of the investigation and research work.

Research into plant diseases, deficiencies and fertiliser needs are important aspects of the Department's work and success in this field made possible the extensive expansion of farming into light land since the 1950s. The sowing of lupins to provide nitrogen, and the use of trace elements were major factors in developing the sandy soils; the establishment of new subterranean clover species in areas of light rainfall, made possible the ley farming system of cropping in rotation with pastures which greatly expanded the productivity of the State's dry land farming.

Original research by the Division of Plant Research showed manganese deficiency was the cause of the split seed disorder of crop lupins and corrective measures to save the infant industry were devised. The unequivocal demonstration that a single application of copper fertiliser remains effective for decades has saved farmers several million dollars on the unnecessary practice of reapplying copper every few years. Cereal plant tissue tests for copper and molybdenum which provide savings through the more accurate diagnosis of plant disorders have been developed in recent years. Boron toxicity affecting particular barley varieties was identified in 1984. There have been many other significant advances made in plant nutrition recently, including the development of a 'coastal superphosphate' for application to leaching sands. This is a major contribution to solving the pollution problem of inland waters which has caused great concern to sections of the community.

Many specific problems and deficiencies have been investigated. Recent important examples are lupinosis disease in sheep, annual ryegrass toxicity, clover scorch and blackleg in rape. Breeding new cultivars is the long term answer to some of these problems and good progress has been made. Crop lupins are grown for their high protein grain and have become an important field crop. Many research projects are joint efforts between different Divisions. Space precludes a list of all research effort but animal health and nutrition, weed control and efficient sheep, beef, dairy, chicken meat, egg and pig production are part of the constant research stream. Research by the Beef Branch and Carcase Classification Branch has originated a commercial system of continuous on-line descriptive classification of beef carcasses in abattoirs. This development which is important in the evaluation of carcasses for both producers and the meat industry is being implemented in abattoirs throughout Australia and the system is finding increasing application for improvement of marketing and quality control. The pig carcass classification system introduced by the Department in 1977 has already resulted in a marked improvement in the quality of pigs produced in Western Australia.

In the horticultural industries, research has helped commercial growers to maintain and expand production in the face of diminishing numbers of growers. This has been achieved by the introduction of new varieties and rootstocks and the development of management techniques to improve quality and yields well above previous levels.

Disease in farm animals is of major economic significance to the agricultural industry, both in its clinical and sub-clinical manifestations. Disease can be due to bacterial and viral infections, parasitic infestations of a wide variety of types, the ingestion of toxic plants and other toxic substances, specific nutritional deficiencies such as selenium, copper, cobalt and vitamin E, inborn errors of metabolism such as mannosidosis and glycogenosis, and disorders in metabolism producing diseases such as hypomagnesemia and pregnancy toxemia.

The Department provides a diagnostic service for all food-producing animals, undertakes research and implements disease control and eradication programmes. Notable recent research achievements have been made into the diseases lupinosis, annual ryegrass toxicity, caseous lymphadenitis, mycotic dermatitis and sheep lice. Disease control programmes for cattle have led to the eradication of bovine pleuropneumonia, virtual elimination of brucellosis and confinement of tuberculosis to the pastoral areas. In sheep, ked have been virtually eradicated, lice controlled and footrot reduced to a very low level. Programmes of vaccination and preventative treatment have been developed and are used by farmers to reduce the losses in their animals due to major bacterial diseases and gastro-intestinal parasites.

Research in food technology has been directed at developing improved processing methods and better utilisation of produce, especially in relation to sheep meat, abattoir by-products, dairy products and alternatives to fossil fuels, such as vegetable oils.

A soil conservation service was established in the Department in 1947 and since then much information on the incidence and nature of erosion has been collected. Soil losses by water and wind erosion are widespread, particularly in the cereal growing areas. The main thrust of soil conservation research programmes relates to the development of stable productive systems. Studies of the surface hydrology of farmland catchments aim to provide more information relevant to water erosion control and flooding problems. A considerable area of agricultural land has suffered from salt encroachment since clearing. Over 260,000 hectares of once productive land has become too saline for cropping. The Department has carried out considerable research into the reasons for salt encroachment and the measures that can be taken to improve the productivity of saline land. The provision of water supplies in many rural areas has been difficult. Research has developed various means of improved water conservation by the use of roaded catchments and techniques of dam sealing and design. Although the main emphasis has been on soil and water conservation in agricultural areas, an increasing amount of research is being carried out concerning the wider aspects of environmental protection, often in co-operation with other Government Departments. Examples include coastal and river protection, studying and reducing the impact of industrial and urban development and examining possible consequences of activities such as the wood chip industry and the mining of mineral sands.

The Department is responsible for carrying out surveys of rangeland condition and erosion in the pastoral areas and provides maps and descriptions of the resource base of leasehold land. The work is done in collaboration with the Department of Lands and Surveys.

In the north-west of the State the carrying capacity of large tracts of country has been seriously reduced by drought and overgrazing. Officers of the Department have shown that much of this country can be improved by adopting systems of grazing management different from those of the past.

Lupin growing and the production of sheep meat for Middle East markets are two successful agricultural enterprises with which the Department has been closely associated in recent years. Research has established lupins as a source of protein in feeds manufactured for the poultry, pig, sheep and cattle industries. The Department has been engaged in developing management and breeding systems to help satisfy the new market requirements, advising on feeding and accommodation during shipping and discussing market requirements with importers.

Research on tropical crops and pastures is concentrated on the Irrigation Research Station near Kununurra in the Ord River irrigation area. Research is focused on irrigation row crops for tropical areas — sugar cane, rice, oilseeds, legumes, cereals, forages, pharmaceutical and horticultural crops. The sugar pilot farm demonstrated the potential for commercial sugar production in the area.

Recent years have seen major developments in horticulture (cucurbits, bananas) for out of season production, and soybeans as a wet season crop. Peanuts have developed as an important wet season crop on sands.

At Carnarvon the main emphasis is on out-of-season winter vegetables for the Perth market. At the Gascoyne Research Station in Carnarvon, the Department assists growers with research into disease, pest and weed control, variety selection, cultural and irrigation methods, and packaging, marketing and economic developments.

Rangeland management and beef production research is conducted from Derby and Kununurra on various properties, including the adjacent Ord River and Fox River stations, the site of a massive million-hectare regeneration project conducted by the Department. Other rangeland research is carried out on individual properties throughout the pastoral areas.

The Western Australian Herbarium conducts research into the flora of the State. The work is primarily in taxonomy, but studies in ecology, anatomy and cytology are also undertaken.

### **Advisory Services**

Extension work is perhaps the Department's most important function. Farmers want to be made aware of new production possibilities as they arise from research and from other inventive farmers. District advisers have contact with the local farming community in many ways including individual farm visits, group meetings, radio, television and through the *Agmemo* which is a district newsletter.

Extension officers are generalists and are competent to discuss the full range of farming issues with which the farmer may be confronted. Advisers support the formation of farmers' organisations, attend meetings and give talks at field days, many of which are held on the Department's research stations or on farmers' properties.

Mass media play an important role in extension and about 200 radio broadcasts are given by Departmental officers each year. The Information Branch provides a weekly press service and regular publications include the quarterly *Journal of Agriculture* which is distributed to about 6,000 farmers, mostly as part of the Direct Mail Service which includes *Farmnotes*. These are brief, one topic articles. Other major publications include an agricultural Bulletin series, a *Rangeland Bulletin* for the State's pastoralists and a *Market Information Service* newsletter. Technical publications include *Technical Bulletins* for scientists and *Technotes* which provide an internal technical advisory service. Since 1968, the Department has made twenty-six half-hour programmes each year for televising to farmers in most of the central and southern agricultural areas. In 1983, the Department's television service was extended to Geraldton and Kalgoorlie.

Apart from specialist services available from the Department's Head Office at South Perth, advice relevant to country areas is available from officers stationed at district offices at Albany, Bridgetown, Bunbury, Busselton, Carnarvon, Derby, Esperance, Geraldton, Harvey, Jerramungup, Kalgoorlie, Katanning, Kununurra, Lake Grace, Manjimup, Meekatharra, Merredin, Midland, Moora, Narrogin, Northam and Three Springs. In addition to these district offices, there is also a Metropolitan Farm Enquiry Centre. There has been decentralisation of some services, such as diagnostic tests, to larger regional offices at Albany and Bunbury. The district office at the port of Fremantle is mainly concerned with inspection and quarantine services.

The extension and advisory work of the Herbarium, while it is to a large degree involved in agriculture, is also directed to other activities concerning the use and management of the State's flora, including forestry and wildlife research. Research findings not related to agriculture are published in *Nuytsia* and *Western Australian Herbarium Research Notes*.

### **Other Services**

Since 1970, the Department has made considerable progress towards the eradication of brucellosis and bovine tuberculosis from Western Australian cattle. Early in 1980, the Kimberley Region was declared a brucellosis free area after a ten year programme of testing blood samples from more than 300,000 head of Kimberley cattle had demonstrated that the disease was not present. In March 1982, the rest of the State was declared a brucellosis provisionally free area. To achieve this status

required all herds to have been assessed for the presence of the disease, infected herds quarantined and infected animals slaughtered with compensation. By June 1984 there were no infected herds remaining in the State. Over 300,000 breeding cattle are tested annually in the eradication programme. Except for the Kimberley region, where a recently accelerated TB eradication campaign continues, Western Australia has been provisionally free of bovine tuberculosis since 1975.

The Department's Division of Animal Health has also greatly assisted the increased export of live sheep and cattle by inspection and the issue of health certification.

The Department operates certain services which assist the producer to increase his efficiency. Probably the best known is the production of pure pedigree varieties of seed wheat, oats, barley, sweet lupins, rapeseed and linseed. These are of value to the grower, who is able to obtain his requirements at moderate cost. Sponsoring and supervising the production of approved lines of seed, notably potatoes and beans, has led to the wide use of these specialised lines with a resulting increased yield, and certification of pure lines of pasture seed gives farmers a guarantee of quality in the seed they buy. A dairy herd recording scheme is administered and subsidised. This enables farmers to gauge the milk yield and mastitis status of individual cows. The central laboratory at Bunbury has enabled an extension of the service and 43 per cent of dairy farms are now covered by the scheme. Determinations of the digestibility of hay and other feedstuffs are also carried out. Milking machines on dairy farms are checked for correct working as a free service. Assistance and technical advice is given to farmers concerned with the installation of irrigation schemes and the preparation of land for irrigation. The accuracy of carcass measurements used in association with livestock and meat trading on a specification basis is monitored by Departmental staff.

The Department's Plant Nutrition Section is a reference source of current knowledge and, on all aspects of plant nutrition, advises the fertiliser industry, extension staff, farmers, private consultants, and other scientific bodies intrastate, interstate and overseas. The Plant Nutrition Section provides a back-up diagnostic service to advisers and farmers based on the identification of visual symptoms, interpretation of soil and plant analyses, and what is known of the biological environment and the economics of fertiliser use.

A superphosphate application rate prediction service is now available to help farmers decide the best rates of application of superphosphate for their crops and pastures based on previous fertiliser history and on soil test. The service uses the 'Decide' method of superphosphate prediction, developed in co-operation with the Commonwealth Scientific and Industrial Research Organization.

#### **Avondale Project**

At the historic Avondale Research Station, Beverley, the Avondale Project dealing with the development of agriculture was created as one of the contributions by the Department to the State's 150th Year Celebrations held in 1979. Officially opened by His Royal Highness, The Prince of Wales, the Project features a flora reserve, a cultivar garden of historic crop and pasture plants, sheep and cattle displays of breed types found in Western Australia and probably the largest technological collection of farm machinery and artifacts, which have been important to the development of the State's agriculture since settlement in 1829. The Project includes the restoration of the original Avondale stables and homestead, built in the last century. The homestead has been furnished to the period 1900, and Clydesdale horses have been re-introduced. The Station is open to the public.

#### **Administration of Acts**

The Department of Agriculture is responsible for administering sixty Acts concerning a wide range of subjects. Some of the more important relate to animal and plant disease and insect pests, industry trust funds, soil conservation, regulations of the dairy industry, vermin control, marketing of agricultural products and registration of feeding stuffs, fertilisers and stock brands. The Department processes loan applications for the Rural Adjustment Authority.

The Department operates an integrated inspection service to provide quarantine protection for animal, horticultural, agricultural and forest industries against the importation and spread of plant pests and diseases from overseas as well as interstate, and to maintain quality standards of fruit

and vegetables supplied to the local market and for shipment overseas. The properties of milk and dairy produce are kept under constant surveillance to ensure the best possible quality to the consumer.

#### AGRICULTURE PROTECTION BOARD

The Agriculture Protection Board is the body responsible for ensuring that the State's agricultural resources are protected from the sometimes devastating effects of plant and animal pests.

The Board consists of the Director of Agriculture as Chairman, the Chief Executive Officer as Deputy Chairman, an officer of the State Treasury, two representatives of the Primary Industry Association, one representative of the Pastoralists' and Graziers' Association and five representatives of the Country Shire Councils' Association of W.A.

The Board administers the Agriculture and Related Resources Protection Act which replaced the Noxious Weeds Act and the Vermin Act in 1976. Plants and animals can be declared by the Board to be 'declared plants' and 'declared animals' for the purposes of the Act. These terms replace noxious weeds and vermin.

Responsibility for controlling declared plants or declared animals rests with the occupier of land, whether this be a private individual or company, a local government authority, or a government department. 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. The legislation provides for local policies to be formulated by ten Zone Control Authorities on the advice of Regional Advisory Committees. The authorities and committees are made up of farmers, pastoralists and Shire Councillors from each region.

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. The Board also has an operational contract service to carry out control work on behalf of landholders.

Major problems facing the Board include the invasion of starlings across the Nullarbor from South Australia, the spread of skeleton weed in the wheatbelt, periodic outbreaks of the Australian plague locust, damage caused by native parrots and cockatoos in orchards, blackberry infestations in forest and farm land in the south-west, feral animal damage to rangeland and wild dog attacks on domestic livestock.

#### 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 is run by a five member Board which consists of an officer of the Department of Agriculture who is Chairman, two representatives of the Primary Industry Association, one representative of United Dairy Cattle Breeders Association and one member with relevant commercial expertise.

HIS 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 improvement 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.

Extensive stocks of cattle semen are held at the HIS Administration and Laboratory Centre in North Boyanup Road, Bunbury. These originate from selected areas within Australia and around

the world. Six dairy bulls and forty beef breeds are represented in the stock holding.

In addition a full range of artificial breeding equipment and associated accessories is maintained.

#### 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.

The Laboratory hires its own staff and computer time, and pays its own operating expenses. Fees are charged to cover costs, though initially the Laboratory drew on capital grants made to it by various firms and institutions through the John Thomson Agricultural Economics Centre at the Institute of Agriculture.

#### 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 forest; 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 1,897,950 hectares have been permanently dedicated as State forest, and 362,474 hectares are held as Timber Reserves under the Forests Act and the Land Act.

##### The Prime Indigenous Forests

Jarrah (*Eucalyptus marginata*) is the State's principal timber and the prime forest covers almost 1.5 million hectares. Karri (*E. diversicolor*) is next in importance and is distributed over some 140,000 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 3,000 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, has been used to a limited extent, for building scantling and as a pole timber. Of greatest importance, however, is the use of marri as principal material for an export wood chip industry based on 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 the map facing page 268.

##### 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

Scientific forestry was given considerable impetus in Western Australia with the passing of the Forests Act in 1918. Extensive cutting over the previous fifty years had seriously depleted the State's forests and adequate provision had not been made for protection and regeneration. The Act, with significant amendments in 1974 and 1976 conferred wide powers on the then Forests Department to provide for multiple use management of the forest resource. The *Conservation and Land Management Act 1984* saw the amalgamation of the Forests Department, the National Parks Authority and the Wildlife wing of the Department of Fisheries and Wildlife. The Act was proclaimed on 22 March 1985 and the new Department commenced from that date.

The forests are managed within a long range working plan which caters for wood production, water yield, recreation, flora and fauna conservation, amenity and minor product values. Specific areas are accorded a usage priority depending on the natural site potential and the State demand. Trees approved for cutting are marked by trained foresters, who work under the direction of the Executive Director and closely control both the indigenous forest and State pine plantations. The future productivity of the forests is also safeguarded by ensuring that cutting is carried out to protect immature growth and other forest values and to encourage regeneration.

All forest operations are planned to reduce the influence of forest disease. In particular, the introduced jarrah dieback disease (*Phytophthora cinnamomi*) necessitates careful planning and control and special hygiene and quarantine measures are employed.

In future years, if the demand from the increasing population is to be met, it will be necessary to supplement the timber supplies from the natural hardwood forest. For this purpose pine forests principally *Pinus radiata* and *Pinus pinaster*, have been established throughout the south-west.

Only approximately 5,500 hectares of pine were planted in the period from just prior to 1920 up to 1950. These areas were almost entirely experimental and were used to solve the many nutritional and technological problems which were encountered.

Plantings at a higher rate have been undertaken since 1955, bringing the present total State-owned pine plantation area in Western Australia to 59,089 hectares.

Recent plantings have been at just over 2,000 hectares per annum, but this will have to be lifted to approximately 3,000 hectares per annum if self-sufficiency is to be attained. In 1985 a joint venture scheme for pine production was launched, for the purpose of making up this shortfall. Private landholders enter into sharefarming agreements with the government and all production and harvesting operations will be carried out under contract to the Department of Conservation and Land Management.

Because of the hot, dry summers experienced in most of the areas covered by State Forests, there is a considerable risk of damage by fire and intensive precautions are taken by the Department to minimise this danger. Radio-equipped spotter aircraft and key look-out towers provide surveillance of the critical forest areas during prescribed burning periods and during summer. Restrictions are placed on all burning operations by farmers and other persons when the fire hazard is high and at such times warnings are issued emphasising the danger. All staff and employees of the Department are available and trained to fill roles in either direct fire fighting or technical support. Fire suppression is planned on the basis of rapid attack with adequate crews for achieving early control.

### 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 now 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 shrub species are important nectar producers for apiarists, who move their bees to various forest sites to follow the nectar flow.

With increased development and competition for resources the value of State Forests for water production and recreation is becoming increasingly apparent. The current working plan emphasises water production as the major production objective in the northern jarrah forest. Provision to meet the forest recreation needs of the public is also afforded high priority.

The following table gives details of log production and sawn timber production from 1978-79 to 1983-84.

TIMBER PRODUCTION  
(Cubic metres)

Particulars	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Sawlog production (a) —						
Hardwood	963,147	935,416	976,880	946,421	712,522	763,507
Softwood	57,388	60,030	67,062	63,335	43,519	52,744
Other log production (b) —						
Hardwood	472,961	615,488	574,058	385,323	433,952	502,612
Softwood	125,683	136,160	137,478	124,953	138,747	149,096
Sawn timber production —						
Hardwood	331,135	331,411	330,863	320,915	252,124	258,861
Softwood	18,145	21,400	22,954	22,190	13,216	14,723

(a) Includes sawlogs and logs used in the production of plywood veneer. (b) Includes chipwood.

Of the hardwood chiplogs supplied from State forest, 19 per cent were Karri and 81 per cent were Marri.

In 1983-84 overseas exports of railway sleepers totalled 10,894 cubic metres and 8,215 cubic metres of 'other than sleepers' were shipped overseas.

Sawmilling and production of timber is also referred to under *Manufacturing* in Chapter 17.

## FISHERIES (INCLUDING WHALING AND PEARLING)

### General Fisheries

Since the end of the second World War, rock lobsters have become the most important item of production of the fishing industry. Prior to the war there was a small local market for fresh rock lobsters, but in 1941 production was stimulated by canning for the armed forces. Although canning continued until 1950, it had become far less important by 1947 than another development, the freezing of rock lobster tails for export, mainly to the United States of America. The overseas demand, which developed rapidly in post-war years, gave great impetus to the industry and the take increased greatly after 1947 to a record production of 12,482 tonnes in 1982-83 valued at \$93.2 million. The highest value of catch ever recorded is \$96.1 million in 1983-84. Overseas exports of rock lobster tails in 1983-84 totalled 4,039 tonnes with a f.o.b. value of \$84.7 million.

The most important commercial species of rock lobster in Western Australian waters is the western rock lobster (*Panulirus cygnus*), which is fished off the south-west coast between Murchison River and Bunbury. The principal localities around which rock lobsters are caught are Houtman Abrolhos, Geraldton, Dongara, Beagle Island, Green Head, Jurien Bay, Cervantes, Lancelin, Ledge Point and Fremantle. The industry is protected from overfishing by such measures as the declaration of closed seasons; the proclamation of fishing zones; the prohibition of the taking of lobsters of less than a prescribed size or of female rock lobsters having berry (i.e. eggs) attached; requiring that every rock lobster pot shall have an escape gap of specified dimensions; limiting licences for boats for rock lobster-fishing; and limiting the number of pots that a boat may carry or use at any one time. The catch is processed at shore stations licensed under the *Fisheries Act 1905* as processing establishments.

The catches of Australian salmon (*Arripis trutta*), which school in the bays on the south and lower south-western coasts, yield a large 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 tailor (*Pomatomus saltatrix*), Australian herring (*Arripis georgianus*), western sand whiting (*Sillago schomburgki*), sea mullet (*Mugil cephalus*) and trevally or skipjack (*Caranx georgianus*). This is sold mainly as wet fish on the local market, but large quantities of Australian herring are canned and there are some exports, principally of whiting, to other Australian States. There is an important fishery for southern bluefin tuna (*Thunnus maccoyii*) 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 (*Chrysophrys unicolor*) 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. At Shark Bay a prawn-fishing industry has been successfully established, the catch being processed at Carnarvon. The species caught are the western king prawn (*Penaeus latisulcatus*) and the brown tiger prawn (*P. esculentus*). A prawn fishery has also been established at Exmouth Gulf, the principal species caught being the brown tiger prawn and the western king prawn. Quantities of endeavour prawn (*Metapenaeus endeavouri*) and banana prawn (*P. merguensis*) are also caught. The catch is processed at Learmonth and on freezer boats. As a conservation measure the number of fishing boats licensed to operate has been limited to thirty-five at Shark Bay and nineteen at Exmouth Gulf. From a catch of 108 tonnes in 1961-62, the State production of prawns increased significantly and in 1977-78 reached 3,940 tonnes but during the early 1980s problems occurred in the recruitment of tiger prawns and catches of this species dropped dramatically, especially in Exmouth Gulf. Where an average catch of about 550-600 tonnes of tiger prawns could have been expected in Exmouth Gulf, catches of 319 tonnes, 116 tonnes and 77 tonnes were recorded in successive years from 1981. Management measures have been adopted to overcome an identified recruitment problem with the tiger prawn stock, aimed at improving catches. A small fishery, limited to 15 prawn trawlers, fishes from Nickol Bay. Banana and brown tiger prawns are also caught seasonally at Onslow and Shark Bay.

Significant catches of saucer scallops (*Amusium balloti*) are taken in Shark Bay while a smaller fishery occurs at the Abrolhos Islands. In 1984 the scallop fisheries produced over \$6 million.

Shark fishing is an important activity on the lower west and south coasts. In 1983-84 the fishery was worth about \$2.5 million to the fishermen.

Abalone are taken by twenty-six licensed divers in the southern half of the State with most production coming from the south coast. Species taken are Greenlip abalone (*Haliotis laevigata*), Brownlip abalone (*Haliotis conicopora*) and Roes's abalone (*Haliotis roei*). The 1984 value of the fishery was about \$2 million.

The following table shows the catch and value of fish, crustaceans and molluscs by method for Western Australia for 1983-84.

FISH, CRUSTACEANS AND MOLLUSCS — CATCH BY METHOD: 1983-84  
(Tonnes)

Particulars	Haul net and beach seining	Mesh set and gill netting	Hand lining	Trawling	Pot fishing and drop nets	Other methods	Total
Fish	5,395	2,805	1,283	36	105	8,044	17,667
Crabs	5	135	—	9	9	1	158
Prawns	—	26	—	3,299	—	—	3,325
Rock lobsters	—	—	—	3	10,708	10	10,721
Molluscs	11	—	1	3,676	10	536	4,235
Total	5,411	2,966	1,285	7,021	10,832	8,591	36,106

## FISH, CRUSTACEANS AND MOLLUSCS: CATCH AND VALUE

Species — Common name	Quantity (a) (tonnes)			Value (b) (\$'000)		
	1981-82	1982-83	1983-84	1981-82	1982-83	1983-84
<b>Fish —</b>						
Barramundi (Giant perch)	28	63	64	173.7	388.8	398.8
Cobbler	153	110	147	331.0	271.8	373.6
Emperor (North-west snapper)	80	100	137	92.9	100.7	183.1
Herring, Australian	796	935	1,081	348.6	473.8	551.5
Herring, Perth	176	91	136	68.6	49.3	74.5
Jewfish, Westralian	144	188	208	605.9	752.9	849.3
Mackerel, Spanish	248	231	256	384.0	383.6	435.0
Mullet, sea	538	715	596	473.7	568.0	429.2
Mullet, yellow-eye	635	650	544	418.7	409.5	348.3
Pilchard	1,657	2,008	2,774	646.2	763.8	1,109.6
Salmon, Australian	1,407	2,289	3,687	686.8	1,121.2	1,327.3
Scaly mackerel	145	242	291	85.8	125.8	151.4
Shark, bronze whaler	273	267	361	335.7	362.4	429.2
Shark, whiskey	494	379	282	511.2	400.4	347.0
Shark, other	553	501	612	491.3	470.0	504.9
Snapper	676	745	876	788.4	1,076.2	1,121.7
Tuna, southern bluefin	3,586	5,809	4,089	1,967.3	3,018.4	2,903.3
Whiting, King George	25	39	43	45.0	69.7	69.1
Whiting, western sand	184	243	196	258.8	355.7	303.7
Other species	861	880	1,289	791.8	1,008.4	1,501.3
Total, Fish	12,659	16,486	17,667	9,505.4	12,170.3	13,411.8
<b>Crustaceans —</b>						
<b>Crabs</b>						
Prawns — Banana	228	276	61	1,050.6	1,795.4	376.6
Brown tiger	391	509	938	2,508.0	3,548.8	7,756.3
Endeavour	246	273	258	1,021.5	1,215.4	1,169.0
Western king	1,744	1,833	1,891	7,552.6	9,654.1	12,309.1
Other species	192	224	177	470.5	622.4	514.7
Total, Prawns	2,801	3,115	3,325	12,603.2	16,836.2	22,125.7
Rock lobsters —	10,509	12,482	10,721	74,848.7	93,249.7	96,138.0
Total, Crustaceans	13,375	15,721	14,204	87,604.7	110,400.9	118,676.0
<b>Molluscs —</b>						
Abalone	289	264	290	1,450.0	1,474.6	1,785.0
Scallops	1,048	4,208	3,659	418.8	1,883.6	7,281.0
Other molluscs	263	288	286	275.2	279.0	270.0
Total, Molluscs	1,600	4,759	4,235	2,144.0	3,637.2	9,336.9
<b>TOTAL, WESTERN AUSTRALIA</b>	<b>27,634</b>	<b>36,967</b>	<b>36,106</b>	<b>99,254.2</b>	<b>126,208.4</b>	<b>141,424.7</b>

(a) Live (whole) weight. (b) Gross value paid to fishermen.

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 cobbler (*Cnidoglanis macrocephalus*) and yellow-eye mullet (*Aldrichetta forsteri*), sea mullet and Perth herring (*Nematalosa vlaminghi*) 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 (*Sillaginodes punctatus*), tailor, garfish (*Hyporhamphus spp.*) and pilchard (*Sardinops neopilchardus*). Crabs (*Portunus pelagicus*), school prawns (*Metapenaeus dalli*) and western king prawns are also caught commercially in these waters.

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.

Limited commercial production of marron (*Cherax tenuimanus*) began in 1977 following the passing of legislation which established fish farming guidelines, including licensing of marron farms.

Brown trout, rainbow trout and English perch have been introduced into the streams of the south-west and these species together with indigenous stocks of freshwater cobbler, marron, barramundi and cherabin, provide sport for licensed amateur inland fishermen.

### **Whaling**

Whaling was conducted along the Western Australian coast from the first years of settlement and whale oil and whale bone were among the earliest exports from the Colony. Activity since then has fluctuated widely and has now ceased altogether. At a meeting held in London in July 1963 the International Whaling Commission imposed a total ban on the taking of humpback whales for an indefinite period in all waters of the Southern Hemisphere. The company operating from Carnarvon, which relied mainly on the taking of humpbacks, ceased whaling activities at its Carnarvon base in August 1963.

From 1963 onwards, the only station operating was at Cheynes Beach, Frenchman Bay, where sperm whaling had been carried on since 1955. The station finally closed in November 1978. In that year 679 whales were taken and 3,478 tonnes of oil were produced.

### **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 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. Activities were suspended following the outbreak of war with Japan, when valuable luggers and equipment were lost. After the war recovery of the industry was slow because of a shortage of suitable boats and the difficulty in obtaining experienced divers. In 1953 the rate of progress improved when the services of trained Japanese divers again became available. By 1957 production of the shell had reached the pre-war level of about 1,000 tonnes but because of the depressed state of the market it fell to 765 tonnes in 1958. Except for a slight recovery in 1960, production declined in each year from 1959 until 1964, when 140 tonnes of shell were raised. As a result of the increased demand for shell for pearl culture, production has increased slightly since then.

In 1956 a licence was granted to a company to culture pearls at Kuri Bay in Brecknock Harbour, 209 kilometres north-east of Derby and the initial harvest of pearls was gathered in 1957. Licences have since been issued to other companies and pearl culture farms are now successfully established in other locations such as Cygnet Bay, Roebuck Bay and the Monte Bello Islands.

### **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 programmes have been conducted in the Zone since its declaration.

# Chapter 15

## MINING

### INTEGRATED ECONOMIC STATISTICS

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). A brief description of ASIC and the system of integrated economic censuses is given below.

#### Australian Standard Industrial Classification (ASIC)

In 1985 the Australian Bureau of Statistics issued the 'Australian Standard Industrial Classification (1983 Edition)', or 'ASIC', which sets out a classification of all economic activities grouped into four hierarchic levels. This replaced the 'Australian Standard Industrial Classification (1978 Edition)'. At the broadest level of the classification, economic activities are grouped into the following 'industry divisions':

- Division A Agriculture, Forestry, Fishing and Hunting
- B Mining
- C Manufacturing
- D Electricity, Gas and Water
- E Construction
- F Wholesale and Retail Trade
- G Transport and Storage
- H Communication
- I Finance, Property and Business Services
- J Public Administration and Defence
- K Community Services
- L Recreation, Personal and Other Services

Each industry division is further divided into industry sub-divisions, groups and classes. An example from the Manufacturing division is given below:

Industry Division	:	C	Manufacturing
Industry Sub-division	:	28	Non-Metallic Mineral Products
Industry Group	:	286	Clay Products and Refractories
Industry Class	:	2861	Clay Bricks

Economic units are classified to industry division, sub-division, group and class, in that order, based on the predominant activities among all the activities carried out by the unit concerned. The basic economic unit is the *establishment* which generally represents the total operations under one ownership at one physical location (e.g. a farm, a shop, a factory, a mine). In some cases (e.g. construction and transport, electricity and gas production and distribution) the location constraint is relaxed to cover the total operations under one ownership. Some separately-located units which exist primarily to provide services to other establishments under the same ownership (e.g. separately-located administrative offices, laboratories, warehouses, manufacturers' sales offices not holding

stocks, etc.) are regarded as *ancillary units* and are classified to the industry of the establishments served rather than to an industry based on the activity performed. If all the activities of all establishments and ancillary units under the same ownership are considered together the unit is described as the *enterprise*, or all the operations of a single entity in Australia. The final unit in the hierarchy is the *enterprise group* which is the group of legal entities owned or controlled by a single legal entity (e.g. a parent company and its subsidiaries as defined in the Companies Act).

### **Integrated Economic Censuses**

In 1968-69 the Australian Bureau of Statistics commenced a programme of integrated economic censuses to replace or add to the range of existing censuses developed independently over many years. By employing standard definitions of data items as described below and by using the standard definitions of units and methods of classification set out in ASIC, the programme was designed to remove many inconsistencies, gaps and overlaps between existing censuses and thereby permit comparisons of data across broad sectors of economic activity.

Statistics published from the integrated economic censuses are mainly *establishment statistics* or statistics resulting from the aggregation of data for individual establishments and ancillary units.

**Enterprise Statistics.** Since an enterprise is defined as a single legal entity, the use of the enterprise as the unit of aggregation provides statistics which are often of more value than establishment statistics in considering questions related to management and ownership. The statistics which result from the aggregation of enterprise data are different from establishment statistics since, for enterprises comprised of establishments operating in different industries, the industry classification of the enterprise depends on the respective contributions of each establishment to the value added of the enterprise. For example, an enterprise operating a mine and a factory contributes to both mining and manufacturing in establishment statistics whereas, in enterprise statistics, it is classified wholly to either mining or manufacturing depending on which establishment has the greater value added.

The concept of an enterprise has no geographical limits other than the requirement that only operations within Australia are included. For this reason enterprise statistics generally relate only to Australia as a whole and are not dissected into State components. Where published, such statistics show the number of enterprises in each ASIC industry class together with data for the standard set of establishment items described below, plus additional items collected only at the enterprise level such as rent and leasing revenue, land tax, rates and pay-roll tax, employer contributions to superannuation schemes, depreciation, interest and royalties (paid and received) and other expenses.

**Standard Data Items in Integrated Censuses.** A necessary part of the system of integrated economic censuses was the adoption of common definitions for data items common to all censuses. Listed below are the definitions of the standard data items.

*Number of Establishments.* The number of establishments as defined above operating at 30 June of each year. Numbers of separately-located administrative offices and ancillary units serving the establishments are not included.

*Persons Employed.* Working proprietors and employees on the pay-roll including those working at separately-located administrative offices and ancillary units.

*Wages and Salaries.* The wages and salaries of all employees including those at separately-located administrative offices and ancillary units. Amounts drawn by working proprietors are excluded.

*Turnover.* Sales (exclusive of excise and sales tax) of goods, whether produced in the establishment or not, plus transfers out of goods to other establishments of the same enterprise, plus bounties and subsidies on production, plus all other operating revenue (such as commission, repair and service revenue), plus capital work done for own use, or for rental or lease. Rent and leasing revenue, interest income, royalties and receipts from the sale of fixed tangible assets are excluded.

*Stocks.* All the stocks of materials, fuels, etc. and finished goods and work-in-progress of the establishment, whether located at the establishment or elsewhere in Australia.

*Purchases, Transfers In and Selected Expenses.* Purchases of materials, fuel, power, stores, containers, etc. plus transfers in of goods from other establishments of the same enterprise, plus charges for commission and sub-contract work, repair and maintenance expenses, outward freight and cartage, motor vehicle running expenses and sales commission payments.

*Value Added.* Turnover, plus increase (or less decrease) in the value of stocks, less purchases, transfers in and selected expenses.

*Rent and Leasing Expenses.* Outlay on rent and leasing of buildings, vehicles, machinery, plant and equipment.

*Fixed Capital Expenditure.* Outlay on new and secondhand fixed tangible assets, less disposals, including expenditure on establishments not yet in operation.

### MINING IN WESTERN AUSTRALIA

Although the discovery of gold was of particular significance in the early development of the Western Australian economy, the renewed importance of the mining industry in the State began mainly with the considerable expansion associated with iron ore and other minerals which occurred in the late 1960s. This recent growth in importance of the industry is demonstrated by the fact that in 1983-84, value added (see definition at the beginning of this Chapter) by mining establishments in Western Australia was a record \$1,914 million, or 902 per cent more than in 1968-69 when value added data first became available. Value added by mining establishments in Western Australia in 1983-84 was \$1,392 per head of mean population, compared with the national average of \$571.

The map which follows shows the location of the major operating mining projects in Western Australia at the end of December 1984. The text below describes the development of the mining industry in the State including references to current projects depicted on the map.

The first major developments followed the discovery of *gold* in the Kimberley region of the far north of the State in 1885, although gold had been found in various places previously and other minerals had also been discovered, including copper and lead in the Northampton district, north of Geraldton, and coal at the Irwin River, south of the same town. The Kimberley gold find was followed by extensive prospecting activity resulting in gold strikes between 1887 and 1891 in the Yilgarn, Pilbara, Ashburton and Murchison districts. Rich discoveries in 1892 at Coolgardie and in 1893 at nearby Kalgoorlie were followed by development of the famous 'Golden Mile' between Kalgoorlie and Boulder which became one of the major gold producing areas of the world.

Gold production declined after the exhaustion of surface deposits at the turn of the century. Since 1903, production of gold has fluctuated although gold mining remained as the major component of the Western Australian mining industry for many years. The commencement of the Telfer Mine in the Paterson Ranges in 1977 reversed the generally downward trend which had existed since 1960. From 1982 production by a number of new and refurbished mines has led to an increase in gold production and has reinstated the 'Golden Mile' as the principal source of gold in Australia. The State's gold production of 31,061,000 grams in 1983-84 was 61 per cent higher than the 1981-82 figure.

Increases in the price of gold during the latter part of the 1970s, and particularly in the last half of 1979, resulted in increased exploration for new gold deposits, as well as the reassessment of old goldmines which had previously been closed. From the low level of \$83 per fine ounce in August 1976, the Australian gold price rose steadily to reach the high figure of \$752 in January

1980. The price subsequently decreased to \$293 towards the middle of 1982 and then improved to remain in the range \$400 to \$450 for the most of 1983-84. These prices continued to attract a high level of gold exploration in the State (see table in the following section *Exploration for Minerals*).

By early 1984 a number of new mines and previously abandoned mines came into production and numerous other projects were in the evaluation or developmental stages. Apart from increased prices, technological advances contributed to this revival in gold mining. High recovery processes like carbon-in-pulp and heap leaching have enabled treatment of previously uneconomic low grade ore from open cut mines and the retreatment of tailings and residues from earlier mining operations.

In the mid 1960s the importance of gold in Western Australia (in terms of value of production) was surpassed by the production of iron ore from the major deposits in the north-west of the State; and by the mid 1970s the value of gold had also fallen behind nickel, petroleum, bauxite and mineral sands. However, subsequent increases in both production and prices resulted in the value of production of gold in 1983-84 being exceeded only by that for iron ore.

*Iron ore* in the form of hematite has been mined at Cockatoo Island, in Yampi Sound in the north of the State, since 1951 and limonitic ore was mined at Wundowie in the Darling Range east of Perth for some years from 1948. It was not until the early 1960s, however, following the Australian Government's decision to modify its embargo on overseas exports of iron ore, which had been in force since 1938, that widespread interest in developing the State's iron ore resources occurred. The ensuing activity has resulted in iron ore becoming the major Western Australian mineral with production of 72,604,000 tonnes containing 46,067,000 tonnes of iron, valued at \$1,166 million in 1983-84. This represents a 3.6 per cent decrease over the previous year's production of ore and a 13.9 per cent decrease in value.

The State's reserves of iron ore with an iron content of more than 55 per cent iron were estimated to total 39,800 million tonnes at the end of 1982. The deposits occur mainly in the Pilbara, in the north-west of the State, where major production commenced in 1966 and expanded each year up to 1975-76, when a fall in production was recorded. Since then, production has fluctuated, but has generally tended to decrease, except for a significant increase in 1979-80 when a record 91,519,000 tonnes was produced. All of the production from this area is exported, mainly to Japan. Ore from Shay Gap, east of Port Hedland, is railed to a deepwater port at Finucane Island, just off Port Hedland. Output from Mount Tom Price and Paraburdoo, in the Hamersley Range area south-west of Port Hedland, is railed to Dampier for shipping through loading facilities at Parker Point and East Intercourse Island. From Mount Whaleback in the Ophthalmia Range near Newman, ore is railed to Port Hedland and limonitic ore from Pannawonica in the Robe River valley is railed to Cape Lambert where it is shipped as fines.

Iron ore was also mined at Koolyanobbing, some 450 kilometres east of Perth, where production commenced in 1950. This ore was used mainly for pig-iron production at Kwinana and Wundowie; however, the Wundowie and Kwinana blast furnaces were closed in early 1981 and 1982 respectively, and all production at Koolyanobbing ceased in 1983. The first shipment of ore from the deposits on Koolan Island, adjacent to Cockatoo Island in Yampi Sound, was made in January 1965. Mining at Cockatoo Island ceased in late 1984 but shipments from stockpiles were expected to continue until 1986.

At the end of 1983, a number of new mines remained in the planning stage, awaiting improved markets for the ore. Concentrating plants continued to operate at Mount Whaleback and Tom Price, to upgrade low grade ores which are currently unsaleable. However, iron ore pelletising plants located at Dampier and Cape Lambert have been closed since 1980, largely because of cost increases caused by the escalation in crude oil prices.

*Nickel* was discovered in 1966 at Kambalda to the south of Kalgoorlie and there followed a period of rapid expansion in the nickel industry accompanied by a very high level of exploration activity. At the end of 1983 mines were operating at Kambalda, south of Kalgoorlie, and at Agnew and Mt Windarra, north of Kalgoorlie. Weakness in the world market for nickel led to some

reduction in production during 1978-79, which continued into 1979-80. Production subsequently increased and the 1983-84 production of nickel concentrates was a record 505,947 tonnes, containing 59,842 tonnes of nickel. Nickel concentrates are processed in a smelter at Hampton, near Kalgoorlie, and a refinery at Kwinana for subsequent export in processed form.

*Crude oil* was shipped from Barrow Island, about 100 kilometres north-east of Onslow on 25 April 1967 following the declaration of the first commercial oilfield in the State in May 1966. Small oilfields at Blina near Derby and at Mt Horner near Dongara began commercial production in October 1983 and June 1984 respectively. Production in 1983-84 (including a small amount produced from the Dongara and Blina fields) was 1,290,000 kilolitres. The crude oil is refined at Kwinana south of Fremantle.

A *natural gas* field at Dongara, about 100 kilometres south-east of Geraldton was declared commercially viable in July 1970. A 410-kilometre pipeline has supplied gas to domestic and industrial users in Perth and heavy industry at Kwinana and Pinjarra since December 1971. Since mid 1982 supplies have been supplemented by the Woodada gas field sixty kilometres south of the Dongara field. Production of natural gas in 1983-84 (excluding field usage) was 1,011 million kilolitres. In 1980, commercial development of the more significant natural gas field on the North West Shelf commenced. This field is recognised as one of the largest in the world. Gas is piped from 130 kilometres off-shore to a treatment plant near Dampier, and from there 1,500 kilometres southwards to service industrial and domestic users in Perth and the South-West. The local phase of the project came on stream in mid 1984, with planned gas production of 10.9 million kilolitres a day. The second and larger stage, unlikely to be completed until 1989, involves the production and export of liquefied natural gas. The total estimated cost of the project is over \$11,000 million. Exploration for petroleum throughout the State has intensified since 1979 (see following section *Petroleum Exploration*) and a number of oil and/or gas discoveries are currently being evaluated.

*Bauxite* deposits at Jarrahdale in the Darling Range near Perth were first mined in 1959, and in 1963 the mine began supplying ore to an alumina refinery at Kwinana. Mining commenced further south in the Darling Range in 1972 to supply a new refinery near Pinjarra which began operations in April 1972. Bauxite/alumina projects at Wagerup and Worsley, in the southern region of the Darling Range were commissioned in early 1984 while evaluation of a bauxite deposit at Mitchell Plateau in the far north of the State is currently under way. The production of alumina extracted from bauxite (including a small amount from the Worsley site) was 4,355,000 tonnes at an estimated value of \$796.7 million.

*Mineral sands* are mined and treated at Capel, south of Perth and at Eneabba, to the north, with some further treatment, at Bunbury and Geraldton respectively, prior to export. Ilmenite concentrates are the major product from Capel, whereas the major products from the Eneabba area are rutile and zircon concentrates. Monazite, leucosene and xenotime concentrates are also produced. In 1983-84 ilmenite production was 957,787 tonnes, rutile 51,661 tonnes, and zircon 286,859 tonnes. Major expansion projects are currently underway with synthetic rutile plants being developed at Geraldton and Capel. The total value of mineral sands produced was \$88.0 million, an increase of 11.1 per cent from the previous year.

Production of *coal* in Western Australia occurs at Collie in the south-west of the State. The coal is sub-bituminous and there are substantial reserves in the area which have been deep-mined since the 1890s. Surface mining was introduced in 1943. In 1983-84 production from surface and underground mines totalled 3,942,000 tonnes valued at \$106.3 million. Large increases in the price of petroleum have resulted in a growth in the demand for coal, particularly for power generation, and coal output has increased considerably since 1974, having been fairly stable at around one million

tonnes per annum for a number of years. During the same period, the value of coal per tonne has also increased significantly, as has the amount spent on exploration for coal. This has resulted in several large finds of brown coal (lignite) which are currently being evaluated.

*Copper* and *zinc* have been mined at Teutonic Bore, 250 kilometres north of Kalgoorlie. Although mining operations ceased in December 1984, treatment of stockpiled ore continued until November 1985. Exploration activities have not revealed significant new ore bodies. Production in 1983-84 was 59,387 tonnes of zinc concentrate containing 30,817 tonnes of zinc, and 42,449 tonnes of copper concentrates containing 9,417 tonnes of copper. Significant amounts of copper also occur in nickel concentrates, together with cobalt and precious metals. The Teutonic Bore mine was also the State's leading producer of *silver*, accounting for over 85 per cent of the 35.8 million grams produced in 1983-84, the balance of silver production being a by-product of gold and nickel mining.

*Common salt* (sodium chloride) is produced by solar evaporation at Port Hedland, Dampier, Useless Loop in Shark Bay and Lake MacLeod near Carnarvon. Most of the salt produced is exported. Production in 1983-84 was 4,473,000 tonnes valued at \$65.1 million.

The first commercial *diamond* prospect was discovered south of Lake Argyle in September 1979 following extensive exploration and evaluation work in the Kimberley region. Commercial production of diamonds began on alluvial leases at Argyle in January 1983 and the main deposit in kimberlite pipe (AK-1) commenced production in 1985. The deposits are rich by world standards and when in full production an estimated 25 million carats of diamonds will be produced annually. A high proportion of this will be industrial stones. Production in 1983-84 was 6.91 million carats.

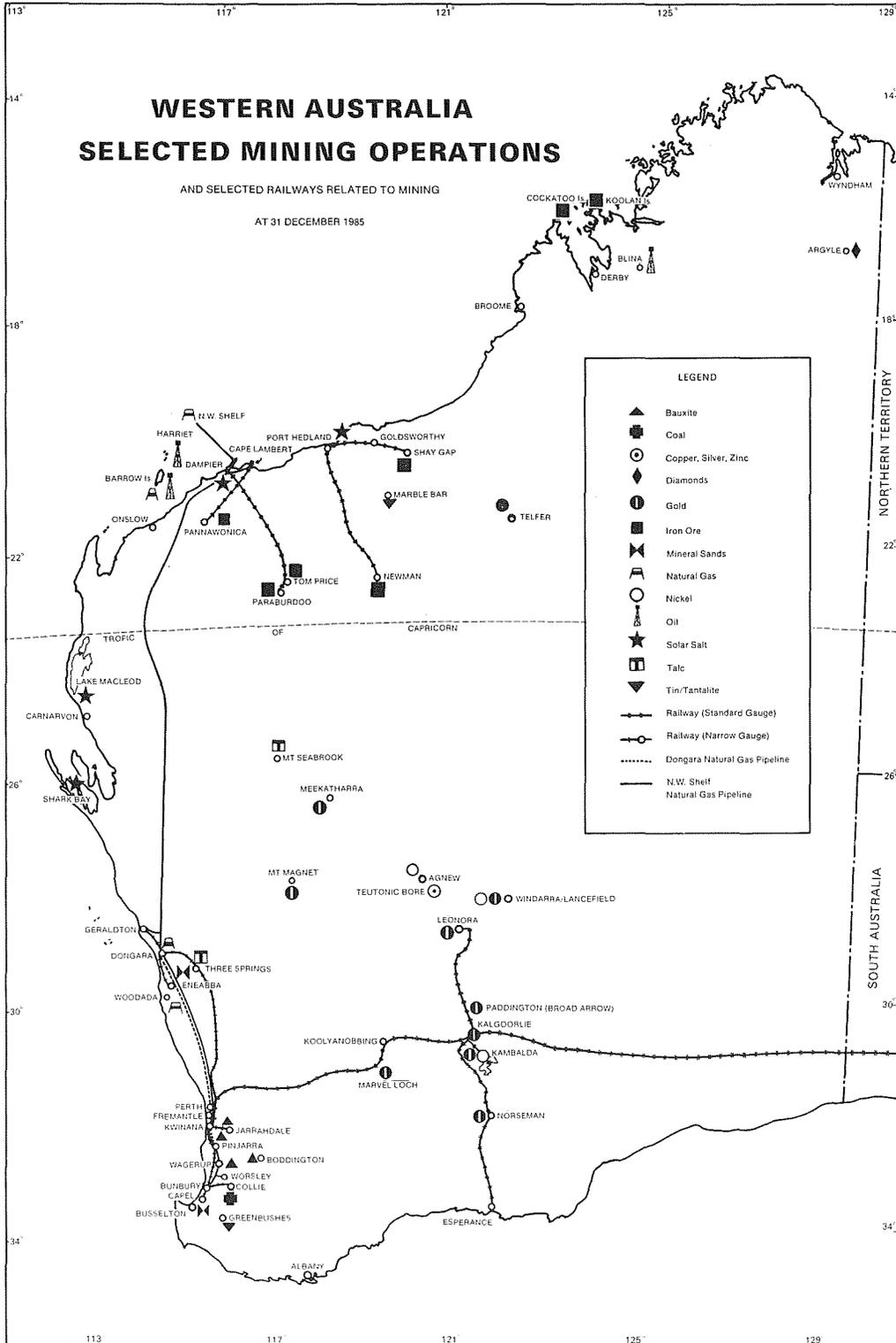
Among other minerals produced in Western Australia are *tin* and *tantalite-columbite* which were discovered at Greenbushes, in the south-west, in 1888 and 1893 respectively. Deposits of these minerals are also mined in the Pilbara region, in the north-west of the State. Production of 654 tonnes of tin concentrate valued at \$6.35 million was recorded in 1983-84, while output of tantalite-columbite concentrate was 91,834 kilograms, valued at \$2.41 million. A tantalite ore body announced at Greenbushes in late 1980 is thought to be the largest such deposit in the world. Development of the mine commenced in mid 1984. *Talc* is produced from deposits at Three Springs, south-east of Geraldton, and at Mount Seabrook near the upper Murchison River. Production in 1983-84 totalled 159,443 tonnes. *Lead* and *manganese* have been mined in significant quantities in the past but activity has declined in recent years.

The quarrying of *construction materials* in Western Australia is an important part of the mining industry. However, materials such as sand and gravel, which are in very plentiful supply, are not included in mining statistics because of difficulties in compiling reliable data. In 1983-84 the value of recorded production of crushed and broken stone (used mainly for roads, concrete and rail ballast) and crushed and broken limestone, was \$34.9 million. Production of 616,318 tonnes of *gypsum* valued at \$4.9 million was recorded in 1983-84. Other industrial minerals mined in Western Australia include limestone, spodumene, silicon, garnets, various clays and magnesite.

Apart from these minerals, a number of deposits of other minerals exist in Western Australia and may be developed in the future. These include uranium, tungsten, vanadium and silicon.

#### MINING STATISTICS

In the Australian Standard Industrial Classification, 'mining' is used in the broad sense to include the extraction of minerals occurring naturally as solids such as coal and ores, liquids such as crude petroleum, or gases such as natural gas, by such processes as underground mining, open-cut extraction, quarrying, operating of wells or evaporation pans, dredging or recovering from ore dumps or tailings. Establishments engaged mainly in dressing or beneficiating ores or other minerals by crushing, milling, screening, washing, flotation, other (including chemical) beneficiation processes and natural gas absorption and purifying are included. Excluded are establishments engaged mainly in the refining or smelting of ores (other than the preliminary smelting of gold) and in the manufacture of such products of mineral origin as coke, cement or fertilisers. Data for these industries are included in Chapter 17, Manufacturing.



Mining statistics presented in the following tables are derived from the integrated economic censuses of mining described in the introduction to this Chapter. Definitions of the items in these tables are also given in the introduction. It should be noted that the tables relate only to mining establishments (i.e. establishments at which mine development has commenced) and exclude mining leases at which only exploration is being carried out. The statistics, however, cover all exploration which continues on leases on which development or production has commenced. Separate details of exploration expenditure both on and off production leases are given in tables later in this Chapter.

The year-by-year comparisons in the following tables indicate that the growth in the mining industry evident in recent years continued into 1983-84, with a 10.2 per cent rise in value added.

MINING ESTABLISHMENTS — SUMMARY OF OPERATIONS BY INDUSTRY  
SUB-DIVISION: 1983-84

Industry sub-division		Number of establishments operating at 30 June	Persons employed (a)			Wages and salaries \$'000
ASIC code (b)	Description		Males	Females	Total	
11	Metallic minerals	119	12,565	1,431	13,996	365,650
12 - 13	Coal, oil and gas	10	2,073	305	2,378	66,881
14	Construction materials	36	354	72	426	8,997
15	Other non-metallic minerals	43	797	129	926	24,428
Total mining		208	15,789	1,937	17,726	465,956

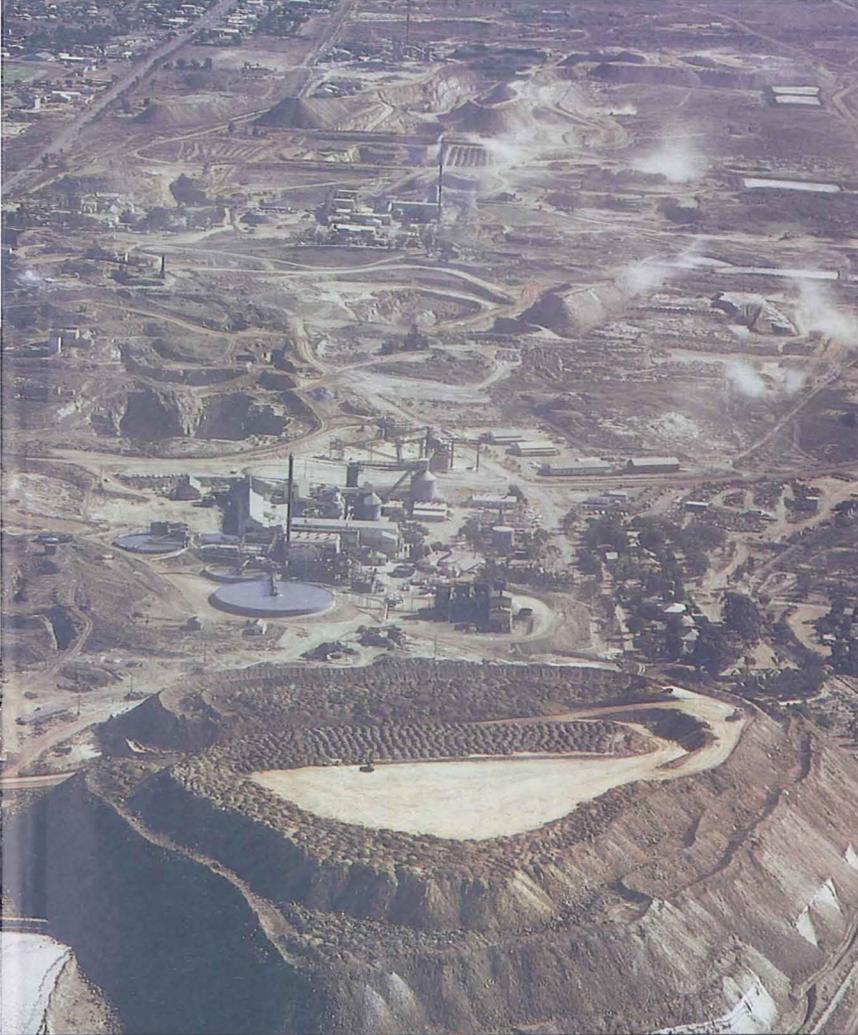
Industry sub-division		Stocks			Purchases, transfers in and selected expenses	Value added	Fixed capital expenditure
ASIC code (b)	Description	Turnover	Opening	Closing			
		\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
11	Metallic minerals	2,635,230	379,793	296,756	1,084,284	1,467,908	238,657
12 - 13	Coal, oil and gas	386,112	16,698	32,789	88,219	313,983	366,832
14	Construction materials	41,531	5,275	5,546	19,630	22,172	819
15	Other non-metallic minerals	156,816	33,619	53,509	67,093	109,612	60,340
Total mining		3,219,688	435,385	388,600	1,259,226	1,913,676	666,648

(a) Average over whole year. (b) Australian Standard Industrial Classification.

MINING ESTABLISHMENTS — SUMMARY OF OPERATIONS

Item	Unit	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Number of establishments operating at 30 June	No.	135	153	166	176	193	208
Persons employed (a)							
Males	No.	12,594	13,127	14,554	15,359	15,204	15,789
Females	No.	1,202	1,456	1,846	1,947	1,913	1,937
Total	No.	13,796	14,583	16,400	17,306	17,117	17,726
Wages and salaries	\$'000	220,015	265,378	339,430	407,449	428,393	465,956
Turnover	\$'000	1,650,015	1,934,435	2,300,736	2,369,925	2,853,353	3,219,688
Closing stocks	\$'000	155,949	191,821	298,251	332,117	427,909	388,600
Purchases, transfers in and selected expenses	\$'000	687,298	803,324	973,688	1,071,358	1,216,002	1,259,226
Value added	\$'000	949,865	1,165,283	1,434,494	1,333,407	1,736,757	1,913,676
Fixed capital expenditure	\$'000	337,736	167,637	620,405	861,210	986,958	666,648

(a) Average over whole year.



technological advances have given rise to a resurgence in gold mining over recent years. The 'Golden Mile' between Kalgoorlie and Boulder has increased production following the opening of a number of new and refurbished mines.

*photograph: Richard Woldendorp; Photo Index*

PLATE 10 — Pouring molten gold into bars.  
*photograph: Roger Garwood; Photo Index*





PLATE 11 — The Swan River, looking upstream from Perth Water over Heirisson Island and the Causeway. Perth's new casino on Burswood Island can be seen under construction to the right.

photograph: Richard Woldendorp; Photo Index

PLATE 12 — The Second Board Market established at the Perth Stock Exchange in June 1984 was the first in Australia.

photograph: Australian Information Service



The relative importance of metallic mineral mining in Western Australia compared with Australia is clearly illustrated in the following table. This table also reflects the greater importance of coal and petroleum mining in some other States compared with Western Australia. The relatively low contribution by construction materials in Western Australia, by comparison with Australia, is partly the result of sand and gravel not being included in the Western Australian figures.

MINING ESTABLISHMENTS — PERSONS EMPLOYED AND VALUE ADDED BY INDUSTRY  
SUB-DIVISION: WESTERN AUSTRALIA AND AUSTRALIA, 1983-84

Sub-division		Persons employed (a)				Value added			
		Western Australia		Australia		Western Australia		Australia	
ASIC code (b)	Description	No.	Per cent	No.	Per cent	\$'000	Per cent	\$'000	Per cent
11	Metallic minerals	13,996	79.0	31,116	40.1	1,467,908	76.7	2,763,471	31.3
12 - 13	Coal, oil and gas	2,378	13.4	37,743	48.6	313,983	16.4	5,487,935	62.2
14	Construction materials	426	2.4	5,994	7.7	22,172	1.2	380,387	4.3
15	Other non-metallic minerals	926	5.2	2,775	3.6	109,612	5.7	193,565	2.2
Total mining		17,726	100.0	77,628	100.0	1,913,676	100.0	8,825,357	100.0

(a) Average over whole year. (b) Australian Standard Industrial Classification.

MINING ESTABLISHMENTS — SUMMARY OF OPERATIONS  
WESTERN AUSTRALIA AND AUSTRALIA

Particulars	Year	Number of establishments operating at 30 June	Persons employed (a)	Wages and salaries	Turnover	Value added
Western Australia	1978-79	135	13,796	220,015	1,650,015	949,865
	1979-80	153	14,583	265,378	1,934,435	1,165,283
	1980-81	166	16,400	339,430	2,300,736	1,434,494
	1981-82	176	17,306	407,449	2,369,925	1,333,407
	1982-83	193	17,117	428,393	2,853,353	1,736,757
	1983-84	208	17,726	465,956	3,219,688	1,913,676
Australia	1978-79	1,368	67,857	1,096,055	6,561,020	4,406,881
	1979-80	1,448	71,924	1,285,502	8,041,951	5,484,252
	1980-81	1,514	77,788	1,594,480	9,329,118	6,224,402
	1981-82	1,490	80,371	1,881,575	10,198,608	6,697,670
	1982-83	1,542	78,756	2,063,124	11,901,085	8,146,613
	1983-84	1,630	77,628	2,128,562	13,524,166	8,825,357
Western Australia as a percentage of Australia		Per cent	Per cent	Per cent	Per cent	Per cent
	1978-79	9.7	20.33	20.07	25.15	21.55
	1979-80	10.57	20.28	20.64	24.05	21.25
	1980-81	10.96	21.08	21.29	24.66	23.05
	1981-82	11.81	21.53	21.66	23.20	19.85
	1982-83	12.52	21.73	20.76	23.98	21.32
1983-84	12.76	22.83	21.89	23.81	21.68	

(a) Average over whole year.

The preceding tables indicate that mining establishments in Western Australia are generally larger than those in the rest of Australia and output per worker is generally higher, mainly because of the comparative magnitude and capital-intensive nature of the mining projects in Western Australia.

The importance of iron ore to Western Australia is shown in the following table. Iron ore surpassed gold as the mineral with the highest annual value of production in 1966, but lower prices in 1983-84 led to iron ore being less than half the annual value of the State's mineral production for the first time since 1967-68. Other noteworthy features are the significant increase in the value of gold production because of large increases in the price of this commodity and the general increase in production of mineral sands and diamonds in 1983-84.

## MINERAL PRODUCTION — QUANTITY AND EX-MINE VALUE

Mineral	Unit	1981-82		1982-83		1983-84	
		Quantity	Value	Quantity	Value	Quantity	Value
Bauxite	'000 tonnes	11,907	n.p.	n.p.	n.p.	n.p.	n.p.
Clays — all kinds (a)	'000 tonnes	1,737	6,634	1,333	5,979	1,205	6,108
Coal	'000 tonnes	3,434	75,132	3,903	95,529	3,942	106,325
Construction materials —							
Building and monumental stone	'000 tonnes	49	650	37	572	n.p.	n.p.
Crushed and broken stone	'000 tonnes	6,493	51,081	3,411	30,279	3,221	29,286
Crushed and broken limestone	'000 tonnes	1,672	4,596	1,694	6,539	1,727	5,668
Copper concentrate	tonne	31,482	n.p.	55,127	n.p.	42,440	n.p.
Crude oil (b)	'000 kilolitres	1,238	122,626	1,325	n.p.	1,290	n.p.
Diamonds	'000 carats	350	n.p.	2,749	n.p.	6,906	n.p.
Felspar	tonne	2,646	n.p.	n.p.	n.p.	n.p.	n.p.
Gold bullion	'000 grams	19,324	181,883	26,617	325,188	31,061	362,930
Gypsum	tonne	446,365	5,024	398,007	5,395	616,318	4,901
Iron ore	'000 tonnes	82,524	1,079,814	75,338	1,355,296	72,604	1,166,341
Limestone for industrial purposes (c)	'000 tonnes	1,834	6,822	1,253	4,880	n.p.	n.p.
Manganese ore	tonne	596	15	—	—	—	—
Mineral sands —							
Ilmenite	tonne	1,198,537	36,136	896,131	26,230	957,787	36,030
Leucoxene	tonne	20,267	4,200	14,364	2,889	15,409	2,958
Monazite	tonne	11,042	4,479	10,932	4,725	15,604	6,483
Rutile	tonne	74,038	21,491	72,609	n.p.	51,661	13,469
Xenotime	tonne	58	218	n.p.	n.p.	48	246
Zircon	tonne	311,051	24,647	279,751	27,264	286,859	28,802
Natural gas (d)	'000 kilolitres	838,217	30,436	1,029,625	n.p.	1,010,800	n.p.
Nickel concentrate	tonne	423,438	n.p.	483,283	n.p.	505,947	n.p.
Ochre	tonne	386	7	—	—	—	—
Salt	'000 tonnes	3,989	42,799	4,154	54,311	4,473	65,101
Semi-precious stones	40	..	73	..	118	..	66
Silica	tonne	148,701	800	260,597	1,148	269,742	1,325
Spodumene	tonne	..	..	1,747	19	4,593	885
Talc	tonne	84,773	n.p.	107,891	n.p.	159,443	n.p.
Tantalite-columbite concentrate	kilogram	262,675	11,091	149,311	3,971	91,834	2,411
Tin concentrate	tonne	1,023	8,517	731	6,331	654	6,349
Zinc concentrate	tonne	59,982	n.p.	71,528	n.p.	59,387	n.p.
Other (value only) (e)	305,976	..	348,594	..	596,756	..	738,637
Total value	..	..	2,067,762	..	2,553,400	..	2,584,321

(a) Includes attapulgit. (b) Value for 1981-82 based on price per barrel published by Ampol Petroleum Limited. (c) Comprises limestone for agriculture, cement making, flux, glass making and lime burning. (d) 1981-82 figure includes field usage. (e) Includes those minerals for which values are not available for publication.

The following table sets out the contents of selected metallic minerals produced. Variations in the contents data shown in this table are, by and large, reflections of variations in production of the parent mineral.

MINERAL PRODUCTION  
CONTENTS OF SELECTED METALLIC MINERALS

Mineral in which contained	1981-82	1982-83	1983-84
COPPER (tonnes)			
Copper concentrate	7,167	12,533	9,417
Nickel concentrate	2,848	3,532	3,808
Total, Copper	10,015	16,065	13,225
GOLD ('000 grams)			
Gold bullion	15,938	22,116	25,905
Nickel concentrate	197	n.p.	277
Total, Gold	16,135	n.p.	26,182
IRON ('000 tonnes)			
Iron ore	52,074	49,003	46,067
Total, Iron	52,074	49,003	46,067

MINERAL PRODUCTION  
CONTENTS OF SELECTED METALLIC MINERALS  
— *continued*

Mineral in which contained	1981-82	1982-83	1983-84
MONAZITE (tonnes)			
Monazite concentrate	10,271	10,166	14,511
Total, Monazite	10,271	10,166	14,511
NICKEL (tonnes)			
Nickel concentrate	50,321	58,643	59,842
Total, Nickel	50,321	58,643	59,842
SILVER ('000 grams)			
Copper concentrate	22,383	28,852	25,005
Gold bullion	2,512	3,425	4,611
Nickel concentrate	255	369	370
Zinc concentrate	9,115	7,217	5,868
Total, Silver	34,265	39,863	35,854
TANTALITE-COLUMBITE (kilograms)			
Tantalite-columbite concentrate	(a) 129,635	(a) 78,975	(a) 50,013
Total, Tantalite-columbite	(a) 129,635	(a) 78,975	(a) 50,013
TIN (tonnes)			
Tin concentrate	721	512	460
Total, Tin	721	512	460
TITANIUM DIOXIDE (tonnes)			
Ilmenite concentrate	697,007	518,151	580,514
Leucosene concentrate	18,330	12,945	13,954
Rutile concentrate	71,080	n.p.	49,374
Total, Titanium dioxide	786,417	n.p.	643,842
ZINC (tonnes)			
Zinc concentrate	30,383	36,903	30,817
Total, Zinc	30,383	36,903	30,817
ZIRCONIUM OXIDE (tonnes)			
Zircon concentrate	201,311	184,589	192,295
Total, Zirconium oxide	201,311	184,589	192,295

(a) Includes a small amount contained in tin concentrate.

## EXPLORATION FOR MINERALS

### Mineral Exploration (other than for Petroleum)

The data in this section have been derived from the annual Mineral Exploration Census (excluding Petroleum Exploration) which is carried out by the Australian Bureau of Statistics. The first census was conducted in respect of the year 1965 and for further information and statistics in greater detail, the reader is referred to the publication *Mineral Exploration, Australia* (Catalogue No. 8407.0) issued by the Australian Statistician, Canberra.

For the purposes of the census, mineral exploration consists of the search for and appraisal of new ore occurrences and known deposits of minerals (including extensions to deposits being worked) by geological, geophysical, geochemical, and other methods, including drilling. Exploration for

water and oil shale is excluded. The construction of shafts and adits is included if primarily for exploration purposes. Excluded are mine development activities (which include the construction of drives, shafts, winzes, etc.) in underground mines and the preparation of quarrying sites for open-cut extraction (including overburden removal) carried out primarily for the purpose of commencing or extending mining and quarrying operations.

Mineral exploration (other than for petroleum), covers a major portion of the State and is concerned chiefly with exploration for iron, nickel, copper, zinc, gold, lead, tin, bauxite, mineral sands, uranium, diamonds and coal.

In the following tables, the first gives details of private exploration in Western Australia for 1983-84, and the second table gives details of private and State Government exploration in Western Australia over the period 1978-79 to 1983-84.

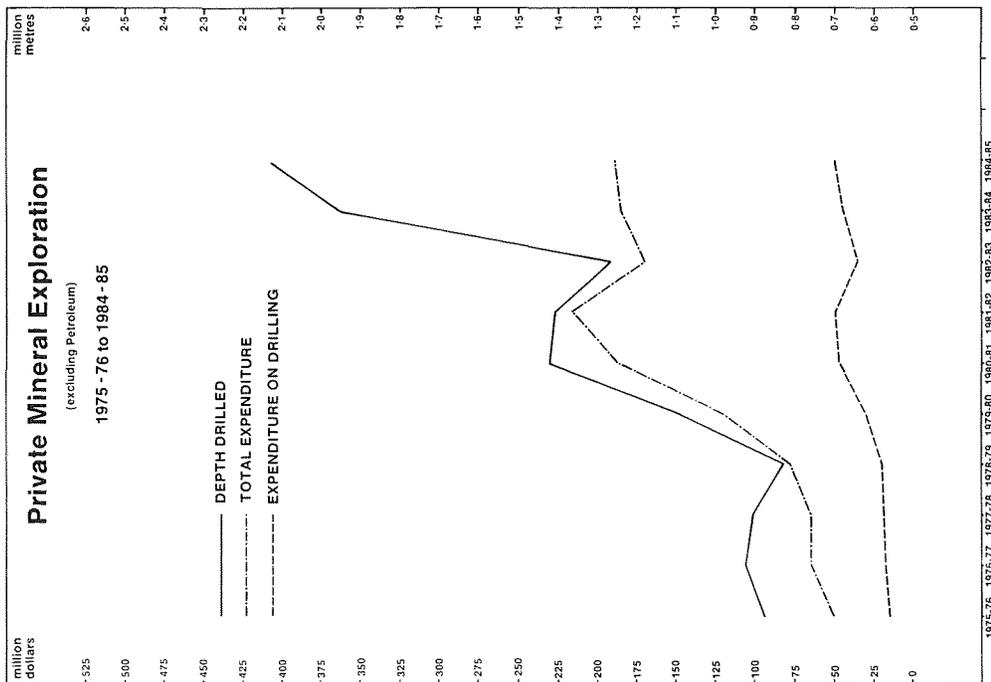
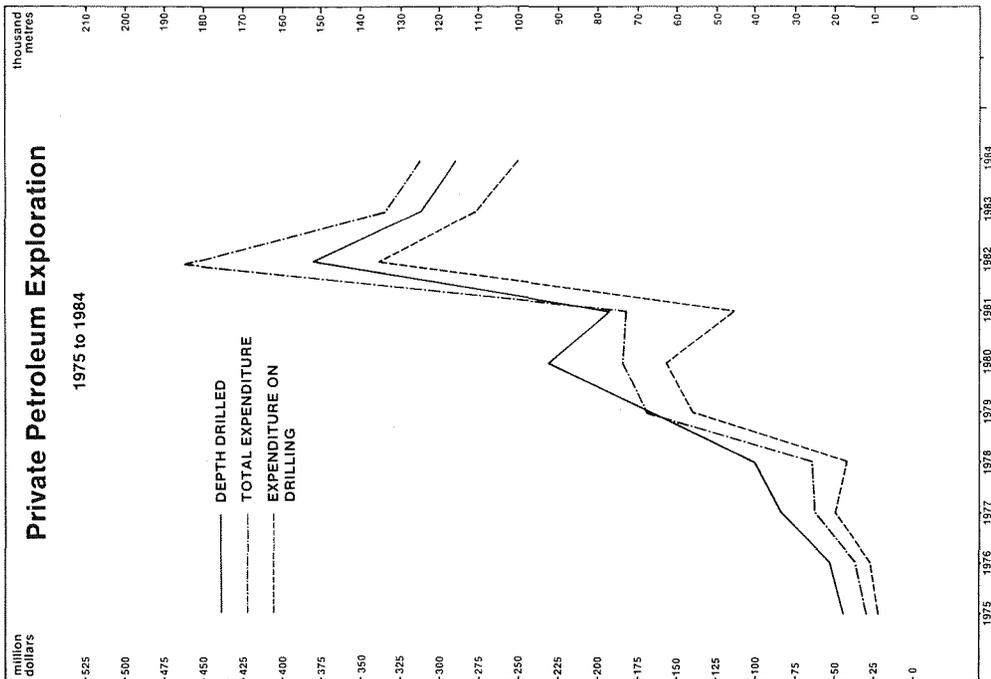
PRIVATE MINERAL EXPLORATION (OTHER THAN FOR PETROLEUM)  
EXPENDITURE AND DRILLING: 1983-84

Particulars	Private exploration		
	On produc- tion leases	On other areas	Total
Exploration expenditure (\$'000) —			
Wages and salaries	4,357	34,871	39,228
Stores, materials and fuels purchased	2,773	18,464	21,237
Payments to contractors, consultants, etc.	8,929	53,925	62,854
Other current expenses	1,857	48,608	50,465
Net capital expenditure	857	10,058	10,915
Total	18,773	165,926	184,699
Drilling expenditure (a) (\$'000) —			
On core drilling	7,103	15,512	22,615
On non-core drilling	4,266	17,350	21,616
Total	11,369	32,862	44,231
Drilling operations ('000 metres) —			
Core drilling	144	373	517
Non-core drilling	196	1,237	1,433
Total	340	1,610	1,950

(a) Included in 'Exploration expenditure' above.

From 1965, expenditure on private exploration in Western Australia rose from \$3,948,000 to a peak of \$86,082,000 in 1970-71. This peak came as the culmination of a period of activity which commenced with the discovery of nickel at Kambalda in 1966 and during which there was a significant increase in expenditure on mineral exploration. This period, which became known as the 'nickel boom', was followed by a period of declining exploration activity, and by 1975-76 private exploration expenditure had fallen to \$50,123,000. Notwithstanding the rate of inflation throughout the 1970s, it was not until 1979-80, when private expenditure on exploration reached \$118,574,000, that the peak of 1970-71 was exceeded. Strong growth in exploration for gold and diamonds was largely responsible for exploration expenditure reaching \$216,946,000 in 1981-82. 1982-83 saw a substantial drop to \$171,477,000. In 1983-84, exploration expenditure rose to \$184,699,000, an increase of 8.4 per cent over the previous year. Expenditure on drilling has fluctuated similarly, with the 1970-71 expenditure of \$21,507,000 remaining as the highest on record until 1979-80. The 1981-82 figure was a record \$49,315,000, but 1982-83 saw a considerable drop to \$35,297,000. In 1983-84 drilling expenditure increased to \$44,231,000. Actual drilling activity, as measured in terms of metres drilled, shows an almost continuous decline from 1971-72 to 1978-79. Since then, drilling activity has increased significantly, 1,950,000 metres being drilled in 1983-84.

These fluctuations in expenditure and depth drilled are clearly evident in the graphs which follow.



MINERAL EXPLORATION (OTHER THAN FOR PETROLEUM) (a)  
EXPENDITURE AND DRILLING

Particulars	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Exploration expenditure (\$'000) —						
Wages and salaries	17,693	25,171	34,087	43,263	38,982	39,228
Stores, materials and fuels purchased	8,151	15,908	25,640	18,499	14,741	21,237
Payments to contractors, consultants, etc.	25,943	43,166	66,749	89,462	55,553	62,854
Other current expenses	21,875	27,903	46,168	47,230	39,963	50,465
Net capital expenditure	3,880	7,344	14,938	18,491	22,238	10,915
Total	77,541	119,493	187,583	216,946	171,477	184,699
Drilling expenditure (b) (\$'000) —						
On core drilling	11,052	17,390	24,414	30,940	18,966	22,615
On non-core drilling	7,618	10,978	21,820	18,374	16,331	21,616
Total	18,671	28,368	46,234	49,315	35,297	44,231
Drilling operations ('000 metres) —						
Core drilling	187	352	395	443	366	517
Non-core drilling	637	739	1,029	966	900	1,433
Total	824	1,091	1,423	1,409	1,266	1,950

(a) Includes exploration by the Western Australian Department of Mines from 1978-79 to 1982-83. (b) Included in 'Exploration expenditure' above.

The two tables that follow show details of private exploration classified by the type of mineral sought and by the size of the enterprise group involved in the exploration. From the first table it can be seen that, until recently, nearly all mineral exploration activity (apart from petroleum exploration) was directed to seeking metallic minerals. More recently, an increasing proportion of exploration expenditure is being directed to the search for diamonds and coal, although since 1980-81 the individual mineral attracting the highest exploration expenditure was gold. Exploration expenditure on gold accounted for 54 per cent of the total expenditure in 1983-84.

The most notable feature of the second table is the predominance of the larger enterprise groups in mineral exploration. Expenditure on exploration by enterprise groups spending in excess of two and a half million dollars was 52 per cent of total expenditure in 1983-84, although such groups accounted for only 3.5 per cent of the number of explorers.

PRIVATE MINERAL EXPLORATION (OTHER THAN FOR PETROLEUM)  
EXPENDITURE BY TYPE OF MINERAL SOUGHT  
(\$'000)

Type of mineral sought	Total private exploration					
	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Iron ore	7,991	10,379	14,383	15,138	10,061	n.p.
Mineral sands	183	425	826	1,055	615	n.p.
Uranium	10,058	11,489	12,044	14,661	11,851	9,790
Copper, lead, zinc, silver, nickel and cobalt	40,943	35,826	45,943	47,144	34,050	35,852
Gold		21,520	49,002	56,864	55,888	99,841
Tin/tungsten		2,418	3,573	2,538	1,340	1,546
Other metallic minerals		3,317	7,279	11,909	5,478	3,630
Coal		1,438	4,709	11,965	14,266	6,728
Construction materials	12	82	220	110	77	52
Diamonds	16,145	26,886	40,334	51,342	43,332	15,961
Other non-metallic minerals		1,523	1,112	1,044	961	1,870
Total	76,769	118,574	186,681	216,072	170,380	184,699

PRIVATE MINERAL EXPLORATION (OTHER THAN FOR PETROLEUM)  
ENTERPRISE GROUPS (a) CLASSIFIED BY SIZE OF EXPENDITURE

Size of total expenditure of enterprise groups on mineral exploration	Expenditure						Enterprise groups	
	On production leases		On other areas		Total exploration			
	\$'000	Per cent	\$'000	Per cent	\$'000	Per cent	No.	Per cent
1982-83								
\$10,000 and under	29	—	552	0.3	580	0.3	157	37.8
\$10,001 to \$25,000	166	0.1	990	0.6	1,156	0.7	70	16.9
\$25,001 to \$50,000	202	0.1	1,194	0.7	1,396	0.8	39	9.4
\$50,001 to \$100,000	430	0.3	1,881	1.1	2,312	1.4	33	8.0
\$100,001 to \$250,000	1,199	0.7	4,761	2.8	5,960	3.5	37	8.9
\$250,001 to \$500,000	1,158	0.7	10,150	6.0	11,308	6.6	29	7.0
\$500,001 to \$1,000,000	1,853	1.1	11,059	6.5	12,913	7.6	19	4.6
\$1,000,001 to \$2,500,000	3,797	2.2	41,439	24.3	24,859	14.6	18	4.3
\$2,500,001 to \$5,000,000					20,377	12.0	7	1.7
Over \$5,000,000	21,151	12.4	68,368	40.1	89,519	52.5	6	1.4
Total 1982-83	29,985	17.6	140,395	82.4	170,380	100.0	415	100.0
1983-84								
\$10,000 and under	50	—	468	0.3	518	0.3	118	27.3
\$10,001 to \$25,000	80	—	997	0.6	1,077	0.6	66	15.3
\$25,001 to \$50,000	348	0.2	1,421	0.8	1,769	1.0	49	11.3
\$50,001 to \$100,000	489	0.3	2,862	1.5	3,351	1.8	46	10.6
\$100,001 to \$250,000	1,944	1.0	7,009	3.8	8,953	4.8	53	12.2
\$250,001 to \$500,000	899	0.5	9,612	5.2	10,511	5.7	29	6.7
\$500,001 to \$1,000,000	2,348	1.3	21,392	11.6	23,740	12.9	34	7.8
\$1,000,001 to \$2,500,000	6,200	3.4	64,171	34.7	37,089	20.1	23	5.3
\$2,500,001 to \$5,000,000					33,282	18.0	9	2.1
Over \$5,000,000	6,415	3.5	57,994	31.3	64,409	34.8	6	1.4
Total 1983-84	18,773	10.2	165,926	89.8	184,699	100.0	433	100.0

(a) For the purposes of this table, the total exploration activities of an enterprise group (i.e. a group of companies which are related in terms of the Companies Act) are considered to relate to a single unit, irrespective of the number of returns completed or the number of types of activity in which it engaged.

### Petroleum Exploration

Petroleum exploration is defined as consisting of the search for, and appraisal of, deposits of crude oil and gas by geological, geophysical, geochemical and other means, including drilling. Included in the expenditure are the costs of drilling and testing exploratory oil and gas wells. Also included are the costs of access roads, site construction, permits, licences and similar fees, relevant office buildings and furniture, transportation equipment, storage facilities, plant and equipment and review work if primarily for the purposes of exploration for deposits of crude oil or natural gas. Details of drilling developmental wells and expenditure on production facilities, and pipelines, and production costs, etc. are excluded.

An extensive programme of oil exploration commenced in 1952 and resulted in the discovery of flow oil in the Exmouth Gulf area of the Carnarvon Basin in 1953. The discovery proved to be of non-commercial significance, but it stimulated further exploration for oil in Western Australia. In 1964 crude oil was discovered at Barrow Island and commercial production commenced in 1966. The discovery of natural gas at Dongara in 1966 formed the basis of supplies currently piped to the Perth area and nearby industrial users. Very large deposits of natural gas were discovered in 1972 on the North West Shelf, offshore from Dampier and these deposits are currently under development. More recently, further discoveries of oil and/or gas have been made at a number of locations both onshore and offshore, and, as the tables below indicate, exploration activity has been at a very high level. Major events in 1983-84 included the commencement of oil production in the Canning Basin from the Blina oilfield, the start of development drilling on the North Rankin gasfield, and the small oil discoveries in the North Herald, South Pepper, Bambra, Chervil and Harriet wells in the offshore Canning Basin.

Information on petroleum exploration expenditure and on drilling in Western Australia for the six years 1978 to 1983 is given in the tables below. These figures have been compiled from data published by the Bureau of Mineral Resources, Geology and Geophysics.

The tables show a significant increase in exploration expenditure in recent years, reaching a peak in 1982 and falling off to \$336,038,000 in 1983, a decrease of 27.5 per cent over the previous year.

PRIVATE PETROLEUM EXPLORATION EXPENDITURE  
(\$'000)

Private expenditure	1978	1979	1980	1981	1982	1983
Geological	1,187	1,163	717	2,733	5,336	2,370
Geophysical	16,306	14,247	16,750	46,886	77,513	24,745
Drilling	42,669	140,284	156,341	112,762	341,204	277,917
Other	4,697	12,972	9,455	19,509	39,323	31,006
Total	64,859	168,666	183,263	181,890	463,376	336,038

PRIVATE PETROLEUM EXPLORATION — WELLS AND DEPTH DRILLED

Particulars	Unit	1978	1979	1980	1981	1982	1983
Wells —							
Drilled (i.e. those which reached final depth) —							
As oil producers	No.	2	1	9	7	r 12	16
As gas producers	No.	—	—	3	10	r 3	2
As oil and gas producers	No.	—	—	—	—	—	—
Plugged and abandoned	No.	17	17	20	24	r 54	53
Total	No.	19	18	32	41	r 69	71
Average final depth of wells drilled	metre	2,511	3,401	2,400	2,069	r 2,163	1,861
Drilling still in progress at 31 December (uncompleted holes)							
Drilled or drilling over 3,000 metres	No.	9	14	17	8	r 18	12
Depth drilled —							
Completed wells	metre	37,538	58,623	76,807	69,049	140,252	118,818
Uncompleted holes	metre	2,917	7,850	15,789	7,935	11,204	4,823
Total	metre	40,455	66,473	92,596	76,984	151,456	123,641

## Chapter 16

### 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 has resulted in a high demand for transport energy.
- (b) The development and expansion of large scale mining and mineral processing industries since the mid 1960s 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. In 1967 production of crude oil commenced at Barrow Island. The State's energy supply base was further broadened with the commencement of natural gas production at Dongara in 1971. More recently, large deposits of natural gas in the North West Shelf area of Western Australia have been developed, and production from this source commenced in 1984.

In early 1985, several deposits of energy minerals were 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, and this energy self-sufficiency is likely to increase in the immediate future.

#### ENERGY RESOURCES

Western Australia's resources of energy minerals are shown in the table below. To put these resource data into perspective, recent State production data have also been shown.

FUEL MINERALS — RESOURCES AND PRODUCTION  
WESTERN AUSTRALIA  
(Source: Department of Resources and Energy, Bureau of Mineral Resources; Western Australian Department of Mines)

Type	Unit	Resources at 31.12.84	Production 1984-85
Hydrocarbon liquids (a)	million cu m	112	1.4
Natural gas	million cu m	1,009,000	1,903
Black coal	million tonnes	739	3.7
Uranium	tonnes U <sub>3</sub> O <sub>8</sub>	52,000	—

(a) Crude oil, condensate and Liquefied Petroleum Gas (LPG).

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. It should also be noted that the above production data relate to a period immediately following the commencement of production from the North West Shelf project. Annual production of natural gas in particular is therefore subject to significant increases in future years.

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 utilisation 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 (SEC), although significant amounts are also generated by private enterprise. The SEC was formed in 1975, through the combination of the State Electricity Commission of Western Australia (which had been established in 1946) and the Fuel and Power Commission. The SEC has responsibility for ensuring the effective and efficient utilisation of the State's energy resources, and for providing economical and reliable supplies of electricity and gas.

While the SEC has extended its operations to include an increasing number of non-metropolitan towns, increases in non-SEC generation have also occurred. Electricity generation by private enterprise located outside the SEC grid system includes large scale mining operations. This electricity is mainly produced through the use of oil-burning generators, however, greater use of natural gas will occur in future years. Waste process heat is also utilised for generation purposes.

The following table sets out details of electricity production in Western Australia from 1979-80 to 1984-85.

PRODUCTION OF ELECTRICITY — WESTERN AUSTRALIA  
(Million kWh)

	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Generated by —						
Government	5,231	5,543	5,913	6,025	6,212	6,868
Private	n.p.	n.p.	2,204	2,234	2,451	2,757
TOTAL	n.p.	n.p.	8,117	8,259	8,663	9,625

### 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 discovery of crude oil in Western Australia occurred in 1953 in the Exmouth Gulf area. While the discovery proved to be non-commercial, it provided the impetus to further petroleum exploration in the State.

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 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 was being reticulated by the State Electricity Commission and the Fremantle Gas and Coke Company to the Perth Metropolitan area. After investigations had confirmed the commercial viability of the scheme, a pipeline was constructed linking the Dongara field and the metropolitan gas mains system. The replacement of manufactured gas commenced in December 1971 and was completed before the end of 1972.

The Dongara gas pipeline extends to Pinjarra, to the south of Perth, servicing a number of major industrial consumers. Details of natural gas production in recent years are contained in a table in Chapter 15.

The SEC also sells natural gas to the Fremantle Gas and Coke Company, which has a franchise to distribute the gas within an eight kilometre radius from the centre of Fremantle. At 30 June 1985, a total of 5,350 kilometres of gas distribution mains was installed in the SEC's supply area, serving 143,757 customers. Other areas served by SEC gas are Bunbury and Albany on a small scale.

The Dongara natural gas deposits are expected to be substantially depleted by 1987. However, gas from a large new source — the North West Shelf project — became available in the latter half of 1984.

The North West Shelf project had its beginnings in 1963, when petroleum exploration permits covering 367,000 square kilometres of the shelf area were granted to Woodside Oil N.L. An exploration Joint Venture was formed, and preliminary exploration began in 1964. Ten unsuccessful wells were drilled before major gas/condensate (a light crude oil) discoveries were made in 1971 and 1972 at Scott Reef in the Browse Sedimentary Basin, and at North Rankin, Goodwyn and Angel in the Dampier Sub-basin, some 130 kilometres offshore from Dampier.

By December 1985, the Joint Venture had drilled 78 exploration wells, 13 field appraisal wells and 7 developmental wells in an exploration programme costing \$640 million.

The project is based on the utilisation of the North Rankin and Goodwyn gasfields which contain proven recoverable hydrocarbons currently estimated at 300,000 million cubic metres of gas and 40 million cubic metres of condensate. In North Rankin, the first field to be developed, the natural gas 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.

On 30 September 1980, the Joint Venture participants signed contracts to supply 10.9 million cubic metres of natural gas per day for twenty years to the SEC.

In August 1985, export contracts were signed with eight Japanese electric power and gas companies for the sale, at a plateau level of six million tonnes per year, of Liquefied Natural Gas (LNG).

Construction of the offshore and onshore facilities for the North West Shelf gas project is being carried out in two phases. The first is to supply gas to Western Australia, while the second is to supply LNG to Japan.

The total development consists of:

- (a) The North Rankin 'A' drilling and production platform with a capacity to produce 34 million cubic metres of gas per day from 34 wells. The steel structure stands in 125 metres of water and is designed to withstand 23 metre waves and 215 kilometre per hour winds.
- (b) Two other offshore production facilities, a second on North Rankin and one on Goodwyn.
- (c) A 1,016 millimetre pipeline 134 kilometres long to carry the gas and liquids from the platforms to Withnell Bay in the Burrup Peninsula. Future offshore production facilities will connect with the pipeline at North Rankin 'A'.

- (d) A gas treatment and liquefaction plant at Withnell Bay, comprising two domestic gas 'trains' (each capable of meeting daily contract quantities), three condensate stabilisation 'trains' and three LNG 'trains'.
- (e) Storage and loading facilities for LNG and condensate.
- (f) A fleet of seven 125,000 cubic metre capacity LNG vessels.
- (g) Infrastructure items and improved regional and community facilities in the Shire of Roebourne.

When both phases are fully operational at planned plateau production levels, output from the project will include:

- (a) 10.9 million cubic metres of gas per day for the domestic market in Western Australia.
- (b) 6 million tonnes of LNG per year for the Japanese market.
- (c) 1.4 million tonnes of condensate per year.

Construction began in 1980 and the first gas was delivered to domestic markets in Western Australia in August 1984. Construction for the LNG phase, which is expected to provide Australia with export earnings equivalent to its current main export commodities, began in 1985. LNG deliveries to Japan will begin in 1989.

The entire project is expected to cost in the order of \$12,000 million. By the commencement of domestic gas deliveries, \$2,600 million had been invested in exploration and development. Approximately 72 per cent of contracts for the domestic gas phase were sourced in Australia; 63 per cent in Western Australia. Investment in the LNG phase will be spread out over 20 years with \$3,700 million estimated for onshore plant and \$6,100 million for offshore construction. This does not include the cost of ships to transport LNG.

The SEC has constructed a 1,500 kilometre pipeline from Dampier to Wagerup to carry gas to its Perth distribution network, and to major industrial customers in the South-West of the State. A map in Chapter 15 shows the location of the North West Shelf project and of the pipeline. Construction of the pipeline, including installation of ancillary equipment was completed, at a cost of \$930 million, in time for the first deliveries of gas in August 1984. An extension from Wagerup to Bunbury, and a lateral line to Geraldton were completed in 1985.

There is also a number of small operations engaged in production of crude oil. In addition, some natural gas was produced from a small field at Woodada (260 kilometres north of Perth, near the existing Dongara to Perth gas pipeline) immediately prior to commencement of production from the North West Shelf. This latter production enabled the SEC to phase in expanded gas sales contracts prior to commencement of deliveries from the North West Shelf.

Exploration for petroleum in Western Australia has continued at a high level in recent years. Statistics relating to this activity are given in the section *Petroleum Exploration* in Chapter 15. Details of production of crude oil and natural gas are contained in a table in Chapter 15.

Details of sales of petroleum products within Western Australia are set out in the following table. It should be noted that this table relates only to sales of refinery products (whether produced in this State or imported), and hence does not include products such as natural gas, which do not go through a refining process; or crude oil, which is a refinery input.

SALES (a) OF PETROLEUM PRODUCTS — WESTERN AUSTRALIA  
(Source: Department of Resources and Energy)  
(Megalitres)

Product	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
LPG	83	92	81	90	87	95
Aviation gasoline	15	16	15	15	16	16
Automotive gasoline —						
Premium	1,327	1,344	1,390	1,401	1,426	1,471
Regular	89	73	61	54	45	35
Unleaded (b)	..	..	..	..	..	3
Total	1,416	1,417	1,451	1,455	1,471	1,509
Aviation turbine fuel	245	248	268	288	254	255
Lighting kerosene	78	67	58	43	37	36
Heating oil	9	6	3	1	1	1
Automotive diesel oil —						
Inland	1,300	1,392	1,387	1,392	1,423	1,391
Bunkers	54	25	37	54	33	29
Total	1,354	1,417	1,424	1,446	1,456	1,420
Industrial and marine diesel fuel —						
Inland	61	24	13	10	6	4
Bunkers	94	103	64	64	54	66
Total	155	127	77	74	60	70
Fuel oil —						
Inland	1,410	1,100	963	736	983	534
Bunkers	441	448	262	312	238	280
Total	1,851	1,548	1,225	1,048	1,221	814
Lubricating oils and greases	n.a.	n.a.	59	56	54	56
Bitumen	n.a.	n.a.	64	49	54	64
Other products	n.a.	n.a.	57	76	64	70
TOTAL PRODUCTS (c)	5,321	5,045	4,782	4,641	4,775	4,405

(a) Includes reporting companies' own use, but excludes refinery fuel. (b) Sales of unleaded petrol commenced on 1 July, 1985. (c) Prior to 1981-82, does not include lubricating oils and greases, bitumen and other products.

## 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. Production grew steadily to the 1950s; after reaching a peak output of 1,034,000 tonnes in 1954, production slumped, and did not reach the same level again until 1966. Subsequent production increases were minimal until the mid 1970s. The reason for this decline was largely the result of an extended period in which the cost of petroleum fell relative to other fuels. This resulted in the increased use of oil rather than coal in electricity generation and in industry. During this period, coal-powered locomotives were being replaced with diesel-powered units, and during 1971 and 1972, gas manufactured from coal was replaced by natural gas in the Perth area.

The large increases in the world price of crude oil in the 1970s led to an increase in demand for coal as it became a relatively cheaper source of energy. Since 1975 significant production increases have occurred. Production data illustrating the above trends in the coal industry 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. Details of exploration for coal are contained in a table in Chapter 15.

### **Solar Energy**

In a broad sense, 'solar energy' may be taken to encompass a large range of energy sources, such as wind, biomass, wave energy, coal and petroleum products; all of which are ultimately the result of solar energy. In the present discussion of solar energy, consideration will be restricted to those processes which involve the direct interception of solar radiation.

The use of solar energy for the production of domestic hot water is well established in Western Australia, and is the most common application of solar energy. At 30 June 1983, over 20 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. Also there is a well established use of photovoltaic cells which convert light directly into electrical energy for communications equipment in remote localities.

More recent developments have been the use of solar energy for water and space heating in commercial applications. In the goldfields town of Meekatharra, solar energy is being used via a thermal process to augment the local electricity supply. Research into solar energy utilisation is being carried out by a number of organisations. The main thrust of current research is the improvement of conversion efficiencies, and the reduction in capital costs of equipment for conversion and energy storage. Developments in this area could see more widespread usage of solar energy in the future. At present, economic 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, in this context, relates to living matter which can be used as a source of energy. 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.

### **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. Details of amounts expended on uranium exploration in recent years are included in a table in Chapter 15.

### **Wind Energy**

Windpower was of some significance as an energy source in the early days of the settlement of Western Australia. Today it is still used extensively in agricultural and pastoral areas for pumping water for stock. Research is being conducted into extended use of windpower, and a windpowered generator is being used to augment the electricity supply on Rottnest Island.

Owing to its intermittent nature, windpower 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 windpower 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

Research into various aspects of energy is conducted by a number of organisations within the State, and some reference to this has already been made in this Chapter.

The Australian Bureau of Statistics Survey of Research and Experimental Development provided some data relating to energy. Total energy research and experimental development expenditure for Western Australia in 1982-83 was estimated at \$7.3 million (4.7 per cent of the Australian total). Solar energy research and experimental development accounted for 24.2 per cent of this expenditure in Western Australia.

Estimates of manpower expended in energy research and experimental development are detailed in the table below:

ENERGY RESEARCH AND EXPERIMENTAL DEVELOPMENT (a)  
WESTERN AUSTRALIA AND AUSTRALIA: 1982-83  
DETAILS OF MANPOWER BY SECTOR OF PERFORMANCE  
(Man years)

Sector of performance	Australia		Western Australia	
	Number	Per cent	Number	Per cent
Business enterprises —				
Private (b)	917.5	28.5	33.3	39.6
Public	161.6	5.0	6.0	7.1
Total	1,079.1	33.5	39.3	46.7
General Government —				
Commonwealth	1,061.6	32.9	1.0	1.2
State	93.5	2.9	3.0	3.6
Total	1,155.1	35.8	4.0	4.8
Universities	988.1	30.7	40.8	48.5
<b>TOTAL ALL SECTORS</b>	<b>3,222.3</b>	<b>100.0</b>	<b>84.1</b>	<b>100.0</b>

(a) Refers to activity predominantly directed towards producing, storing, transmitting, utilising and conserving energy. (b) Excludes enterprises mainly engaged in agriculture, forestry, fishing and hunting.

The most important energy research organisations in Western Australia are the SEC and the Solar Energy Research Institute of Western Australia (SERIWA).

The SEC is primarily responsible for the efficient and effective utilisation of energy resources available to the State of Western Australia. Consistent with this responsibility it is engaged in an active programme of investigation and evaluation of alternative sources of energy which may become significant in the future. Much of this work, particularly in relation to renewable energy sources, is conducted in conjunction with SERIWA, the SEC providing management of some projects in addition to funding and technical support.

SERIWA is a statutory body established by the Western Australian Government in 1977 to encourage and fund the development of solar energy in the State. It aims to seek and prove economic applications of solar energy, to encourage solar research activities, to assist industry with solar energy product development and to co-ordinate these activities to avoid duplication of effort. A watching brief of solar energy developments in other States and overseas is maintained, with a view to bringing new technologies to Western Australia for test and evaluation. For the purposes of SERIWA's activities, solar energy comprises direct solar energy as well as wind energy, wave energy and biomass-derived sources of energy and energy storage.

SERIWA is funded primarily by the Western Australian Government, with additional funds provided by the National Energy Research Development and Demonstration Council, the SEC, the Department of Aboriginal Affairs and private industry. The total value of projects receiving SERIWA support to June 1985 was approximately \$19.7 million.

SERIWA has established a number of testing facilities, some of which are operated under contract. These facilities, and the institutions responsible for operating them include:

- (a) Corrosion Testing Facility — Western Australian Institute of Technology
- (b) Materials Performance Testing Facility — Western Australian Institute of Technology
- (c) Materials Standards Laboratory — University of Western Australia
- (d) SERIWA Solar Energy Research Centre

In July 1980, SERIWA joined with the SEC in a project to establish a comprehensive solar research centre for the purpose of testing flat plate, concentrating and evacuated tube collectors, solar water heaters and photovoltaic cells. The test facilities were upgraded with the construction of a new Solar Energy Research Centre, which opened in August 1983 on the Western Australian Institute of Technology campus. Tests by SERIWA are conducted on a confidential basis for manufacturers and research workers on prototype devices and products already on the market.

Since 1984, SERIWA has undertaken field trials in remote areas on photovoltaic systems for producing electricity. It is now engaged in developing systems suitable for remote Aboriginal communities, under funding from the Federal Departments of Aboriginal Affairs and Resources and Energy.

SERIWA encourages projects intended to develop or demonstrate uses of solar energy which have potential for economically viable application in the short to medium term. These include projects in the following areas:

- (a) Applications involving the use of photovoltaic cells.
- (b) Energy storage.
- (c) Improvements in building designs to maximise solar energy use and minimise the use of energy from conventional sources.
- (d) Harnessing wind energy.
- (e) Solar collector development to reduce cost and increase performance.
- (f) Thermal systems for using solar energy in commercial and industrial applications.
- (g) Production of alcohol and biogas using various forms of biomass.

In addition to its involvement in solar energy research the SEC has undertaken studies into the use of alternative fuels for power generation and 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.

## NATIONAL ENERGY SURVEY OF HOUSEHOLDS

National Energy Surveys were conducted by the Australian Bureau of Statistics in November 1980 and June 1983. The surveys were conducted as part of the regular Australian Bureau of Statistics population survey, which is based on a sample of private dwellings (houses, flats, etc.) and non-private dwellings (hotels, motels, etc.). The National Energy Survey excluded certain types of dwellings, such as non-private dwellings, caravan parks and dwellings occupied by more than one household, diplomatic personnel or persons from overseas holidaying in Australia.

The surveys sought information about the types of domestic appliances held and water heating facilities, room heating, air-conditioning, insulation and swimming pools installed. In addition, the June 1983 Survey sought details of consumption of electricity and reticulated gas by households over a twelve-month period. The following tables summarise the Survey results.

HOUSEHOLDS BY MAJOR APPLIANCES AND FACILITIES, NOVEMBER 1980 AND JUNE 1983  
WESTERN AUSTRALIA AND AUSTRALIA

	Western Australia				Australia			
	November 1980		June 1983		November 1980		June 1983	
	Households '000	Per cent (a)						
Refrigerator (b) —								
One door (c)	(d)	(d)	210.7	48.4	(d)	(d)	2,354.6	47.3
Two door (c)	(d)	(d)	159.5	36.6	(d)	(d)	1,967.4	39.5
Combination	(d)	(d)	64.3	14.8	(d)	(d)	640.0	12.8
Total	407.1	98.6	434.5	99.7	4,697.7	99.2	4,962.0	99.6
Freezer —								
Top opening	(d)	(d)	137.3	31.5	(d)	(d)	1,623.4	32.6
Front opening	(d)	(d)	64.9	14.9	(d)	(d)	667.2	13.4
Total	180.9	43.8	202.2	46.4	2,038.7	43.0	2,290.7	46.0
Oven	(d)	(d)	431.5	99.1	(d)	(d)	4,993.1	99.0
Hotplates	(d)	(d)	424.5	97.5	(d)	(d)	4,868.3	97.7
Microwave oven (e)	14.9	3.6	56.1	12.9	165.0	3.5	498.4	10.0
Electric frypan/skillet (e)	161.4	39.1	156.5	35.9	1,903.5	40.2	1,895.3	38.0
Vertical grill (e)	28.5	6.9	24.7	5.7	423.2	8.9	342.6	6.9
Crockpot (e)	20.5	5.0	27.9	6.4	230.4	4.9	289.1	5.8
Dishwasher	39.5	9.6	57.0	13.1	640.7	13.5	854.1	17.1
Washing machine —								
Automatic	193.7	46.9	261.5	60.0	2,661.3	56.2	3,264.7	65.5
Other	178.8	43.3	139.8	32.1	1,660.1	35.0	1,305.6	26.2
Total	372.5	90.2	401.3	92.1	4,321.4	91.2	4,570.3	91.7
Clothes dryer —								
Rotary	80.5	19.5	122.5	28.1	1,626.9	34.3	2,082.1	41.8
Cabinet	10.3	2.5	8.8	2.0	195.4	4.1	167.2	3.4
Total	90.8	22.0	131.3	30.1	1,822.3	38.5	2,249.3	45.2
Hotwater system —								
Shared	8.0	1.9	3.1	0.7	104.6	2.2	107.5	2.2
Non-shared	398.9	96.6	428.1	98.3	4,530.6	95.6	4,806.8	96.5
Total	406.9	98.6	431.2	98.9	4,635.1	97.8	4,914.3	98.7
Main heating —								
Oil	(d)	(d)	56.4	12.9	(d)	(d)	380.2	7.6
Electric	(d)	(d)	132.6	30.4	(d)	(d)	2,204.0	44.2
Gas	(d)	(d)	66.7	15.3	(d)	(d)	1,093.3	21.9
Woodfire/solid fuel	(d)	(d)	93.0	21.3	(d)	(d)	619.7	12.4
No heating	26.0	6.3	32.5	7.5	349.8	7.4	368.0	7.4
Air-conditioning	156.1	37.8	161.5	37.1	1,288.3	27.2	1,607.0	32.3
Wall insulation (f)	17.2	4.2	18.6	4.3	451.4	9.5	537.5	10.8
Ceiling insulation (f)	154.2	37.4	159.9	36.7	1,783.1	37.6	1,944.6	39.0
Swimming pool —								
With filter	45.3	11.0	51.3	11.8	389.4	8.2	492.0	9.9
No filter	*	..	*	..	27.9	0.6	13.4	0.3
Total	47.0	11.4	51.8	11.9	417.3	8.8	505.4	10.1
TOTAL HOUSEHOLDS	412.8	100.0	435.6	100.0	4,737.3	100.0	4,981.1	100.0

(a) Percentage of total households. (b) In the November 1980 Survey, refrigerators were only counted if they were in continuous use. Non-electric refrigerators are excluded from 1980 figures. (c) Refers only to external doors. (d) Comparable figures not available. (e) Included only if used more than once a week. (f) Excludes households in flats and mobile and improvised dwellings. \* Subject to sampling variability too high for most practical purposes.

AVERAGE CONSUMPTION OF RETICULATED GAS  
AND ELECTRICITY BY HOUSEHOLDS  
WESTERN AUSTRALIA AND PERTH STATISTICAL DIVISION  
1982-83

Particulars	Unit	Western Australia	Perth Statistical Division
Households with reticulated gas —			
Number of households	'000	135.0	129.4
Average annual consumption —			
Gas	MJ	16,671	16,796
Electricity	MJ	12,521	12,607
Households without reticulated gas —			
Number of households	'000	300.6	188.8
Average annual electricity consumption	MJ	17,689	18,146
Total households	'000	435.6	318.2
Average annual electricity consumption	MJ	16,087	15,893

A third National Energy Survey is currently being carried out and results from this survey are expected to be available by the end of 1986.

## Chapter 17

### MANUFACTURING

Manufacturing in Western Australia does not have the relative importance which mining has when a comparison is made between this State and Australia. Nevertheless, value added (see definition at the beginning of Chapter 15) by manufacturing establishments in Western Australia in 1982-83 was \$2,041 million, or \$304 million more than value added by the State's mining establishments. This value added, however, was only 6.6 per cent of all value added by manufacturing establishments in Australia and was \$1,510 per head of mean population compared with the national average of \$2,031.

Owing to the inclusion of manufacturing in the system of integrated economic censuses in 1968-69 it is not possible to compare the statistics in this Chapter with manufacturing statistics for years prior to 1968-69. The statistics up to 1967-68, however, which are available in the Statistical Summary following Chapter 25 and in earlier issues of the Year Book, provide a consistent historical record back to the year 1900. At that time 632 factories employing 11,166 persons were recorded, compared with 5,404 factories in 1967-68, employing 67,335 persons.

Up to the early 1950s, manufacturing in Western Australia had grown steadily with some surge in growth during each of the World Wars and a pronounced down-turn during the depression of the early 1930s. Most of the 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. The long-established industries such as slaughtering, dairy products processing, brewing, baking, wool scouring, sawmilling, printing, building materials production and the various types of metal fabrication and engineering remain as important components of manufacturing in the State.

Heavy industry and large-scale operations have been a more recent development, although it could be said that heavy industry commenced with the establishment in 1948 of the State Government's wood distillation, charcoal, iron and steel plant at Wundowie, east of Perth in the Shire of Northam. This plant, sold by the Government in 1974, was converted to the treatment of vanadium ores in early 1981 but production was suspended in early 1982 because of weakening world markets. Perhaps the most significant change, however, came when the basis for 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 was followed soon after by a steel rolling mill and later by a series of large plants which have made Kwinana the State's major industrial centre. The interrelated complex of metals, fuels and chemicals plants is served by a fine harbour, a standard gauge railway line linked with mining centres and the other States, and a pipeline from the natural gasfields north of Perth.

The major part of the more recent development of heavy industry in Western Australia has been associated with mineral development (see Chapter 15). Two of the plants in the Kwinana complex are directly concerned with metals processing. An alumina refinery, which commenced operations in 1964, processes bauxite mined in the Darling Range and railed about forty-eight kilometres from a crushing plant at Jarrahdale. A nickel refinery, which commenced operations in 1970, processes nickel concentrates and matte transported from Kambalda and Kalgoorlie. In addition, there was a blast furnace which used iron ore from Koolyanobbing, but production was suspended indefinitely in early 1982. Major mineral-processing plants outside Kwinana also

contribute to Western Australia's manufacturing industry. A nickel smelter, to produce nickel matte from concentrates, commenced operations at Kalgoorlie in 1973 and another alumina refinery, at Pinjarra, began operating in 1972. A plant at Australind, near Bunbury, which extracts titanium dioxide from ilmenite mined in the surrounding districts, has been in operation since 1963 and in September 1980 an electric arc tin smelter was commissioned at Greenbushes. In addition, two new alumina refineries, one at Wagerup, near Waroona and the other at Worsley, near Collie, commenced operations early in 1984.

Besides providing for heavy industry directly associated with minerals processing, the mining developments of recent years have also given impetus to other manufacturing activity, particularly to industries associated with the provision of capital equipment and other manufactured goods for the major mining projects.

## MANUFACTURING STATISTICS

Information presented in this Chapter comes mainly from a system of integrated economic censuses based on the Australian Standard Industrial Classification (ASIC). A brief description of ASIC and the system of integrated economic censuses is given at the beginning of Chapter 15 — MINING.

In the Australian Standard Industrial Classification manufacturing is used in the broad sense to relate to the physical or chemical transformation of materials or components into new products. Certain activities, however, which do not fit easily into this definition are included or excluded from manufacturing according to other criteria.

Activities which are *included* as manufacturing are grading, testing, filtering, cooling and bulk handling of milk; publishing, electrotyping, signwriting and bookbinding; installation of lifts and escalators; repair activity usually associated with manufacturing (e.g. engine reconditioning, repair of industrial machinery, repair of ships, aircraft and railway rolling stock); and blending, assembly, bottling and repacking except where otherwise stated.

Activities which are *excluded* from manufacturing are washing, packing and dehydrating of fresh fruit; sun-drying of fruit; cleaning or filleting of fish on commission or freezing of whole fish; pulping of eggs; bottling of wine and spirits; repacking of flour, cereal food products and dried fruits; blending or repacking of tea; the making or installation of curtains; custom tailoring and dressmaking; boot and shoe repairs; hewing or rough-shaping of railway sleepers, posts, etc. in the forests; installation of joinery and erection of prefabricated wooden buildings; screening, crushing, dressing or other rudimentary treatment of minerals and construction materials; purification of natural gas; blending of lubricating oils and greases; glazing; motor vehicle repair (except engine reconditioning); repair of household appliances, sporting and photographic equipment, watches, clocks and jewellery, etc.; repair of tractors, and farm and construction machinery; and installation of structural steel, air-conditioning and heating equipment, industrial furnaces or shop fittings.

Production and distribution of electricity and gas are not regarded as manufacturing in the Australian Standard Industrial Classification (ASIC) but are included in a separate Industry Division (Division D: Electricity, Gas and Water). Details of electricity and gas appear in Chapter 16 — ENERGY.

The following tables summarise the results of the Census of Manufacturing Establishments for Western Australia. Definitions of the data items used are contained in the introduction to Chapter 15. While the statistics that follow relate mainly to ASIC Industry Sub-divisions, most data items presented are also available at Industry Group and Industry Class levels.

As from the 1975-76 Census, only a limited range of data — employment, and wages and salaries — is being collected from single establishment manufacturing enterprises with less than four persons employed. To facilitate comparisons with previous years, the 1974-75 Census data were published in such a way that a link was provided between past and future series.

The table below relates to manufacturing establishments from which the full range of data is collected under the new collection criteria (i.e. all manufacturing establishments owned by multi-establishment enterprises and single establishment manufacturing enterprises with four or more persons employed). The succeeding table relates to single establishment manufacturing enterprises with less than four persons employed (i.e. enterprises from which only employment, and wages and salaries data are being collected). As can be readily seen, enterprises in this category contribute only marginally to statistical aggregates other than number of establishments. Data in respect of the larger manufacturers therefore provide reliable information for the evaluation of trends in the manufacturing sector of the economy. All other manufacturing census data presented in this Chapter relate to manufacturing establishments owned by multi-establishment enterprises and single establishment manufacturing enterprises with four or more persons employed.

**MANUFACTURING ESTABLISHMENTS**  
**SUMMARY OF OPERATIONS ACCORDING TO INDUSTRY SUB-DIVISION: 1982-83**

(Manufacturing establishments of multi-establishment enterprises, and single establishment manufacturing enterprises employing four or more persons.)

Industry sub-division		Number of establishments operating at 30 June	Persons employed (average over whole year) (a)			Wages and salaries (b)
ASIC code (c)	Description		Males	Females	Persons	
						\$m
21	Food, beverages and tobacco	366	8,216	3,786	12,002	181.0
23	Textiles	29	409	279	688	9.3
24	Clothing and footwear	66	271	1,150	1,421	15.2
25	Wood, wood products and furniture	427	5,922	1,142	7,064	88.2
26	Paper, paper products, printing and publishing	209	4,672	2,186	6,858	102.8
27	Chemical, petroleum and coal products	81	2,776	374	3,150	66.0
28	Non-metallic mineral products	212	3,977	378	4,355	74.2
29	Basic metal products	39	5,283	372	5,655	131.7
31	Fabricated metal products	431	7,586	1,070	8,656	134.9
32	Transport equipment	156	4,593	245	4,838	75.1
33	Other machinery and equipment	316	6,689	1,118	7,807	124.8
34	Miscellaneous manufacturing	167	1,871	615	2,486	35.3
Total manufacturing		2,499	52,265	12,715	64,980	1,038.3

Industry sub-division		Stocks		Purchases, transfers in and selected expenses	Value added	Fixed capital expenditure	
ASIC code (c)	Description	Turnover	Opening				Closing
		\$m	\$m	\$m	\$m	\$m	
21	Food, beverages and tobacco	1,331.5	93.3	104.6	958.8	383.9	27.1
23	Textiles	36.8	6.4	4.7	23.2	11.9	0.5
24	Clothing and footwear	39.1	4.0	4.3	18.4	21.0	0.3
25	Wood, wood products and furniture	349.9	61.9	58.2	195.4	150.8	4.8
26	Paper, paper products, printing and publishing	316.6	30.2	28.8	159.4	155.9	2.0
27	Chemical, petroleum and coal products	441.0	62.5	76.8	301.1	154.3	24.6
28	Non-metallic mineral products	356.3	58.2	63.6	204.8	156.9	-1.6
29	Basic metal products	1,340.9	199.1	190.9	924.6	408.1	442.1
31	Fabricated metal products	573.6	72.3	61.2	328.3	234.1	12.6
32	Transport equipment	196.6	28.4	32.4	96.8	103.8	4.0
33	Other machinery and equipment	449.2	100.4	109.4	260.5	197.7	16.6
34	Miscellaneous manufacturing	165.2	20.8	20.7	102.5	62.6	3.5
Total manufacturing		5,596.5	737.5	755.7	3,573.8	2,040.9	536.6

(a) Includes working proprietors. (b) Excludes amounts drawn by working proprietors. (c) Australian Standard Industrial Classification.

**MANUFACTURING ESTABLISHMENTS  
SUMMARY OF OPERATIONS ACCORDING TO INDUSTRY SUB-DIVISION: 1982-83**

(Single establishment manufacturing enterprises with less than four persons employed.)

Industry sub-division		Number of establishments operating at 30 June	Persons employed (average over whole year) (a)			Wages and salaries (b)
ASIC code (c)	Description		Males	Females	Persons	
21	Food, beverages and tobacco	115	157	104	261	\$m
23	Textiles	30	38	23	61	0.6
24	Clothing and footwear	26	7	36	43	0.2
25	Wood, wood products and furniture	418	649	172	821	0.1
26	Paper, paper products, printing and publishing	117	162	76	238	2.5
27	Chemical, petroleum and coal products	28	n.p.	n.p.	n.p.	1.0
28	Non-metallic mineral products	66	98	41	139	n.p.
29	Basic metal products	11	n.p.	n.p.	n.p.	0.5
31	Fabricated metal products	228	343	109	452	n.p.
32	Transport equipment	88	145	29	174	1.6
33	Other machinery and equipment	168	250	87	337	0.7
34	Miscellaneous manufacturing	157	202	93	295	1.4
Total manufacturing		1,452	2,108	789	2,897	0.8

(a) Includes working proprietors. (b) Excludes amounts drawn by working proprietors. (c) Australian Standard Industrial Classification.

Most of the manufacturing establishments in Western Australia are located in the Perth Statistical Division (see map inside back cover). The accompanying table shows that in 1982-83 this Division had 80 per cent of the State's manufacturing establishments with 74 per cent of value added in all manufacturing establishments. While manufacturing is carried out in all local government areas within the Perth Statistical Division, major concentrations of establishments are found in certain localities. The large industrial complex at Kwinana has already been mentioned. The City of Stirling, however, had the largest number of establishments of all local government areas in the Division at 30 June 1983 including a major industrial area located at Osborne Park producing a wide range of products.

**MANUFACTURING ESTABLISHMENTS — WESTERN AUSTRALIA  
SUMMARY OF OPERATIONS BY STATISTICAL DIVISION: 1982-83**

(Manufacturing establishments of multi-establishment enterprises and single establishment manufacturing enterprises employing four or more persons.)

Statistical division (a)	Number of establishments operating at 30 June	Persons employed (average over whole year) (b)	Wages and salaries (c)	Turnover	Closing stocks	Value added
			\$m	\$m	\$m	\$m
Perth Statistical Division	2,001	54,395	855.9	4,200.7	599.8	1,512.3
Other divisions —						
South-West	198	n.p.	n.p.	n.p.	n.p.	n.p.
Lower Great Southern	59	1,375	22.3	91.2	16.1	31.1
Upper Great Southern	32	246	2.5	12.2	1.5	5.4
Midlands	57	582	7.1	66.4	7.4	16.8
South-Eastern	50	1,003	18.9	217.7	19.0	40.4
Central	53	1,122	15.8	157.0	17.7	44.6
Pilbara	38	561	13.1	40.3	2.9	20.1
Kimberley	11	n.p.	n.p.	n.p.	n.p.	n.p.
Total	498	10,585	182.4	1,395.8	156.0	528.6
WESTERN AUSTRALIA	2,499	64,980	1,038.3	5,596.5	755.7	2,040.9

(a) For component local government areas, see list at the end of the Chapter III. (b) Includes working proprietors. (c) Excludes amounts drawn by working proprietors.

The City of Fremantle contains a major industrial area at O'Connor, east of the city centre, as well as a number of major factories north and south of Fremantle. Included in the City of Perth are a cement works, a variety of food and clothing factories, and numerous printing and publishing establishments. The City of Canning contains a major industrial area located at Welshpool and a newer industrial area in the locality of Canning Vale. The localities of Coogee and Spearwood in the City of Cockburn have a number of the larger factories, including cement, wool scouring, meat products and paper products establishments. The Midland locality in the Shire of Swan contains large Government railway workshops, which contribute significantly to employment in the area. Other local government areas with large manufacturing establishments are the City of Bayswater, the Town of Bassendean and the Cities of Subiaco and Belmont.

Measured in terms of employment (average over whole year), the most important concentrations of manufacturing activity outside the Perth Statistical Division were in the City of Bunbury and the Shires of Manjimup and Harvey in the South-West Statistical Division, the Town of Albany in the Lower Great Southern Statistical Division and the Town of Geraldton in the Central Statistical Division.

The relationship between manufacturing in this State and manufacturing in Australia over recent years may be seen from the data in the following tables. Western Australia is not a major manufacturing State.

#### MANUFACTURING ESTABLISHMENTS — WESTERN AUSTRALIA AND AUSTRALIA PERSONS EMPLOYED AND VALUE ADDED BY INDUSTRY SUB-DIVISION: 1982-83

(Manufacturing establishments of multi-establishment enterprises, and single establishment manufacturing enterprises employing four or more persons.)

Industry sub-division		Persons employed (average over whole year) (a)				Value added			
		Western Australia		Australia		Western Australia		Australia	
ASIC code (b)	Description	number	per cent of total	number	per cent of total	\$m	per cent of total	\$m	per cent of total
21	Food, beverages and tobacco	12,002	18.5	174,322	16.6	383.9	18.8	5,907.1	19.0
23	Textiles	688	1.1	32,632	3.1	11.9	0.6	805.4	2.6
24	Clothing and footwear	1,421	2.2	69,899	6.6	21.0	1.0	1,349.1	4.3
25	Wood, wood products and furniture	7,064	10.9	70,983	6.7	150.8	7.4	1,672.7	5.4
26	Paper, paper products, printing and publishing	6,858	10.6	100,724	9.6	155.9	7.6	3,069.7	9.9
27	Chemical, petroleum and coal products	3,150	4.8	58,278	5.5	154.3	7.6	2,834.2	9.1
28	Non-metallic mineral products	4,355	6.7	40,882	3.9	156.9	7.7	1,559.9	5.0
29	Basic metal products	5,655	8.7	83,047	7.9	408.1	20.0	2,502.5	8.1
31	Fabricated metal products	8,656	13.3	101,799	9.7	234.1	11.5	2,670.7	8.6
32	Transport equipment	4,838	7.4	121,005	11.5	103.8	5.1	3,292.9	10.6
33	Other machinery and equipment	7,807	12.0	140,753	13.4	197.7	9.7	3,822.4	12.3
34	Miscellaneous manufacturing	2,486	3.8	58,878	5.6	62.6	3.1	1,587.4	5.1
Total manufacturing		64,980	100.0	1,053,202	100.0	2,040.9	100.0	31,074.1	100.0

(a) Includes working proprietors.

(b) Australian Standard Industrial Classification.

**MANUFACTURING ESTABLISHMENTS — WESTERN AUSTRALIA AND AUSTRALIA  
SUMMARY OF OPERATIONS**

(Manufacturing establishments of multi-establishment enterprises and single establishment manufacturing enterprises employing four or more persons. Based on 1978 edition of ASIC.)

Area	Year	Number of establishments operating at 30 June	Persons employed (average over whole year) (a)	Wages and salaries (b)		Turnover	Value added
				\$m	\$m		
Western Australia	1977-78	2,037	65,740	629.1	3,031.5	1,182.0	
	1978-79	2,202	65,232	670.8	3,498.8	1,321.7	
	1979-80	2,301	65,987	734.2	4,259.1	1,643.3	
	1980-81	2,426	68,870	869.2	4,902.2	1,876.7	
	1981-82	2,603	70,799	1,013.4	5,491.0	2,052.7	
1982-83	2,499	64,980	1,038.3	5,596.5	2,040.9		
Australia	1977-78	26,065	(r) 1,144,199	(r) 11,135.8	(r) 48,112.6	19,754.4	
	1978-79	26,312	1,143,891	11,966.4	55,211.3	22,230.1	
	1979-80	27,430	1,154,184	13,357.5	65,354.8	25,614.0	
	1980-81	27,681	(r) 1,149,963	(r) 14,912.7	(r) 73,723.0	(r) 28,594.1	
	1981-82	28,706	(r) 1,154,806	(r) 17,002.8	(r) 81,869.3	(r) 31,548.7	
1982-83	27,705	1,053,202	17,408.8	82,326.0	31,074.1		
Western Australia as a percentage of Australia	1977-78	7.82	(r) 5.75	5.65	6.30	5.98	
	1978-79	8.37	5.70	5.61	6.34	5.95	
	1979-80	8.39	5.72	5.50	6.52	6.42	
	1980-81	8.76	5.99	5.83	6.65	(r) 6.56	
	1981-82	9.07	6.13	5.96	6.71	(r) 6.51	
	1982-83	9.0	6.2	6.0	6.8	6.6	

(a) Includes working proprietors.

(b) Excludes amounts drawn by working proprietors.

**MANUFACTURING ESTABLISHMENTS — SUMMARY OF OPERATIONS**

(Manufacturing establishments of multi-establishment enterprises, and single establishment manufacturing enterprises employing four or more persons.

Based on 1978 edition of ASIC.)

Item	Unit	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
Number of establishments operating at 30 June	No.	2,037	2,202	2,301	2,426	2,603	2,499
Persons employed (including working proprietors) —							
Average over whole year —							
Males	No.	53,336	53,001	53,461	55,874	57,395	52,265
Females	No.	12,404	12,231	12,526	12,996	13,404	12,715
Total	No.	65,740	65,232	65,987	68,870	70,799	64,980
Wages and salaries (excluding amounts drawn by working proprietors)	\$m	629.1	670.8	734.2	869.2	1,013.4	1,038.3
Turnover	\$m	3,031.5	3,498.8	4,259.1	4,902.2	5,491.0	5,596.5
Stocks —							
Opening	\$m	411.3	512.0	508.1	563.1	673.4	737.5
Closing	\$m	533.3	510.4	555.6	686.3	736.0	755.7
Purchases, transfers in, and selected expenses	\$m	1,971.6	2,175.6	2,663.2	3,148.8	3,500.9	3,573.8
Value added	\$m	1,182.0	1,321.7	1,643.3	1,876.7	2,052.7	2,040.9
Fixed capital expenditure	\$m	173.7	214.3	169.4	423.8	718.6	536.6

The following table shows the principal products of manufacturing activity in the State. Owing to the confidentiality provisions of the *Census and Statistics Act 1905*, data for some important commodities including petroleum products, alumina, refined nickel, pig iron, beer and superphosphate are not available for publication.

### PRODUCTION, SALES AND TRANSFERS OUT OF SELECTED COMMODITIES

(Manufacturing establishments of multi-establishment enterprises, and single establishment manufacturing enterprises employing four or more persons.)

Commodity	Unit	1981-82			1982-83		
		Production	Sales and transfers out		Production	Sales and transfers out	
		Quantity	Quantity	Value	Quantity	Quantity	Value
				\$m			\$m
Bacon and ham, not canned	tonne	6,097	6,127	30.6	6,363	6,314	33.9
Blocks, concrete (a), in terms of 400mm x 200mm x 200mm blocks	'000	5,998	5,732	8.2	5,233	5,111	7.6
Boats and ships, total amount received during the year —							
On vessels 5 tonnes gross and less than 50 tonnes	..	(b)	(b)	17.2	(b)	(b)	12.7
On vessels 50 tonnes gross and over	..	(b)	(b)	12.2	(b)	(b)	18.1
Boats, small (less than 5 tonnes) —							
Fibreglass	number	n.p.	797	3.7	525	525	3.4
Aluminium	number	n.p.	n.p.	1.3	457	n.p.	n.p.
Boots, shoes, sandals and slippers (c)	'000 pairs	409	455	7.2	291	294	6.0
Bread, total value	..	..	..	55.5	..	..	64.9
Bricks, clay (all sizes)	'000	392,127	379,661	74.6	279,688	275,506	59.8
Cheese (d)	tonne	r 3,322	n.p.	n.p.	3,417	n.p.	n.p.
Constructional steel, fabricated	tonne	(b)	(b)	114.8	(b)	(b)	109.4
Cordials and syrups	'000 litres	6,461	6,410	5.5	8,932	8,572	6.6
Crustaceans and molluscs (excl. oysters) —							
Chilled or frozen, fresh —							
Abalone	'000 kg	n.p.	n.p.	n.p.	n.p.	154	1.8
Prawns and shrimps	'000 kg	n.p.	n.p.	n.p.	3,036	3,142	30.1
Rock lobster or crayfish (tails)	'000 kg	n.p.	n.p.	n.p.	4,949	4,729	90.4
Chilled or frozen, simply boiled in water —				74.4			
Rock lobsters or crayfish (whole)	'000 kg	n.p.	n.p.	n.p.	1,552	1,566	15.4
Furniture —							
Metal or partly metal	..	(b)	(b)	22.6	(b)	(b)	19.8
Wooden (e)	..	(b)	(b)	68.9	(b)	(b)	61.8
Other (excluding seagrass, wicker or cane)	..	(b)	(b)	4.8	(b)	(b)	2.8
Hoists, cranes and lifting machinery (f)	..	n.a.	n.a.	21.1	(b)	(b)	15.6
Jewellery and silverware	..	(b)	(b)	8.1	(b)	(b)	7.8
Mattresses, other than inner spring	number	n.p.	n.p.	n.p.	49,770	49,312	1.3
Meat, fresh (for human consumption) —							
Carcasses, whole or butchered	..	(b)	(b)	128.8	(b)	(b)	119.9
Boned	..	(b)	(b)	115.2	(b)	(b)	152.4
Meat, fresh (other than for human consumption) —							
Kangaroo	'000 kg	1,686	n.p.	n.p.	2,977	2,451	2.9
Metal window frames, aluminium	..	(b)	(b)	32.6	(b)	(b)	27.4
Mining and drilling machinery and parts	..	(b)	(b)	55.2	(b)	(b)	45.5
Newspapers and periodicals	..	(b)	(b)	30.6	(b)	(b)	35.4
Offal, bones, etc. —							
Edible (heart, liver, brains, etc.)	..	(b)	(b)	6.8	(b)	(b)	7.4
Inedible (welts, horns, hides, etc.)	..	(b)	(b)	9.5	(b)	(b)	12.7
Paints, enamels and clears (h)	'000 litres	7,078	7,723	21.1	6,385	6,127	19.0
Paper containers, bags and packets	..	(b)	(b)	9.1	(b)	(b)	5.6
Prefabricated steel garages, carports and sheds, etc.	..	(b)	(b)	19.7	(b)	(b)	14.1
Ready-mixed concrete	'000 cu m	1,293	1,293	77.7	950	950	66.9
Roofing tiles — number	'000	33,071	32,674	21.1	25,480	25,245	16.5
area	'000 sq m	2,821	..	..	2,195	..	..
Signs and advertising displays (excl. neon)	..	(b)	(b)	7.7	(b)	(b)	6.8
Small goods	..	(b)	(b)	33.0	(b)	(b)	35.6

PRODUCTION, SALES AND TRANSFERS OUT OF SELECTED COMMODITIES — *continued*

(Manufacturing establishments of multi-establishment enterprises, and single establishment manufacturing enterprises employing four or more persons.)

Commodity	Unit	1981-82			1982-83		
		Production	Sales and transfers out		Production	Sales and transfers out	
		Quantity	Quantity	Value	Quantity	Quantity	Value
				\$m			\$m
Stock and poultry foods —							
Meat and bone meal	tonne	35,322	36,890	10.1	39,048	39,420	11.5
Other prepared stock and poultry food (j)	tonne	251,788	250,300	55.8	284,517	286,884	66.3
Tallow, rendered — inedible	'000 kg	24,513	25,059	9.5	29,856	30,172	11.1
Timber —							
Undressed (k) —							
Sleepers	'000 cu m	59	56	12.5	40	41	9.1
All other (excl. palings) obtained from logs sawn in the mill	'000 cu m	274	266	0.1	232	206	46.2
Kiln dried	'000 cu m	34	(i)	(i)	27	(i)	(i)
Wire fabric, woven or linked (l)	..	(b)	(b)	n.p.	(b)	(b)	4.6

(a) Basic building and paving blocks for walks, partitions, foundations, flooring, paths, etc. and decorative blocks, lintels and sill blocks. Excludes architectural screen and similar fancy blocks. (b) Only value of sales and transfers out is collected. (c) Excludes footwear solely of rubber. (d) Source — production only: Department of Agriculture. (e) Includes prefabricated wooden furniture but excludes in-built furniture. (f) Includes electric hoists. Excludes hydraulic hoists for trucks. (g) Includes ice cream combined with other confections including those aerated, milk-based confections which contain 10 per cent or more butterfat. (h) Includes architectural, decorative and industrial paints. Excludes water paints in powder form. (i) Only quantity produced is collected. (j) Includes poultry pellets, crumbles and mash. Excludes cereal grain and oilseed cakes and meals. (k) Includes preserved timber. (l) Steel and non-ferrous (including chain, wire, link mesh, fencing wire, crimped fabric and fine wire mesh).

## Chapter 18

### INTERNAL TRADE

Statistics of internal trade in Western Australia are derived from the programme of integrated economic censuses which was introduced in 1968-69 and from surveys based on the economic censuses.

#### CENSUSES OF RETAIL AND SELECTED SERVICE ESTABLISHMENTS

Retail trade is described as the re-sale of new or used goods to final consumers for personal or household consumption.

Five retail censuses relating to the years 1947-48, 1948-49, 1952-53, 1956-57 and 1961-62 were conducted prior to the inclusion of the Censuses of Retail and Selected Service Establishments in the system of integrated economic censuses in 1968-69. Data collected from these censuses have been used to provide a framework for quarterly and monthly surveys of retail sales.

The 1979-80 Census included all establishments classified in the 'Retail Trade' sub-division, and selected industry classes from the 'Recreation, Personal and Other Services' division of the Australian Standard Industrial Classification (ASIC).

The full range of data was collected from multi-establishment enterprises and single establishment enterprises with turnover of \$50,000 or more, as well as from Hotels etc. (mainly drinking places) and Accommodation establishments irrespective of turnover size. A less comprehensive range of data was collected for all other single establishment enterprises with less than \$50,000 turnover.

Detailed results for each Census have been published for each State and Territory and for Australia as a whole.

The following tables show final figures by industry group for major data items collected in the 1979-80 Retail Census. More detailed figures, i.e. by industry class were previously published in *Western Australian Year Book*, No. 22 — 1984 and earlier issues.

RETAIL ESTABLISHMENTS AND SELECTED SERVICE ESTABLISHMENTS (a)  
WITH TURNOVER OF \$50,000 OR MORE  
DETAILS OF OPERATIONS BY INDUSTRY GROUP: 1979-80

ASIC group description	Establishments at 30 June	Persons employed at 30 June (b)	Wages and salaries (c)	Retail sales	Turnover	Stocks at 30 June	Total floor space
	No.	No.	\$'000	\$'000	\$'000	\$'000	sq m
Retail establishments —							
Department and general stores	82	8,574	60,092	342,972	366,627	60,318	355,601
Clothing, fabric and furniture stores	1,387	6,466	40,041	325,421	330,602	64,445	292,586
Household appliance and hardware stores	729	3,359	23,566	216,659	242,281	37,467	131,313
Motor vehicle dealers, petrol and tyre retailers (d)	2,482	15,962	118,121	1,106,561	1,619,073	167,406	..
Food stores	3,164	24,589	106,201	1,191,747	1,217,209	82,944	745,421
Other retailers	1,550	5,956	28,092	241,935	255,505	40,201	205,101
<b>TOTAL, RETAIL ESTABLISHMENTS</b>	<b>9,394</b>	<b>64,906</b>	<b>376,112</b>	<b>3,425,294</b>	<b>4,031,296</b>	<b>452,781</b>	<b>..</b>

RETAIL ESTABLISHMENTS AND SELECTED SERVICE ESTABLISHMENTS (a)  
WITH TURNOVER OF \$50,000 OR MORE  
DETAILS OF OPERATIONS BY INDUSTRY GROUP: 1979-80 — continued

ASIC group description	Establish- ments at 30 June	Persons employed at 30 June (b)	Wages and salaries (c)	Retail sales	Turnover	Stocks at 30 June	Total floor space
Selected service establishments —							
Motion picture theatres	97	951	4,404	3,396	18,976	158	..
Restaurants, hotels and accommodation	1,463	17,077	102,834	233,253	424,889	13,639	..
Licensed clubs	283	2,005	13,835	44,253	58,331	2,954	..
Laundries and dry-cleaners	109	942	6,516	86	16,763	322	..
Hairdressers, beauty salons	225	1,323	8,160	1,403	17,863	587	..
TOTAL, SELECTED SERVICE ESTABLISHMENTS	2,177	22,298	135,749	282,391	536,822	17,661	..
TOTAL, RETAIL AND SELECTED SERVICE ESTABLISHMENTS	11,571	87,204	511,861	3,707,685	4,568,118	470,442	..

(a) Excludes bread and milk vendors. (b) Includes working proprietors. (c) Excludes drawings by working proprietors. (d) The retail sales and turnover figures for this group do not include sales of petrol on commission.

RETAIL SINGLE ESTABLISHMENT ENTERPRISES AND SELECTED SERVICE  
SINGLE ESTABLISHMENTS ENTERPRISES (a) WITH TURNOVER LESS THAN \$50,000  
DETAILS OF OPERATIONS BY INDUSTRY GROUP: 1979-80

ASIC group description	Establish- ments at 30 June	Persons employed at 30 June (b)	Wages and salaries (c)	Turnover	Total floor space
	No.	No.	\$'000	\$'000	sq m
Retail establishments —					
Department and general stores	6	9	8	148	611
Clothing, fabric and furniture stores	460	771	745	10,636	24,336
Household appliance and hardware stores	331	595	443	7,326	17,005
Motor vehicle dealers, petrol and tyre retailers (d)	726	1,425	1,838	18,902	..
Food stores	848	1,601	1,503	20,293	44,407
Other retailers	828	1,342	892	16,180	59,115
TOTAL, RETAIL ESTABLISHMENTS	3,199	5,743	5,429	73,485	..
Selected service establishments —					
Motion picture theatres	14	41	50	244	..
Cafes and restaurants	170	552	670	4,456	..
Licensed clubs	60	82	190	1,728	..
Laundries and dry-cleaners	103	207	195	1,705	..
Hairdressers, beauty salons	567	1,430	3,764	11,890	..
TOTAL, SELECTED SERVICE ESTABLISHMENTS	914	2,312	4,869	20,023	..
TOTAL, RETAIL AND SELECTED SERVICE ESTABLISHMENTS	4,113	8,055	10,298	93,508	..

(a) Excludes Hotels, etc. (mainly drinking places), Accommodation, Bread and Milk vendors. (b) Includes working proprietors. (c) Excludes drawings by working proprietors. (d) The turnover figures for this group does not include sales of petrol on commission.

### Commodity Statistics

Details of commodity sales and service takings were compiled from the Retail Census conducted in respect of the year ended 30 June 1980. To conform with the concepts and definitions used in the Australian National Accounts the sale of certain commodity items are treated as wholesale trade, as they are mainly used for commercial purposes. These commodity items are building materials; builders' hardware and supplies such as tools of trade, paint, etc.; commercial refrigerators; business machines; tractors; farm machinery and implements; earthmoving equipment and grain, feed, fertiliser and agricultural supplies. Consequently, where sales of these items constitute the predominant activity of an establishment, the establishment has been classified as a wholesale establishment and not included in the retail census.

The following table shows the number of retail establishments selling each commodity item and the value of retail sales of those commodity items for 1979-80, excluding single establishment enterprises with turnover less than \$50,000 and bread and milk vendors. Similar data were collected in previous censuses; however, changes in classification (ASIC) and scope make direct comparisons impractical.

RETAIL ESTABLISHMENTS (a) — NUMBER OF ESTABLISHMENTS AND THE  
VALUE OF RETAIL SALES BY COMMODITY ITEM: 1979-80

Commodity item	Establish- ments at 30 June (b)	Retail sales		
		Value	Commodity items to total retail sales	Value per head of population (c)
	No.	\$'000	%.	\$
Groceries and confectionery	3,164	576,969	16.8	456.1
Fresh meat	957	167,008	4.9	132.0
Fresh fruit and vegetables	1,193	76,018	2.2	60.1
Bread, cakes and pastries	1,617	43,693	1.3	34.5
Ready-to-eat take-away food, including fresh seafoods	1,430	83,330	2.4	65.9
Ice cream, soft drinks, milk drinks — for immediate consumption	2,285	30,750	0.9	24.3
Beer, wine and spirits	339	110,246	3.2	87.2
Cigarettes and other tobacco products	3,105	75,267	2.2	59.5
Furniture, mattresses, awnings, blinds, etc.	413	82,734	2.4	65.4
Floor coverings, carpets, linoleum, floor tiles, etc.	250	50,986	1.5	40.3
Fabrics, piece goods, drapery, manchester, blankets, soft furnishings, etc.	595	71,666	2.1	56.6
Clothing and accessories — men's and boys'	800	101,430	3.0	80.2
Clothing and accessories — women's, girls' and infants'	1,153	176,599	5.2	139.6
Footwear	731	61,150	1.8	48.3
Radios, radiograms, record players, tape recorders, television sets and accessories	447	63,447	1.9	50.2
Musical instruments, records, sheet music, etc.	380	26,547	0.8	21.0
Domestic refrigerators, freezers, washing machines, stoves, clothes dryers, dishwashers, air conditioners and evaporative coolers	301	63,344	1.8	50.1
Other household appliances and accessories	445	38,088	1.1	30.1
Kitchenware, china, glassware and garden equipment	1,030	57,320	1.7	45.3
Petrol, oils and motor lubricants, etc.	1,276	256,805	7.5	203.0
New motor vehicles including trucks and commercial vehicles	258	373,220	10.9	295.0
New parts and accessories for motor vehicles	1,073	88,997	2.6	70.4
Used motor vehicles including trucks and commercial vehicles	451	253,267	7.4	200.2
Used parts and accessories for motor vehicles	167	9,921	0.3	7.8
New and used motor cycles, motor scooters, parts and accessories	138	23,379	0.7	18.5
New and used tyres, tubes and batteries for motor vehicles and motor cycles	991	59,803	1.7	47.3
New and used boats, outboard motors, car, box and boat trailers	102	20,156	0.6	15.9
New and used caravans	41	17,919	0.5	14.2
Cosmetics, perfumes, toilet preparations, etc.	1,036	50,119	1.5	39.6
Prescription and patent medicines and therapeutic appliances	631	54,149	1.6	42.8
Photographic equipment and supplies	564	16,858	0.5	13.3
Watches, clocks, jewellery, silverware	745	43,644	1.3	34.5
Sporting goods and requisites, camping equipment, bicycles, toys, etc.	889	56,636	1.7	44.8
Books, stationery, newspapers, periodicals, devotional and religious goods, artists' requisites	1,528	90,872	2.7	71.8
Antiques, disposal goods, unredeemed pledges and other secondhand goods	166	11,474	0.3	9.1
Cut flowers, garden seeds, shrubs, trees and other nursery stock	286	17,952	0.5	14.2
Goods not included above	593	23,530	0.7	18.6
TOTAL RETAIL SALES	..	3,425,294	100.0	2,707.7

(a) Excludes all bread and milk vendors and single establishment retail enterprises with turnover of less than \$50,000. (b) Many establishments showed takings in more than one commodity item. Accordingly the sum of the number of establishments showing sales for individual items will exceed the total number of retail establishments. (c) Population at 30 June 1980.

### SURVEY OF RETAIL ESTABLISHMENTS

In intercensal periods estimates of the value of retail sales are obtained from sample surveys. Quarterly statistics based on the 1973-74 Retail Census are available for the period from the September quarter 1975 to the June quarter 1982. The current quarterly series, introduced in April 1982, is based on the 1979-80 Retail Census. Quarterly estimates are published in *Retail Sales of Goods (Excluding Motor Vehicles, Parts, Petrol, etc.)*, Australia (Catalogue No. 8503.0).

The quarterly series is complemented by a new monthly series of estimates of retail sales by industry groups. Monthly data are published in *Retail Sales of Goods (Excluding Motor Vehicles, Parts, Petrol, etc.)* (Catalogue No. 8501.0).

The table below shows estimates of retail sales by commodity groups for the years 1979-80 to 1984-85.

RETAIL SALES — COMMODITY GROUPS  
(\$ million)

Commodity group	Year					
	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Groceries	588.3	678.8	780.7	898.7	947.5	1,010.7
Butchers' meat	155.5	177.4	196.9	194.5	192.0	183.2
Other food (a)	282.3	323.6	371.7	331.4	365.1	442.2
Beer, wine and spirits	363.9	400.5	451.6	468.8	493.2	543.5
Clothing, drapery, etc.	346.0	386.5	437.9	441.0	485.2	526.7
Footwear	61.9	70.1	76.0	79.9	91.1	97.5
Hardware, china and glassware (b)	107.4	125.4	140.9	138.8	168.5	194.7
Electrical goods and musical instruments	194.2	227.2	249.6	265.9	294.5	341.9
Furniture	133.8	155.4	169.1	113.3	122.0	124.2
Floor coverings }				44.4	42.3	47.4
Cosmetics	107.4	124.1	144.1	75.0	83.1	87.5
Medicines, etc. }				78.2	85.9	81.7
Newspapers, books, stationery	87.4	103.2	111.7	106.1	129.9	159.2
Other goods (c)	202.9	217.6	244.4	269.9	308.6	351.7
Total	2,631.0	2,989.8	3,374.6	3,505.6	3,809.3	4,192.2

(a) Includes fresh fruit and vegetables, confectionery, soft drinks, ice cream, cakes, pastry, cooked provisions, fish and wrapped lunches. (b) Excludes basic building materials, builders' hardware and supplies, such as tools of trade, paint, etc. (c) Includes tobacco, cigarettes, sporting goods etc. but excludes grain and produce and business machines.

### CENSUS OF TOURIST ACCOMMODATION ESTABLISHMENTS

A Census of Tourist Accommodation Establishments covering aspects such as the amount, type, and geographical location of tourist accommodation available throughout Australia was conducted for the year 1973-74.

Similar statistics for establishments classified to the Hotels, etc. (mainly drinking places) and Accommodation industries, were compiled from data collected in the Retail Census conducted in respect of the year 1979-80.

Establishments included in that Census were classified according to their method of operation and the facilities available. Accommodation establishments other than caravan parks must have breakfast available in some form for guests and caravan parks must provide powered sites for caravans (or on-site vans) and toilet, shower and laundry facilities for guests. The classification used was based on the following definitions.

Establishments providing tourist accommodation — comprises hotels, motels, etc. and caravan parks which provide predominantly short term accommodation to the general public.

Establishments providing other accommodation — comprises establishments mainly engaged in providing long term accommodation (i.e. for continuous periods of two months or more) or in providing short term accommodation not available to the general public.

Licensed hotels — includes establishments which are licensed to operate a public bar, and also provide accommodation.

Motels, etc. — includes motels, private hotels, guest houses and boarding houses. These establishments are not licensed to operate a public bar.

Establishments not providing accommodation — includes Hotels, etc. (mainly drinking places) which do not provide accommodation.

With facilities — indicates a bath or shower and toilet in most guest rooms.

Results have been published in the Bureau publication *Census of Retail and Selected Service Establishments, Hotels and Accommodation, Western Australia 1979-80* (Catalogue No. 8624.5).

The following table provides a summary of operations by type of establishment for Western Australia.

HOTELS AND ACCOMMODATION ESTABLISHMENTS  
SUMMARY OF OPERATIONS BY TYPE OF ESTABLISHMENT: 1979-80

Type of establishment	Establishments at 30 June	Persons employed at 30 June (a)	Wages and salaries (b)	Turnover	Stocks		Fixed capital expenditure less disposals
					Opening	Closing	
	No.	No.	\$'000	\$'000	\$'000	\$'000	\$'000
Establishments providing tourist accommodation —							
Licensed hotels —							
With facilities	127	4,124	28,138	121,362	3,911	4,131	3,260
Without facilities	183	2,127	12,368	64,164	2,697	2,947	3,070
Motels, etc. —							
With facilities	99	1,572	10,076	33,707	411	471	1,469
Without facilities	43	195	935	2,926	72	76	481
Caravan parks	174	468	1,385	8,196	124	126	3,591
TOTAL ESTABLISHMENTS PROVIDING TOURIST ACCOMMODATION	626	8,486	52,902	230,355	7,215	7,751	11,871
Establishments providing other accommodation —							
With facilities	7	131	908	5,097	109	168	8
Without facilities	102	1,005	5,738	24,255	694	785	765
Camping grounds and caravan parks, n.e.c.	47	130	605	3,292	28	59	756
TOTAL ESTABLISHMENTS PROVIDING OTHER ACCOMMODATION	156	1,266	7,251	32,644	830	1,012	1,528
Establishments not providing accommodation	191	2,082	11,574	61,473	1,821	2,510	5,218
TOTAL ALL ESTABLISHMENTS	973	11,834	71,726	324,473	9,865	11,272	18,619

(a) Includes working proprietors. (b) Excludes drawings by working proprietors.

### TOURIST ACCOMMODATION SURVEYS

Following the Census of Tourist Accommodation Establishments, 1973-74 a series of quarterly Tourist Accommodation Surveys, commencing with the September quarter 1975, has provided monthly statistics showing the utilisation of available tourist accommodation.

The scope of the surveys is the same as the 1973-74 Census of Tourist Accommodation Establishments and the tourist accommodation component of the 1979-80 Retail Census.

Accommodation establishments are classified according to the following definitions:

Licensed hotels with facilities — establishments which provide tourist accommodation, are licensed to operate a public bar, provide bath or shower and toilet facilities in most guest rooms and have breakfast available for guests.

Motels, private hotels, etc. with facilities — licensed or unlicensed motels, private hotels or guest houses which provide tourist accommodation and have bath or shower and toilet facilities in most guest rooms, have breakfast available for guests, but are not licensed to operate a public bar. Motels which are licensed to serve liquor with meals are included in this category.

Establishments without facilities — licensed hotels, private hotels or guest houses which provide tourist accommodation and have breakfast available for guests, but which do not provide bath or shower and toilet facilities in most guest rooms.

Caravan parks — caravan parks which provide tourist accommodation, powered sites for caravans and toilet, shower and laundry facilities for guests.

The following table shows the number of establishments, their capacity, the number of arrivals, the occupancy rates and the takings from accommodation from the March quarter 1984 to the June quarter 1985.

More detailed statistics from the Tourist Accommodation Surveys (including monthly items of data by type of establishment and area) are available from the quarterly publication *Tourist Accommodation* (Catalogue No. 8635.5), issued by this Office.

## TOURIST ACCOMMODATION

		March quarter 1984	June quarter 1984	September quarter 1984	December quarter 1984	March quarter 1985	June quarter 1985
LICENSED HOTELS WITH FACILITIES							
Establishments	Number	146	146	147	147	148	148
Guest rooms	Number	4,088	4,176	4,547	4,607	4,952	4,921
Bed spaces	Number	8,578	8,851	9,626	9,871	10,660	10,586
Room occupancy rates	%	49	49	51	47	45	47
Bed occupancy rates	%	33	32	35	31	30	30
Arrivals	'000	115.7	114.9	149.7	131.3	130.0	135.3
Takings from accommodation	\$'000	7,384	7,645	9,041	9,007	9,572	9,866
MOTELS, ETC. WITH FACILITIES							
Establishments	Number	139	140	142	144	144	143
Guest rooms	Number	5,938	6,077	6,348	6,371	6,306	6,204
Bed spaces	Number	15,711	15,958	16,676	16,814	16,839	16,463
Room occupancy rates	%	51	47	54	50	53	48
Bed occupancy rates	%	35	30	35	33	37	30
Arrivals	'000	201.6	193.0	255.3	232.5	224.5	208.4
Takings from accommodation	\$'000	9,727	9,312	11,621	10,890	11,350	10,390
ESTABLISHMENTS WITHOUT FACILITIES							
Establishments	Number	206	199	191	188	185	180
Guest rooms	Number	3,475	3,405	3,327	3,113	3,071	3,029
Bed spaces	Number	6,102	5,925	5,842	5,556	5,441	5,348
Room occupancy rates	%	34	30	32	30	30	29
Bed occupancy rates	%	25	22	23	22	23	21
Arrivals	'000	41.9	40.2	46.6	43.4	40.4	36.0
Takings from accommodation	\$'000	1,553	1,339	1,469	1,373	1,328	1,254
TOTAL							
Establishments	Number	491	485	480	479	477	471
Guest rooms	Number	13,502	13,658	14,222	14,091	14,329	14,154
Bed spaces	Number	30,393	30,734	32,144	32,241	32,940	32,397
Room occupancy rates	%	46	43	48	45	46	43
Bed occupancy rates	%	32	29	33	31	32	29
Arrivals	'000	359.2	348.8	451.7	407.2	394.9	379.7
Takings from accommodation	\$'000	18,664	18,295	22,130	21,269	22,250	21,510
CARAVAN PARKS							
Establishments	Number	246	245	237	240	241	241
Powered sites	Number	14,688	14,724	14,451	14,365	14,709	15,040
Unpowered sites	Number	4,043	4,073	4,009	4,388	4,045	3,840
Cabins, flats, etc.	Number	498	497	492	516	532	512
<i>Total capacity</i>	<i>Number</i>	<i>19,229</i>	<i>19,294</i>	<i>18,952</i>	<i>19,269</i>	<i>19,286</i>	<i>19,392</i>
Site occupancy rates	%	36	32	34	28	37	33
Arrivals	'000	236.9	216.3	268.6	213.0	250.7	234.8
Takings from accommodation	\$'000	4,074	3,733	4,101	3,596	4,712	4,111

## CONSUMER AFFAIRS

The Department of Consumer Affairs was formed in April 1983 by restructuring the Bureau of Consumer Affairs together with branches from other Departments and a branch consisting of a number of licensing Boards. The functions of the Department are to promote the interests of consumers, to assist them in their assessment and use of goods and services and to regulate through licensing boards the operations of a number of consumer oriented trades and occupations.

The Department of Consumer Affairs consists of the following Branches:

**Complaints and Investigations Branch**

The Complaints and Investigations Branch advises consumers on a wide range of consumer-related problems. The Branch receives formal complaints about unfair, deceptive or fraudulent practices in the provision of goods and services to consumers and takes appropriate action.

This Branch also includes the Education Section which is responsible for developing and implementing the Department's consumer education programme and the Consumer Products Safety Committee which investigates the safety of goods referred to it by the Minister or Commissioner for Consumer Affairs.

### Small Claims Tribunals Branch

The Small Claims Tribunals Branch is a judicial body which can settle and/or determine disputes arising out of a contract between a consumer and trader for the supply of goods or services which cost less than \$2,000. Insurance policy disputes between the insured and insurer and tenancy bond matters can be dealt with by a Tribunal.

### Weights and Measures Branch

The Weights and Measures Branch is responsible for examining weighing and measuring instruments used for trade purposes, the examination and licensing of all scale mechanics, petroleum measuring instrument fitters and public weighmen, and control of wholesale and retail pre-packed goods.

### The Occupational Licensing Branch

This Branch services the following tribunal, licensing and supervisory boards:

- Commercial Tribunal of Western Australia
- Motor Vehicle Dealers Licensing Board
- Real Estate and Business Agents Supervisory Board
- Finance Brokers Supervisory Board
- Land Valuers Licensing Board
- Settlement Agents Supervisory Board
- Insurance Brokers Licensing Board

The Commercial Tribunal will eventually absorb the functions of the various Boards and the consolidation of many areas of occupational licensing under one entity will simplify procedures by standardising the licensing and disciplinary formats.

#### DEPARTMENT OF CONSUMER AFFAIRS SUMMARY OF PRODUCT COMPLAINTS RECEIVED 1983-84 AND 1984-85

(Source: Department of Consumer Affairs)

Product classification	Number of product complaints	
	1983-84	1984-85
Food, beverages, tobacco	66	64
Clothing, footwear, drapery	191	139
Consumer durables	1,034	857
Motor vehicles and transport equipment	1,421	1,410
Building and construction	823	864
Miscellaneous products	530	439
Transport and energy services	120	179
Insurance and finance	336	287
Real estate and accommodation	112	117
Miscellaneous services	593	628
<b>Total</b>	<b>5,226</b>	<b>4,984</b>

#### DEPARTMENT OF CONSUMER AFFAIRS: COMPLAINTS FINALISED, 1982-83 to 1984-85 (Source: Department of Consumer Affairs)

Result of complaint investigation	1982-83		1983-84		1984-85	
	No.	Per cent	No.	Per cent	No.	Per cent
Outcome assessed as having provided full measure of redress to consumer	1,458	33.7	1,640	31.0	1,406	29.9
Some adjustment secured as distinct from full redress	48	1.1	69	1.3	82	1.7
Situation clarified and consumer advised	1,024	23.7	1,243	23.5	1,073	22.8
Incapable of resolution by Department	267	6.1	388	7.4	452	9.6
Proceedings initiated under Federal or State Laws	(b) 5	0.1	7	0.1	20	0.4
Complaint referred to other Departments and Statutory Bodies (including Parliamentary Commissioner)	74	1.8	87	1.6	93	2.0
Complaint considered to be outside the Department's jurisdiction	46	1.1	84	1.6	151	3.2
Complaint withdrawn or lapsed	434	10.0	555	10.5	519	11.0
Complaint not justified	117	2.7	248	4.7	220	4.7
No redress — trader warned (a)	—	—	—	—	107	2.3
Complainant referred to Small Claims Tribunal	785	18.2	883	16.7	473	10.1
For information purposes	66	1.5	84	1.6	106	2.3
<b>Total</b>	<b>4,324</b>	<b>100.0</b>	<b>5,288</b>	<b>100.0</b>	<b>4,702</b>	<b>100.0</b>

(a) New category. (b) Initiated under State Law.

### SMALL BUSINESS DEVELOPMENT CORPORATION

The Small Business Development Corporation was created as a statutory authority by an Act of the Western Australian Parliament in 1983. The Corporation operates as an independent autonomous organisation, offering a comprehensive range of services to encourage, promote and help develop small and medium sized businesses in Western Australia.

A major role of the Corporation is to co-ordinate existing services and co-operate with associations, groups, government departments, professionals and business specialists to develop business in Western Australia.

The services offered by the Corporation to business people include:

Free and confidential business advice and counselling service.

Regular workshops for people intending to start, buy or develop a business.

Information on a variety of business related subjects.

A register of the many courses, seminars and management skill training programmes available in Western Australia.

The Corporation organises seminars and workshops throughout Western Australia in co-operation with professional bodies, business associations, and industry groups.

Regular visits to country centres by business advisers for personal discussion with country people on their business ventures.

Business advisers counsel inquirers on the source and availability of finance.

The operation of a one-stop shopfront Business and Technology Information Centre, under the name of First Base.

Research and enquiry into matters affecting small business.

Administration of the Small Business Guarantee Scheme.

The Corporation has a brief to advise the Western Australian Government on matters affecting small business.

A regional office has been opened in Bunbury to service the south-west region of the State.

## Chapter 19

# HOUSING AND CONSTRUCTION

### A HISTORICAL REVIEW

*Contributed by J. G. White, A. ARCH, P.T.C., F.R.A.I.A.  
(Senior Lecturer in Architecture, University of Western Australia)*

Although the first known permanent buildings in Western Australia were built at King George Sound in 1827, the first widespread building began in 1829, following the establishment of the Swan River settlement. The difficult first twenty years of settlement produced a simple architecture which, at best, was a conservative adaptation of the British Georgian tradition. Ironically, for many settlers anxious to establish immediate shelter, the best example they could follow was that shown by their own labourers who helped them construct basic cottages using little more than the raw materials of their new country. Perth, Fremantle, Guildford, York, Bunbury, Augusta and Albany were the only established town-sites to achieve any identity as towns during that period; only Perth and Fremantle made any considerable progress. Lack of capital and resources during the early years did not deter the government from constructing permanent buildings for its own use, two of which, the gaol at Fremantle, now known as the Round House (1831) and the first court-house at Perth (1837), have survived. Only a handful of other buildings, mostly houses, have survived from this period.

The problems of survival encountered by the earliest settlers were partly met in 1850 when the transportation of convicts was introduced to Western Australia, after it had ceased in the eastern colonies. The commandant of the convict establishment at Fremantle, Captain E.Y.W. Henderson, and several of his officers, all of whom were Royal Engineers with building experience, were responsible for the large buildings at Fremantle which dominated the town until the end of the century. The convict gaol, warders' houses, commissariat store, asylum and other smaller buildings, many of which survive in good condition, were substantially completed by 1865. The Royal Engineers, and public works officers, separately or in association, constructed works and buildings throughout the settled portion of the State. From this period the present Government House (1863) which was built to replace an earlier building completed in 1835, the old Town Hall, the Cloisters, and several churches and schools are among those buildings in Perth which have survived. During the years of slow but steady development which paralleled the activities arising out of transportation, Perth and Fremantle grew at a disproportionate rate in relation to the rest of the colony. Improvement in the quality of building was reflected in all towns, but most obviously in Perth, which developed a characteristic style of patterned-brick architecture, and in Fremantle, which had grown into a neat, small town with narrow building lots surrounded by stone walls and a predominantly stone architecture using the limestone plentiful in the area.

Expansion until the gold-boom years of the 1890s was essentially agricultural and pastoral with small, widely spaced rural centres. The prosperity which had quickly come to the eastern colonies proved elusive in Western Australia and its absence is reflected in the buildings of the seventies and eighties. When the gold-boom began, Perth and Fremantle were small in scale and domestic in character with not much more than church spires and town halls, and at Perth a sprinkling of small public buildings, to distinguish them in appearance from the smaller country towns, which had increased in number as the boundaries of settlement extended.

The situation changed dramatically in the 1890s when the progressive gold-rushes east of Perth produced rapid increases in population and capital and a sudden demand for buildings of all types. The goldfields towns are entirely the outcome of this period, but many other towns in the State show signs of the sudden growth which followed, in their hotels, banks, railway stations, public buildings, and houses. The absence of a large market for building materials, which had denied to Western Australia many of the benefits of nineteenth century technology, ended and by 1900 the construction industry was assimilating new building techniques such as the structural uses of steel and concrete, electric lifts, reticulation of gas, water and electricity, sewage disposal, and the elaborate and costly degrees of finish which affluence made possible. Domestic architecture also reflected the change of taste brought by affluence, experienced many years before in the eastern States, and industries were established to supply the decorative cast-iron work, moulded plaster and pressed metal panels which had hitherto been imported by those few who could afford them.

The war of 1914-18 caused a partial cessation of building activities, but building picked up in the early 1920s to carry on what had been begun in the two decades from 1895. By 1929 the centre of Perth had almost been rebuilt and the amalgamation of Perth and Fremantle into one large metropolitan region was under way.

The depression years of 1930 to 1932 once more brought the building industry almost to a standstill, but by 1939, at the outbreak of war, building was again proceeding strongly. The Commonwealth Bank in Murray Street, built during the depression with public funds, was the last grand expression of an architectural tradition going back to ancient Rome. The architecture of the post-depression years was more austere than that which preceded it, foreshadowing the change that was to take place following the end of the 1939-45 war.

The recommencement of building after the war was strictly controlled by the State Government which imposed limitations upon the cost and size of houses for which there was a great demand. Flat building, which had been very limited before 1939, began to expand, at first slowly, but more rapidly in the 1960s when it became closely linked with investment. The State Housing Commission modified its policy of providing detached houses to build Wandana Flats in Subiaco in 1956. Uniform regulations to control flat building were introduced in 1966. In the private sector of housing, the large-scale project home builders continued to grow in strength, many of them tending to combine subdivision and building into large tract developments, several of which have assumed the form of regional centres within the metropolitan region and on the periphery of the larger country towns. A belief in the advantages of individual home ownership which was established in 1829, has continued to form the basis of planning despite the erosion caused by an increasing proportion of flats and home units in all parts of the State.

The change in architectural style which began in the early post-war years and influenced the appearance of all subsequent buildings, had the visual consequence of almost eliminating decoration from buildings. Although nostalgia remains for the ornate buildings of the years before 1939, the building industry has reduced its capacity to construct them, and is geared to the technical demands of modern construction methods which can be seen in their variety in the centre of Perth. Almost all of the commercial buildings completed up to 1939 in St George's Terrace have been replaced by high-rise steel, concrete and glass office towers with air-conditioning and well-lit interiors. As they grow in height, so does the centre of the metropolitan region become correspondingly more apparent.

In Fremantle, the almost complete retention of its pre-war buildings coincided with a change of attitude which originated in the 1970s. Victorian and Edwardian buildings, previously prime targets for demolition and redevelopment, are being 'recycled' to enable retention of their visual character, and new buildings in the same context are now required to present a similar appearance. The influence has flowed well beyond Fremantle. Many home owners have migrated back to the older, inner suburbs attracted by turn-of-the-century houses which are carefully renovated, reviving almost forgotten skills; many builders have responded to this phenomenon with their own versions of 'period' houses for the homes market.

Throughout the metropolitan region, and in the larger country towns there has been a proliferation, in the decade to 1985, of primary, secondary and tertiary education buildings, factories, buildings for leisure and entertainment, commercial buildings, and government and local government buildings; large air conditioned shopping centres have created highly visible new centres of focus for urban life. Major projects of the eighties have included a new public library, art gallery and casino for Perth, and at Fremantle and elsewhere, major construction works in response to the perceived requirements of the defence of the America's Cup scheduled for 1987.

## HOUSING AND THE CENSUS

The definitions given below are relevant when considering data derived from the Census of Population and Housing.

*Occupied Dwelling.* For the purpose of the Census of Population and Housing 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. The term has therefore a very wide reference and includes, in addition to houses and flats, a great variety of dwellings ranging from a single-roomed shack to a multi-roomed hotel or institution.

*Unoccupied Private Dwelling.* 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. The term includes vacant dwellings available for sale or renting; dwellings such as week-enders or holiday homes which were not occupied on census night; dwellings normally occupied but whose occupants were temporarily absent on the night of the census; newly-completed dwellings whose owners or tenants had not entered into occupation on census night; and dwellings described as 'to be demolished', 'condemned', 'exhibition home', etc. The total number of unoccupied dwellings does not, therefore, represent the number of vacant houses and flats available for sale or renting.

*Private Dwellings* comprise the following classes:

*Private House*, which includes separate houses; semi-detached houses; attached houses; terrace houses; and villa units.

*Self-contained Flat.* A self-contained flat is part of a house or other building which can be completely closed off and which has its own cooking and bathing facilities. Home units are included in this class.

*Other Flat* is part of a house, flat or other premises which is not self-contained.

*Other Private Dwellings* include sheds, tents, garages, caravans, houseboats, etc. occupied on a permanent or semi-permanent basis.

### Dwellings at Censuses from 1901

The number of unoccupied dwellings shown for censuses prior to 1971 include both private and non-private dwellings, while those for the 1971 and subsequent censuses refer to private dwellings only.

## DWELLINGS — CENSUSES, 1901 TO 1981 (a)

Census date	Occupied dwellings			Unoccupied dwellings
	Number	Average number of inmates	Non-private	
			Total	
1901 — 31 March	(b) 46,436	(c) 3.35	2,070	2,263
1911 — 3 April	(d) 66,553	(e) 3.68	2,317	3,158
1921 — 4 April	70,185	4.11	3,363	3,274
1933 — 30 June	100,441	3.95	3,137	4,029
1947 — 30 June	122,078	3.73	2,689	2,606
1954 — 30 June	159,496	3.64	3,327	6,614
1961 — 30 June	191,616	3.59	2,701	13,705
1966 — 30 June	222,416	3.53	3,285	17,965
1971 — 30 June	284,359	3.38	2,486	(f) 28,274
1976 — 30 June	336,768	3.18	2,337	(f) 34,064
1981 — 30 June	403,600	2.99	2,397	(f) 42,100

(a) Figures for censuses prior to 1966 exclude dwellings occupied solely by full-blood Aborigines; those for 1966 and later relate to all dwellings. (b) Comprises 17,702 dwellings of calico, canvas, and hessian, with an average of 2.10 inmates, and 28,734 other dwellings with an average of 4.12 inmates. (c) See note (b). (d) Comprises 14,216 dwellings of calico, canvas, and hessian, with an average of 1.93 inmates, and 52,337 other dwellings with an average of 4.16 inmates. (e) See note (d). (f) Unoccupied private dwellings only.

The following table gives particulars of the numbers of occupied dwellings at the Censuses of 1976 and 1981, together with the total numbers of persons enumerated.

Between the Censuses of 1976 and 1981, the number of occupied dwellings in the State increased by 19.7 per cent. The number of persons enumerated in private dwellings showed an increase of 12.7 per cent.

OCCUPIED DWELLINGS AND PERSONS ENUMERATED  
CENSUSES, 1976 AND 1981

Particulars	Census, 30 June —		1981		Increase since 1976	
	1976	Per cent of total	Number	Per cent of total	Number	Per cent
Occupied dwellings —						
Private	'000		'000		'000	
Non-private	336.8	99.3	403.6	99.4	66.8	19.8
Total, Occupied dwellings	2.3	0.7	2.4	0.6	0.1	2.6
Total, Occupied dwellings	339.1	100.0	406.0	100.0	66.9	19.7
Persons enumerated in —						
Private dwellings	1,070.1	93.5	1,205.8	94.7	135.7	12.7
Non-private dwellings	71.5	6.2	65.1	5.1	-6.4	-9.0
Migratory population (a)	3.2	0.3	2.7	0.2	-0.5	-15.6
Total population	1,144.9	100.0	1,273.6	100.0	128.8	11.2

(a) Comprises persons (both passengers and crew) who, at midnight on census night, were enumerated on board ships in Western Australian ports, or ships which had left an Australian port before census night for a next port of call in Western Australia. It includes also those who were enumerated on long-distance trains, motor coaches or aircraft. Also includes campers-out.

**Occupied Private Dwellings**

**Number of Rooms.** The following table shows details of the number of rooms in occupied private dwellings at the Census of 30 June 1981.

**OCCUPIED PRIVATE DWELLINGS**  
**NUMBER OF ROOMS (a) — CENSUS, 30 JUNE 1981**

Number of rooms (a)	Separate house			Other (b)		
	Perth Statistical Division	Rest of State	Total	Perth Statistical Division	Rest of State	Total
1	93	177	270	758	677	1,435
2	283	560	843	3,542	976	4,518
3	1,767	1,851	3,618	11,972	2,103	14,075
4	20,134	10,815	30,949	25,915	4,263	30,178
5	62,352	30,683	93,035	13,580	2,758	16,338
6	64,717	24,036	88,753	5,272	956	6,228
7	44,632	12,689	57,321	1,310	322	1,632
8 or more	37,964	9,591	47,555	777	332	1,109
Not stated	1,394	795	2,189	1,671	1,883	3,554
Total	233,336	91,197	324,533	64,797	14,270	79,067

(a) Includes kitchen, bathroom and permanently enclosed sleep-out, but does not include toilet, pantry, laundry, storeroom, hall or corridor. (b) Includes flat, home unit, mobile home (not in caravan park), improvised dwelling and private boarding house.

**Number of Bedrooms.** The next table shows details of the number of bedrooms in occupied private dwellings at the Census of 30 June 1981.

**OCCUPIED PRIVATE DWELLINGS**  
**NUMBER OF BEDROOMS (a) — CENSUS, 30 JUNE 1981**

Number of bedrooms (a)	Separate house			Other (b)		
	Perth Statistical Division	Rest of State	Total	Perth Statistical Division	Rest of State	Total
None (c)	14	23	37	65	19	84
1	3,480	2,299	5,779	15,970	3,261	19,231
2	44,318	17,673	61,991	31,821	5,466	37,287
3	134,296	52,919	187,215	14,335	3,032	17,367
4	45,015	15,227	60,242	820	429	1,249
5	4,239	1,818	6,057	100	70	170
6 or more	674	486	1,160	59	121	180
Not stated	1,300	752	2,052	1,627	1,872	3,499
Total	233,336	91,197	324,533	64,797	14,270	79,067

(a) Includes permanently enclosed sleep-out. (b) Includes flat, home unit, mobile home (not in caravan park), improvised dwelling and private boarding house. (c) Includes one-room flat and bed-sitting room.

### Unoccupied Private Dwellings

For dwellings not occupied on the night of the census, collectors were required to determine as many particulars as possible and, where the information was available, to enter on the census schedule the reason why the dwelling was unoccupied. The following table shows details of unoccupied private dwellings at the Census of 30 June 1981.

**UNOCCUPIED PRIVATE DWELLINGS — CENSUS, 30 JUNE 1981**

Reason for being unoccupied	Perth Statistical Division	Rest of State	Total
For sale	2,269	787	3,056
To let, not holiday home	4,547	2,122	6,669
New, awaiting occupancy	1,235	624	1,859
Vacant for repair etc.	1,012	723	1,735
Holiday home	2,369	6,610	8,979
Condemned for demolition	466	348	814
Resident temporarily absent	9,520	5,348	14,868
Other, n.e.i.	1,787	2,333	4,120
Total	23,205	18,895	42,100

### Geographical Distribution of Dwellings

**Statistical Divisions.** The following table shows the numbers of occupied and unoccupied dwellings in each statistical division of Western Australia at the Censuses of 1976 and 1981.

The former grouping of municipal districts on the basis of climatological and geographical characteristics was revised with effect from 1 January 1976 to take into account social and economic criteria. (The statistical divisions and their component local government areas are shown in lists at the end of Chapter 5.)

Between the Censuses of 1976 and 1981 the number of dwellings in Western Australia rose by 20.0 per cent. The number in the Perth Statistical Division increased by 20.6 per cent, compared with an increase of 18.5 per cent in the rest of the State. The other divisions showed the following increases: Kimberley, 50.7 per cent; Pilbara, 41.2 per cent; South-West, 24.7 per cent; Central, 19.9 per cent; Lower Great Southern, 16.0 per cent; South-Eastern, 9.0 per cent; Upper Great Southern, 5.2 per cent and Midlands, 4.7 per cent.

#### DWELLINGS IN STATISTICAL DIVISIONS — CENSUSES, 1976 AND 1981

Statistical division	Census, 30 June 1976 (a)		Census, 30 June 1981			
	Total occupied dwellings	Un-occupied private dwellings	Occupied dwellings			Un-occupied private dwellings
			Private	Non-private	Total	
Perth Statistical Division	249,328	17,744	298,133	810	298,943	23,205
Other divisions —						
South-West	25,163	6,070	31,052	240	31,292	7,642
Lower Great Southern	11,398	1,920	13,057	125	13,182	2,266
Upper Great Southern	6,614	902	6,832	81	6,913	997
Midlands	14,068	3,250	14,603	193	14,796	3,331
South-Eastern	10,872	1,555	11,921	229	12,150	1,401
Central (b)	11,874	1,645	13,847	298	14,145	2,064
Pilbara	7,592	691	10,577	208	10,785	911
Kimberley	2,504	200	3,578	213	3,791	283
Total	90,085	16,233	105,467	1,587	107,054	18,895
WESTERN AUSTRALIA	339,413	33,977	403,600	2,397	405,997	42,100

(a) The 1976 Census figures have been adjusted to provide figures on the basis of the boundaries of local government areas at 30 June 1981. (b) Includes Houtman Abrolhos (unincorporated).

**Australian States.** The following table gives the numbers of dwellings recorded in each of the Australian States and in Australia as a whole at the Census of 30 June 1981.

#### DWELLINGS IN AUSTRALIAN STATES — CENSUS, 30 JUNE 1981

Type of dwelling	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	Australia (a)
Occupied dwellings—							
Private	1,662,758	1,238,945	698,232	432,136	403,600	135,598	4,668,909
Non-private	6,836	4,506	5,730	1,703	2,397	670	22,503
Total, Occupied dwellings	1,669,594	1,243,451	703,962	433,839	405,997	136,268	4,691,412
Unoccupied private dwellings	153,251	124,522	83,366	42,407	42,100	17,765	469,742
Total dwellings	1,822,845	1,367,973	787,328	476,246	448,097	154,033	5,161,154

(a) Includes Northern Territory (29,049 occupied private dwellings, 512 occupied non-private dwellings and 2,368 unoccupied dwellings) and Australian Capital Territory (68,591 occupied private dwellings, 149 occupied non-private dwellings and 3,963 unoccupied dwellings).

#### CONSTRUCTION OF BUILDINGS, 1984-85

The value of building work done in Western Australia in 1984-85 was \$1,253 million at current prices, an increase of 33 per cent over 1983-84. This represented 9 per cent of all building work done in Australia (\$14,024 million). Private sector projects accounted for 82 per cent of work done in Western Australia and also in Australia. The value of work done on new residential buildings increased by 41 per cent to \$725 million; work done on alterations and additions to residential buildings increased by 20 per cent to \$53 million; and construction of non-residential buildings increased by 24 per cent to \$475 million.

The value of new residential building commenced in 1984-85 was \$750 million, an increase of 34 per cent over 1983-84. This represented an increase of 3,430 new dwelling units, from 14,900 in 1983-84 to 18,330 in 1984-85. The house component increased by 2,340 to 14,320 and other residential buildings increased by 1,093 to 4,011.

Approval of new residential buildings increased by 12 per cent from 17,195 dwelling units in 1983-84 to 19,279 dwelling units in 1984-85. This is the highest annual total approved since 1975-76 when 21,388 units were approved. In value terms new residential buildings commenced in 1984-85 reached \$776 million, an increase of 25 per cent over 1983-84. Non-residential building approved showed a significant increase (127 per cent) from \$361 million in 1983-84 to \$820 million in 1984-85. Types of non-residential buildings which recorded the largest increases in approval value (with corresponding values for 1983-84 shown in brackets) are: Hotels \$163m (\$36m), Offices \$206m (\$63m), Educational \$90m (\$28m), Health \$93m (\$37m) and Entertainment and recreational \$94m (\$16m).

## MAJOR CONSTRUCTION PROJECTS

### **North West Shelf Project**

The North West Shelf project is being undertaken by a joint venture comprising a group of Australian and international companies. Its purpose is to exploit natural gas and associated hydrocarbon liquids from the North Rankin and Goodwyn gas fields located off the north-west coast of Western Australia, providing gas for Western Australia and, from 1989, liquefied natural gas (LNG) for Japan.

The domestic gas, or first phase of the project involved the fabrication and installation of the North Rankin 'A' gas production platform, in 125 metres of water 134 kilometres from Dampier; the laying of an offshore pipeline which brings the gas and liquids to their landfall on the Burrup Peninsula near Dampier; and an onshore gas treatment plant at Withnell Bay on the Peninsula which treats the gas for delivery to the State Energy Commission of Western Australia (SEC). The cost of construction of these facilities was \$2,200 million.

This phase of the project has been in production since August 1984 when the joint venturers commenced deliveries of natural gas to the SEC for use by domestic consumers.

This project is Western Australia's first offshore petroleum project. The domestic gas facilities were built over a four year period, with industry in Western Australia responsible for 62 per cent of the total work. During the peak construction period (in 1982-83), approximately 4,500 people were involved on the project either in the Pilbara or at work sites elsewhere in Australia or overseas.

In terms of scale and complexity, the project is already one of the largest undertaken in Australia. The second phase will provide LNG to eight power and gas utilities in Japan from a target date of October 1989.

Facilities for this phase include a gas liquefaction plant being constructed adjacent to the present domestic gas plant on the Burrup Peninsula, two additional offshore production facilities and associated infrastructure. Seven LNG tankers will also be dedicated to the North West Shelf project.

The cost of construction of this phase is estimated at \$9,800 million. Main construction activity commenced in August 1985, after final commitment to the LNG phase. Employment on the construction of this phase is expected to reach a peak of 5,400 workers in 1987-88.

## CONTROL OF BUILDING

Each of the local government authorities as constituted under the provisions of the *Local Government Act 1960* has 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.

The *Town Planning and Development Act 1928* gives local authorities the right to make town planning schemes and town planning by-laws covering such aspects as the purchase or reservation of land for thoroughfares, the density of dwelling accommodation per hectare, the classification of areas for residential, commercial, industrial and recreational use, the prescription of building standards, and the general planning of new subdivisions. Town planning schemes proposed by a local authority are subject to the approval of the Minister for Town Planning, who has the advice of the Town Planning Board.

The *Local Government Act 1960* contains provisions, for the control of building, which are compatible with those exercised under the Town Planning and Development Act but are in a more detailed form. The Uniform Building By-laws have been applied to most local government areas, and the erection of all buildings must be carried out in compliance with these by-laws. The Local Government Act provides that no new building or any alteration of an existing building may be begun before the plans have been approved by the local authority. The Governor may by Order, at the request of a local authority, suspend the operation of this provision in its district. Generally, in remote parts of the State prior approval of plans is required only in the case of building in townsite areas. Where any local authority refuses to approve plans, the Act provides that an appeal may be made to the Minister for Local Government, who has the power to modify or reverse the decision of the local authority. The decision of the Minister is final and not subject to appeal. Other appeals or matters in dispute in relation to the control of building may be determined only by two referees, one of whom is appointed by the Governor and the other by the local authority concerned.

## BUILDING STATISTICS

### Scope

The statistics in this section relate to the erection of new buildings and alterations and additions valued at \$10,000 or more to existing buildings. Non-building construction of railways, roads, bridges, earthworks, etc. is excluded. Also excluded are particulars of repairs and maintenance to buildings.

From the September quarter 1945, up to and including the June quarter 1980, a quarterly collection of statistics of building operations was undertaken. This collection comprised the activities of all private contractors and government authorities engaged in building, and owner-builders who erected buildings without the service of a contractor responsible for the whole job.

From the September quarter 1980, the Building Activity Survey replaced the Building Operations Census. The main difference is the replacement of the former full enumeration of private sector house jobs (both new and alterations and additions valued at \$10,000 and over) by a sample survey. All other building jobs continue to be completely enumerated. Changes to collection procedures to reduce the significance of revisions to the series resulted in a further break in the continuity of the series from the September quarter 1981.

Although the differences in concept between the Building Activity Survey and the previous Building Operations Census are minor, figures from the September quarter 1980 are not strictly comparable with those for earlier periods, and caution should be exercised in comparing data across the time span of the change in collection methodology. Similarly, figures from the September quarter 1981 are not strictly comparable with those for earlier periods.

### 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.

### 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 being constructed by private sector builders under government housing authority schemes whereby the authority has contracted, or intends to contract, to purchase the buildings on or before completion, are classified as public sector.

*Residential buildings.* A residential building is defined as a building predominantly consisting of one or more dwelling units. Residential buildings can be either 'Houses' or 'Other residential buildings' as follows:

- (i) A 'House' is defined as a detached building predominantly used for long term residential purposes and consisting of only one dwelling unit. Thus detached 'granny flats' and detached dwelling units (such as caretaker's residences) associated with other buildings are defined as houses for the purpose of these statistics; and
- (ii) An 'Other residential building' is defined as a building which is predominantly used for long term residential purposes and which contains (or has attached to it) more than one dwelling unit (e.g. includes flats, home units, townhouses, duplexes, apartment buildings, etc.).

*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 in the form of materials fixed in place and/or labour expended (this includes site preparation but excludes delivery of building materials, the drawing of plans and specifications and the construction of non-building infrastructure such as roads).

*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, where practicable, on the market or contract price of building jobs including site preparation costs but excluding the value of land and landscaping.

*Value of building work done.* Represents the estimated value of building work actually carried out during the period on building jobs which have commenced.

All values shown are current values, i.e. no adjustment has been made for the substantial rise in building costs over recent years. Some perspective to the increases in values can be gained from the wholesale price indexes of materials used in house building and of materials used in building other than house building for Perth (see Chapter 23).

### Building Approvals

The following table shows details of building approved in Western Australia for the years 1980-81 to 1984-85.

## BUILDING APPROVALS

Particulars	1980-81	1981-82	1982-83	1983-84	1984-85
Number of dwelling units					
New residential buildings —					
Houses — Private sector	10,343	9,623	8,382	13,183	13,916
Public sector	548	672	970	648	940
Other — Private sector	5,052	4,951	2,093	2,768	3,650
Public sector	438	407	398	596	773
Total	16,381	15,653	11,843	17,195	19,279
Value (\$'000)					
New residential buildings —					
Houses — Private sector	384,701	394,279	332,427	500,090	587,218
Public sector	19,458	23,474	33,304	25,630	39,979
Other — Private sector	133,984	172,735	65,317	78,589	123,596
Public sector	8,901	11,588	10,682	17,158	25,539
Total	547,044	602,076	441,731	621,468	776,332
Alterations and additions (a) to residential buildings —					
Private sector	42,033	46,828	41,867	45,102	53,268
Public sector	105	49	129	1,228	162
Non residential building —					
Private sector	380,389	356,701	190,791	225,600	607,890
Public sector	90,453	50,855	111,185	135,627	211,594
All building —					
Private sector	941,108	970,543	630,402	849,381	1,371,971
Public sector	118,916	85,966	155,301	179,643	277,274
Total	1,060,024	1,056,508	785,703	1,029,024	1,649,245

(a) Valued at \$10,000 and over.

## Building Activity Survey

The following tables show, for each class of building, the value (when completed) of building work commenced and completed, together with the value of building work done, in the years 1980-81 to 1984-85.

VALUE OF BUILDING COMMENCED BY CLASS OF BUILDING  
(\$m)

Class of building	1980-81 (a)	1981-82	1982-83	1983-84	1984-85 (p)
New residential buildings —					
Houses	392.2	387.6	341.4	474.0	617.8
Other residential buildings	149.4	201.5	65.3	85.9	132.4
Total, New residential buildings	541.6	589.1	406.7	559.9	750.1
Alterations and additions (b) to residential buildings	42.3	51.2	39.0	47.5	52.9
Non residential building —					
Hotels, etc.	15.9	9.2	54.3	41.0	110.5
Shops	46.4	72.1	22.7	44.9	41.1
Factories	50.7	45.8	25.9	27.8	24.6
Offices	124.2	110.8	89.2	67.4	215.4
Other business premises	51.7	71.1	49.5	48.7	79.0
Educational	37.8	34.7	37.8	32.7	88.1
Religious	2.6	4.8	4.4	3.6	3.8
Health	28.6	14.9	10.5	27.9	102.5
Entertainment and recreational	18.2	16.4	18.2	15.9	93.6
Miscellaneous	51.9	23.6	31.4	30.7	32.2
Total, Non residential building	428.0	403.4	343.9	340.7	790.6
TOTAL, ALL BUILDING	1,011.9	1,043.7	789.6	948.2	1,593.6

(a) Details are not strictly comparable with those for subsequent periods. See preceding text dealing with scope of building statistics. (b) Valued at \$10,000 and over.

## VALUE OF BUILDING COMPLETED BY CLASS OF BUILDING

(\$m)

Class of building	1980-81 (a)	1981-82	1982-83	1983-84	1984-85 (p)
New residential buildings —					
Houses	375.5	398.5	372.5	407.4	583.4
Other residential buildings	108.0	165.0	143.4	75.9	115.3
Total, New residential buildings	483.4	563.5	515.9	483.3	698.7
Alterations and additions (b) to residential buildings	37.5	51.9	47.4	41.0	51.9
Non residential building —					
Hotels, etc.	8.1	17.8	10.7	59.8	38.4
Shops	40.8	46.7	66.3	38.7	53.6
Factories	37.0	52.6	45.2	19.0	27.9
Offices	75.0	131.5	152.1	75.0	55.6
Other business premises	37.2	63.1	58.2	46.8	68.9
Educational	29.6	39.9	37.7	45.1	30.7
Religious	2.7	2.3	7.0	3.0	3.0
Health	36.8	86.1	30.3	19.9	24.3
Entertainment and recreational	20.3	20.1	18.3	17.4	19.3
Miscellaneous	21.3	35.3	38.5	26.3	35.9
Total, Non residential building	308.8	495.6	464.3	351.0	357.5
TOTAL, ALL BUILDING	829.7	1,111.0	1,027.5	875.4	1,108.0

(a) See footnote (a) to previous table. (b) Valued at \$10,000 and over.

## VALUE OF BUILDING WORK DONE BY CLASS OF BUILDING

(\$m)

Class of building	1980-81 (a)	1981-82	1982-83	1983-84	1984-85 (p)
New residential buildings —					
Houses	388.4	399.1	354.9	438.8	600.8
Other residential buildings	123.7	191.3	112.7	75.9	124.5
Total, New residential buildings	512.2	590.3	467.6	514.7	725.3
Alterations and additions (b) to residential buildings	42.3	54.1	41.9	43.5	52.7
Non residential buildings —					
Hotels, etc.	10.5	15.7	27.5	60.8	46.8
Shops	40.8	53.1	58.3	41.1	44.7
Factories	53.5	62.2	36.5	29.2	33.5
Offices	101.0	157.9	85.4	77.1	129.0
Other business premises	52.5	64.7	48.7	62.7	58.0
Educational	29.4	42.0	39.1	38.0	52.9
Religious	2.5	3.4	5.9	3.4	3.0
Health	33.9	26.9	19.3	24.8	37.5
Entertainment and recreational	19.2	19.9	19.9	14.9	28.8
Miscellaneous	32.1	35.2	29.4	32.3	41.2
Total, Non residential building	375.4	481.0	370.1	384.3	475.4
TOTAL, ALL BUILDING	930.0	1,125.4	879.5	942.5	1,253.4

(a) See footnote (a) to previous table. (b) Valued at \$10,000 and over.

The following table shows the number of houses and other residential buildings, classified by ownership, commenced in Western Australia for the years 1980-81 to 1984-85.

NUMBER OF NEW HOUSES AND NEW OTHER RESIDENTIAL BUILDINGS COMMENCED  
CLASSIFIED BY OWNERSHIP

Year	Private sector		Public sector		Total	
	Houses (a)	Other residential buildings (b)	Houses	Other residential buildings (b)	Houses (a)	Other residential buildings (b)
1980-81 (c)	9,670	4,759	536	418	10,210	5,177
1981-82	8,430	5,100	677	407	9,100	5,507
1982-83	7,520	1,875	909	454	8,430	2,329
1983-84	11,300	2,379	678	539	11,980	2,918
1984-85	13,420	3,260	895	751	14,320	4,011

(a) Figures are rounded to nearest ten units. (b) Number of dwelling units. (c) See footnote (a) to previous table.

NEW HOUSES AND NEW OTHER RESIDENTIAL BUILDINGS COMPLETED  
AUSTRALIAN STATES AND TERRITORIES: 1984-85

	New houses (b)	New other residential buildings (a)	Total new residential buildings (a)		
			Total number completed (b)	Proportion of Australian total (per cent)	Per thousand of mean population (c)
New South Wales	27,250	8,571	35,820	25.2	6.6
Victoria	29,650	5,851	35,500	24.9	8.7
Queensland	25,230	6,249	31,480	22.1	12.5
South Australia	9,510	3,670	13,180	9.3	9.7
<b>Western Australia</b>	<b>14,000</b>	<b>3,735</b>	<b>17,730</b>	<b>12.5</b>	<b>12.7</b>
Tasmania	2,790	898	3,690	2.6	8.4
Northern Territory	1,450	958	2,410	1.7	17.1
Australian Capital Territory	1,930	632	2,560	1.8	10.3
Australia	111,800	30,564	142,360	100.0	9.1

(a) Number of dwelling units. (b) Rounded to nearest ten units. (c) Based on latest available estimated resident population figures.

The previous table shows the number of new dwelling units completed in each of the Australian States and Territories during the year 1984-85. The total number of new dwelling units completed in Western Australia per thousand of mean population increased from 9.1 in 1983-84 to 12.7 in 1984-85, and the number of new dwelling units completed per thousand of mean population in Australia increased from 8.0 to 9.1 in the same period.

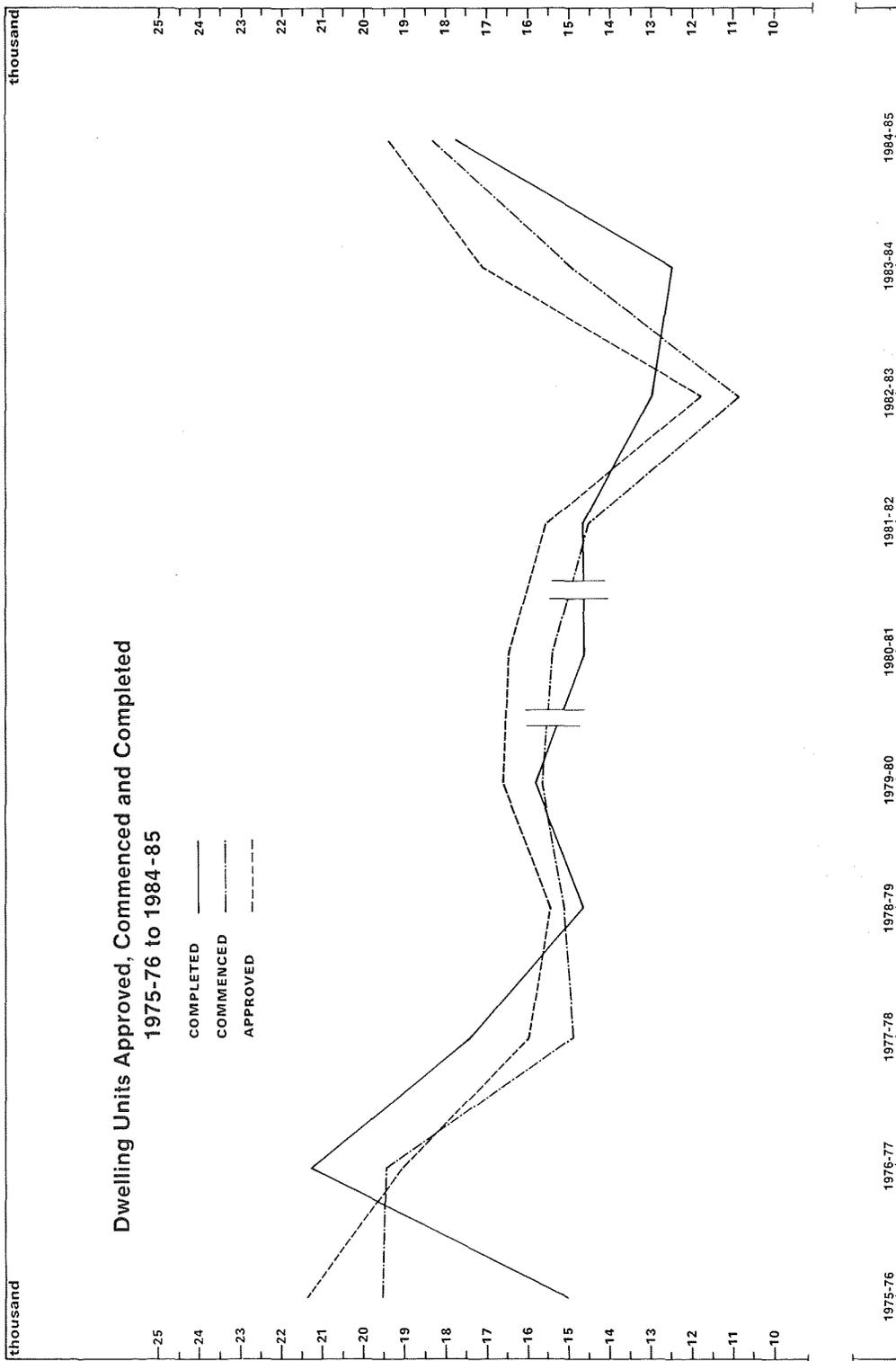
More detailed statistics relating to building are published quarterly in the bulletin *Building Activity, Western Australia*, (Catalogue No. 8752.5).

### 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. For the same reason data are unable to be classified by as many variables as was possible previously, so that information regarding materials of outer walls and roof, floor area, etc. are no longer available from this source.

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.

The following table shows the number of new dwelling units commenced in each statistical division during 1984-85.



Note: Breaks in series for Dwelling Units Commenced and Completed occur between 1979-80 and 1980-81 and 1980-81 and 1981-82.

## NEW DWELLING UNITS COMMENCED IN STATISTICAL DIVISIONS BY OWNERSHIP: 1984-85

Statistical division	Private sector			Public sector			Total		
	Houses	Other residential buildings	Total	Houses	Other residential buildings	Total	Houses	Other residential buildings	Total
Perth Statistical Division	9,795	2,536	12,331	363	402	765	10,158	2,938	13,096
Other divisions —									
South-West	1,469	297	1,766	145	154	299	1,614	451	2,065
Lower Great Southern	272	43	315	26	9	35	298	52	350
Upper Great Southern	53	2	55	15	4	19	68	6	74
Midlands	304	18	322	28	4	32	332	22	354
South-Eastern	321	111	432	87	67	154	408	178	586
Central	397	94	491	84	46	130	481	140	621
Pilbara	102	103	205	79	80	159	181	183	364
Kimberley	57	78	135	73	54	127	130	132	262
Total	2,975	746	3,721	537	418	955	3,512	1,164	4,676
WESTERN AUSTRALIA	12,770	3,282	16,052	900	820	1,720	13,670	4,102	17,772

The next table shows the number of new houses, classified by material of outer walls, commenced in Western Australia for the years 1980-81 to 1984-85.

## NUMBER OF NEW HOUSES COMMENCED, BY MATERIAL OF OUTER WALLS

Year	Double brick (a)	Brick veneer	Fibre cement	Other	Total, new houses
1980-81	8,041	1,168	712	146	10,067
1981-82	8,007	923	507	153	9,590
1982-83	7,086	694	553	206	8,539
1983-84	10,198	719	583	240	11,740
1984-85	11,936	871	579	284	13,670

(a) Includes houses built with outer walls of stone or concrete.

For more detailed monthly dwelling unit commencement statistics see the publication, *Dwelling Unit Commencements Reported by Approving Authorities* (Catalogue No. 8741.5).

## HOUSING FINANCE

The following table shows secured housing finance commitments made by significant lenders to individuals for the construction or purchase of dwellings for owner occupation. The types of lenders include banks, permanent building societies, co-operative housing societies, credit unions, life and general insurance companies, finance companies and general government enterprises.

1984-85 figures are not strictly comparable with those for earlier periods. For further information on this change in series and more details on housing finance in general, refer to the publication *Housing Finance for Owner Occupation* (Catalogue No. 5609.0) issued by the Australian Statistician, Canberra.

## SECURED HOUSING FINANCE COMMITMENTS APPROVED TO INDIVIDUALS FOR CONSTRUCTION OR PURCHASE OF OWNER OCCUPIED DWELLINGS

Year	Purpose of commitment:							
	Construction of new dwellings		Purchase of newly built dwellings		Purchase of established dwellings		Total	
	Dwelling units	\$m	Dwelling units	\$m	Dwelling units	\$m	Dwelling units	\$m
1979-80	7,757	204.2	2,158	53.7	18,254	444.4	28,169	702.3
1980-81	6,343	171.1	2,202	56.6	18,977	501.6	27,522	729.3
1981-82	5,548	154.8	1,624	43.3	16,967	443.3	24,139	641.4
1982-83	5,349	157.1	1,139	29.9	16,824	453.9	23,312	640.8
1983-84	9,654	291.6	1,165	31.8	24,146	705.7	34,965	1,029.1
1984-85	9,242	319.6	1,334	44.3	25,754	877.6	36,330	1,241.6

## GOVERNMENT AND GOVERNMENT-SPONSORED HOUSING

**Commonwealth Government**

**Commonwealth and State Housing Agreements.** Legislation enabling agreements between the Commonwealth Government and State Governments to provide homes and associated finance for persons in need of government assistance has been in existence in the form of various Commonwealth and State Acts since 1945.

The *Housing Assistance Act* 1984 was enacted to continue the provision of housing assistance after the termination of the *Housing Assistance Act* 1981. It refers to the Commonwealth-State Housing Agreement; a 10 year Agreement with a triennial review.

The Agreement is guided by its primary principles which are to alleviate housing related poverty and to ensure that housing assistance is, as far as possible, distributed equitably to persons resident in different forms of housing tenure. There should be no discrimination by age, sex, marital status or life situation. Rather, assistance should be on the basis of need only. The 1984 Agreement does away with the concept of welfare housing and replaces it with public housing.

Base funding of \$510 million is guaranteed to the States (including the Northern Territory) for each of the years 1985-86 and 1986-87. Additional funding will be determined in the Federal Budget. Allocation of these funds between the States is based on a formula which will achieve equal per capita allocation by 1990-91. Total funding in 1984-85 was \$623 million, of which Western Australia received \$60.8 million.

A number of specific programmes are covered by the Agreement. These are Pensioner Housing, Aboriginal Housing, Mortgage and Rent Relief, Crisis Accommodation and Local Government and Community Housing Programmes.

A more detailed account of the various Commonwealth and State Housing agreements is given on page 259 of the *Western Australian Year Book*, No. 19 — 1981 and in earlier issues.

**Aboriginal Housing.** The Commonwealth Government provides annual grants, through the Housing Assistance Act and the Department of Aboriginal Affairs, for the housing of Aboriginal people. In 1984-85 forty-six metropolitan and ninety country Aboriginal housing units were built.

**Defence Service Homes Corporation.** The *Defence Service Homes Act* 1918 is administered by the Defence Service Homes Corporation whose affairs are conducted and controlled by the Secretary to the Department of Veterans' Affairs. On 14 May 1985 the Treasurer announced the Government's intention to restructure the Defence Service Homes Scheme by inviting financial institutions to co-operate in providing housing loans to eligible persons and to take over the administration of the Scheme. Further details of the Scheme are available on page 261 of the *Western Australian Year Book* No. 20 — 1982 and previous issues.

A summary of the Corporation's activities in Western Australia for the six years 1979-80 to 1984-85 is given in the following table.

## DEFENCE SERVICE HOMES SCHEME — OPERATIONS IN WESTERN AUSTRALIA

Year	Loans granted during year				Total	Net capital expenditure	Principal repayments of loans	Loan accounts at end of period
	Construction of homes	Purchase of new homes	Purchase of previously occupied homes	Enlarge-ment of existing homes				
	No.	No.	No.	No.	No.	\$'000	\$'000	No.
1979-80	233	33	200	8	474	6,923	8,359	16,971
1980-81	269	48	333	18	668	12,506	9,127	16,569
1981-82	212	169	412	13	806	18,537	8,949	16,235
1982-83	300	70	416	24	810	18,877	8,019	16,246
1983-84	310	63	372	25	770	18,487	10,322	15,990
1984-85	367	66	499	12	944	21,821	12,679	15,660

**Housing Loans Insurance Scheme.** The Housing Loans Insurance Corporation was established by the *Housing Loans Insurance Act* 1965 (Commonwealth) to insure approved lenders against losses arising from the making of housing loans, and it is the largest mortgage insurer in both Australia and Western Australia. To 30 June 1985 insured loans in Western Australia amounted to \$2,393 million.

Details of the operations of the Corporation for the six years ended 1984-85 are given in the following table.

HOUSING LOANS INSURANCE CORPORATION  
LOANS INSURED IN WESTERN AUSTRALIA

Particulars		1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Loans insured	No.	7,053	6,034	4,501	3,368	10,142	7,776
Amount of loans insured	\$'000	207,872	188,563	161,898	112,828	290,257	295,121

**First Home Owners Scheme.** This Scheme was introduced on 1 October 1983 to replace the Home Deposit Assistance Scheme which operated between 18 March 1982 and 30 September 1983. Prior to 18 March 1982 assistance was available through the Home Savings Grant Scheme, details of which are available on page 336 of the *Western Australian Year Book* No. 21 — 1983.

The purpose of the Federal Government's First Home Owners Scheme is to help people buy or build their first home. The Scheme also aims at raising the borrowing capacity of first home owners and assisting successful applicants over a five year period. The assistance is a tax-free gift (not a loan). Applicants must be buying or building their first home in Australia. There is no restriction on the age or marital status of the applicants. Assistance may be made towards a new or established house, home unit or flat. In contrast to earlier Schemes, applicants are not required to prove savings.

An income test is applied to each application. The test applies to the combined taxable income of the person or persons applying. For families, joint applicants and sole applicants with dependent children who acquire a home on or after 22 August 1984, a full benefit may be paid if their taxable income in 1983-84 is \$20,000 or less. The benefit is reduced proportionately to nil when the income equals or exceeds the upper limit of \$27,900. For sole applicants without dependants, who acquire their home on or after 22 August 1984, the income limits are \$10,000 and \$13,950.

The maximum entitlement payable to applicants who have two or more dependent children is \$6,000; applicants who have one child may receive up to \$5,500; and applicants with no dependent children may receive up to \$4,000. These amounts may be varied depending upon the mode of payment chosen by the applicants.

Successful applicants may choose to receive the assistance in the form of monthly instalments over a five year period, or in a lump sum (of up to \$3,000) plus smaller monthly instalments. The lump sum is paid at the commencement of the instalment payments and may be used toward the settlement of a home acquisition.

### State Government

**The State Housing Commission.** (Since September, 1985, the Commission has adopted the trade name 'Homeswest'). The State Housing Commission was established in January 1947 by the State Housing Act of 1946 to replace the Workers' Homes Board which had been in operation since 1912. The Act remained in force until repealed and replaced by the Housing Act of 1980. Further details of the repealed Act are given on page 259 of the *Western Australian Year Book*, No. 19 — 1981 and in earlier issues. Funds for the Commission's operations are provided by the State Government.

Eligibility for assistance is restricted to persons with income below a prescribed amount, the amount being subject to quarterly adjustment according to the movement in the seasonally adjusted national average weekly earnings. From 1 April 1985 the maximum weekly earnings were \$334.50 for the Perth Metropolitan region, \$472.20 for the North-West and Kimberley regions, and \$432.90 in other remote areas.

## THE STATE HOUSING COMMISSION — NEW RESIDENTIAL BUILDINGS COMPLETED

Category	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Number of dwelling units (a)						
Housing Act 1980	—	—	272	254	137	197
Commonwealth and State Housing Agreements (b)	660	579	203	639	(c) 415	(c) 879
Aboriginal Housing	72	151	138	74	81	136
Departmental Homes	48	42	17	35	18	17
Government Employees' Homes	140	140	163	136	90	194
Shire Building Scheme (d)	5	1	1	4	2	7
Dwellings for Aged Pensioners (e)	104	176	198	111	93	137
Other (f)	49	25	32	63	12	37
Total	1,078	1,114	1,024	1,316	848	1,604
Other activities (g)	34	42	12	6	12	10

(a) Comprises number of houses and number of individual units in other residential buildings. (b) For details see section *Commonwealth and State Housing Agreements* above. (c) Excludes 433 dwelling units acquired through spot purchase and buy-in programmes. (d) For local government employees. (e) Constructed under the provisions of the *State Grants (Dwellings for Pensioners) Act 1974*, Part III of the *Housing Assistance Act 1978* and Part XI of the 1981 Housing Agreement. (f) Comprises houses built by the Commission in terms of the *Industrial and Commercial Employees' Housing Act 1973* and Project Development (Special Agreements Scheme) and other schemes. (g) The figures shown represent housing units built by charitable organisations for which the Commission provided design and supervisory services.

**Government Employees' Housing Authority.** The Government Employees' Housing Authority is established under the provisions of the *Government Employees' Housing Act 1964* to provide adequate and suitable housing accommodation for employees of State Government Departments to which the Act applies.

**Industrial and Commercial Employees' Housing Authority.** The Industrial and Commercial Employees' Housing Authority is established under the provisions of the *Industrial and Commercial Employees' Housing Act 1973* with the aim of providing adequate and suitable housing for key industrial or commercial employees in employment outside the Perth Metropolitan region.

To 30 June 1984 the Authority had assisted business organisations by providing 270 units of accommodation dispersed over a wide area of the State.

**Rural Housing Authority.** The Rural Housing Authority is established under the provisions of the *Rural Housing (Assistance) Act 1976*, to assist primary producers seeking finance to purchase or build a suitable dwelling or to add to or modernise an existing dwelling on their holding for themselves or an employee and his family.

A summary of the activities of the Authority is given in the following table.

## RURAL HOUSING AUTHORITY OPERATIONS

Type of assistance	1979-80		1980-81		1981-82		1982-83		1983-84		1984-85	
	Number	\$'000										
Loans made through permanent building societies	18	342	27	840	24	1,038	14	605	4	195	11	303
Direct advances by the Authority	39	1,014	32	1,000	36	938	42	128	36	1,305	23	945

**State Housing Death Benefit Scheme Act.** The *State Housing Death Benefit Scheme Act 1965* establishes, with effect from 20 February 1965, a scheme to provide benefits for the families of purchasers of dwellings who die leaving unpaid the whole or part of a liability to the State Housing Commission under a contract of sale or mortgage.

**Housing Loan Guarantee Act.** The purposes of the *Housing Loan Guarantee Act 1957* are to encourage, through provisions for guarantees and indemnities, the building and the purchasing of new houses. Under this Act, the Government provides guarantees to lenders of funds to building societies and other approved financial organisations making advances to persons desiring to purchase or build their own home on low deposits.

Additional details relating to the operations of the State Housing Commission and other Authorities can be found on pages 259-61 of the *Western Australian Year Book*, No. 20 — 1982 and in previous issues.

## 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. 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. The following table shows the number and value of such contracts classified by stage of construction.

NUMBER AND VALUE OF CONSTRUCTION (OTHER THAN BUILDING)  
PRIME CONTRACTS BY STAGE OF CONSTRUCTION

Period	Commenced		Completed		Under construction (a)		Work done during period \$m	Work yet to be done (a) \$m
	Number	\$m	Number	\$m	Number	\$m		
1979-80	215	632	173	138	118	761	160	610
1980-81	247	383	239	203	125	1,023	297	778
1981-82	284	381	258	358	152	1,167	496	784
1982-83	271	355	264	363	159	1,456	714	722
1983-84	306	269	291	481	174	1,301	738	309
1984-85	388	476	419	1,258	143	546	596	212

(a) At end of period.

## 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 was the first time that the Bureau had obtained comprehensive information on the structure of the construction industry; the survey forms part of the system of integrated economic censuses, further details of which are contained in the introduction to Chapter 15.

A survey covering the 1984-85 financial year is currently being carried out. Details of the 1978-79 survey, and tables of results appear on pages 338-40 of the *Western Australian Year Book* No. 21 — 1983.

# Chapter 20

## 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.

The following table shows distances by road, rail, sea and air between Perth and selected towns and localities in Western Australia.

DISTANCES BETWEEN PERTH AND SELECTED TOWNS AND LOCALITIES  
IN WESTERN AUSTRALIA

Town or locality	Road	Rail	Sea (a)	Air (b)	Town or locality	Road	Rail	Air (b)
North of 26°S latitude —	kilo-	kilo-	nautical	route	South of 26°S latitude —	kilo-	kilo-	route
Coastal —	metres	metres	miles	metres	Inland — <i>continued</i>	metres	metres	metres
Broome	(c)2,200	..	1,193	1,677	Bruce Rock	243	308	..
Carnarvon	902	..	484	816	Collie	202	198	..
Dampier	1,555	..	..	..	Coolgardie	557	..	..
Denham (Shark Bay)	831	..	479	691	Donnybrook	205	209	..
Derby	(c)2,354	..	1,358	1,795	Forrest	(g)1,460	1,300	..
Exmouth	1,259	..	683	(d)1,094	Harvey	140	138	..
Karratha	1,535	..	(e)857	1,250	Hyden	339	554	..
Onslow	1,387	..	733	1,144	Kalgoorlie	596	655	538
Port Hedland	(c)1,657	..	957	1,312	Kambalda	632	704	543
Roebourne	1,560	..	(f)885	1,248	Katanning	278	393	244
Wyndham	(c)3,191	..	1,761	2,204	Koolyanobbing	422	455	..
Inland —					Leonora	833	914	616
Fitzroy Crossing	(c)2,534	..	..	1,558	Madura	1,254	..	..
Goldsworthy	(c)1,700	..	..	1,337	Manjimup	299	313	..
Halls Creek	(c)2,817	..	..	1,659	Meekatharra	765	..	643
Kununurra	(c)3,176	..	..	2,211	Merredin	260	284	..
Marble Bar	1,476	..	..	1,085	Moora	172	174	..
Newman	1,186	..	..	1,020	Mount Barker	359	517	..
Nullagine	1,364	..	..	1,190	Mukinbudin	293	358	..
Paraburdoo	1,536	..	..	990	Mullewa	450	544	..
Tom Price	1,553	..	..	1,036	Nannup	277	289	..
Wittenoom	(c)1,448	..	..	1,105	Narrogin	192	292	..
South of 26°S latitude —					Newdegate	399	523	..
Coastal —					Norseman	724	833	547
Albany	409	578	353	375	Northam	97	120	..
Augusta	315	..	..	..	Pinjarra	87	86	..
Bunbury	175	184	104	165	Ravensthorpe	532	..	..
Busselton	224	236	..	..	Southern Cross	369	403	..
Esperance	721	1,033	560	582	Wagin	229	341	..
Eucla	1,436	..	..	..	Wiluna	949	..	720
Fremantle	18	19	..	..	Wyalkatchem	191	237	..
Geraldton	424	493	215	370	York	97	156	..
Inland —								
Bridgetown	262	277	..	..				

(a) From Fremantle. (b) Shortest direct distance. (c) Inland route via Great Northern Highway. (d) Distance to Learmonth. (e) Distance to Dampier. (f) Distance to Port Walcott. (g) Via Eyre Highway.

The railway system extends from Fremantle, Perth and Midland for hundreds of kilometres into the mining, agricultural, pastoral and forest areas in the southern half of the State. There is also a well-developed road system in this area, and the coastal towns in the north-west and the north are connected by road with the south and with the pastoral and mining areas of the hinterland. The Western Australian Coastal Shipping Commission operates a shipping service which connects Fremantle with the north of the State, the Eastern States and the Northern Territory. International flights operate through Perth and Port Hedland airports. Perth Airport is also the centre of a comprehensive network of airline services to towns in Western Australia and to the capital cities of other States.

In recent years important mineral developments in the north-west have led to the provision of deep-water port facilities and the construction of railways and roads connecting them with the extensive iron ore deposits now being exploited.

### 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.

NUMBERS OF OVERSEAS DIRECT VESSELS ENTERED AND CLEARED AT MAJOR PORTS

Port	Entrances			Clearances		
	1982-83	1983-84	1984-85	1982-83	1983-84	1984-85
Port of Fremantle	1,038	1,015	1,018	1,045	1,006	1,016
Other ports —						
Bunbury	121	152	195	120	149	196
Cape Cuvier	10	9	13	11	10	13
Dampier	391	470	506	388	470	504
Geraldton	168	181	187	168	178	186
Port Hedland	328	391	448	323	380	424
Port Walcott	112	132	109	110	137	106
Yampi Sound	36	35	15	33	34	15
Other	276	236	300	276	235	302
Total	1,442	1,606	1,773	1,429	1,593	1,746
All ports	2,480	2,621	2,791	2,474	2,599	2,762

The preceding table shows the number of entrances into and clearances from each port by vessels coming direct from or going direct to overseas ports during the years 1982-83 to 1984-85. 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 tons and under.

The importance of mineral developments in the north-west of the State is evident from the numbers of entrances and clearances 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.

The following table shows the amount of cargo loaded and discharged at each port during 1983-84. 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.

## OVERSEAS CARGO LOADED AND DISCHARGED AT MAJOR PORTS

Port	Loaded		Discharged	
	Revenue tonnes (a)	Gross weight tonnes (a)	Revenue tonnes (a)	Gross weight tonnes (a)
1983-84				
Port of Fremantle	5,888,959	5,787,757	4,093,860	3,736,343
Other ports —				
Bunbury	2,496,286	2,491,331	256,077	256,077
Cape Cuvier	456,671	456,671	—	—
Dampier	35,559,271	35,542,282	217,827	217,267
Geraldton	1,522,341	1,515,407	77,358	77,187
Port Hedland	28,940,596	28,940,416	444,299	437,163
Port Walcott	15,453,805	15,332,359	26,876	26,876
Yampi Sound	2,290,415	2,290,415	—	—
Other	2,302,844	2,294,368	179,035	176,786
Total	89,022,229	88,863,249	1,201,472	1,191,356
All ports	94,911,188	94,651,006	5,295,332	4,927,699
1984-85				
Port of Fremantle	5,236,936	5,152,806	3,873,654	3,446,589
Other ports —				
Bunbury	3,297,874	3,297,874	482,555	482,555
Cape Cuvier	551,973	551,973	—	—
Dampier	39,797,735	39,797,735	98,547	98,547
Geraldton	1,454,896	1,454,896	108,152	108,152
Port Hedland	30,826,649	30,758,100	214,191	193,791
Port Walcott	14,229,407	14,229,407	4,509	4,509
Yampi Sound	1,432,090	1,432,090	—	—
Other	3,845,160	3,844,071	209,226	206,828
Total	95,435,784	95,366,146	1,117,180	1,094,382
All ports	100,672,720	100,518,952	4,990,834	4,540,971

(a) See text preceding table.

Apart from general cargo, overseas consignments discharged were principally petroleum and petroleum products, rock phosphate, caustic soda, iron and 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, zinc and copper concentrates, and salt; and at Albany cereal grains, sheep and tallow. At Bunbury the principal cargoes loaded were alumina, mineral sands, woodchips and cereal grains. 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, and salt from 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 Melbourne and Tasmanian ports, bringing a range of general cargo including newsprint, other paper products and steel into the State and carrying Western Australian goods (mainly ilmenite, wheat, chemicals and furniture) eastward, principally to Tasmanian ports.

#### 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 1985, is given below. Reference 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. Wharfage consists of three berths situated on the northern side of the harbour. These berths are land-backed with a continuous length of 609 metres and a depth alongside of 10.4 metres at No. 1 and No. 2 berths and a depth alongside of 12.2 metres at No. 3 berth.

**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 2.4 kilometres in length, 12.2 metres in depth and 121 metres wide. The maximum loaded draft permitted in the inner harbour is 11.6 metres. Separate berths, linked by conveyor to shipside storage, provide for the loading of alumina and woodchips at the rate of 2,000 tonnes and 1,000 tonnes per hour, respectively. There is a general purpose berth, 240 metres in length capable of handling roll on/roll off cargo.

The deepest permissible loaded draft of the outer harbour, 8.7 metres, is subject to a small increase at the harbour master's discretion. Wharf berth accommodation consists of two land-backed berths each 184 metres in length. There is a conveyor with a capacity of 900 tonnes per hour used for loading mineral sands and a bulk grain loading facility with a capacity of some 250 tonnes per hour. The cargo transit shed has a cool storage capacity of some 1,150 cubic metres.

**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. Together, they provide a continuous structure 457 metres long, dredged to a depth alongside of 11.0 metres, with a land area backing of approximately forty-seven hectares.

The approach channel to the land-backed berths is 244 metres wide and is dredged to a depth of 11.0 metres. The deepest permissible loading draft is ten metres. Two privately-owned ship loaders are available; one, with a loading capacity rate of 860 tonnes per hour, handles gypsum and bulk grains, the latter product being drawn from a 184,200 tonne capacity storage terminal. The other conveyor, which has a capacity of some 200 tonnes per hour, is used for the loading of mineral concentrates. An underground pipeline enables petroleum discharged at No. 2 berth to be conveyed three kilometres to inland storage tanks.

**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 is constructed within the mouth of the Swan River, about nineteen kilometres from Perth. It is protected by two breakwaters, one 1,474 metres in length and the other 620 metres. The harbour is approached through a short entrance channel dredged to a depth of eleven metres at low water. It encloses eighty-one hectares of water dredged throughout to eleven metres

at low water and is the centre of the general cargo trade of the port. There are twenty land-backed berths, with a total quayage of about 4,000 metres. Transit sheds occupy an area of 44,074 square metres and large paved areas are provided for the open storage of cargo. The Inner Harbour is well equipped to handle container, roll-on/roll-off and unit-load cargoes. Further provision is being made to extend facilities by rebuilding some of the older berths.

The Outer Harbour is protected from the west by islands and reefs. It embraces three main anchorages of depths up to nineteen 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.

There are six jetties in Cockburn Sound. Five of these are owned and operated by private companies concerned with specialised cargoes. They comprise a jetty for the export of grain, an oil refinery jetty, two jetties to serve a blast furnace and a steel-rolling mill, and a jetty for the export of refined alumina and the import of caustic soda. The sixth jetty, a common-user facility, built by the Port Authority is used mainly for imports of rock phosphate and sulphur.

All Inner Harbour berths are equipped to supply bunker fuel direct to ships from privately-owned storage tanks close to the port and an oil lighter is available to service ships berthed in the Inner Harbour or anchored in the Outer Harbour. Ships can also take on bunker fuel oil at the oil refinery jetty and bulk cargo jetty in the Outer Harbour.

**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 ten metres deep, provides a good holding anchorage and 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 (0.8 m tide), or to 9.3 metres at mean higher high water (1.1 m tide). The port has one berth of 99 metres with depth alongside of 8.8 metres and four berths, lengths 203 metres, 203 metres, 181 metres and 213 metres respectively, with depth alongside of 9.4 metres. The cargo transit shed has a floor area of 2,230 square metres and extensive paved areas are available for open storage of cargo. Bulk grain-loading facilities with a capacity of 500 tonnes per hour serve a terminal of 150,000 tonnes capacity. A conveyor system used for loading minerals has a rated capacity of 1,000 tonnes per hour.

**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 thirteen kilometres in length, 11.8 metres minimum depth and 183 metres wide. The channel, subject to tidal movements, is navigable by vessels drawing up to 16.8 metres. Wharf facilities service five berths. Three privately-owned berths with a total length of 1,039 metres and a depth alongside ranging from 14.8 metres to 17.3 metres are served by three shiploaders, two of them each having a capacity of 6,100 tonnes of iron ore per hour and the third a capacity of 4,570 tonnes per hour. Of the two remaining berths, one is 183 metres in length with a depth alongside of 11.2 metres. It is served by a privately-operated salt-loading facility with a capacity of 1,500 tonnes per hour. The fifth berth is a land-backed general cargo berth 213 metres long with a depth alongside of 11.2 metres.

## RAILWAYS

Railways open for general and passenger traffic in the southern part of the State are operated by the Western Australian Government Railways Commission. The system is linked with railways of other States by the Australian National Railways between Kalgoorlie in Western Australia, Serviceton in South Australia and Broken Hill in New South Wales. There are, in addition, private railways for the haulage of iron ore in the northern part of the State and timber in the south-west.

### Origin and Development

The first railway in the Colony, built in 1871 from Busselton into the nearby forest, was a private line constructed for the transport of timber. By the end of 1900, the Colony had a railway system for general and passenger traffic which comprised 2,181 kilometres of government line and 446 kilometres of privately-owned line. The State Government system reached a maximum of 7,051 kilometres in 1940 but this figure was reduced, particularly during the 1960s, by the closure of certain non-paying lines.

At 30 June 1985 there were 6,294 kilometres of railway open for general and passenger traffic in Western Australia. Of this total, 5,563 kilometres were owned by the State Government and operated by the Western Australian Government Railways Commission, and 731 kilometres were owned by the Commonwealth Government and operated by the Australian National Railways. At the same date private railways used for the transport of iron ore were those between Newman and Port Hedland (534 kilometres), Shay Gap and Port Hedland (180 kilometres), Paraburdoo and Dampier (386 kilometres), and Pannawonica and Cape Lambert (185 kilometres).

### The Western Australian Government Railways Commission

The *Government Railways Act 1904* constituted the Western Australian Government Railways Commission, in the person of the Commissioner of Railways, who is responsible, subject to the Minister, for the administration of the Act.

The Act provides the Railways Commission with statutory authority to borrow funds in its own right, subject to specific approval of the Minister and the Treasurer. In addition the Act authorises the Commission to engage in such other financial transactions as are appropriate for trading corporations generally in the normal course of business. The payment of interest and the repayment of loans are guaranteed by the Treasurer on behalf of the State, provided the guarantee has been approved by the Governor.

Previously funds were provided from the General Loan Fund or from the Consolidated Revenue Fund, the financial procedure being basically the same as for other Departments. The loan liability of the Western Australian Government Railways Commission to the Treasury was \$172,348,000 at 30 June 1985, the net decrease during 1984-85 being \$7,733,000.

#### WESTERN AUSTRALIAN GOVERNMENT RAILWAYS (a)

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
FINANCE						
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Capital investment at 30 June (b)	198,828	191,351	191,783	187,594	180,081	172,348
Operating revenues —						
Passenger fares	5,114	6,325	7,313	7,858	8,055	8,521
Parcels and mails	2,357	2,876	3,091	426	381	463
Paying goods and livestock	143,299	148,422	175,054	183,632	180,439	209,627
Miscellaneous	24,964	24,749	28,108	34,283	39,464	39,696
Total operating revenues	175,735	182,373	213,566	226,199	228,339	258,307
Operating expenses	172,979	186,156	209,552	227,439	246,552	261,938
Excess of operating revenues over expenses	2,755	—3,783	4,014	—1,240	—18,213	—3,631
Depreciation	11,240	10,707	11,798	12,092	11,906	12,261
Interest charges	19,534	22,778	27,479	33,581	35,988	38,727
Total deficit (c)	28,033	37,239	35,262	46,915	66,107	54,619

## WESTERN AUSTRALIAN GOVERNMENT RAILWAYS (a) — continued

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
RAILWAY OPERATIONS						
Route kilometres at 30 June —						
1,067 mm gauge (d)	4,396	4,393	4,226	4,226	4,239	4,179
1,435 mm gauge	1,229	1,229	1,228	1,226	1,213	1,212
Dual gauge	148	151	155	158	171	172
Employees at 30 June	9,727	9,304	8,937	8,391	7,777	7,101
	'000	'000	'000	'000	'000	'000
Number of —						
Train kilometres run (e)	12,486	11,604	11,360	11,204	10,936	11,656
Passenger-journeys —						
Suburban (f)	7,132	6,505	6,607	6,651	(g) 8,754	9,307
Country	416	428	398	388	379	362
Total	7,548	6,933	7,005	7,039	9,133	9,669
Tonnes of freight —						
Paying goods and livestock	21,388	20,271	19,776	19,791	19,870	22,085
Departmental (h)	549	578	610	682	384	361
Total	21,937	20,849	20,386	20,473	20,254	22,446
Tonne kilometres —						
Paying goods and livestock	4,730,671	4,488,572	4,389,792	4,384,388	3,903,394	4,327,707
Departmental	69,438	83,903	85,191	122,745	60,631	51,405
Total	4,800,109	4,572,475	4,474,983	4,507,133	3,964,025	4,379,112

(a) Includes details of road services. (b) Including Stores Funds. (c) Actual deficits after adjustment resulting from fluctuations in rates of exchange. (d) Excludes route kilometres of 1,067 mm gauge line which parallels the 1,435 mm gauge line. (e) Revenue and non-revenue train kilometres. (f) Responsibility for the financial and policy direction of the suburban railways passed to the Metropolitan (Perth) Passenger Transport Trust from 1 July 1974. (g) The Perth-Fremantle passenger train service was suspended in September 1979 and re-introduced on 29 July 1983. (h) Departmental freight comprises mainly oil, ballast, timber and rails.

WESTERN AUSTRALIAN GOVERNMENT RAILWAYS  
PAYING GOODS AND LIVESTOCK CARRIED (a)

Freight classification	1982-83	1983-84	1984-85
	tonnes	tonnes	tonnes
Ores and minerals	9,862,212	10,379,054	11,057,166
Energy reserves	2,074,968	2,515,789	2,092,444
Agriculture (b)	5,954,896	4,886,605	6,619,314
Manufactured goods	569,143	667,313	872,673
Intersystem traffic	1,201,277	1,277,814	1,318,983
Other goods	128,962	143,293	124,467
Total	19,791,458	19,869,868	22,085,047

(a) Includes details of road services. (b) Includes timber and woodchips. Includes weight of livestock carried.

In addition to its railways services, the Commission operates an extensive system of road services for the carriage of passengers, mail and freight.

Suburban railway passenger services are operated by the Commission on behalf of and at the direction of the Metropolitan (Perth) Passenger Transport Trust under the provisions of the *Metropolitan (Perth) Passenger Transport Trust Act 1957*. The Commissioner of Railways, as provided by the Act, is an *ex-officio* member of the Trust.

Administrative and operational control of suburban railway passenger services remains with the Commissioner of Railways but, as from 1 July 1974, the Trust accepted responsibility for finance and policy direction in terms of the 1973 legislation.

**Iron Ore Railways**

The exploitation of extensive inland deposits of iron ore in Western Australia has necessitated the construction of a number of 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 and ratified by Act of Parliament.

The following summary relates to railways used for the transport of iron ore during the year ended 30 June 1985. The quantity of ore carried on these railways was 77.5 million tonnes in 1982-83, 69.7 million tonnes in 1983-84 and 86.4 million tonnes in 1984-85. At 30 June 1985 there were 123 locomotives and 5,497 ore wagons in service on these railways.

## RAILWAYS USED FOR TRANSPORT OF IRON ORE

Railway	Enabling Act	Length (route kilometres)	Gauge	Date operative (a)
Shay Gap-Port Hedland (b)	No. 97 of 1964 (c)	180	1,435 mm	1966 — 23 May
Paraburdoo-Dampier (b)	No. 24 of 1963 (d)	386	1,435 mm	1966 — 1 July
Koolyanobbing-Kwinana (e)	No. 27 of 1961 (f)	490	1,435 mm	1967 — 10 April
Newman-Port Hedland (b)	No. 75 of 1964 (g)	534	1,435 mm	1969 — 18 January
Pannawonica-Cape Lambert (b)	No. 91 of 1964 (h)	185	1,435 mm	1972 — 6 July

(a) Date on which first load of iron ore was dispatched from mine. (b) Privately owned and operated. (c) *Iron Ore (Mount Goldsworthy) Agreement Act 1964*. (d) *Iron Ore (Hammersley Range) Agreement Act 1963*. (e) Part of the Western Australian Government Railways' system; open for general and passenger traffic. Iron ore haulage on this line ceased in August 1983. (f) *Railways (Standard Gauge) Construction Act 1961*. (g) *Iron Ore (Mount Newman) Agreement Act 1964*. (h) *Iron Ore (Cleveland-Cliffs) Agreement Act 1964*.

## Australian National Railways Commission

The former Commonwealth Railways comprised four separate systems. These were the Trans-Australian Railway, operating partly in Western Australia and partly in South Australia; the Central Australia Railway, partly in South Australia and partly in the Northern Territory; the North Australia Railway, wholly in the Northern Territory; and the Australian Capital Territory Railway. Commonwealth and State legislation was enacted in 1975 to transfer the Tasmanian Government Railways and the non-metropolitan South Australian Railways to the Commonwealth Government. The Australian National Railways Commission came into existence on 1 July 1975 to control the two transferred systems and the former Commonwealth Railways. Services operating on the North Australia Railway were withdrawn from 30 June 1976. On 1 March 1978 the Australian National Railways Commission assumed full control of the non-urban South Australian State railways and the Tasmanian Government railways. Details of the operations of the non-urban South Australian railways and the Tasmanian railways are included in particulars shown for the National railway system. The State Transport Authority operates urban rail services in South Australia and particulars of these are shown as the South Australian railway system.

## GOVERNMENT RAILWAYS IN AUSTRALIA — SUMMARY OF OPERATIONS: 1982-83

Railway system of —	Route kilometres at 30 June	Revenue train kilometres run	Passenger- journeys	Goods and livestock carried	Gross earnings	Average number of employees (a)
State Governments —		'000	'000	'000 tonnes	\$'000	
New South Wales	9,883	61,507	207,778	41,350	694,819	40,872
Victoria	5,815	30,166	84,323	8,570	247,945	20,905
Queensland	9,979	30,885	34,749	43,706	549,859	25,943
South Australia	131	3,894	(b) 85,420	—	(b) 41,908	(b) (c) 3,586
Western Australia	5,610	10,560	(d) 220	19,791	223,925	8,600
Commonwealth Government —						
National	7,647	10,795	357	10,676	193,854	9,817
Australia	39,065	147,806	412,847	124,093	1,952,310	109,723

(a) Excluding construction staff except for Victoria where construction staff are included. (b) Includes details for combined rail, bus and train operations. Separate details for rail are not available. (c) Includes staff on loan from, and paid by, the Australian National Railways Commission. (d) Excludes suburban rail passenger-journeys, which are operated under the direction of the Metropolitan (Perth) Passenger Transport Trust.

## Railway Gauges

GOVERNMENT RAILWAYS IN AUSTRALIA  
ROUTE KILOMETRES OPEN, BY GAUGES, 30 JUNE 1983

Railway system	Route kilometres of gauge —				Total route kilometres
	1,600 mm	1,435 mm	1,067 mm	Dual (a)	
New South Wales	—	(b) 9,883	—	—	(b) 9,883
Victoria	(c) 5,490	313	—	12	(c) 5,815
Queensland	—	(d) (e) 111	9,868	—	(e) 9,979
South Australia	131	—	—	—	131
Western Australia	—	1,226	4,226	158	5,610
National	2,198	3,636	1,813	—	7,647
Total route kilometres	7,819	15,169	15,907	170	39,065

(a) Victorian Railways operate a 1,600 mm/1,435 mm dual gauge line and Western Australian Government Railways operate a 1,435 mm/1,067 mm dual gauge line. (b) Includes 469 kilometres which are electrified. (c) Includes 328 kilometres of 1,600 mm gauge line operating in New South Wales. Includes 417 route kilometres which are electrified. (d) Operated by the State Rail Authority of N.S.W. which is reimbursed for the cost of operations. (e) Includes 32 route kilometres which are electrified.

## ROADS AND ROAD TRAFFIC

Work connected with road construction and maintenance and associated projects in Western Australia is undertaken by the State Government, through the Main Roads Department, and by local government authorities. The financing of roadworks is the responsibility of Commonwealth, State and Local Governments.

Under the provisions of the Main Roads Act, the Main Roads Department was established in 1930 to replace the Main Roads Board originally constituted as a central road authority in 1926. The Department operates under the *Main Roads Act 1930* and is administered by a Commissioner of Main Roads who is currently responsible to the Minister for Transport. The Act was amended in 1975 to introduce from 1 July 1976, a new road classification system ranking roads in order of 'highways', 'main roads' and 'secondary roads', thus bringing the terminology in the Act more into line with the functional classifications accepted by the National Association of Australian State Road Authorities. The previous concept of a 'controlled-access' road has been replaced by the power to declare 'control of access' over section or part of, highways and main roads.

Main roads are those which provide communication between a large producing area, either actual or potential, and its market or nearest port or railway station; between two or more such areas; or between large centres of population. They also provide a major route for high volume traffic movements within large urban areas. Highways are defined similarly to main roads but represent a higher functional category. In addition, they provide direct communication between capital cities or between a capital city and a large producing area or a large centre of population. Secondary roads provide feeder routes connecting producing areas with a highway or main road or with their market outlets; connect centres of population; or provide the main means of access to national parks, scenic reserves or sites and seaside resorts. The Main Roads Act provides that, on the recommendation of the Commissioner, any road may be declared by the Governor to be, or cease to be a highway, main road or secondary road. At 30 June 1985, classified roads comprised 7,769 kilometres of highways, 7,477 kilometres of main roads and 8,774 kilometres of secondary roads.

The construction and maintenance of highways and main roads are the responsibility of the Main Roads Department. Traffic engineering is also a function of the Department and includes regulatory sign posting and traffic signals throughout the State. In the interest of road safety, the Department also controls advertising signs directed primarily at traffic on the highways and main roads. The Department also makes substantial financial provision for the construction and maintenance of secondary roads. In addition the Main Roads Act provides that the Commissioner may allocate funds for the construction or improvement of unclassified roads, which are roads of less importance than highways, main roads and secondary roads. The construction and maintenance of strategic roads and roads of access to Commonwealth property is undertaken by the Department for the Commonwealth Government.

Within its own district, each local government authority is responsible for the provision and upkeep of roads other than those provided by the Main Roads Department. In addition, the local authority is required by the Main Roads Act to maintain any secondary road situated in its district.

ROADS OPEN FOR VEHICULAR TRAFFIC AT 30 JUNE 1985  
CLASSIFIED ACCORDING TO STATISTICAL DIVISION  
(Kilometres)

Statistical division	Formed roads			Total	Unformed roads (b)	Grand total
	Sealed or primed	Gravel surface	Formed only (a)			
Perth Statistical Division	8,659	580	129	9,369	167	9,536
Other statistical divisions —						
South-West	4,943	3,636	1,895	10,473	750	11,223
Lower Great Southern	3,106	4,086	4,039	11,231	1,511	12,741
Upper Great Southern	3,267	5,878	4,522	13,666	850	14,517
Midlands	7,827	10,716	8,734	27,276	2,126	29,403
South-Eastern	3,127	4,888	4,317	12,332	5,665	17,997
Central	4,686	5,082	13,094	22,862	6,202	29,064
Pilbara	1,681	951	3,561	6,194	2,011	8,204
Kimberley	1,790	1,715	2,661	6,167	1,483	7,650
Total	30,426	36,951	42,822	110,200	20,598	130,798
WESTERN AUSTRALIA	39,086	37,532	42,952	119,569	20,765	140,334

(a) Comprises roads, mainly of natural surfaces, formed but not metalled or otherwise prepared. (b) Roads, unprepared except for certain clearing, used for vehicular traffic.

The preceding table, derived from data provided by the Main Roads Department, shows the length of public roads open for vehicular traffic at 30 June 1985, classified according to statistical division. Roads under the control of the Department of Conservation and Land Management (which totalled 25,136 kilometres at 30 June 1985) are excluded.

### Finance for Roads

The principal source of revenue for road works in Western Australia is in the form of Commonwealth Government financial assistance authorised by a series of Acts, the first of which, the Main Roads Development Act, was passed in 1923. The main form of Commonwealth assistance to the States and the Northern Territory in 1985-86 will be the grants provided under the Australian Land Transport program and the Australian Bicentennial Roads Development program.

*The Australian Land Transport (Financial Assistance) Act 1985* came into effect on 1 July 1985 and provides for a new five year land transport program to replace the *Road Grants Act 1981*, which expired on 30 June 1985. Besides roads, the new program provides scope for funding to approved road safety organisations and funding of railway improvements and transport research. For the 1985-86 period, out of a grant of \$810.0 million, the Commonwealth is to provide \$776.6 million to the States and \$28.4 million to the Northern Territory. Western Australia's share of the total in 1985-86 is estimated to amount to \$98.2 million. For national roads, the Act authorised grants totalling \$363.9 million for 1985-86 of which \$40.2 million is allocated to Western Australia. For the other categories of roads, Western Australia's share of the total grant of \$412.7 million for 1985-86 is \$58.0 million comprising \$28.4 million for arterial roads, and \$29.6 million for local roads.

In addition to assistance provided under the *Australian Land Transport (Financial Assistance) Act 1985*, the Commonwealth introduced in 1982-83 a special Australian Bicentennial Road Development (ABRD) program with the overall aim of developing the Australian road system to a high standard by 1988, the bicentennial year.

This program is to be fully financed by a surcharge on excise on motor spirit and distillate to be paid into the Australian Bicentennial Road Development Trust Fund. The level of the surcharge to apply from 1 July 1983 until the termination of the program on 31 December 1988 is to be two cents per litre; an initial surcharge of one cent per litre was applied from 18 August 1982 to 30 June 1983. It is estimated that the program will involve overall expenditure of about \$2,500 million over the period to 1988-89.

Expenditure under this program in 1985-86 is estimated at \$440 million, of which Western Australia's share is \$54.8 million.

Western Australian Acts which provide for a system of receipt and disbursement of moneys for road purposes are the *Road Traffic Act 1974*, the *Transport Act 1966*, and the *Main Roads Act 1930*.

The *Road Traffic Act 1974* provides for payment to the Main Roads Trust Account, maintained under the Main Roads Act, of all fees received for the issue, renewal and transfer of motor vehicle licences (other than recording fees) and for the issue of excess load permits.

In conjunction with the repeal of the *Road Maintenance (Contribution) Act 1965*, the *Transport Act 1966* was amended to provide for licence fees to be paid by businesses engaged in the wholesaling of petroleum products. Enabling legislation was authorised in May 1979 by the *Acts Amendment and Repeal (Road Maintenance) Act 1979*, which also provides for such licence fees to be paid to the Main Roads Trust Account.

The *Main Roads Act 1930* provides for payment to the Main Roads Trust Account of moneys received from the Commonwealth Government as financial assistance in relation to roads; amounts payable under the provisions of the Traffic Act or any other Act; moneys appropriated by the Parliament; and payments by local government authorities in respect of permanent works and the maintenance of main roads and developmental roads. Moneys standing to the credit of the Account are used to meet expenditure by the Commissioner of Main Roads on the administration of the Act and the construction of roads and associated works, and to provide funds to local government authorities for roads and road works.

The *Main Roads Act Amendment Act 1980* established a system of grants to local government authorities for each of the five financial years during the period ending 30 June 1985. The Act allocates each local government authority to one of five groups and provides for payment of a base grant to each local government authority for road construction and maintenance, and for payments of additional grants for approved programs. The conditions relating to matching expenditures and, where applicable, to additional grants vary according to the groups. The total amount paid to local government authorities in 1985-86 is estimated at \$29.6 million. In addition, a provision of the *Main Roads Act Amendment Act 1975* empowers the Commissioner of Main Roads to borrow money for the purpose of road construction and associated activities, subject to the approval of the Minister.

Grants payable from the Main Roads Trust Account are an important source of funds available to local government authorities for road construction and maintenance. Other moneys may be provided from the ordinary revenue of a local authority or from loans raised for road purposes.

### **Vehicle Registration, Licences and Traffic Control**

Until February 1982 the Road Traffic Authority, established in 1975 by the Road Traffic Act, was responsible for general traffic control (except for certain powers in relation to the parking of vehicles) and the issuing of motor driver's licences. The Authority was also responsible for the registration of motor vehicles with over forty local authorities acting as agents of the Authority in this capacity.

A more detailed account of events preceding the creation of the Road Traffic Authority appears in the *Western Australian Year Book*, No. 14 — 1975.

The *Road Traffic Amendment Act (No. 4) 1981* which came into effect on 2 February 1982 abolished the Road Traffic Authority and established the Traffic Board. Responsibility for the

control of traffic was given to the Commissioner of Police while the Traffic Board became responsible for registration of vehicles and licensing of drivers. The duties associated with the Board's responsibilities are conducted by officers of the Police Department. At 30 June 1985, thirty-one local authorities were continuing to act under delegated powers as vehicle licensing bodies.

The Board comprises seven members, namely the Commissioner of Police; the Commissioner of Main Roads; the Co-ordinator General of Transport (or their respective deputies); a member of the Police Force (nominated by the Commissioner of Police); and three persons appointed by the Governor to represent, respectively, the Local Government Association of Western Australia (Inc.), the Country Shire Councils' Association of W.A., and the Country Urban Councils' Association.

Under the *Road Traffic Act 1974*, persons who have not previously held a driver's licence are issued with a probationary licence, the period of probation being one year, provided the person is at least seventeen years of age, or until the person turns eighteen if they are less than seventeen years old. At the end of this period the probationary licence becomes an ordinary licence. Persons who have previously held a licence in a place outside the State are issued with an ordinary licence provided that the previous licence had been held for a period of one year and the person is at least eighteen years old.

The Act provides that the Traffic Board may suspend or cancel a driver's licence under certain conditions, one of which is the number or nature of the convictions under the Act or its Regulations.

In addition to vehicle registration and the licensing of drivers of motor vehicles, the Board is charged with responsibility for the collection and analysis of road traffic statistics and the undertaking of research into the causes and prevention of road accidents. In discharging its functions under the Act, the Board is required, *inter alia*, to maintain a comprehensive knowledge of significant developments in traffic administration and research projects conducted elsewhere and to achieve the most efficient use of resources by eliminating duplication of work performed by any other body or authority, whether established within the State or elsewhere.

Section 231 of the *Local Government Act 1960* authorises local authorities to make by-laws in relation to the parking of vehicles and, in the case of the Perth City Council, certain powers in this regard are granted in terms of the *City of Perth Parking Facilities Act 1956*.

The following table shows the number of motor vehicles, classified according to type, on register in the Perth Statistical Division (see map inside back cover) and in the whole of Western Australia from 1980 to 1985. Vehicles owned by the Commonwealth Government are not licensed under the Traffic Act but are included in the figures. The table also gives the estimated number of vehicles per 1,000 of population and the number of persons per vehicle.

MOTOR VEHICLES ON REGISTER (a) AND RATIO TO POPULATION (b)

At 30 June —	Motor cars and station wagons ( <sup>'000</sup> )	Light and heavy commercial, omnibuses ( <sup>'000</sup> )	Motor cycles and scooters ( <sup>'000</sup> )	Total ( <sup>'000</sup> )	Estimated number of vehicles per 1,000 of population		Estimated number of persons per vehicle	
					Motor cars and station wagons	All motor vehicles (a)	Motor cars and station wagons	All motor vehicles (a)
PERTH STATISTICAL DIVISION								
1980	398.7	93.8	18.6	511.1	443	568	2.3	1.8
1981	413.8	98.7	21.4	533.9	449	579	2.2	1.7
1982	428.8	103.6	22.6	554.9	452	585	2.2	1.7
1983	440.6	109.8	23.3	573.7	455	592	2.2	1.7
1984	453.5	113.0	23.1	589.6	461	600	2.2	1.7
1985	472.9	121.1	23.3	617.3	472	617	2.1	1.6

## MOTOR VEHICLES ON REGISTER (a) AND RATIO TO POPULATION (b) — continued

At 30 June —	Motor cars and station wagons ('000)	Light and heavy commercials, omnibuses ('000)	Motor cycles and scooters ('000)	Total ('000)	Estimated number of vehicles per 1,000 of population		Estimated number of persons per vehicle	
					Motor cars and station wagons	All motor vehicles (a)	Motor cars and station wagons	All motor vehicles (a)
WESTERN AUSTRALIA (c)								
1980	535.6	179.8	29.5	745.0	422	587	2.4	1.7
1981	552.6	187.6	33.0	773.2	425	595	2.4	1.7
1982	573.4	197.3	35.2	806.0	429	603	2.3	1.7
1983	576.9	196.5	35.9	809.3	423	593	2.4	1.7
1984	592.5	201.8	35.8	830.0	428	600	2.3	1.7
1985	615.4	214.6	36.2	866.3	437	616	2.3	1.6

(a) Excludes tractors, trailers, caravans, and plant and equipment such as bulldozers, road graders and rollers, and mobile cranes. Improvements in the methodology used to produce motor vehicles on register statistics for areas other than Perth Statistical Division have resulted in a break in series between 1982 and 1983. (b) Population figures are based on estimated resident population at 30 June. (c) Includes Commonwealth Government-owned vehicles (other than those of the defence services) listed with the Commonwealth Motor Vehicle Registry, Canberra.

## ROAD PASSENGER TRANSPORT SERVICES

Details of the operations of government and municipal omnibus services in Western Australia during the six years ended 30 June 1985 are given in the following table.

## BUS SERVICES (a)

Year	Route kilometres operated (b)	Buses at end of year	Bus kilometres run '000	Passenger-journeys '000	Employees at end of year	Operating revenues (c) \$'000	Operating expenses \$'000	Depreciation \$'000	Interest \$'000
METROPOLITAN (PERTH) PASSENGER TRANSPORT TRUST									
1979-80	1,515	896	41,012	55,903	2,097	14,972	37,205	1,682	1,105
1980-81	1,564	899	42,413	56,820	2,113	18,715	42,440	1,740	1,196
1981-82	1,602	898	42,366	54,256	2,094	21,724	48,953	1,924	1,354
1982-83	1,628	904	43,487	53,854	2,097	39,803	56,643	2,004	1,222
1983-84	1,647	912	43,711	46,712	2,066	41,329	61,533	2,269	1,215
1984-85	1,690	882	44,030	45,334	2,098	44,037	69,249	2,465	1,325
WESTERN AUSTRALIAN GOVERNMENT RAILWAYS									
1979-80	7,011	45	2,894	190	136	1,549	2,102	104	61
1980-81	7,011	43	2,937	205	127	1,936	2,290	130	91
1981-82	6,732	41	2,666	187	124	2,183	2,396	122	86
1982-83	6,732	41	2,537	176	123	2,383	2,724	102	84
1983-84	6,732	43	2,465	176	110	2,743	2,471	125	136
1984-85	6,732	41	2,451	172	99	2,693	2,515	125	130
THE EASTERN GOLDFIELDS TRANSPORT BOARD									
1979-80	45	21	619	552	22	471	434	81	—
1980-81	45	20	632	517	19	563	499	86	—
1981-82	45	21	613	435	22	581	534	89	—
1982-83	45	19	583	427	19	558	562	93	—
1983-84	45	18	547	477	21	624	662	74	—
1984-85	49	18	564	477	21	688	661	98	—

(a) Excludes tourist services. (b) Excludes school bus routes. (c) Passenger fares and subsidies only. Commencing in 1982-83, includes Social Welfare payments from the State Government.

Motor bus services (as well as a passenger ferry service) in the metropolitan area are operated by the Metropolitan (Perth) Passenger Transport Trust, constituted under the *Metropolitan (Perth) Passenger Transport Trust Act 1957*. For the purposes of the Act, the metropolitan area is defined by a proclamation of 6 June 1973 as being 'all the land within a circle having a radius of 50 kilometres from the Perth Town Hall' and in addition, an area bounded by the South-Western Highway and the ocean, extending southward to an east-west line 1.6 kilometres south of the town of Pinjarra.

Road transport of passengers outside the metropolitan area is provided by both the railway road services, and privately operated bus services. The railway coach services tend to operate to areas in the southern part of the State, and the privately operated bus services cater for predominantly those areas north of Geraldton.

Intratown bus services are provided in a number of the larger country towns by private operators, although in the Kalgoorlie-Boulder region services are undertaken by the Eastern Goldfields Transport Board. The Board is constituted under the *Eastern Goldfields Transport Board Act 1984*, and Board members represent local government, user and employee groups.

In certain country areas, children are taken to and from school by motor bus at government expense. In 1983-84 the cost to the Government of school transport services was \$20,002,417. The number of buses engaged was 797. Each day they travelled a total of 131,496 kilometres and carried 23,780 children.

#### MOTOR VEHICLE USAGE

A survey conducted by the Australian Bureau of Statistics throughout Australia in late 1982 collected data on motor vehicle usage relating to the twelve months ended 30 September 1982. This survey was similar to others carried out in 1963, 1971, 1976 and 1979.

The survey was based on a sample of approximately 60,000 vehicles, of which some 80 per cent were trucks and other commercial types in order to ensure adequate representation of the various types in this diverse sector.

Because the survey results are based on a sample, representing some 8.5 million vehicles on register at 30 September 1982, they are subject to sampling variability when compared with results which would have been obtained from a complete census of all registered motor vehicles using the same questionnaires and procedures.

Results of the survey showed, in Western Australia, an average annual distance travelled of 16,000 kilometres for all vehicles. Cars and station wagons averaged 15,600 kilometres, while articulated trucks averaged 64,400 kilometres.

Detailed information appears in the publication *Survey of Motor Vehicle Usage, Twelve months ended 30 September 1982*, (Catalogue No. 9208.0), published by the Australian Statistician, Canberra.

#### 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 thirty days after the accident or bodily injury to a person to an extent requiring surgical or medical treatment.

The following table shows, for each year during the period 1980 to 1985, the number of accidents involving casualties which occurred in Western Australia. In the succeeding table road traffic accident casualties which occurred in Western Australia during the six years ended 31 December 1985 are classified according to type of road user.

#### ROAD TRAFFIC ACCIDENTS INVOLVING CASUALTIES WESTERN AUSTRALIA

Particulars	1980	1981	1982	1983	1984	1985
WESTERN AUSTRALIA						
Accidents involving casualties —						
Total	6,460	6,364	6,559	6,248	6,808	7,614
Per 10,000 motor vehicles on register (a)	87	82	81	77	82	88
Per 100,000 of mean population (b)	509	489	491	458	492	n.y.a.
Number of persons killed —						
Total	293	238	236	203	221	243
Per 10,000 motor vehicles on register (a)	3.9	3.1	2.9	2.5	2.7	2.8
Per 100,000 of mean population (b)	23.1	18.3	17.7	14.9	16.0	n.y.a.
Number of persons injured —						
Total	8,386	8,255	8,363	8,007	8,697	9,871
Per 10,000 motor vehicles on register (a)	113	107	104	99	105	114
Per 100,000 of mean population (b)	661	634	626	587	628	n.y.a.

(a) Vehicles on register at 30 June. (b) Based on latest available estimated resident population figures.

**ROAD TRAFFIC ACCIDENTS  
CASUALTIES ACCORDING TO TYPE OF ROAD USER**

Type of road user	1980	1981	1982	1983	1984	1985
<b>PERSONS KILLED</b>						
Drivers of motor vehicles	126	97	79	85	78	85
Motor cyclists (a)	32	31	26	25	25	32
Pedal cyclists	6	4	8	5	10	4
Passengers —						
Pillion	4	—	4	—	3	3
Other	67	61	79	52	55	71
Pedestrians	56	43	40	36	47	47
Other (b)	2	2	—	—	3	1
<b>Total</b>	<b>293</b>	<b>238</b>	<b>236</b>	<b>203</b>	<b>221</b>	<b>243</b>
<b>PERSONS INJURED</b>						
Drivers of motor vehicles	3,968	3,939	4,011	3,827	4,203	4,746
Motor cyclists (a)	765	785	774	730	792	923
Pedal cyclists	273	299	341	302	319	406
Passengers —						
Pillion	109	112	101	105	132	140
Other	2,633	2,520	2,531	2,472	2,561	2,975
Pedestrians	544	544	518	467	519	552
Other (b)	94	56	87	104	171	129
<b>Total</b>	<b>8,386</b>	<b>8,255</b>	<b>8,363</b>	<b>8,007</b>	<b>8,697</b>	<b>9,871</b>

(a) Includes riders of motor scooters. (b) Includes bystanders, train drivers, riders of horses, drivers of animal-drawn vehicles and road user type not stated.

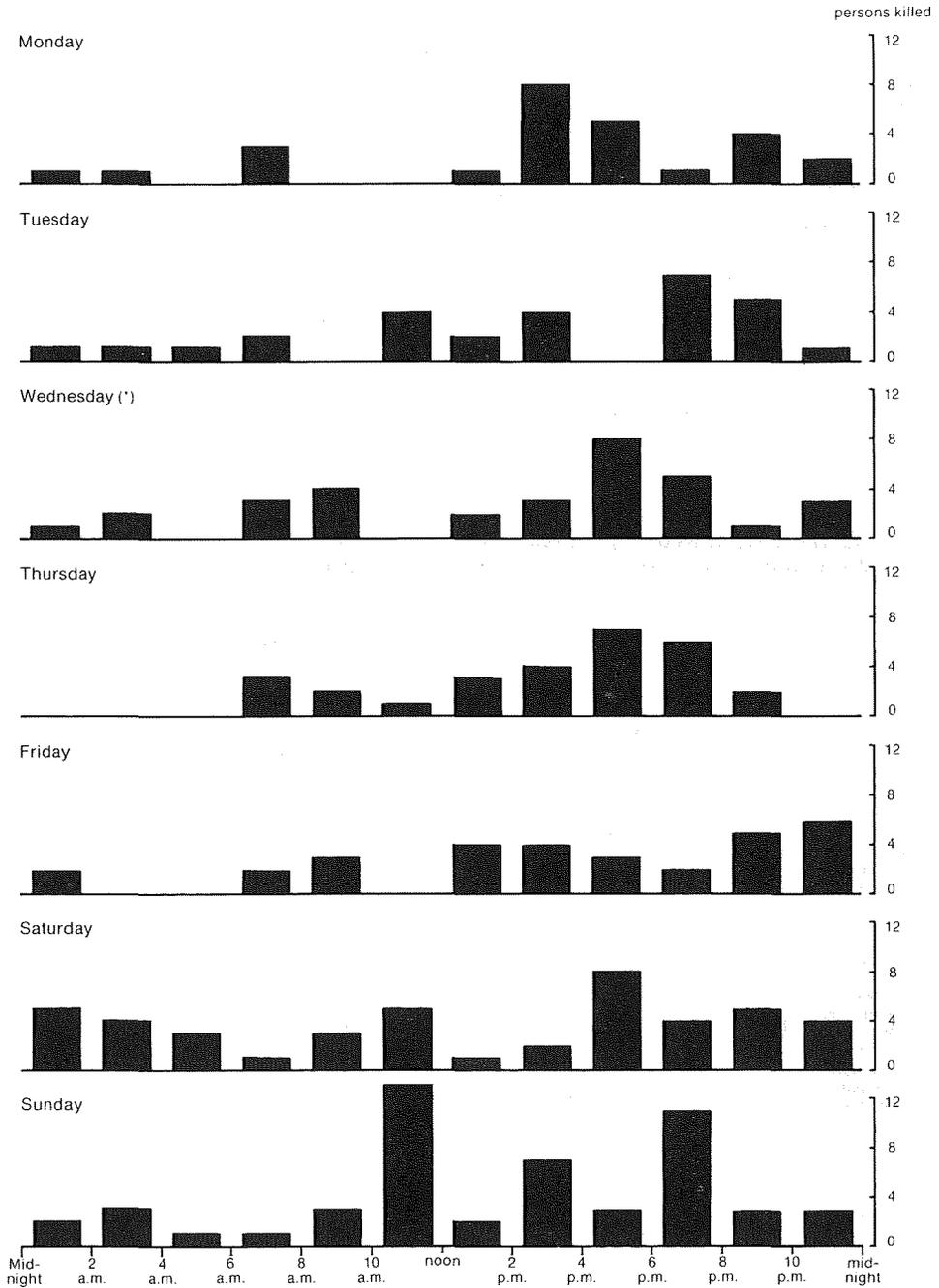
Road traffic accidents during the years ended 31 December 1984 and 1985 are classified in the next tables according to nature of accident and type of traffic unit involved.

**ROAD TRAFFIC ACCIDENTS — NATURE OF ACCIDENT**

Nature of accident	1984			1985		
	Accidents involving casualties	Casualties		Accidents involving casualties	Casualties	
		Persons killed	Persons injured		Persons killed	Persons injured
<b>Vehicle to vehicle collisions —</b>						
On carriageway —						
Vehicles in traffic	4,082	74	5,313	4,807	92	6,362
Vehicles parked	157	2	192	134	3	190
Off carriageway	32	—	39	44	—	49
<b>Single vehicle accidents —</b>						
On carriageway —						
Struck object	55	2	72	60	1	75
Struck pedestrian	555	44	534	571	39	562
Struck animal	59	—	76	73	2	92
Non collision —						
Falling (a)	126	2	142	143	2	148
Overturning	123	6	169	137	5	192
Other	38	3	37	15	2	18
Off carriageway —						
Struck object	957	48	1,257	1,003	69	1,286
Struck pedestrian	19	1	23	24	—	25
Struck animal	—	—	—	4	—	7
Non collision —						
Falling (a)	31	1	34	53	4	59
Overturning	441	30	645	445	19	671
Other	48	3	60	40	1	54
<b>Other accidents (b) —</b>						
On carriageway	72	4	89	43	2	61
Off carriageway	12	1	14	1	—	1
Unknown	1	—	1	17	2	19
<b>Total</b>	<b>6,808</b>	<b>221</b>	<b>8,697</b>	<b>7,614</b>	<b>243</b>	<b>9,871</b>

(a) Includes all motor cycle and pedal cycle accidents where the rider or passenger fell from the vehicle, regardless of whether the vehicle overturned. Also included are all accidents where the driver or passenger fell from the vehicle without the vehicle overturning. (b) Includes all accidents where the number of vehicles involved is unknown.

**ROAD TRAFFIC ACCIDENTS  
PERSONS KILLED  
DAY OF WEEK AND TIME OF DAY: 1985**



(\*) Excludes 1 fatality for which time of accident was not available.

## ROAD TRAFFIC ACCIDENTS — TYPE OF UNIT INVOLVED

Type of unit	1984			1985		
	Units involved (a)	Casualties		Units involved (a)	Casualties	
		Persons killed	Persons injured		Persons killed	Persons injured
Motor car	7,340	82	5,017	8,259	85	5,678
Station wagon	1,141	9	792	1,438	34	956
Utility	636	25	389	783	25	455
Panel van	617	9	433	719	7	436
Truck	239	—	63	249	2	77
Semi-trailer	91	4	39	122	1	45
Bus	69	2	24	81	1	56
Tractor	7	2	2	9	—	3
Motor cycle or scooter, moped	912	28	924	1,067	35	1,063
Pedal cycle	418	10	384	478	4	450
Pedestrian	621	47	510	650	47	545
Trailer, caravan	131	—	4	215	—	2
Other	230	3	92	155	2	75
Not stated	114	—	23	150	—	30
<b>Total</b>	<b>12,573</b>	<b>221</b>	<b>8,697</b>	<b>14,375</b>	<b>243</b>	<b>9,871</b>

(a) The number of each type of unit involved in casualty accidents.

The following table gives a classification of casualties according to the ages of persons killed and persons injured during each year of the period from 1980 to 1985.

## ROAD TRAFFIC ACCIDENTS — CASUALTIES CLASSIFIED ACCORDING TO AGE

Year	Age last birthday (years)										Total
	0-4	5-6	7-16	17-20	21-29	30-39	40-49	50-59	60 and over	Not stated	
PERSONS KILLED											
1980	9	7	30	56	68	43	20	22	38	—	293
1981	5	—	15	40	63	29	26	21	39	—	238
1982	6	2	36	40	65	33	13	18	23	—	236
1983	8	2	15	26	63	32	15	15	27	—	203
1984	8	3	16	40	54	28	22	19	31	—	221
1985	7	5	15	42	64	30	28	8	44	—	243
PERSONS INJURED											
1980	175	129	870	1,770	2,098	1,116	638	489	464	637	8,386
1981	167	98	815	1,674	2,062	1,124	673	476	536	630	8,255
1982	164	112	940	1,697	2,152	1,140	693	506	536	423	8,363
1983	151	82	881	1,512	2,134	1,116	708	426	459	538	8,007
1984	167	92	912	1,700	2,208	1,245	775	503	538	557	8,697
1985	201	95	990	1,929	2,572	1,436	860	533	621	634	9,871

For additional information on road traffic accidents in this State, refer to the publication *Road Traffic Accidents Involving Casualties* issued quarterly (Catalogue No. 9405.5) and annually (Catalogue No. 9406.5) by the Western Australian Office of the Australian Bureau of Statistics.

## PASSENGER FERRY SERVICE

The Metropolitan (Perth) Passenger Transport Trust operates a passenger ferry service across the Swan River from Perth to South Perth and makes boats available for charter. Particulars of private charter excursions, other than those which relate to operating revenues and expenses, are excluded from the figures in the following table which gives a summary of operations over the period 1979-80 to 1984-85.

## PASSENGER FERRY SERVICE

Year	Ferries at end of year	Kilometres run (a)	Passenger-journeys (a)	Employees at end of year	Operating revenues	Operating expenses	Depreciation	Interest
					\$	\$	\$	\$
1979-80	5	39,708	336,718	10	209,612	199,139	5,922	7,500
1980-81	5	39,656	334,542	11	245,392	230,505	5,920	8,900
1981-82	5	39,550	343,405	9	263,069	281,406	5,920	8,500
1982-83	5	39,720	325,510	10	294,978	351,780	5,920	7,941
1983-84	6	40,510	438,753	10	299,198	357,397	5,686	6,782
1984-85	5	40,052	404,100	12	303,669	474,076	12,029	14,267

(a) Excludes private charter operations.

## AIR TRANSPORT

The supervision and control of civil air transport throughout Australia is the responsibility of the Commonwealth Department of Aviation. Its regulatory functions include the licensing of air crew, engineering staff, airlines, charter and aerial work operators, flying schools and aerodromes; the issuing of approvals for export of aircraft and permits for import of aircraft; and the establishment and operation of air traffic control procedures. The Federal Minister for Aviation has the responsibility for the approval of international fares and timetables. The Department is responsible for the conduct of search and rescue operations; the determination of air rules and enforcement of safety regulations; the setting of requirements for and the issue of certificates of airworthiness for all civil aircraft; the provision and maintenance of government aerodromes, aeronautical communication systems and radio navigational aids; the specification of required meteorological services; the administration of aviation security and aviation medical policies and standards; and the negotiation and administration of international air transport agreements. It also co-operates with the State Transport Commission which has a statutory licensing function in respect of air transport facilities within the State.

An extensive system of regular air services operates in Western Australia for the transport of passengers, freight and mail. At 30 November 1985 the International Airport, twelve road kilometres from central Perth, was used by:

- (i) eleven international operators providing regular jet services to and from Africa, Europe, India, Indonesia, Malaysia, the Middle East, Singapore, Hong Kong, Thailand, New Zealand and the United Kingdom;
- (ii) three interstate operators providing frequent jet services between Perth and other cities throughout Australia;
- (iii) two intrastate operators providing jet services to various centres within Western Australia and to Darwin in the Northern Territory; and
- (iv) commuter operators connecting Perth with twenty country centres.

Other commuter services connect thirty-four townships and stations with ports on jet routes.

During the past ten years the average annual passenger traffic growth at Perth Airport has exceeded 7 per cent.

In addition to the aircraft capacity provided by airline and commuter operators there is a large fleet of light aircraft based in Western Australia available for charter work and all kinds of aerial work including aerial surveys, spotting, aerial agriculture, etc. This fleet, which includes executive twin-jet type aircraft and helicopters, numbered 359 commercial aircraft and 498 private aircraft on 30 November 1985.

Perth Airport is equipped with modern electronic and electrical navigation and approach aids to enable operations in periods of low visibility, and fifteen airports in the State have been equipped with visual approach slope indicator lighting systems to permit regular jet operations at those ports. There are ten flight service and four air traffic control establishments at various ports throughout Western Australia.

On 1 July 1985 the Commonwealth Government owned and maintained twenty aerodromes in Western Australia and there were thirty-two licensed aerodromes owned privately or by local authorities. Strips suitable for use by light aircraft and scattered throughout the State were estimated to exceed 1,000 in number. The Royal Flying Doctor Service, which has occasion to operate to and from many of those strips, has a number of bases in Western Australia and details of its activities are given in Chapter 8.

**Airport Operations.** The following table, compiled from information published by the Commonwealth Department of Aviation, provides a summary of civil air transport operations at principal airports in Western Australia during each of the years 1982 to 1984. The figures refer only to regular public transport operations on scheduled services by licensed airlines and exclude charter and commuter services. Commuter service is a term used to describe regular flights by charter firms with small aircraft operating to fixed and published timetables.

**CIVIL AIR TRANSPORT — TRAFFIC HANDLED AND AIRCRAFT MOVEMENTS  
AT PRINCIPAL AIRPORTS**

Airport	Passengers (a)			Freight (tonnes) (b)			Aircraft movements (c)		
	1982	1983	1984	1982	1983	1984	1982	1983	1984
Broome	27,987	28,833	27,057	293	283	227	2,091	1,948	1,900
Carnarvon	16,251	15,960	15,887	132	118	79	1,280	1,202	1,114
Derby	36,280	33,920	34,485	718	629	560	2,670	2,367	2,523
Geraldton	32,812	27,903	25,869	127	92	61	1,768	1,633	1,590
Kalgoorlie	47,586	52,154	60,964	199	186	180	1,365	1,331	1,509
Karratha	101,808	109,017	111,358	936	1,128	1,024	4,229	4,099	4,400
Kununurra	28,361	27,482	35,742	409	350	341	1,716	1,595	1,690
Learmonth	14,552	9,016	9,908	222	203	89	1,147	905	870
Newman	21,323	17,952	20,043	279	241	205	1,690	1,679	1,786
Paraburdoo	25,484	22,871	24,951	389	309	230	1,909	1,884	1,764
Perth —									
Internal (d)	1,027,444	1,004,978	1,075,410	16,678	18,160	17,500	15,227	14,122	14,465
International	433,730	413,979	454,622	12,259	17,932	19,654	3,414	3,231	3,053
Port Hedland —									
Internal	73,667	64,782	69,753	2,480	2,018	1,753	4,453	3,964	3,928
International (e)	1,139	2,708	3,209	—	1	—	56	105	104

(a) Total of embarkations and disembarkations. (b) Total of freight loaded and unloaded. Includes mail for internal traffic but not for international traffic. (c) Total of arrivals and departures. (d) Interstate and intrastate. (e) International services from Port Hedland commenced in June 1982.

**Casualty Accidents.** The following table shows the number of accidents involving civil aircraft which resulted in death or serious injury for the years ended 31 December 1979 to 1984.

**CIVIL AIR TRANSPORT — ACCIDENTS INVOLVING CASUALTIES (a)**

Particulars	1979	1980	1981	1982	1983	1984
WESTERN AUSTRALIA						
Number of —						
Accidents (a)	4	9	4	5	8	4
Persons killed	4	7	5	4	4	7
Persons seriously injured	4	6	4	5	7	4
AUSTRALIA						
Number of —						
Accidents (a)	39	48	39	50	45	41
Persons killed	36	57	53	58	53	45
Persons seriously injured	29	32	31	34	29	30

(a) Accidents involving civil aircraft which resulted in death or serious injury. Excludes parachutists killed on contact with earth after an uninterrupted fall. Excludes accidents outside Australia involving aircraft on the Australian register.

The statistics relate to the following classes of operation: regular public transport; charter flights; aerial agriculture; training; other aerial work; private; and gliding.

### **Transport Co-ordination Act**

The *Transport Co-ordination Act 1966* was proclaimed on 1 January 1986. It repealed the *State Transport Co-ordination Act 1981*, amended the *Transport Act 1966*, and amalgamated the Office of the Co-ordinator General of Transport and the Transport Commission to form a Department of Transport.

The amalgamation also abolished the positions of Co-ordinator General of Transport and Commissioner of Transport. The occupants of these two positions became Director General of Transport and Deputy Director General of Transport respectively, of the new Department.

The new Act provides for the co-ordination, planning and advancement of all forms of transport in the State, and also provides for the review, control and licensing of transport services. In contrast to the two earlier Acts, the Minister for Transport has a more direct role in the administration of the *Transport Co-ordination Act 1966*, however, in practice, many of his powers have been delegated to the Director General.

The duties of the Director General are to maintain an overview of existing transport services in the State; to recommend to the Minister measures for achieving co-ordination of the various forms of transport in the State; to report on trends and developments in transport within the State and elsewhere and on transport requirements within the State; to provide assistance and advice in the development and application of appropriate planning techniques and the establishment and maintenance of detailed plans for resource use, operations and, where appropriate, marketing; to report on sources and uses of funds for the advancement of transport services; and to undertake research relating to transport and such other duties relating to transport as the Minister may require.

The Minister may also establish a Transport Strategy Committee comprising the Director General of Transport (as Chairman) and such other persons as the Minister considers suitable. Any number of Transport Strategy Committees may be established and in operation at any one time. The duty of each Transport Strategy Committee is to advise the Minister on matters relating to transport policy which are referred to it by the Minister.

Other duties of the Director General are to inquire into existing transport services; to recommend the provision of new or additional road transport services; to examine and report on any proposal for the construction of a new railway; to recommend the closure or partial suspension of any transport service, including a railway; and to advise the Minister on the administration of specified Acts relating to transport. The Minister may call tenders for the provision of transport services; administer and direct the payment of subsidies for the provision of transport as may be authorised under the Act; consider and determine all applications for licences for the transport of passengers and goods by road, air and sea; conduct such investigations, inquiries, study or research as he considers necessary or desirable, on matters related to the operational and economic stability of the transport industry in this State; and control the operations of country-based taxis. The Director General is required to consider and determine all applications for licences for persons who carry on the business of selling petroleum products.

Vehicles required to be licensed under the Act are omnibuses, other than those operated by the Metropolitan (Perth) Passenger Transport Trust; commercial goods vehicles; aircraft, other than those operated solely in connection with the Royal Flying Doctor Service; and ships engaged on intrastate trade, other than those operated by the Western Australian Coastal Shipping Commission. There are numerous exemptions from licensing for aircraft, commercial goods vehicles, omnibuses and ships. These usually relate to either the class of goods being carried, or to the area of operation.

Financial transactions are recorded in a Transport Co-ordination Fund as required by the Act. The principal revenues of the fund are receipts from licence and permit fees and amounts received from the Treasury for distribution in the form of subsidies to transport operators and others in certain areas. The expenditure from the fund includes amounts necessary to meet administration costs; such amounts as are necessary or expedient to be granted in aid of any transport service or

scheme for which the Minister has a responsibility; to maintain a trust fund to be used for the provision, maintenance and improvement of any aircraft landing ground or facilities, and such amount as is necessary or expedient to establish and maintain a reserve of moneys to facilitate the carrying out of functions of the Act.

### **Taxi-car Control Act**

The *Taxi-car Control Act 1985* constitutes a Taxi Control Board of ten members to provide for the co-ordination and control of taxi-cars and the registration and conduct of taxi-car drivers in the Perth Metropolitan Control Area and such other areas as may be declared. The Act provides that the Board shall consist of a Chairman appointed by the Governor; a representative appointed by the Traffic Board; and eight persons, appointed by the Governor, comprising one to represent the interests of local authorities, chosen from a panel of names that is obtained by each local authority submitting the name of one person; one nominated by the Metropolitan (Perth) Passenger Transport Trust; and six industry members, including at least one taxi-car owner and one full-time driver who is not also an owner, four of whom are elected by taxi-car owners or full-time drivers of taxi-cars; and two nominated by the Minister for Transport.

The principal functions of the Board are to keep under continuous review in the public interest the conduct of the taxi industry; the formulation and enforcement of schemes for the co-ordination, operation and control of taxis which will assist in providing an adequate and efficient taxi-car service to the public; the determination of the number and kind of taxis to be licensed; the issue, cancellation and suspension of licences; the determination of fares and other charges; the supervision of the operation of taxis and the regulation and establishment of stands; the registration of, and the control of the conduct and dress of, drivers; and the enforcement of regulations made under the Act.

It is provided that the number of taxis that may be licensed to operate within the Metropolitan Control Area shall not at any time exceed one for every 1,000 of the population in that area.

The Act provides for a Taxi Control Fund for the receipt of fees payable on the issue, renewal or transfer of licences, with the expenses of the administration of the Act being paid from the Fund.

The operation of taxis in areas outside the Metropolitan Control Area and other declared areas is governed by the *Transport Co-ordination Act 1966*, administered by the Department of Transport.

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## Communication

### POSTS, TELEGRAPHS AND TELEPHONES

The first postmasters in the Colony of Western Australia were appointed at Perth and Fremantle in 1830 and a Postal Department was established by the Colonial Government in 1834. Telegraphic communication, between Perth and Fremantle, was inaugurated in 1869 by means of a private line, which was purchased by the Government in 1871. A telephone exchange system, installed and operated by the Government, was opened at Perth in 1887.

In 1901, following the federation of the Australian Colonies, the post, telegraph and telephone services of the State Governments were transferred to the Commonwealth Government. The Post and Telegraph Act of 1901 placed the services under the control of a Commonwealth Minister to be known as the Postmaster-General. The *Postal Services Act 1975*, *Telecommunications Act 1975*, and *Postal and Telecommunications Commissions (Transitional Provisions) Act 1975* established two statutory authorities, the Australian Postal Commission (Australia Post) and the Australian Telecommunications Commission (Telecom) to control, respectively, from 1 July 1975, the postal and telecommunications services previously provided by the Postmaster-General's Department. Tables in the next two sections show details of the operations of the two Commissions for the years ended 30 June 1980 to 1985.

### Australian Postal Commission

The following table shows the number of persons employed by the Australian Postal Commission in Western Australia, and the number of post offices throughout the State at 30 June 1980 to 1985. Full-time employees are those directly under the control of the Commission. The remainder, shown as 'Other employees', provide services, which may or may not occupy their full time, under contract or in return for payments appropriate to work performed. 'Non-official' post offices are conducted by persons who are not officers of the Australian Postal Commission, and are frequently operated in conjunction with some other business activity.

#### AUSTRALIAN POSTAL COMMISSION NUMBERS OF EMPLOYEES AND OFFICES — WESTERN AUSTRALIA

Particulars	At 30 June —					
	1980	1981	1982	1983	1984	1985
Full-time employees —						
Permanent officers	2,210	2,241	2,223	2,273	2,304	2,341
Temporary officers	188	183	183	131	122	158
Total	2,398	2,424	2,406	2,404	2,426	2,499
Other employees —						
Non-official postmasters and staff	341	336	386	354	348	311
Mail contractors (a)	321	323	302	347	330	323
Part-time employees	278	286	261	275	296	318
Total	940	945	949	976	974	952
Total, Employees	3,338	3,369	3,355	3,380	3,400	3,451
Post offices —						
Official	161	158	158	158	156	156
Non-official	335	329	304	295	280	255
Total	496	487	462	453	436	411

(a) Includes persons employed by contractors to drive vehicles on mail runs.

The net result of the operations throughout Australia of the Commission for the years ended 30 June 1980 to 1985 are shown in the following table. The amounts included as *Interest* represent interest on funds provided by the Treasury.

#### AUSTRALIAN POSTAL COMMISSION STATEMENT OF REVENUE AND EXPENDITURE — AUSTRALIA (\$'000)

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Revenue —						
Mail services	582,200	668,676	767,843	870,719	971,676	1,080,539
Money order and postal order services	6,350	7,758	10,059	10,544	11,632	11,940
Commission on agency services	82,189	83,471	86,935	90,113	90,449	94,547
Other revenue	19,442	22,147	22,591	28,058	21,993	24,269
Total, Revenue	690,181	782,052	887,428	999,434	1,095,750	1,211,295
Expenditure —						
Labour and related expenditure (a)	537,100	621,300	695,400	774,662	831,600	911,776
Transportation (b)	52,744	61,018	69,985	83,665	92,984	103,551
Depreciation and interest	14,788	16,630	(c) 33,590	15,056	15,299	17,159
Other operating expenditure	73,863	95,847	107,675	117,257	131,716	154,301
Total, Expenditure	678,495	794,795	(c) 906,650	990,640	1,071,599	1,186,787
Operating surplus available for appropriation	11,686	— 12,743	— 19,222	8,794	24,151	24,508

(a) Includes the cost of operating the Commission's own motor transport fleet. (b) This item includes only the cost of conveyance of mail by outside agencies. See also footnote (a). (c) Includes abnormal once-only depreciation adjustment of \$20,068,000.

Details of postal articles handled in Western Australia during the years 1979-80 to 1984-85 are shown in the following table.

POSTAL ARTICLES HANDLED (a) — WESTERN AUSTRALIA  
(Thousands)

Year	Ordinary postal articles		Parcels (b)	Registered articles (c)
	Standard letters	Non-standard articles		
POSTED FOR DELIVERY WITHIN AUSTRALIA				
1979-80	157,217	18,861	1,529	265
1980-81	163,156	20,315	1,799	271
1981-82	175,265	21,902	1,971	255
1982-83	187,304	21,855	2,195	255
1983-84	195,006	22,113	2,156	257
1984-85	198,302	23,718	2,310	252
POSTED FOR DELIVERY OVERSEAS				
1979-80	7,198	908	92	82
1980-81	8,642	1,088	99	86
1981-82	8,516	1,188	101	88
1982-83	9,295	1,272	109	81
1983-84	9,213	1,247	135	77
1984-85	9,372	1,210	109	78
RECEIVED FROM OVERSEAS				
1979-80	7,252	2,458	144	99
1980-81	6,996	2,168	152	105
1981-82	7,587	2,014	155	106
1982-83	8,069	2,189	159	108
1983-84	8,043	2,255	142	106
1984-85	8,392	2,201	164	107

(a) Excludes matter received from other Australian States. (b) Includes registered, cash on delivery and duty parcels. (c) Excludes registered parcels; see footnote (b).

### Australian Telecommunications Commission

The following table shows the number of persons employed by the Australian Telecommunications Commission in Western Australia at 30 June 1980 to 1985.

AUSTRALIAN TELECOMMUNICATIONS COMMISSION  
NUMBER OF EMPLOYEES — WESTERN AUSTRALIA

Particulars	At end June					
	1980	1981	1982	1983	1984	1985
Full-time employees —						
Permanent officers	6,493	6,654	6,704	6,806	6,746	6,990
Temporary officers	483	632	255	189	193	466
Total	6,976	7,286	6,959	6,995	6,939	7,456
Other employees —						
Part-time employees	160	176	173	151	136	142
Employees paid by other government authorities	48	45	39	44	30	21
Contract employees	79	n.a.	n.a.	n.a.	n.a.	n.a.
Total	287	(a) 221	(a) 212	(a) 195	(a) 166	(a) 163
Total, Employees	7,263	(a) 7,507	(a) 7,171	(a) 7,190	(a) 7,105	(a) 7,619

(a) Excludes contract employees.

The annual net results of the operations of the Commission throughout Australia for 1979-80 to 1984-85 are shown in the following table. The amounts appearing under the heading of *Interest* represent interest on funds provided by the Treasury.

AUSTRALIAN TELECOMMUNICATIONS COMMISSION  
PROFIT AND LOSS STATEMENT — AUSTRALIA  
(\$'000)

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
<b>Earnings —</b>						
Telephone rents	602,655	674,102	833,201	1,001,212	1,165,912	1,290,545
Telephone calls	1,355,373	1,533,172	1,761,610	2,011,546	2,328,977	2,640,434
Telephone connection fees and rearrangement charges	102,091	119,556	142,727	157,750	178,628	187,844
Telegrams	32,497	33,005	30,165	28,998	27,424	26,424
Telex rents	25,644	29,830	40,020	56,748	59,443	65,175
Telex calls	28,936	29,345	32,488	34,556	35,012	40,324
Other earnings	133,613	190,430	244,166	345,038	425,335	514,112
<b>Total, Earnings</b>	<b>2,280,809</b>	<b>2,609,440</b>	<b>3,084,377</b>	<b>3,635,848</b>	<b>4,220,731</b>	<b>4,764,858</b>
<b>Expenses —</b>						
Installation and maintenance of customer services				444,796	722,927	782,447
Maintenance of plant	(a) 976,633	(a) 1,126,902	(a) 1,347,233	414,570	476,807	544,786
Marketing and operations				728,867	823,531	890,124
General and administrative	178,739	191,762	238,097	261,554	281,660	422,021
Accommodation	99,382	116,484	128,527	155,369	174,258	193,549
Depreciation	447,383	533,680	577,216	711,853	570,829	647,825
Interest	367,127	408,125	518,187	656,172	861,937	898,915
<b>Total, Expenses</b>	<b>2,069,264</b>	<b>2,376,953</b>	<b>2,809,260</b>	<b>3,373,181</b>	<b>3,911,949</b>	<b>4,379,667</b>
<b>Operating profit</b>	<b>211,545</b>	<b>232,487</b>	<b>275,117</b>	<b>262,667</b>	<b>308,782</b>	<b>385,191</b>

(a) Separate figures not available.

The total number of employees (excluding contract employees) of the Telecommunications Commission throughout Australia at 13 June 1985 was 95,336.

Figures relating to the cash receipts and expenditure of the Commission in Western Australia during the years 1979-80 to 1984-85 are given in the following table. Some additional items of revenue and expenditure are not apportioned to States and therefore do not appear in the table. The figures shown relate to actual collections and payments made and as such they do not represent the net results of the Commission's operations in Western Australia for the year.

AUSTRALIAN TELECOMMUNICATIONS COMMISSION  
CASH RECEIPTS AND EXPENDITURE — WESTERN AUSTRALIA  
(\$'000)

Particulars	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
<b>Cash receipts —</b>						
Telephone	185,123	211,076	250,661	308,785	322,232	372,771
Telegraph	7,742	8,385	10,041	11,632	12,876	13,671
Proceeds of sales	1,190	1,126	1,081	1,518	2,343	3,414
Recoverable works	1,781	1,922	4,214	18,639	18,584	9,209
Miscellaneous	—3	28	—2	104	175	397
<b>Total, Cash receipts</b>	<b>195,832</b>	<b>222,537</b>	<b>265,995</b>	<b>340,678</b>	<b>356,210</b>	<b>399,462</b>
<b>Cash expenditure —</b>						
Salaries and wages	91,926	104,560	121,563	138,445	144,101	156,303
Material	35,322	46,527	61,777	95,925	92,880	103,041
Buildings, sites, properties	5,185	10,074	9,729	4,165	2,922	2,286
Accommodation services	5,297	6,964	7,462	8,057	8,659	11,297
Other administrative expenses	18,216	21,484	21,734	26,869	30,380	35,058
<b>Total, Cash expenditure</b>	<b>155,946</b>	<b>189,609</b>	<b>222,265</b>	<b>273,471</b>	<b>278,942</b>	<b>307,985</b>

**Telegraphs and Telephones.** Telegrams can be lodged at any post office, telephone office or from any public telephone equipped for multi-coin operation. In addition, telegrams can be dispatched from any subscriber's telephone or teleprinter exchange (telex) equipment. The number of telegraph offices in the State and of telegrams transmitted from Western Australia during the years 1980 to 1985 are set out below.

Telephone services comprise ordinary exchange services (i.e. those which provide direct access to the exchange system by means of exclusive use of an exchange line), duplex services, party-line services, private branch exchange services and public telephones. The numbers shown as 'Telephone instruments in service' relate to those through which direct access to the exchange system may be obtained.

At 30 June 1985, the pair length of conductors in telegraph and telephone cables in Western Australia was 3,763,236 kilometres. The pair length of aerial wires was 47,530 kilometres and the length of pole routes was 15,000 kilometres. There were 10,219 tube kilometres of coaxial cable.

The teleprinter exchange service (telex) was introduced in Perth in December 1956. This service enables a subscriber's teleprinter to be connected with that of any other subscriber in the local network or networks in other States.

## TELEGRAPHS — WESTERN AUSTRALIA

Particulars	1980	1981	1982	1983	1984	1985
Number of —						
Offices (a)	535	514	486	470	437	438
Telegrams dispatched —	'000	'000	'000	'000	'000	'000
Within Australia	533	465	414	348	310	281
Beyond Australia	178	153	147	111	80	65

(a) At end June.

## TELEPHONES AND EXCHANGES (a) — WESTERN AUSTRALIA

Particulars	1980	1981	1982	1983	1984	1985
Number of —						
Exchanges	687	686	677	667	659	639
Services —						
Metropolitan (b)	297,191	322,125	341,644	359,484	377,533	402,033
Country	92,145	102,611	110,474	119,371	127,778	138,541
Total	389,336	424,736	452,118	478,855	505,311	540,574
Telephone instruments in service —						
Total	556,831	609,781	652,825	690,417	729,228	779,058
Per 100 of population	44.6	47.3	48.9	50.6	52.7	55.9

(a) At end June. (b) Services connected to exchanges located within 32 kilometres of the General Post Office, Perth.

## TELEPRINTER EXCHANGE NETWORK (TELEX) — WESTERN AUSTRALIA

Particulars	1980	1981	1982	1983	1984	1985
Number of —						
Services at end June	3,205	3,765	4,301	4,484	4,766	5,036
Internal calls (a)	'000 4,565	5,071	5,258	5,556	5,362	5,320

(a) Includes Post Office official traffic.

## BROADCASTING AND TELEVISION

The Australian Broadcasting Tribunal is constituted by the *Broadcasting and Television Act 1942*, and consists of a minimum of three and a maximum of eight full-time members.

The Tribunal has responsibility for the general oversight of licensed broadcast and television services and determines the standards to be observed by licensees in respect of the broadcasting or televising of programs, the conditions under which advertisements may be broadcast or televised and the hours during which programs may be transmitted. Except in special circumstances, the Tribunal holds public inquiries into applications for licences for commercial broadcasting and television stations for areas for which it proposes to grant licences.

The Broadcasting and Television Act gives the Minister for Communications the power to determine the situation, operating power and operating frequencies of broadcasting and television stations.

Under the *Broadcasting and Television Amendment Act 1985* the Broadcasting and Television Act became known as the *Broadcasting Act 1942* from 1 January 1986. From this date new classes of 'remote licences' were introduced to provide a service via the AUSSAT satellites to regions previously without adequate services.

The Australian Broadcasting Corporation, constituted under the *Australian Broadcasting Corporation Act 1983*, replaced the Australian Broadcasting Commission that was constituted under the *Broadcasting and Television Act 1942* and operated until the enactment of the *Australian Broadcasting Corporation Act 1983*. The Corporation controls the activities of, and provides programs for, the National Broadcasting Service and the National Television Service which use transmitters operated on behalf of the Minister for Communications. The operations of the Australian Broadcasting Corporation are financed by appropriations made by the Commonwealth Parliament.

The income of licensees of commercial broadcasting and television stations is derived from advertisements, other forms of publicity and from other sources such as program sales.

The income of licensees of public broadcasting stations is derived from a variety of sources including limited sponsorship announcements, government grants, charges for time allocated to participating groups, membership fees and sale of publications.

The initial period of a licence granted by the Tribunal is a maximum of five years, and renewals are granted for a maximum of three years after examination of the performance of the licensee.

Public broadcasting services operate on a non-profit basis and may be licensed to provide services for people within a specified area or community, or to provide programs having a specified nature or purpose. There are no public television services in Australia.

#### BROADCASTING STATIONS AT 30 JUNE 1985

NATIONAL STATIONS				COMMERCIAL STATIONS			
Type and location	Call sign	Frequency (kHz)	Hours of service per week (a)	Type and location	Call sign	Frequency (kHz)	Hours of service per week (a)
Medium frequency —				Medium frequency —			
Perth	6WF	720	138	Perth	6IX	1,080	168
Perth	6WN	810	132	Perth	6KY	1,206	168
Albany	6AL	630	138	Perth	6PM	990	168
Bridgetown	6BR	1,044	138	Perth	6PR	882	168
Broome	6BE	675	138	Albany	6VA	783	133
Busselton	6BS	684	138	Bridgetown	6BY	900	133
Carnarvon	6CA	846	138	Bunbury	6TZ	963	131
Dalwallinu	6DL	531	138	Carnarvon	6LN	666	119
Derby	6DB	873	138	Collie	6CI	1,134	131
Esperance	6ED	837	138	Dampier/Karratha/Roebourne	6KA	1,260	130
Exmouth	6XM	1,188	138	Esperance	6SE	747	127
Geraldton	6GN	828	138	Geraldton	6GE	1,008	117
Kalgoorlie	6GF	648	138	Kalgoorlie	6KG	981	126
Kununurra	6KW	756	138	Katanning	6WB	1,071	133
Manjimup	6MJ	738	138	Merredin	6MD	1,098	122
Newman	6MN	567	138	Narrogin	6NA	918	131
Northam	6NM	612	138	Northam	6AM	864	126
Pannawonica	6PN	567	138	Port Hedland	6NW	1,026	130
Paraburdoo	6PU	567	138	Frequency modulation —			
Port Hedland	6PH	603	138	Perth	6NOW	(c) 96.1	168
Tom Price	6TP	567	138				
Wagin	6WA	558	138				
Wyndham	6WH	1,017	138				
High frequency —							
Perth	VLW	(b)	132	Medium frequency —			
Frequency modulation —				Perth (e)	6NR	927	125
Perth	ABC-FM	(c) 97.5	168	Frequency modulation —			
Albany	ABC-FM	(c) 94.5	168	Perth (f)	6UVS	(c) 92.1	128
Bunbury	ABC-FM	(c) 93.3	168	Newman	6NEW	(c) 92.9	168
Geraldton	ABC-FM	(c) 95.1	168				
Kalgoorlie	ABC-FM	(c) 95.5	168				
Mawson	ABC-FM	(c) 98.9	168				

(a) To the nearest hour. (b) The station operates two transmitters, of 10,000 and 50,000 watts. Frequencies are varied as required to obtain optimum results. (c) Frequency is shown in megahertz (MHz). (d) Stations licensed under the *Radiocommunications Act 1983*. (e) Operated by the Western Australian Institute of Technology. (f) Operated by the University of Western Australia.

In 1923, the first radio broadcasting station commenced operations in Australia and, in the following year, station 6WF (Westralian Farmers) opened in Perth. The preceding table shows details of stations operating in Western Australia at 30 June 1985. At that date there were thirty national, nineteen commercial and three public broadcasting stations in the State. In addition, there were commercial broadcasting translator stations operating at Paraburdoo, Exmouth and Tom Price.

## TELEVISION STATIONS AT 30 JUNE 1985

Call sign and channel	Area served	Location of transmitter	Hours of service per week (a)	Date of commencement of operations (b)
NATIONAL STATIONS				
ABW-2	Perth	Bickley	94	7 May 1960
ABAW-2	Southern Agricultural	Mount Barker	94	6 June 1966
ABCW-5A	Central Agricultural	Mawson Trig	94	28 March 1966
ABCMW-8	Morawa	Billaranga Hills	94	8 March 1975
ABCNW-7	Carnarvon	Carnarvon	94	30 June 1972
ABDW-10	Dampier	Dampier	94	17 December 1973
ABEW-10	Esperance	Microwave Terminal Wireless Hill	94	21 October 1974
ABGW-6	Geraldton	Geraldton	94	8 December 1969
ABKAW-7	Karratha	Karratha	94	17 December 1973
ABKW-6	Kalgoorlie	Kalgoorlie	94	27 January 1970
ABMW-10	Moora	Quarrell Range	94	30 September 1974
ABNW-7	Norseman	Norseman Microwave Repeater	94	14 April 1971
ABPHW-7	Port Hedland	Port Hedland	94	3 October 1973
ABRBW-9	Roebourne	Roebourne	94	17 December 1973
ABSW-5	Bunbury	Mount Lennard	94	10 May 1965
ABSBW-9	Southern Cross-Bullfinch	Ghooli Microwave Repeater	94	16 July 1973
COMMERCIAL STATIONS				
STW-9	Perth	Bickley	168	12 June 1965
TVW-7	Perth	Bickley	120	16 October 1959
BTW-3	Bunbury	Mount Lennard	81	10 March 1967
GSW-9	Southern Agricultural	Mount Barker	81	23 August 1968
GTW-11	Geraldton	Geraldton	58	21 January 1977
VEW-8	Kalgoorlie	Kalgoorlie	49	18 June 1971

(a) To the nearest hour. (b) Date on which full-scale transmission began.

Television commenced in Australia on 16 September 1956 when station TCN, Sydney began regular transmission. Colour television was introduced officially into Australia on 1 March 1975. By 30 June 1985 the number of stations in operation had increased to a total of 141, comprising eighty-four national stations, fifty commercial stations and seven Special Broadcasting Service Stations.

The first television station in Western Australia commenced full-scale transmission in Perth on 16 October 1959 and, at 30 June 1985, three metropolitan (two commercial and one national, and nineteen country television stations (four commercial and fifteen national) were operating in the State. Details are shown in the preceding table, in which particulars are given of both national and commercial stations. Applications for a third commercial television licence for Perth are currently being heard in a Tribunal inquiry.

Television transmissions by means of either a repeater station or a translator station are provided to some areas of the State not served by the stations shown in the previous table. Repeater stations are stations of low operating power designed to transmit only programs recorded on magnetic tape. At 30 June 1985 television repeater stations were operating at Cockatoo Island, Koolan Island, Mount Nameless, Mount Tom Price, Newman and Paraburdoo. Translator stations are low-powered stations which receive signals from a parent station or another translator station and re-transmit those signals on a different frequency channel. They serve mainly isolated areas where there is not satisfactory reception from high-powered stations. A licence for a Remote Commercial Television Service to provide commercial television by satellite to remote areas was granted in early 1985.

## TELEVISION TRANSLATOR STATIONS AT 30 JUNE 1985

Area served	Location of transmitter	Parent station	
		Call sign and channel	Area served
NATIONAL STATIONS			
Albany	Mount Clarence	ABAW-2	Southern Agricultural
Argyle Mine (b)	Smoke Creek (a)	ABW-2	Perth
Broome	Broome (a)	ABW-2	Perth
Cockatoo Island	Cockatoo Island (a)	ABW-2	Perth
Condingup/Howick	Condingup Peak	ABEW-10	Esperance
Cue	Cue (a)	ABW-2	Perth
Dalwallinu	Dalwallinu	ABMW-10	Moora
Denham	Denham (a)	ABW-2	Perth
Derby	Derby (a)	ABW-2	Perth
Eneabba	Eneabba (a)	ABW-2	Perth
Exmouth	Exmouth (a)	ABW-2	Perth
Goldsworthy (b)	Goldsworthy (a)	ABW-2	Perth
Halls Creek	Halls Creek (a)	ABW-2	Perth
Jurien Bay	Jurien Bay (a)	ABW-2	Perth
Kalbarri	Kalbarri (a)	ABW-2	Perth
Kambalda	Red Hill	ABKW-6	Kalgoorlie
Katanning	Fairfield Microwave Repeater Station	ABW-2	Perth
Kojonup (b)	Kojonup	ABW-2	Perth
Koolan Island	Koolan Island (a)	ABW-2	Perth
Koolyanobbing	Wundowie Hills	ABSBW-9	Southern Cross-Bullfinch
Kununurra	Kelly Knob (a)	ABW-2	Perth
Laverton	Laverton (a)	ABW-2	Perth
Leeman	Leeman (a)	ABW-2	Perth
Leinster	Leinster (a)	ABW-2	Perth
Leonora	Leonora	ABW-2	Perth
Marble Bar	Marble Bar (a)	ABW-2	Perth
Meekatharra	Meekatharra (a)	ABW-2	Perth
Menzies	Menzies	ABW-2	Perth
Merredin	Merredin Microwave Repeater Site	ABW-2	Perth
Mt Magnet	Mt Magnet (a)	ABW-2	Perth
Mullewa	Mullewa	ABGW-6	Geraldton
Narrogin	Narrogin Microwave Repeater Site	ABW-2	Perth
Newman	TV Hill	ABW-2	Perth
Northampton	Northampton	ABGW-6	Geraldton
Onslow	Onslow (a)	ABW-2	Perth
Pannawonica	Pannawonica	ABW-2	Perth
Paraburdoo	Hill PM62 (a)	ABW-2	Perth
Ravensthorpe	Public Works Department Water Reserve (a)	ABW-2	Perth
Salmon Gums	Red Lake	ABW-2	Perth
Shay Gap (b)	Shay Gap (a)	ABW-2	Perth
Teutonic Bore	Teutonic Bore (a)	ABW-2	Perth
Tom Price	Tom Price (a)	ABW-2	Perth
Wagin	Mount Latham Microwave Repeater Station	ABW-2	Perth
Warburton Range (b)	Warburton Mission (a)	ABW-2	Perth
Wiluna (b)	Wiluna (a)	ABW-2	Perth
Wongan Hills	Wongan Hills	ABMW-10	Moora
Wyndham	Mount Albany (a)	ABW-2	Perth
Yalgoo	Yalgoo (a)	ABW-2	Perth
COMMERCIAL STATIONS			
Albany	Mount Clarence	GSW-9	Southern Agricultural
Baandee	Nareling Hill	VEW-8	Kalgoorlie
Esperance	Microwave Terminal Wireless Hill	VEW-8	Kalgoorlie
Kambalda	Red Hill	VEW-8	Kalgoorlie
Katanning	Fairfield Microwave Repeater Site	BTW-3	Bunbury
Kojonup (b)	Kojonup	BTW-3	Bunbury
Koolyanobbing	Wundowie Hills	VEW-10	Kalgoorlie
Mawson	Mawson National Transmitter Site	BTW-3	Bunbury
Merredin	Merredin Microwave Repeater Site	VEW-8	Kalgoorlie
Narrogin	Narrogin Microwave Repeater Site	BTW-3	Bunbury
Norseman	Norseman Microwave Repeater Site	VEW-8	Kalgoorlie
Northam	Northam	BTW-10	Bunbury
Southern Cross	Ghooli Microwave Repeater Site	VEW-8	Kalgoorlie
Tammin	Cunderdin Hill	VEW-8	Kalgoorlie
Wagin	Mount Latham Microwave Repeater Site	BTW-3	Bunbury
York	Mt Bakewell	VEW-8	Kalgoorlie

(a) Satellite fed. (b) Established under the Self-help Television Reception Scheme (S.T.R.S.)

## RADIOCOMMUNICATION

**External Telecommunications Services**

The Overseas Telecommunications Commission (Australia) is the authority responsible for the operation of telecommunication services between Australia and other countries, with ships at sea and to and between Australia's external Territories.

The Commission was established under the provisions of the *Overseas Telecommunications Act* 1946 which implemented a recommendation of the 1945 Commonwealth Telecommunications Conference for national ownership of the external telecommunications services of the British Commonwealth countries concerned. In 1966 the Commonwealth countries completed a review of the machinery for their collaboration in telecommunications and, as a result, the Commonwealth Telecommunications Organisation was established. The purpose of this body is to promote the efficient exploitation and development of the Commonwealth external telecommunications system.

A number of countries, including Australia, agreed in 1964 to establish a global commercial communications satellite system and Australia, represented by the Commission, is a member of the management body of the International Telecommunications Satellite Consortium (INTELSAT).

The Commission operates five 'standard' earth stations (at Carnarvon and Perth in Western Australia, Ceduna in South Australia, Healesville in Victoria and Moree in New South Wales) which can communicate via satellite with stations in other countries.

The transmission facilities used by the Commission in its external operations are submarine cables, satellites and high frequency radio. It operates a coastal radio service and, in association with the Telecommunications Commission within Australia and with communication carriers in other Commonwealth and foreign countries, provides public message telegram, telephone, telex, photo-telegram, overseas facsimiles, electronic mail, packet switched data, private leased circuits and television services to most countries and places throughout the world.

The coastal radio service provides, as its principal function, essential maritime communications, including distress signals, navigation warnings, air-sea rescue service and radio-medical service messages, meteorological messages and time signals, as well as naval traffic as required. It provides also, by radiotelegraph, radiotelephone and radiotelex, commercial communications with ships at sea and, by radiotelephone, message communication with small vessels. Western Australian coastal radio stations are located at Perth, Broome, Carnarvon, Esperance and Geraldton.

The Royal Flying Doctor Service of Australia, to which reference is made in Chapter 8, provides general telegram and radiotelephone facilities and medical aid and advice in remote areas through its extensive radio network.

**Licensed Radiocommunication Stations**

The licensing of radiocommunication services under the *Radiocommunications Act* 1983 is the responsibility of the Department of Communications.

At 30 June 1985 there were 521,382 civil radiocommunication stations authorised throughout Australia. These included 8,893 fixed stations, 35,332 land stations, 459,662 mobile stations, 16,188 amateur stations and 51 space service stations.

The numbers of each type of radiocommunication station authorised to operate in Western Australia at 30 June 1985 are given in the next table. The following definitions are relevant in considering the figures shown in the table. *Fixed Stations* — Stations established at fixed locations for communication with other stations similarly established. *Outposts* — Stations established in outback areas for communication with control stations of the Royal Flying Doctor Service. *Land Stations* — Stations established at fixed locations for communication with mobile stations. *Coast Stations* — Land stations for communication with sea-going vessels. *Mobile Stations* — Equipment installed in aircraft (aeronautical), motor vehicles (land mobile services), harbour vessels (harbour mobile services) and ocean-going vessels (ships), and mobile equipment of organisations such as the Royal Flying Doctor Service. *Radiodetermination Stations* — Stations employed for the determination of position, or the obtaining of information relating to position, by means of the

propagation of radio waves. *Space Service Stations* — Radiocommunication services, between earth stations and space stations, between space stations or between earth stations when signals are re-transmitted by space stations, or transmitted by reflection from objects in space, excluding reflection or scattering by the ionosphere or within the earth's atmosphere.

CIVIL RADIOCOMMUNICATION STATIONS AUTHORISED AT 30 JUNE 1985 (a)

Type of station	Number	Type of station	Number
Fixed stations	1,421	Mobile stations — <i>continued</i> —	
Land stations —		Land services	31,145
Aeronautical	74	Marine rescue services	13
Base stations —		Outposts	3,218
Limited coast and coast stations	195	Radiodetermination	94
Land services	5,374	Ship	6,974
Experimental	95	Other	484
Other	296	Earth and space service stations	13
Mobile stations —		Amateur	1,426
Aircraft	509		
Citizens band	15,288		
Handphone	1,446	TOTAL	68,065

(a) Includes stations operating on Christmas Island and Cocos-Keeling Islands.

### Internal Satellite Communications Services

Australia's National Satellite System is owned and operated by AUSSAT Pty Ltd, a company incorporated in 1981 with shares held by the Commonwealth of Australia (75 per cent) and the Australian Telecommunications Commission (25 per cent). The *Satellite Communications Act 1984* commissions AUSSAT to operate profitably in providing internal satellite communications for Australia and neighbouring regions.

AUSSAT's first two satellites were launched from Cape Canaveral on the Space Shuttles 'Discovery' and 'Atlantis' in August and November 1985. They began commercial operations on 1 January 1986. A third satellite will be launched in mid-1986 from Kourou, French Guyana, on the European Space Agency's 'Ariane' rocket.

The major access points to the satellite system are through 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 thirteen metre diameter communications antennas for the sending and receiving of telecommunications and broadcasting signals and a thirty-two metre microwave tower for land-based signal sending and receiving.

Each of the commissioned satellites 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).

AUSSAT's domestic satellite communications system complements existing land-based communications systems. It will provide enhanced Telecom services to remote areas and improved communications for mining and exploration companies; provide emergency service organisations with more reliable communications than land-based systems; enable Government Departments, financial institutions and businesses generally to use AUSSAT for voice, video and data transmission; provide improved communications links between air traffic control centres and aircraft; enable television and radio services to reach more remote areas through the ABC Homestead and Community Broadcast Satellite Service and a Remote Commercial Television Service; and provide a more cost-effective and flexible means for establishing interactive distance education.

## Chapter 21

# 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, have been derived from data supplied by the Australian Bureau of Statistics, Canberra.

Statistics of Western Australia's trade with other Australian States are compiled by the Western Australian Office 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 has been 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 currently in use 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 6,600 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 (previously known as the Brussels Tariff 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. The Interstate Trade Commodity Classifications comprise some 358 items of import and 128 items of export within the structure of commodity Sections, Divisions and Groups of the Standard International Trade Classification.

### **The Harmonised Commodity Description and Coding System**

On 1 January 1988, Australia is scheduled to adopt the new Harmonised Commodity Description and Coding System (H.C.D.C.S.). This system will be used internationally and will replace the Australian Import Commodity Classification which is mentioned at the beginning of this chapter, and the Customs Tariff mentioned above. The Australian Export Commodity Classification will be replaced by the Australian Harmonised Export Commodity Classification (A.H.E.C.C.) which will be based on the H.C.D.C.S.

These new classifications will update former classifications to reflect technological development and changes in international trade. They will also provide international uniformity in classifying and coding goods, and simplify the task of collecting, analysing and comparing foreign trade statistics.

From January 1988, all import and export transactions will be 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.

The procedure adopted to value foreign imports and exports is as follows:

*Imports.* Up to 30 June 1976 the recorded value of goods imported was the 'value for duty' as laid down for Customs purposes, i.e. the sum of:

- (a) (i) the actual money price paid or to be paid for the goods by the Australian importer plus any special deduction, or
- (ii) the current domestic value of the goods, whichever was the higher; and
- (b) all charges payable or ordinarily payable for placing the goods free on board at the port of export.

In the case of goods consigned for sale in Australia the value for duty was the amount which would be the value for duty if the goods were, at the date of exportation, sold to an Australian importer instead of being consigned for sale in Australia.

'Current domestic value' was defined as 'the amount for which the seller of the goods to the purchaser in Australia was selling or would be prepared to sell for cash, at the date of exportation of those goods, the same quantity of identically similar goods to any and every purchaser in the country of export for consumption in that country'.

From 1 July 1976 a system of valuation based on the Brussels Definition of Value was introduced, the value for duty being based on the normal price, i.e. the price the goods would fetch at the time when the duty becomes payable on a sale in the open market between a buyer and a seller independent of each other. The goods are valued in the country of exportation, that is freight and insurance are excluded.

*Exports.* The recorded value of goods exported includes the cost of the outside packages and is determined as follows.

- (a) Goods sold to foreign buyers before export are valued at the Australian f.o.b. port of shipment equivalent of the actual price at which the goods were sold.
- (b) Goods shipped on consignment are valued at the Australian f.o.b. port of shipment equivalent of the price paid for similar goods of Australian origin in the principal markets of the country to which they are dispatched for sale.

Throughout this Chapter, statistics of Western Australia's foreign exports refer only to Australian produce and exclude re-exports.

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.

### Ships' Stores

Prior to 1 July 1982 bunkers and stores supplied to foreign-owned vessels and aircraft prior to departure overseas were excluded from export statistics but were published separately as ships' stores. The United Nations Statistical Commission has recommended that such bunkers and stores be included in total export statistics.

Accordingly, commencing with 1982-83 statistics, these commodities have been classified to the appropriate Australian Export Commodity Classification items. As a result, from 1982-83, total exports and commodity statistics include stores for foreign ships and aircraft and are not strictly comparable with information for earlier periods.

The values of ship's stores for the current period and previous periods are shown in the Statistical Summary at the back of the Year Book.

### 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.

### Summary of Trade

Statistics of Western Australia's external trade are presented in the following series of tables. Particulars relate, in all cases, to the year ended 30 June.

VALUE OF INTERSTATE AND FOREIGN TRADE OF WESTERN AUSTRALIA  
(\$'000)

Direction of trade	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
INTERSTATE (a) —						
Imports	2,044,447	2,337,808	2,841,110	3,141,096	3,160,789	3,638,883
Exports	446,208	635,388	812,996	888,540	1,155,698	1,410,145
Excess of —						
Imports over exports	1,598,238	1,702,420	2,028,114	2,252,556	2,005,091	2,228,738
FOREIGN —						
Imports	1,161,164	1,449,694	1,663,378	2,535,112	2,523,046	1,935,552
Exports	2,820,134	3,854,047	3,791,114	3,907,613	4,766,649	5,060,377
Excess of —						
Exports over imports	1,658,970	2,404,353	2,127,736	1,372,501	2,243,603	3,124,825
TOTAL (a) —						
Imports	3,205,611	3,787,502	4,504,488	5,676,208	5,683,835	5,574,436
Exports	3,266,343	4,489,434	4,604,110	4,796,153	5,922,347	6,470,522
Excess of —						
Exports over imports	60,732	701,933	99,622	—880,055	238,512	896,086

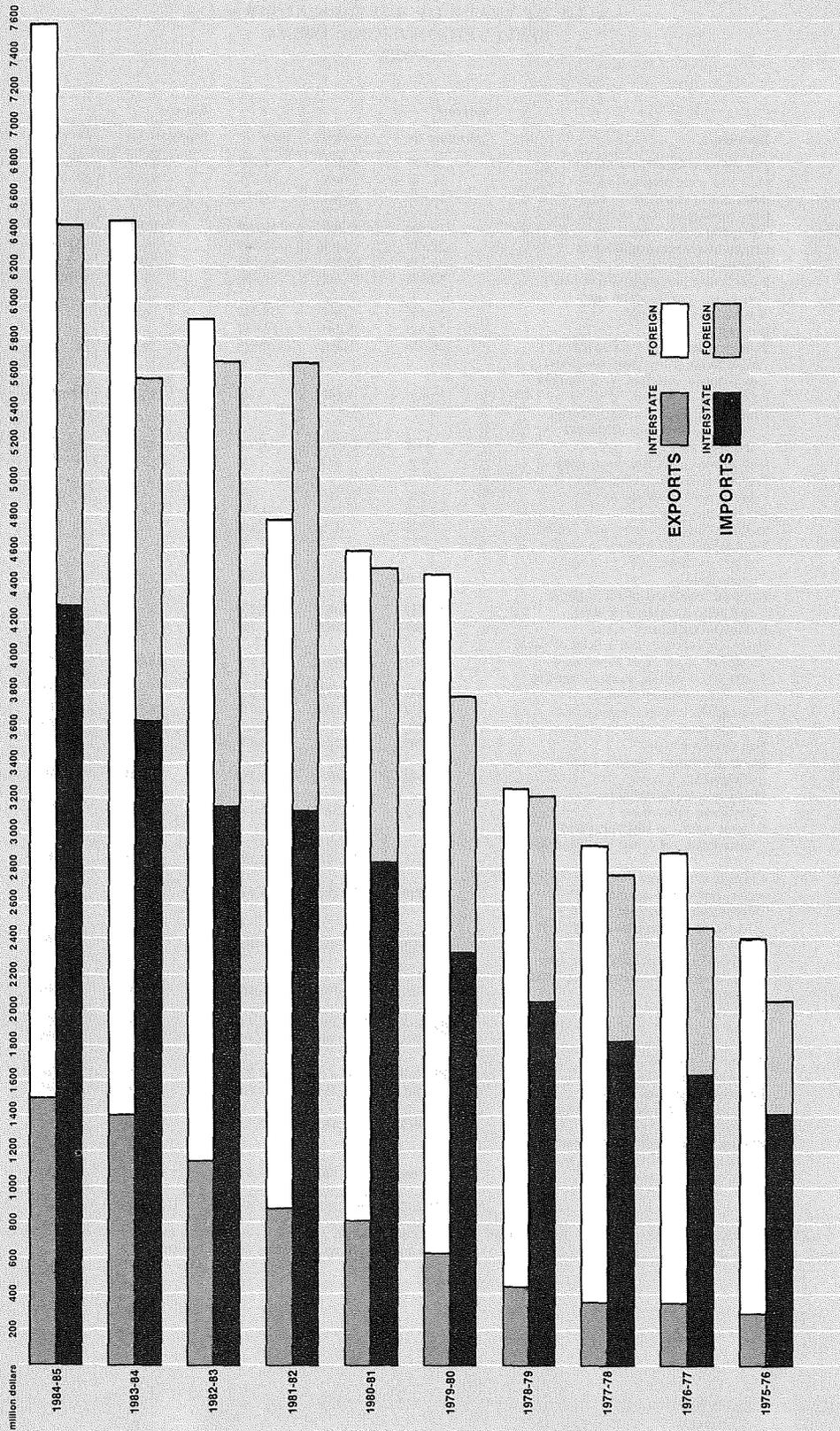
(a) Excludes interstate value of horses. Also excludes value of interstate ships' stores.

IMPORTS AND EXPORTS  
 VALUE OF IMPORTS INTO AND EXPORTS FROM WESTERN AUSTRALIA  
 CLASSIFIED ACCORDING TO ORIGIN OR DESTINATION  
 (\$'000)

Origin or destination	Imports			Exports		
	1981-82	1982-83	1983-84	1981-82	1982-83	1983-84
INTERSTATE (a) —	3,141,096	3,160,789	3,638,883	888,540	1,155,698	1,410,145
OVERSEAS —						
Argentina	244	159	646	40,256	32,717	50,959
Bahrain	9,573	1	6,330	47,846	67,651	70,676
Bangladesh	874	1,072	1,260	2,483	1,414	24,788
Belgium-Luxembourg	8,423	7,341	10,620	28,407	42,113	26,988
Brazil	1,216	1,818	3,044	1,593	7,215	7,777
Canada	51,839	48,443	38,665	21,316	25,652	19,702
China — excluding Taiwan Province	11,092	11,609	14,906	134,122	176,066	162,379
— Taiwan Province only	23,637	25,217	31,443	69,905	96,187	136,513
Christmas Island	12,441	8,566	8,092	2,894	3,323	5,904
Denmark	19,234	4,169	5,750	187	631	580
Egypt, Arab Republic of	4	1	1	56,619	228,760	124,302
Fiji	231	518	462	5,604	9,145	18,671
Finland	7,555	5,224	7,529	4,620	19,190	16,072
France	231,975	40,873	49,059	71,514	57,268	72,265
Germany, Democratic Republic of	385	415	642	2,864	9,113	8,517
Germany, Federal Republic of	109,855	84,296	72,609	94,780	73,510	124,840
Hong Kong	14,854	12,809	13,918	76,952	21,902	167,970
India	4,192	24,359	5,998	83,894	23,580	20,451
Indonesia	198,421	225,318	67,648	62,736	63,998	118,825
Iran, Islamic Republic of	17,591	18,169	33	47,432	128,701	99,612
Iraq	262	180	140	63,229	39,465	38,840
Italy	28,988	90,549	41,906	72,550	76,360	95,974
Japan	398,578	369,369	298,787	1,383,552	1,513,550	1,629,179
Jordan	—	1,210	6,331	7,560	3,935	5,622
Korea, Republic of	16,095	19,382	13,612	118,722	145,625	169,347
Kuwait	121,695	123,242	146,949	17,312	34,194	17,968
Libyan Jamahiriya	—	—	—	23,852	18,596	22,210
Malaysia	19,284	35,949	10,045	43,080	61,652	56,279
Nauru, Republic of	27,504	18,426	10,279	18	—	11
Netherlands, Kingdom of the	91,465	72,071	42,569	77,576	79,447	83,909
New Zealand	18,780	16,533	26,684	65,442	117,741	42,266
Norway	5,146	3,161	6,038	267	363	160
Pakistan	962	896	1,240	3,973	4,393	4,631
Papua New Guinea	3,084	4,681	3,313	6,280	2,189	3,565
Philippines, Republic of	2,674	2,752	3,218	34,672	27,872	33,601
Poland	349	485	239	10,162	10,580	18,682
Qatar	32,281	51,785	38,913	7,126	8,708	9,607
Saudi Arabia	148,176	141,922	122,765	47,749	44,904	36,892
Singapore, Republic of	206,994	207,792	144,509	75,510	64,007	123,561
South Africa, Republic of	10,569	12,695	26,878	31,127	62,098	64,177
Spain	3,479	3,283	5,181	14,232	9,824	15,189
Sri Lanka	814	889	857	11,125	6,167	5,110
Sweden	15,980	10,616	11,005	10,047	4,090	4,608
Switzerland	4,815	5,163	10,059	844	9,551	39,916
Thailand	5,037	5,003	7,373	8,581	4,863	8,307
Union of Soviet Socialist Republics	97	59	474	93,882	199,602	60,298
United Arab Emirates	161,006	194,659	104,284	62,782	56,094	70,048
United Kingdom	114,146	135,639	231,307	63,499	209,780	239,983
United States of America	353,319	434,782	261,365	566,835	628,738	685,831
Yemen, People's Democratic Republic of	—	—	—	5,637	11,243	14,645
Yugoslavia	981	946	1,439	3,956	13,743	16,310
Other countries and country unknown	18,916	38,550	19,138	120,410	209,139	165,860
Total, Overseas	2,535,112	2,523,046	1,935,552	3,907,613	4,766,649	5,060,377
GRAND TOTAL (a)	5,676,208	5,683,835	5,574,435	4,796,153	5,922,347	6,470,522

(a) Excludes interstate value of horses. Also excludes value of interstate ships' stores.

Imports and Exports, 1975-76 to 1984-85



VALUE OF TRADE OF WESTERN AUSTRALIA  
SELECTED DIVISIONS: 1983-84  
(\$'000)

Division	Description	Imports			Exports		
		Interstate (a)	Foreign	Total (a)	Interstate (a)	Foreign	Total (a)
00	Live animals, chiefly for food	8,029	1,551	9,580	7,038	99,650	106,688
01	Meat and meat preparations	37,765	449	38,214	8,617	129,120	137,737
02	Dairy products and birds' eggs	36,816	4,321	41,137	n.p.	1,851	(b)
03	Fish, crustaceans and molluscs, and preparations thereof	6,594	22,095	28,689	15,806	151,461	167,267
04	Cereals and cereal preparations	51,282	3,287	54,569	n.p.	737,248	(b)
05	Vegetables and fruit	75,174	10,351	85,525	8,056	23,253	31,309
06	Sugar, sugar preparations and honey	30,088	1,342	31,430	n.p.	1,982	(b)
07	Coffee, tea, cocoa, spices, and manufactures thereof	53,689	1,642	55,331	n.p.	266	(b)
11	Beverages	59,449	5,293	64,742	n.p.	914	(b)
12	Tobacco and tobacco manufactures	128,710	1,266	129,976	n.p.	186	(b)
26	Textile fibres (other than wool tops) and their wastes (not manufactured into yarn or fabric)	n.p.	7,142	(b)	3,178	406,661	409,839
27	Crude fertilisers and crude minerals (excluding coal, petroleum and precious stones)	1,368	41,632	43,000	1,664	101,757	103,421
28	Metalliferous ores and metal scrap	n.p.	393	(b)	225,308	1,693,990	1,919,298
33	Petroleum, petroleum products and related materials	n.p.	578,344	(b)	n.p.	171,920	(b)
51	Organic chemicals	14,427	20,165	34,592	n.p.	302	(b)
54	Medicinal and pharmaceutical products	73,883	433	74,316	n.p.	836	(b)
55	Essential oils and perfume materials; toilet, polishing and cleansing preparations	93,549	4,716	98,265	865	316	1,181
58	Artificial resins and plastic materials, and cellulose esters and ethers	61,087	14,922	76,009	3,784	591	4,375
62	Rubber manufactures, n.e.s.	41,805	31,103	72,908	3,412	76	3,488
64	Paper, paperboard, and articles of paper pulp, of paper or of paperboard	98,697	26,453	125,150	15,667	2,044	17,711
65	Textile yarn, fabrics, made-up articles, n.e.s. and related products	112,631	29,358	141,989	n.p.	1,711	(b)
66	Non-metallic mineral manufactures, n.e.s.	43,673	23,106	66,779	15,747	39,508	55,255
67	Iron and steel	207,677	44,820	252,497	n.p.	2,473	(b)
68	Non-ferrous metals	44,369	1,522	45,891	6,211	4,310	10,521
71	Power generating machinery and equipment	34,623	55,676	90,299	6,728	294	7,022
72	Machinery specialised for particular industries	108,917	106,325	215,242	80,859	3,498	84,357
74	General industrial machinery and equipment, n.e.s. and machinery parts, n.e.s.	140,215	113,476	253,691	18,813	3,367	22,180
75	Office machines and automatic data processing equipment	68,398	10,292	78,690	2,505	218	2,723
76	Telecommunications and sound recording and reproducing apparatus and equipment	79,308	38,252	117,560	2,571	168	2,739
77	Electrical machinery, apparatus and appliances, n.e.s. and electrical parts thereof	173,469	43,500	216,969	7,366	3,004	10,370
78	Road vehicles (including air cushion vehicles)	445,850	150,495	596,345	10,054	2,327	12,381
82	Furniture and parts thereof	18,593	8,284	26,877	24,947	573	25,520
84	Articles of apparel and clothing accessories	155,101	10,176	165,277	39,920	360	40,280
85	Footwear (excluding parts)	47,345	3,759	51,104	2,584	268	2,852
87	Professional, scientific and controlling instruments and apparatus, n.e.s.	54,873	32,862	87,735	2,130	2,262	4,392
88	Photographic apparatus, equipment and supplies and optical goods, n.e.s.; watches and clocks	36,096	5,380	41,476	517	107	624
	TOTAL (c)	3,638,883	1,935,552	5,574,435	1,410,145	5,060,377	6,470,522

(a) Excludes interstate value of horses. Also excludes value of interstate ships' stores. (b) Owing to the exclusion of confidential details, a total value is not available. (c) Includes details not available for publication and divisions not shown separately.

VALUE OF FOREIGN TRADE WITH SELECTED COUNTRIES BY  
SELECTED DIVISIONS: 1983-84  
(\$'000)

Division	Description	Imports				Exports			
		Japan	United States of America	United Kingdom	Kuwait	Japan	United States of America	United Kingdom	Korea, Republic of
01	Meat and meat preparations	—	—	198	—	12,593	52,174	1,621	123
03	Fish, crustaceans and molluscs, and preparations thereof	4,021	1,765	519	—	47,079	94,263	—	—
04	Cereals and cereal preparations	89	624	449	—	173,451	—	104	—
05	Vegetables and fruit	52	2,178	322	—	22	—	32	—
08	Feeding stuff for animals (excluding unmilled cereals)	2	2,479	—	—	—	—	4,959	6
11	Beverages	32	109	1,743	—	—	110	35	—
24	Cork and wood	—	523	—	—	29	290	4,006	—
26	Textile fibres (other than wool tops) and their wastes (not manufactured into yarn or fabric)	677	91	516	—	100,542	29,177	10,309	18,950
27	Crude fertilisers and crude minerals (excluding coal, petroleum and precious stones)	95	3,655	64	—	59,859	1,124	83	12,825
28	Metalliferous ores and metal scrap	2	11	—	—	1,112,544	34,966	44,609	124,256
29	Crude animal and vegetable materials, n.e.s.	304	285	95	—	861	259	134	228
33	Petroleum, petroleum products and related materials	16	966	92	146,936	13	—	1	—
51	Organic chemicals	1,836	3,604	3,631	—	—	—	—	—
52	Inorganic chemicals	737	1,312	5,028	—	117	15	—	—
56	Fertilisers, manufactured	36	21,704	15	—	—	—	—	—
58	Artificial resins and plastic materials and cellulose esters and ethers	1,941	4,044	3,270	—	187	—	4	—
59	Chemical materials and products, n.e.s.	351	4,845	11,230	—	—	38	—	—
62	Rubber manufactures, n.e.s.	15,954	3,437	2,911	—	3	—	6	—
64	Paper, paperboard, and articles of paper pulp, of paper or of paperboard	3,447	1,602	937	—	—	—	—	—
65	Textile yarn, fabrics, made-up articles, n.e.s. and related products	4,843	1,465	1,676	1	—	1	—	—
66	Non-metallic mineral manufactures, n.e.s.	4,233	2,637	2,194	—	1,229	47	29	44
67	Iron and steel	20,350	2,350	1,484	—	—	—	—	—
68	Non-ferrous metals	81	539	203	—	—	3,160	915	—
69	Manufactures of metal, n.e.s.	4,079	12,131	2,349	—	259	4,090	5	22
71	Power generating machinery and equipment	18,013	19,096	6,294	8	—	20	13	—
72	Machinery specialised for particular industries	11,347	45,784	11,131	—	1	147	86	14
73	Metalworking machinery	570	686	527	—	1	22	138	—
74	General industrial machinery and equipment, n.e.s. and machine parts, n.e.s.	19,570	35,056	9,772	2	5	20	24	51
75	Office machines and automatic data processing equipment	1,631	5,446	447	—	—	10	6	—
76	Telecommunications and sound recording and reproducing apparatus and equipment	24,388	3,649	924	—	—	—	1	—
77	Electrical machinery, apparatus and appliances, n.e.s. and electrical parts	18,786	7,337	4,555	—	10	120	138	—
78	Road vehicles (including air cushion vehicles)	123,010	12,648	2,349	—	—	3	36	—
79	Other transport equipment	250	3,134	53,412	—	180	60	—	—
87	Professional, scientific and controlling instruments and apparatus, n.e.s.	3,610	11,853	3,667	—	6	88	570	—
88	Photographic apparatus, equipment and supplies and optical goods, n.e.s.; watches and clocks	1,278	1,193	787	—	—	32	—	2
TOTAL (a)		298,787	261,365	231,307	146,949	1,629,179	685,831	239,983	169,347

(a) Includes details not available for publication and divisions not shown separately.

In the table below, details are given of the value of the principal commodities imported from and exported to other Australian States and Territories.

VALUE OF INTERSTATE IMPORTS AND EXPORTS (a) — SELECTED DIVISIONS  
(\$'000)

Division	Description	Imports			Exports		
		1981-82	1982-83	1983-84	1981-82	1982-83	1983-84
00	Live animals, chiefly for food	8,783	12,360	8,029	627	2,704	7,038
01	Meat and meat preparations	22,293	30,300	37,765	4,733	5,775	8,617
02	Dairy products and birds' eggs	33,914	37,872	36,816	n.p.	n.p.	n.p.
03	Fish, crustaceans and molluscs, and preparations thereof	6,450	8,188	6,594	8,496	13,170	15,806
04	Cereal grains and cereal preparations	36,620	42,386	51,282	1,787	n.p.	n.p.
05	Vegetables and fruit	65,721	69,429	75,174	6,402	6,595	8,056
06	Sugar, sugar preparations and honey	29,577	31,604	30,088	n.p.	n.p.	n.p.
07	Coffee, tea, cocoa, spices and manufactures thereof	45,799	51,154	53,689	n.p.	n.p.	n.p.
08	Feeding stuff for animals (excluding unmilled cereals)	20,591	19,255	21,868	n.p.	n.p.	293
11	Beverages	47,644	54,597	59,499	6,057	8,069	8,433
12	Tobacco and tobacco manufactures	100,487	125,242	128,710			
24	Cork and wood	2,158	3,964	5,031	5,278	4,770	9,449
28	Metalliferous ores and metal scrap	n.p.	n.p.	n.p.	179,368	155,307	225,308
51	Organic chemicals	9,060	10,417	14,427	n.p.	n.p.	n.p.
52	Inorganic chemicals	16,302	18,364	22,146	n.p.	n.p.	n.p.
53	Dyeing, tanning and colouring materials	15,919	24,060	23,195	910	1,240	1,605
54	Medicinal and pharmaceutical products	56,843	61,488	73,883	654	n.p.	n.p.
55	Essential oils and perfume materials; toilet, polishing and cleansing preparations	73,363	82,102	93,549	811	1,171	865
58	Artificial resins and plastic materials, and cellulose esters and ethers	46,983	50,414	61,087	1,828	2,559	3,784
62	Rubber manufactures, n.e.s.	46,895	38,706	41,805	2,520	3,186	3,412
63	Cork and wood manufactures (excluding furniture)	11,709	9,228	10,741	n.p.	n.p.	n.p.
64	Paper, paperboard, and articles of paper pulp, of paper or of paperboard	80,359	87,351	98,697	10,500	11,971	15,667
65	Textile yarn, fabrics, made-up articles n.e.s. and related products	98,267	93,264	112,631	n.p.	n.p.	n.p.
66	Non-metallic mineral manufactures, n.e.s.	37,808	37,171	43,673	9,436	12,776	15,747
67	Iron and steel	223,269	170,174	207,677	n.p.	17,726	n.p.
68	Non-ferrous metals	52,634	39,597	44,369	9,812	4,129	6,211
71	Power generating machinery and equipment	39,431	35,667	34,623	7,739	5,154	6,728
72	Machinery specialised for particular industries	144,542	108,958	108,917	66,649	47,407	80,859
73	Metalworking machinery	8,593	7,358	7,397	3,718	4,056	3,623
74	General industrial machinery and equipment, n.e.s. and machine parts, n.e.s.	149,609	135,675	140,215	25,834	19,189	18,813
75	Office machines and automatic data processing equipment	55,943	56,060	68,398	3,018	2,347	2,505
76	Telecommunications and sound recording and reproducing apparatus and equipment	83,469	94,610	79,308	2,495	1,907	2,571
77	Electrical machinery, apparatus and appliances, n.e.s. and electrical parts thereof	166,683	158,382	173,469	6,465	6,002	7,366
78	Road vehicles (including air cushion vehicles)	438,112	386,650	445,850	11,017	9,617	10,054
81	Sanitary, plumbing, heating and lighting fixtures and fittings, n.e.s.	15,808	13,212	15,119	n.p.	n.p.	n.p.
82	Furniture and parts thereof	18,019	16,749	18,593	20,041	16,566	24,947
84	Articles of apparel and clothing accessories	162,478	156,883	155,101	17,218	16,864	39,920
85	Footwear	37,391	42,014	47,345	3,617	2,862	2,584
87	Professional, scientific and controlling instruments and apparatus, n.e.s.	37,438	41,588	54,873	989	929	2,130
88	Photographic apparatus, equipment and supplies and optical goods, n.e.s.; watches and clocks	35,534	33,131	36,096	n.p.	n.p.	517
TOTAL (a) (b)		3,141,096	3,160,789	3,638,883	888,540	1,155,698	1,410,145

(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.

VALUE OF FOREIGN EXPORTS OF SELECTED COMMODITIES  
 MAIN COUNTRIES OF DESTINATION: 1983-84  
 (\$'000)

Description and destination	Value	Item total	Description and destination	Value	Item total
<b>Iron ore and concentrates</b>		<b>1,551,299</b>	<b>Live sheep and lambs for human consumption</b>		<b>89,594</b>
Japan	1,059,037		Saudi Arabia	26,883	
Korea, Republic of	115,283		Libyan Jamahiriya	21,026	
Germany, Federal Republic of	87,485		Kuwait	12,829	
China — excluding Taiwan Province	73,559		Qatar	7,297	
China — Taiwan Province only	66,131		Yemen, People's Democratic Republic of	6,537	
United Kingdom	38,223				
France	29,127		<b>Beef and veal, fresh, chilled, or frozen</b>		<b>79,409</b>
Philippines, Republic of	28,919		United States of America	51,897	
Italy	24,994		China — Taiwan Province only	8,882	
Netherlands, Kingdom of the	8,471				
Belgium — Luxembourg	8,263		<b>Salt</b>		<b>77,623</b>
Spain	7,426		Japan	52,182	
			China — Taiwan Province only	11,291	
<b>Wheat, unmilled</b>		<b>632,247</b>	Korea, Republic of	10,237	
Japan	132,527				
Egypt, Arab Republic of	123,612		<b>Barley, unmilled</b>		<b>69,384</b>
China — excluding Taiwan Province	85,582		Singapore, Republic of	26,234	
Iran	76,846		Japan	15,624	
Indonesia	50,020		Brazil	7,016	
Iraq	37,895		China — Taiwan Province only	6,766	
Singapore, Republic of	32,007				
Union of Soviet Socialist Republics	21,884		<b>Wool, degreased</b>		<b>65,950</b>
Bangladesh	19,621		Japan	23,069	
Malaysia	18,125		Italy	12,878	
Thailand	5,727		United States of America	11,936	
			United Kingdom	8,517	
<b>Wool, greasy</b>		<b>340,256</b>			
Japan	77,467		<b>Feeding stuff for animals</b>		<b>53,935</b>
Union of Soviet Socialist Republics	35,322		Netherlands, Kingdom of the	20,450	
Germany, Federal Republic of	31,777		China — Taiwan Province only	10,976	
Italy	30,540				
France	27,668		<b>Mutton and lamb, fresh, chilled or frozen</b>		<b>39,114</b>
Korea, Republic of	18,317		Japan	9,382	
United States of America	17,241		United Arab Emirates	5,141	
China — Taiwan Province only	16,713				
Poland	16,457		<b>Zirconium</b>		<b>36,821</b>
Yugoslavia	14,348		Japan	16,842	
India	11,636				
Belgium — Luxembourg	8,057		<b>Diamonds, rough, unsorted</b>		<b>35,209</b>
Malaysia	7,100		Switzerland	33,147	
<b>Gold bullion</b>		<b>308,581</b>	<b>Ilmenite (a)</b>		<b>29,686</b>
United Kingdom	154,713		United States of America	11,298	
Hong Kong	153,525				
			<b>Hides and skins</b>		<b>23,998</b>
<b>Petroleum and petroleum products</b>		<b>171,920</b>	Italy	13,356	
New Zealand	34,701				
Fiji	18,010		<b>Rutile</b>		<b>19,961</b>
Singapore, Republic of	15,780		United States of America	10,061	
Iran	7,606				
<b>Rock lobsters whole and tails, fresh or frozen</b>		<b>111,954</b>			
United States of America	84,162				
Japan	24,402				

(a) Excludes beneficiated ilmenite.

The following table shows the total value of Australia's foreign imports and exports, together with the proportion handled at Western Australian air and sea ports, during each of the years 1978-79 to 1983-84.

FOREIGN TRADE OF AUSTRALIA — TOTAL VALUE AND PROPORTION  
HANDLED AT WESTERN AUSTRALIAN AIR AND SEA PORTS

Year	Value of Australian trade (\$'000)			Proportion handled at Western Australian air and sea ports (per cent)		
	Imports	Exports	Total	Imports	Exports	Total
1978-79	13,752,254	14,241,167	27,993,421	8.44	19.80	14.22
1979-80	16,217,505	18,870,079	35,087,584	8.94	20.42	15.12
1980-81	18,964,266	19,169,243	38,133,509	8.77	19.78	14.30
1981-82	23,012,990	19,581,472	42,594,462	11.02	19.96	15.13
1982-83	21,806,179	22,061,519	43,867,698	11.57	21.61	16.62
1983-84	24,060,997	24,766,344	48,827,341	8.04	20.43	14.33

## Chapter 22

### EMPLOYMENT AND INDUSTRIAL CONDITIONS

In addition to the employment data appearing in this Chapter, references to the numbers 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 staffs. Employment in building appears in Chapter 19. Chapter 15 provides information on employment at mines, and Chapter 17 includes tables relating wholly, or in part, to employment in factories. Chapter 18 gives numbers employed in retail and selected service establishments, and Chapter 20 shows numbers engaged in various types of transport undertakings.

#### THE LABOUR FORCE

The labour force comprises two categories of persons: those who are employed and those who are unemployed. In the first category are included employers, self-employed persons, wage and salary earners, and unpaid family helpers. Comprehensive details for each State and Territory and for Australia as a whole in respect of persons in the labour force, classified according to industry, occupation and occupational status (i.e. whether employers, self-employed persons, wage and salary earners or unpaid family helpers) and personal characteristics such as age, sex, marital status and birthplace, are obtained only at a general census of population.

In addition to the population censuses, 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.

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.

#### The Population Census

The comprehensive tables resulting from the 1981 Census include detailed analyses of the labour force according to such characteristics as age, marital status, birthplace, occupational status, industry and occupation. Only some of these tables, in condensed form, have been included in this Chapter. The reader requiring additional information is referred to the census bulletins published by the Australian Statistician, Canberra.

#### The Survey of Employment and Earnings

For many years, estimates of civilian employees were based on a statistical framework constructed from lists of employers subject to payroll tax and lists of government employers and non-profit organisations. The civilian employees series was discontinued in April 1980 because of deficiencies in the data. After a subsequent review of collection methodology it was decided that employment information about the private sector would need to be obtained directly from employers using sample survey methodology based on the Australian Bureau of Statistics register of business units. Information derived from this source and details from all government employers now comprise the basis for the employed wage and salary earner series.

Background information on the reasons for the introduction of the new survey is provided in *Information Paper: Review of ABS Employment Statistics* (Catalogue No. 6239.0) issued by the Australian Statistician, Canberra. Further information on the differences in concepts, methodology and coverage between the old and new employment series is provided in *Information Paper: New Statistical Series: Employment, Average Weekly Earnings, Job Vacancies and Overtime* (Catalogue No. 6256.0) issued by the Australian Statistician, Canberra.

### Population classified according to Occupational Status

#### OCCUPATIONAL STATUS — CENSUS, 30 JUNE 1981

Occupational status	Males '000	Females '000	Persons '000	Proportion of total population		
				Males	Females	Persons
				Per cent	Per cent	Per cent
<b>In labour force —</b>						
Employed —						
Employer	25.6	11.3	36.9	2.0	0.9	2.9
Self-employed	38.8	17.5	56.4	3.1	1.4	4.4
Employee on wage or salary	284.9	169.8	454.7	22.4	13.3	35.7
Helper, unpaid	1.1	4.8	5.9	0.1	0.4	0.5
Total, Employed	350.5	203.4	553.9	27.5	16.0	43.5
Unemployed	21.5	15.5	37.1	1.7	1.2	2.9
Total, In labour force	372.0	218.9	591.0	29.2	17.2	46.4
<b>Not in labour force (15 years of age or more)</b>	99.9	249.7	349.6	7.8	19.6	27.4
Under 15 years of age	171.1	161.9	333.1	13.4	12.7	26.2
<b>TOTAL POPULATION</b>	<b>643.1</b>	<b>630.5</b>	<b>1,273.6</b>	<b>50.5</b>	<b>49.5</b>	<b>100.0</b>

The following tables show details of the labour force from the 1981 Census and from the Labour Force Survey for the month of August 1985.

#### LABOUR FORCE — OCCUPATIONAL STATUS, MARITAL STATUS AND SEX CENSUS, 30 JUNE 1981 ( '000)

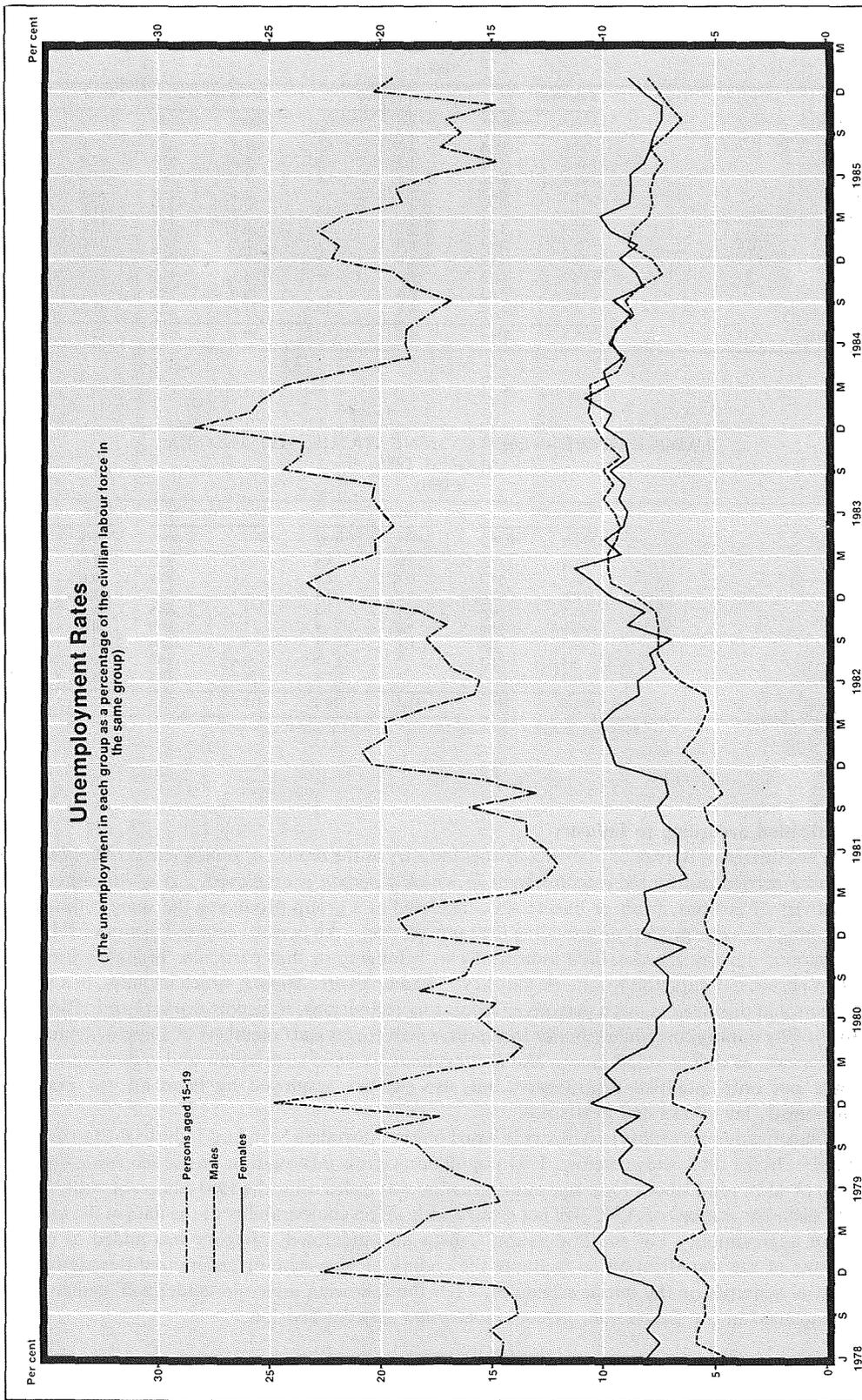
Occupational status	Never married		Now married		Widowed		Other marital status (a)		Total	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
	Employer	2.3	0.3	21.8	10.4	0.2	0.2	1.4	0.4	25.6
Self-employed	6.0	0.7	30.3	15.8	0.3	0.4	2.2	0.6	38.8	17.5
Wage or salary earner	90.4	59.7	174.8	92.3	1.8	3.6	17.9	14.2	284.9	169.8
Helper, unpaid	0.6	0.4	0.5	4.1	—	0.1	0.1	0.1	1.1	4.8
Unemployed	12.5	8.7	6.8	4.7	0.2	0.5	2.1	1.7	21.5	15.5
Not in labour force	35.4	36.0	51.0	156.0	7.5	40.6	5.9	17.1	99.9	249.7
Total, 15 years and over	147.1	105.9	285.2	283.2	10.1	45.5	29.5	34.0	472.0	468.6

(a) Comprises the categories *Permanently separated* and *Divorced*.

#### LABOUR FORCE — OCCUPATIONAL STATUS, MARITAL STATUS AND SEX AUGUST 1985 ( '000)

Occupational status	Males	Females	Persons	
	Total	Married	Not married	Total
	Employer	27.5	11.8	*
Self-employed	51.2	19.0	2.5	21.5
Wage or salary earner	301.2	107.5	92.5	200.0
Helper, unpaid	*	*	*	2.0
Unemployed	32.5	8.1	12.1	20.2
Not in labour force	117.7	170.1	104.1	274.1
Total, 15 years and over	531.5	317.9	212.5	530.4

\* Subject to sampling variability too high for most practical purposes.



LABOUR FORCE — EMPLOYMENT STATUS, AGE AND SEX  
CENSUS, 30 JUNE 1981  
(’000)

Age (years)	Employed		Unemployed		Not in labour force		Total	
	Males	Females	Males	Females	Males	Females	Males	Females
15-19	31.6	26.6	4.7	5.0	21.0	23.3	57.3	54.9
20-24	46.3	34.2	5.2	3.9	5.6	17.3	57.0	55.4
25-29	49.4	27.1	3.2	1.8	3.3	26.1	55.9	55.1
30-34	51.5	26.4	2.1	1.3	2.6	25.8	56.2	53.5
35-39	41.5	23.5	1.5	0.9	2.0	17.2	45.0	41.6
40-44	34.9	21.2	1.2	0.7	2.1	13.5	38.2	35.5
45-49	29.2	16.7	1.0	0.6	2.2	12.7	32.4	30.1
50-54	27.7	13.4	1.0	0.4	3.2	15.8	31.9	29.7
55-59	22.7	8.5	0.9	0.3	4.7	18.4	28.3	27.1
60-64	10.6	3.3	0.4	0.1	10.2	19.3	21.2	22.8
65 and over	5.1	2.4	0.3	0.4	43.1	60.1	48.5	62.9
Total	350.5	203.4	21.5	15.5	99.9	249.7	472.0	468.6

LABOUR FORCE — EMPLOYMENT STATUS, AGE AND SEX  
AUGUST 1985  
(’000)

Age (years)	Employed		Unemployed		Not in labour force		Total	
	Males	Females	Males	Females	Males	Females	Males	Females
15-19	32.6	30.6	7.0	6.3	22.2	22.2	61.7	59.1
20-24	48.5	38.7	6.3	4.5	5.8	16.4	60.6	59.7
25-34	108.0	62.6	7.7	4.4	6.1	51.5	121.9	118.6
35-44	95.2	60.0	4.5	3.2	4.4	34.5	104.0	97.7
45-54	60.0	33.1	3.8	*	7.0	31.9	70.8	66.2
55-59	23.3	6.0	2.1	*	5.7	22.8	31.1	29.4
60-64	9.4	3.3	*	*	16.4	23.9	26.8	27.3
65 and over	4.3	*	*	*	50.2	70.8	54.6	72.4
Total	381.3	236.0	32.5	20.2	117.7	274.1	531.5	530.4

\* Subject to sampling variability too high for most practical purposes.

### Classification according to Industry

The Australian Bureau of Statistics defines industry as the *branch of productive activity, business or service carried out by the establishment in which a person is employed*. It is concerned with the activity of persons, firms or businesses considered as a group producing the same commodity, performing the same process or providing the same service. All persons engaged in any such branch of economic activity are classified industrially as belonging to that particular branch irrespective of their personal occupation within the industry. Examples are: *Mining*, which includes, in addition to miners and prospectors, such persons as laboratory technicians, transport workers and office staff employed by mining companies; *Water transport*, which covers staff members of shipping companies and agencies, as well as ships' crews; and *Professional activities* such as law and architecture which include not only qualified practitioners but also persons employed by them as, for example, receptionists, law clerks and draftsmen.

Classification according to industry is based on the Australian Standard Industrial Classification (ASIC). In the table shown below, 1981 population census information was coded using the 1978 edition of ASIC, and labour force survey information was coded using the 1983 edition of ASIC. The use of different editions of ASIC will not significantly affect comparability of the data at the industry level of aggregation. For the Population Census an 'undefined' category was added to certain Divisions of the classification to facilitate the coding of imprecise or generalised descriptions of industrial activities on the census schedules. For the following table the 'undefined' category has been included in the *Recreation, personal and other services* division.

## EMPLOYED PERSONS — INDUSTRY

Industry division	Census, 30 June 1981			Labour Force Survey, August 1985		
	Males	Females	Persons	Males	Females	Persons
Agriculture, forestry, fishing and hunting	31.5	12.2	43.7	37.7	13.2	50.9
Mining	19.2	2.9	22.0	23.9	3.5	27.4
Manufacturing	55.3	13.9	69.2	59.8	15.8	75.5
Electricity, gas and water	8.8	0.8	9.6	9.4	*	9.9
Construction	36.8	4.9	41.7	39.7	4.6	44.3
Wholesale and retail trade	55.9	42.8	98.7	67.6	55.3	122.8
Transport and storage	26.6	4.3	30.9	29.9	4.8	34.7
Communication	7.5	2.4	9.9	7.3	2.8	10.1
Finance, property and business services	26.2	21.0	47.2	30.7	28.1	58.7
Public administration and defence	17.2	6.7	23.9	14.8	9.5	24.3
Community services	33.6	56.6	90.2	43.3	73.8	117.1
Recreation, personal and other services	(a) 31.9	(a) 34.9	(a) 66.8	17.3	24.2	41.5
Total, all industries	350.5	203.4	553.9	381.3	236.0	617.3

(a) Includes 'unidentified', i.e. persons who could not be accurately assigned to one of the sub-divisions shown. \* Subject to sampling variability too high for most practical purposes.

Further information on the labour force statistics from the 1981 Census was published in the *Western Australian Year Book*, No's 21 and 22 of 1983 and 1984 respectively.

### The Labour Force Survey

The Australian Statistician prepares estimates of the civilian labour force based on results of the population survey which is carried out on a sample basis throughout Australia each month. Selected private dwellings (houses, flats, etc.) and other dwellings (hotels, motels, etc.) are visited in the course of each survey. Information is obtained by means of personal interviews carried out by specially trained enumerators. The results of the survey are published by the Australian Statistician, initially in a preliminary publication, *The Labour Force, Australia, Preliminary* (Catalogue No. 6202.0), and then in the monthly and annual releases entitled *The Labour Force* (Catalogue Nos. 6203.0 and 6204.0 respectively) and in the annual *Labour Statistics* (Catalogue No. 6101.0). The survey includes all persons aged fifteen years and over who were in one of the following categories: those who worked for one hour or more for payment or profit at any time during the survey week (the week preceding the interviews); those who had a job from which they were temporarily absent; those who were temporarily laid off without pay for the whole of the week; and those who did not work, did not have a job and were actively looking for work. Persons helping but not receiving wages or salary who usually worked less than fifteen hours per week are excluded from the survey. The unemployed members of the labour force are those persons who did no work during the survey week and either looked for work (having no job) or were temporarily laid off from a job.

The definitions used in determining the labour force conform closely to the recommendations of the International Labour Organisation.

The following table shows estimates of the employment status of the civilian population of Western Australia since August 1980. The figures relate to all persons aged fifteen years and over except members of the permanent armed forces and certain diplomatic personnel customarily excluded from census and estimated populations.

## CIVILIAN POPULATION 15 YEARS OF AGE AND OVER — EMPLOYMENT STATUS

Month of August	Employed		Unemployed		Total labour force		Not in labour force ('000)	Civilian population aged 15 and over ('000)
	Number ('000)	Per cent of labour force	Number ('000)	Per cent of labour force	Number ('000)	Per cent of population		
MALES								
1980	351.3	94.3	21.1	5.7	372.4	79.3	97.4	469.8
1981	357.0	94.6	20.6	5.4	377.5	78.2	105.0	482.5
1982	360.4	92.3	30.0	7.7	390.4	78.5	106.8	497.2
1983	358.7	90.3	38.4	9.7	397.2	77.9	112.8	510.0
1984	369.5	91.2	35.9	8.8	405.4	77.7	116.6	522.0
1985	381.3	92.1	32.5	7.9	413.8	77.9	117.7	531.5
FEMALES								
1980	203.2	92.7	16.0	7.3	219.2	46.9	248.2	467.4
1981	205.7	92.5	16.7	7.5	222.3	46.3	258.1	480.5
1982	212.6	91.9	18.7	8.1	231.4	46.7	264.2	495.6
1983	215.7	90.8	21.8	9.2	237.5	46.7	271.1	508.6
1984	224.1	91.1	22.0	8.9	246.0	47.3	274.5	520.5
1985	236.0	92.1	20.2	7.9	256.2	48.3	274.1	530.4
PERSONS								
1980	554.6	93.7	37.1	6.3	591.6	63.1	345.5	937.2
1981	562.6	93.8	37.2	6.2	599.8	62.3	363.1	962.9
1982	573.0	92.2	48.7	7.8	621.8	62.6	371.0	992.8
1983	574.5	90.5	60.3	9.5	634.7	62.3	383.9	1,018.6
1984	593.6	91.1	57.8	8.9	651.5	62.5	391.1	1,042.5
1985	617.3	92.1	52.8	7.9	670.0	63.1	391.8	1,061.9

**Employed Wage and Salary Earners**

The Survey of Employment and Earnings was introduced in the September quarter of 1983. The survey was designed to obtain from employers information on numbers of wage and salary earners employed each month and their quarterly earnings. It replaces the civilian employees series, based principally on information obtained from payroll tax returns, which was discontinued after April 1980.

The survey is conducted by mail each quarter with data collected on monthly employment and quarterly earnings. For the first and last month of each quarter the number of persons is collected; for the mid month of each quarter, details of males and females, full-time and part-time, are collected.

All wage and salary earners are represented in the survey, except:

- (a) members of the Australian permanent defence forces;
- (b) employees of enterprises in the private sector primarily engaged in agriculture, forestry, fishing and hunting;
- (c) employees in private households employing staff;
- (d) unpaid family helpers;
- (e) employees of overseas embassies, consulates, etc.;
- (f) employees based outside Australia; and
- (g) self-employed persons such as subcontractors, owner drivers and consultants.

For the private sector a sample of employers is selected whereas for the government sector data are collected from all units.

Employment figures from the Survey of Employment and Earnings (SEE) are not directly comparable with those derived from the Labour Force Survey (LFS) for a number of reasons including:

- (a) the SEE obtains information directly from a sample of private employers and from all government employers whereas the LFS is based on a multi-stage area sample of dwellings;
- (b) the SEE relates to employees, whereas the LFS includes employees, employers, self-employed persons and unpaid family helpers;

- (c) the SEE measures jobs (multiple job holders would be double counted), whereas the LFS measures persons;
- (d) other definitional and classificatory differences.

## EMPLOYED WAGE AND SALARY EARNERS — INDUSTRY

Industry	('000 persons)					(\$m)
	September	December	March	June	September	Gross earnings
	1984	1984	1985	1985	1985	September 1985
Mining	22.3	23.8	23.0	23.3	24.6	189.2
Manufacturing	63.0	63.9	63.3	63.1	62.9	304.3
Food, beverages and tobacco	11.6	11.4	10.7	10.3	10.1	44.5
Chemical, petroleum and coal products and non-metallic mineral products	7.6	7.9	8.1	8.0	7.9	44.9
Metal products	12.6	12.6	12.5	13.5	13.1	73.1
Transport equipment	5.0	5.1	4.5	4.6	4.7	24.2
Other machinery and equipment	7.9	7.4	7.4	6.9	7.1	33.9
Other manufacturing (a)	18.4	19.5	20.1	19.9	20.0	83.7
Electricity, gas and water	11.9	11.9	11.8	11.8	11.4	64.8
Construction	23.9	24.1	24.8	25.9	23.2	120.0
Wholesale and retail trade	91.0	96.8	94.3	93.4	93.2	303.9
Wholesale trade	27.5	27.6	27.9	28.2	27.5	130.8
Retail trade	63.5	69.2	66.4	65.3	65.7	173.1
Transport and storage	25.3	27.1	26.0	26.4	27.5	151.2
Communication	9.6	10.1	10.0	10.2	10.1	50.9
Finance, property and business services	46.2	48.0	49.9	52.0	52.1	235.0
Public administration and defence (b)	22.7	22.7	23.4	24.1	23.8	118.4
Community services	107.9	103.0	109.6	113.2	117.0	512.9
Health	44.7	45.7	47.4	48.5	50.1	213.5
Education	44.0	38.8	43.6	45.4	46.4	209.8
Other community services	19.2	18.5	18.7	19.2	20.5	89.7
Recreation, personal and other services (c)	31.3	31.7	33.6	34.0	35.6	94.2
TOTAL, ALL INDUSTRIES (d)	456.7	464.4	471.3	479.0	482.7	2,152.8

(a) Includes textiles, clothing and footwear; wood, wood products and furniture; paper, printing and publishing; miscellaneous manufacturing.  
 (b) Excludes members of permanent defence forces and employees of overseas embassies, consulates, etc. (c) Excludes private households employing staff. (d) Includes employees of government agencies classified to agriculture, forestry, fishing and hunting.

## EMPLOYED WAGE AND SALARY EARNERS — SECTOR

Sector	('000 persons)					(\$m)
	September	December	March	June	September	Gross earnings
	1984	1984	1985	1985	1985	September 1985
Western Australia	456.7	464.4	471.3	479.0	482.7	2,152.8
Private	305.5	317.3	318.7	322.8	327.0	1,375.2
Government	151.2	147.1	152.7	156.3	155.7	777.5
Commonwealth	25.6	26.0	26.0	26.7	26.2	133.6
State	115.6	111.0	116.4	118.8	119.0	599.0
Local	10.1	10.0	10.3	10.7	10.5	44.9

## COMMONWEALTH EMPLOYMENT SERVICE

The main functions of the Commonwealth Employment Service, established under the *Commonwealth Employment Service Act 1978*, 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, rural workers and persons with professional and technical qualifications.

In Western Australia, at 1 October 1985, the Commonwealth Employment Service operated seventeen Job Centres in Perth and suburbs, and also had centres at Albany, Broome, Bunbury, Carnarvon, Collie, Esperance, Geraldton, Kalgoorlie, Karratha, Mandurah, Manjimup, Merredin, Northam and Port Hedland. In addition, eight Commonwealth Employment Service agencies were spread between Wyndham in the north and Busselton in the south. 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 with respect to employment.

The Professional Employment Service is a specialised unit of the Commonwealth Employment Service which services vacancies in certain occupations and assists job seekers in the managerial/professional fields. Other specialised units are Templine, which services temporary vacancies for white collar workers; Commerce, which deals with commercial vacancies in the Central Business District, and Hospitality which services vacancies in the tourist and hospitality industries.

A Career Reference Centre in Perth provides members of the public with the opportunity to investigate their career choice and to obtain information on available vocational courses. The Centre provides information in a more extensive format than is possible in an employment interview or when a visit is made to a school. Most Commonwealth Employment Service offices have Work Information Centres providing similar services. Another service is the provision of career materials to educational institutions to assist them with their career planning activities. Materials supplied by the Department include Career Planning Packs, the Career Resource Guide, and a wide range of publications and audio visual occupational information.

The Commonwealth Employment Service also administers several Departmental manpower programs designed to assist the following groups: industry overcoming skill shortages; individuals who, because of inadequate, inappropriate or outdated skills, have been displaced from the workforce; unemployed young people to find employment; and other disadvantaged groups. The programs and their main features are shown below:

**Relocation Assistance/Fares Assistance Programs.** The Relocation Assistance Scheme is designed to assist eligible job-seekers who are unlikely to secure continuing employment in their present locality to move to take up continuing employment in another locality within Australia. Financial assistance is available to provide fares for interview, exploratory and relocation trips, removal expenses and legal and agents fees associated with sale or purchase of a home, or rental assistance. The Fares Assistance Scheme provides assistance with public transport fares for job-seekers attending interviews for employment of a continuing nature.

**Training for Aborigines.** Special assistance programs are available for Aboriginal people. These provide subsidised employment ranging from apprenticeships to formalised training. In some cases, these subsidies may be negotiated in the context of the trainee's ability and the degree of difficulty of the employment involved.

**Integrated Wage Subsidy Program.** This is designed for all persons aged 15 years and over, and includes especially disadvantaged job-seekers in target groups such as migrants, women, supporting parents, Aboriginal persons, disabled persons and long term unemployed. The program provides for on-the-job subsidised work experience for a period of six months and is designed to assist trainees to acquire new skills or update their current skills. The amount of subsidy payable varies according to the age and duration of unemployment of the trainee.

**Adult Training Program.** This provides financial assistance to disadvantaged job-seekers, enabling them to participate in flexible training arrangements leading to identified employment opportunities in the labour market. Job-seekers aged 18 years and over who are approved for training may be employed for up to 12 months in training courses linked to local labour market demand.

**Traineeship Program.** This program is aimed at 16-18 year old persons, with priority being given to 16-17 year old school leavers who have not completed Year 12. Initially there will be 10,000 traineeships provided, with a target to be reached, throughout Australia, of 75,000 traineeships by 1988. This level will then be maintained. The duration of the traineeship is 12 months and it will combine training on-the-job with thirteen weeks of institutional training which will probably be undertaken at a Technical and Further Education institution. A negotiated wage will be paid to the trainee for the period of the traineeship.

**Community Employment Programs.** These provide grants to local authorities, community organisations and State, Territory or Commonwealth Government departments and authorities to

develop labour intensive projects, creating temporary job opportunities for long term unemployed persons and disadvantaged groups, while helping to improve community facilities and services.

**Commonwealth Work Experience Program.** This provides disadvantaged job-seekers aged 15-24 years with on-the-job work experience within Commonwealth Government departments and instrumentalities. The subsidy is equal to 100 per cent of gross salary for a period of 17 weeks only. Positions offered are additional to normal staffing levels and should provide the trainee with marketable skills, thereby improving their employment prospects.

**Commonwealth Rebate for Apprentice Full Time Training.** This applies to all apprentices taken on after 14 January, 1977. It aims to encourage employers to train apprentices by subsidising the cost of releasing apprentices during paid working hours to attend or study a basic trade course of technical education or a formal off-the-job training course. The technical education rebate can apply during any year of apprenticeship but the off-the-job rebate applies only during the first year of apprenticeship.

## INDUSTRIAL AUTHORITIES

### Federal Authorities

**Federal Court of Australia.** The Federal Court of Australia, as constituted by the *Federal Court of Australia Act 1976* consists of a Chief Judge and such other Judges as are appointed under the Act, and comprises an Industrial Division and a General Division. The Industrial Division deals with all proceedings under the Conciliation and Arbitration Act and related legislation. The Federal Court of Australia Act provides that, except in respect of certain specified situations, the jurisdiction of the Industrial Division shall be exercised by a Full Court comprising not less than three Judges. A single Judge may refer a question of law for the opinion of a Full Court. The Australian Conciliation and Arbitration Commission may also refer a question of law for the opinion of the Court. Appeal from a judgment of a Full Court may, in certain circumstances, be made to the High Court of Australia.

**Australian Conciliation and Arbitration Commission.** The Australian Conciliation and Arbitration Commission, has jurisdiction in respect of the prevention and settlement of industrial disputes extending beyond the limits of any one State. The Commission consists of a President, Deputy Presidents and Commissioners. The work of the Commission is normally done by individual members; however, certain matters such as standard hours, national wage cases, the minimum wage for adults, equal pay principles, annual leave and long service leave with pay 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 and from the Public Service Arbitrator. Where a State law or an award, etc. of a State Tribunal is inconsistent with a Federal award, etc., the latter prevails to the extent of the inconsistency.

### Western Australian Authorities

The *Industrial Arbitration Act 1979*, proclaimed on 1 March 1980, constituted the Western Australian Industrial Commission and the Western Australian Industrial Appeal Court. Under the provisions of the *Acts Amendment and Repeal (Industrial Relations) Act 1984*, the name of the Statute under which the Commission is constituted was changed to the Industrial Relations Act and the name of the Commission was changed to the Western Australian Industrial Relations Commission. Other important changes effected by amendment Acts during 1984 include:

- The addition to the Commission, as "Constituent Authorities", of the Government School Teachers Tribunal, the Public Service Arbitrator, the Public Service Appeal Boards, the Railways Classification Board and Promotions Appeal Boards.
- The deletion of pecuniary penalties for most acts or omissions which formerly constituted offences and the allocation to the Full Bench of the function of dealing with the enforcement of such matters.
- A greater emphasis on the use of conciliation for preventing and settling industrial disputes before resort is made to arbitration.

- The addition of provisions enabling greater co-operation and co-ordination between the Commission and other Australian industrial tribunals.
- Changes to the provisions relating to the registration of organisations which are aimed at reducing and if possible eliminating over-lapping between union (organisation) constitutions.

**Western Australian Industrial Appeal Court.** The Western Australian Industrial Appeal Court consists of four Judges, one of whom is the Presiding Judge and another the Deputy Presiding Judge. The members are nominated by the Chief Justice of Western Australia. An appeal lies to the 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 is in excess of jurisdiction.

**The Western Australian Industrial Relations Commission.** The Western Australian Industrial Relations Commission consists of a President, a Chief Commissioner, a Senior Commissioner, and 'such number of other Commissioners as may, from time to time, be necessary'. There were seven 'other Commissioners' at 30 June 1985. A person shall not be appointed as President unless he is qualified to be a Judge, and on appointment he is entitled to the status of a Puisne Judge. The President or a Commissioner sitting or acting alone constitutes the Commission and may exercise the appropriate powers of the Commission.

The 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 or of any employer or employee therein, 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 or 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.

The Commission in Court Session is constituted by not less than three Commissioners sitting or acting together, and may make General Orders, hear matters referred by the Commission, and hear appeals from decisions of Boards of Reference.

The Full Bench is constituted by not less than three members of the Commission, one of whom is the President, and may hear matters referred by the Commission on questions of law, and appeals from decisions of the Commission and Industrial Magistrates.

The following table shows details of the number of industrial awards, organisations of employees and employers, and members registered with the Western Australian Industrial Relations Commission under the *Industrial Relations Act 1979*.

#### INDUSTRIAL AWARDS, EMPLOYEE AND EMPLOYER ORGANISATIONS AND MEMBERS REGISTERED (a)

Particulars	At 30 June —					
	1980	1981	1982	1983	1984	1985
Awards in force	494	459	483	488	491	630
Employee organisations (a) —						
Number	74	68	69	66	67	70
Membership	181,409	170,414	171,912	176,065	174,330	185,061
Employer organisations (a) —						
Number	14	14	14	14	14	15
Membership	2,040	2,139	2,142	2,138	2,144	2,535

(a) Before 1 March 1985 the term 'unions' was used in lieu of 'organisations'.

#### EMPLOYER ORGANISATIONS

The two major organisations representative of employers in industrial relations matters are the Confederation of Western Australian Industry (Incorporated) and the Australian Mines and Metals Association (Incorporated).

The Confederation of Western Australian Industry (Incorporated) has approximately 6,000 individual members and 101 affiliated trade, industry and professional associations. It is controlled by a Board representative of its Business Council, Labour Relations Council, Manufacturing Industry Council and Congress of Employers. This Board is elected by members of the Confederation.

The Australian Mines and Metals Association (Incorporated) is an association of mining and hydrocarbon companies which was established in Victoria in 1918. A branch office was opened in Western Australia in 1968. Its activities are mainly directed to the industrial relations interests of its members in the mining, hydrocarbon, and allied industries.

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 (C.A.I.) which came into existence on 1 December 1977, replacing the Associated Chambers of Manufactures and the Australian Council of Employers' Federation. Through C.A.I. they have overseas affiliation with the International Organisation of Employers.

### EMPLOYEE ORGANISATIONS

The employee organisations in Western Australia cover all forms of occupations from the unskilled to the professional worker. The great majority of union organisations are national in character with State branches registered with both the Federal and State industrial authorities.

Major organisations are the Trades and Labor Council of Western Australia and the Government Employees Industrial Council of Western Australia. These two groups cover most of the wage and salary earners employed in the private and governmental sectors of industry and commerce.

The Trades and Labor Council of Western Australia, which is the State branch of the Australian Council of Trade Unions (A.C.T.U.), has provincial councils at Geraldton and Carnarvon. At 31 December 1985 it had affiliated with it eighty-four State resident unions having a membership of approximately 184,000.

The Trades and Labor Council frequently acts on behalf of employees, before the Western Australian industrial authorities, in matters such as wages, hours, holidays and long service leave.

The next table gives particulars of the numbers of employee organisations in Western Australia. The figures are compiled from questionnaires completed by individual employee organisations in respect of their membership and area of operations as at 30 June 1985 and as at 31 December in previous years. For the purpose of these statistics an employee organisation is defined as an organisation consisting predominantly of employees, the principal activities of which include the negotiation of rates of pay and conditions of employment for its members. Non-operating employee organisations or branches, i.e. those with no members at the date of collection, are not included in the statistics.

The published number of employee organisations varies from year to year as a result of amalgamations, cessation of operations, formation of new employee organisations, changes within existing organisations, bringing them within the scope of the definition of an employee organisation, and existing employee organisations reporting for the first time. Comparability of figures for different years may be affected by a number of factors. There may be duplication in the membership count, and this duplication may vary over time. Organisation rules on membership may follow different concepts and practices and this may be reflected in the level and fluctuations of the figures reported.

A break in series occurred in 1985 when employee organisations reported financial and total membership separately for the first time, as at 30 June 1985. In previous years some employee organisations confined their reported membership to financial members whilst others included various other members.

## EMPLOYEE ORGANISATIONS — NUMBERS AND MEMBERSHIP

Date	Number of organisations	Number of members ('000)			Proportion of total wage and salary earners (a) (per cent)		
		Males	Females	Persons	Males	Females	Persons
31 December —							
1980	150	158.8	75.9	234.7	55	44	51
1981	149	156.4	72.7	229.1	54	42	r 49
1982	148	161.2	73.3	234.5	r 55	r 40	50
1983	146	162.2	75.3	237.5	55	40	49
1984	148	166.2	78.0	244.2	55	40	49
1985 (b)	146	166.3	78.2	244.5	54	39	48

(a) Based on estimates from the Labour Force Survey. (b) Break in series. See preceding text for details.

## APPRENTICESHIP AND INDUSTRIAL TRAINING

At 30 June 1985 the total number of apprentices registered in this State was 9,370 in a wide variety of trades.

The training of apprentices in Western Australia is governed by the provisions of the *Industrial Training Act 1975* which was proclaimed on 6 February 1978. The provisions of this Act and associated regulations prescribe the administrative processes and conditions relating to the trades to which persons can be indentured; the duration of apprenticeship; the pre-requisites for entry into trades and criteria for terms shorter than the maximum; the mode and duration of technical training attendance; and the examination and certification of apprentices.

The Act established the Industrial Training Advisory Council as the principal advisory body to the Government on matters relating to industrial training. The Council comprises seven members representing the Department of Employment and Training, the Confederation of Western Australian Industry (Incorporated), the Trades and Labor Council of Western Australia, the Technical Education Division of the Education Department and a State instrumentality. It is responsible for the overall co-ordination of industrial training arrangements in Western Australia.

An industrial training advisory board in respect of each trade or group of trades which is 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 is an agreement which covers the period of time during which an apprentice is contracted to an employer to learn all phases of a trade. It is a form of on-the-job training, and combines practical experience at work with further training at technical school. An apprentice is any person bound to an employer or an industrial training advisory board to learn an apprenticeship trade prescribed under the Act. There is no minimum age prescribed although, in practice, the minimum age is the school leaving age which is at the end of the year during which the student turns fifteen. Any person under the minimum age who wishes to commence an apprenticeship must obtain permission from the Education Department to leave school. At 30 June 1985 112 trades had been prescribed as apprenticeship trades. Apprentices or industrial trainees are normally employed on probation for a period of three months. An employer, upon application to, and with the approval of, the Director of Industrial Training, may extend the probationary period for a further period of three months. The period on probation enables the parties to assess whether they wish to confirm the apprenticeship and sign the indenture which will bind them for the term of training. The period also counts as service if the person subsequently becomes an apprentice or industrial trainee in that trade. Under certain circumstances, it is possible to transfer the employment of an apprentice or industrial trainee from one employer to another.

The term of indenture may be for a period of 3, 3½, 4 or 5 years depending upon the chosen trade and the apprentice's academic achievements. Satisfactory completion of an approved pre-apprenticeship course conducted by the Technical Education Division of the Education Department may entitle an apprentice to a term of indenture of three years.

The following table shows the number of new apprenticeship registrations effected during the twelve months ending 30 June 1985, together with the total number of registered apprentices in training in Western Australia at the end of that period.

APPRENTICESHIP — NEW REGISTRATIONS AND  
NUMBER OF EFFECTIVE REGISTRATIONS TO VARIOUS TRADES

Trade	Registrations effected during year ended 30 June 1985	Effective registrations at 30 June 1985
Building trades —		
Bricklaying	34	88
Carpentry and joinery	154	541
Glazing	12	36
Painting and decorating	63	215
Plumbing and gasfitting	76	249
Signwriting	11	31
Other	39	83
Electrical trades —		
Automotive electrical fitting	30	84
Electrical fitting	210	653
Electrical installing	109	337
Radio and television servicing	27	59
Food trades —		
Baking	39	99
Cooking	205	488
General butchering	96	324
Pastry cooking	21	62
Other	3	10
Metal trades —		
Boilermaking	46	160
Boilermaking and first class welding	92	281
First class machining	14	29
First class welding (boilermaking)	29	66
First class welding (engineering)	32	101
Fitting	158	479
Fitting and first class machining	79	236
Fitting and turning	91	261
Ground engineering (aircraft)	7	26
Instrument fitting	24	111
Jobbing, moulding and coremaking	6	18
Motor mechanics	353	1,056
Plant mechanics (agricultural)	19	55
Plant mechanics (industrial)	71	223
Refrigeration fitting	52	154
Sheetmetal	78	209
Turning and first class machining	—	16
Other	52	164
Printing trades —		
Composing	4	13
Printing machining (all types)	29	81
Other	29	68
Vehicle building trades —		
Bodymaking	27	81
Painting (vehicle building)	56	152
Panel beating	54	165
Trimming	5	24
Other	4	20
Other trades —		
Cabinetmaking	121	279
Horticulture (all types)	47	119
Ladies hairdressing	400	1,042
Male hairdressing	50	116
Upholstering	24	43
Woodmachining	27	63
Other	83	190
TOTAL	3,292	9,370

The Division of Industrial Training, Department of Employment and Training, is responsible for administering the procedures and requirements established under the Industrial Training Act. Minimum wage rates, working hours and matters relating to annual leave and sick leave for apprentices are all detailed in the relevant State or Commonwealth industrial award. Federal awards are of less significance than State awards in apprenticeship matters in Western Australia. Section 52 of the *Conciliation and Arbitration Act, 1904* enables the Australian Conciliation and Arbitration Commission to issue awards covering the rates of pay and conditions of employment of apprentices.

## INDUSTRIAL DISPUTES

Statistics of industrial disputes are compiled by the Australian Statistician from data obtained from the following sources: direct collections from 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.

## INDUSTRIAL DISPUTES (a)

Year	Number of disputes	Number of workers involved		Total	Number of working days lost
		Directly	Indirectly (b)		
1979	252	166.7	2.9	169.6	348.1
1980	368	62.2	7.2	69.4	191.0
1981	364	65.9	7.0	72.9	244.0
1982	436	61.3	2.3	63.6	162.4
1983	300	39.0	3.3	42.3	270.6
1984	406	62.9	6.3	69.2	119.2

(a) Excludes disputes involving cessation of work of less than 10 man-days. (b) Persons thrown out of work at the establishments where the stoppages occurred, but not themselves parties to the dispute.

## INDUSTRIAL DISPUTES (a) — INDUSTRIES: 1984

Industry (b)	Disputes	Workers involved (c)	Working days lost
Mining —			
Coal mining	—	—	—
Other mining	318	35.6	49.9
Manufacturing —			
Food, beverages and tobacco	9	5.3	23.3
Metal products, machinery and equipment	6	1.0	2.2
Other manufacturing	2	0.3	0.3
Construction	23	12.3	27.2
Transport and storage; Communication	35	11.0	11.7
Other industries	13	3.6	4.6
Total	406	69.2	119.2

(a) Excludes disputes involving cessation of work of less than 10 man-days. (b) The statistics in this table are compiled on the basis of the *Australian Standard Industrial Classification*, 1983 edition. (c) Includes workers involved directly and indirectly; those indirectly involved are persons thrown out of work at the establishments where the stoppages occurred, but not themselves parties to the dispute.

In the two previous tables details of industrial disputes in Western Australia during the years 1979 to 1984 are given, together with an analysis, according to industry group, of disputes which were in progress in 1984. The statistics exclude disputes involving stoppages of work of less than ten man-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.

Particulars of 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.

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 of the extent of stoppages of work (as defined).

The table below gives an analysis of disputes which were resolved during 1984, according to cause of stoppages.

## INDUSTRIAL DISPUTES ENDED DURING 1984 (a) — ACCORDING TO CAUSE (b)

Cause of dispute	Transport and Con- struction					Other industries	All industries
	Mining	Manu- facturing	storage; Com- munication				
DISPUTES (NUMBER)							
Wages	14	3	1	3	4	25	
Hours of work	6	4	1	3	1	15	
Managerial policy	126	7	8	15	3	159	
Physical working conditions	81	3	5	5	1	95	
Trade unionism	79	—	6	7	1	93	
Other	12	—	2	2	1	17	
Total	318	17	23	35	11	404	
WORKERS INVOLVED (DIRECTLY OR INDIRECTLY) ('000) (c)							
Wages	2.6	1.7		0.6		5.8	
Hours of work	1.2	0.8		2.0		4.1	
Managerial policy	11.2	1.3		1.7		15.1	
Physical working conditions	5.9	2.5	12.3	2.9	1.3	13.8	
Trade unionism	7.8	—		0.6		11.9	
Other	6.9	0.2		2.9		15.9	
Total	35.6	6.6		10.8		66.7	
WORKING DAYS LOST ('000)							
Wages	2.6	17.7		0.8		22.6	
Hours of work	2.3	0.9		1.1		4.3	
Managerial policy	22.4	3.9		2.7		30.1	
Physical working conditions	11.5	3.1	27.2	4.0	1.8	36.1	
Trade unionism	4.9	—		0.1		8.2	
Other	6.8	0.2		2.6		15.4	
Total	50.5	25.9		11.3		116.7	

(a) Disputes continuing into the next year are excluded. Working days involved and working days lost for the full duration of disputes commencing prior to the current year are included. (b) Excludes disputes involving cessation of work of less than 10 man-days. (c) Includes workers indirectly involved, i.e. persons thrown out of work at the establishments where the stoppages occurred, but not themselves parties to the disputes.

## 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.

State tribunals generally have granted similar wage increases to those of the Australian Conciliation and Arbitration Commission, including wage indexation increases. For details of increases in Federal and State awards and determinations, and for rates of minimum wage for adult males and adult females, see tables in the following pages.

**National Wage Decision**

In the National Wage Case decision handed down on 23 September 1983 the Australian Conciliation and Arbitration Commission decided a new centralised wage fixing system should come into operation from the first pay period on or after 6 October 1983 with an adjustment of 4.3 per cent. This increase was equivalent to the combined Consumer Price Index increases for the March and June quarters 1983. The Commission also formulated a set of eleven principles designed to govern the processing of claims before the Commission over the next two years. Of the eleven principles only two are to be applied in such a way as to become a vehicle for a general improvement in wages or conditions.

In summary, these are firstly that the Commission will sit in February and August following the publication of the Consumer Price Index for the December and June quarters respectively and will adjust award wages and salaries in relation to the last two quarterly movements of the eight capital cities Consumer Price Index unless it is persuaded to the contrary by those seeking to oppose the adjustment. Secondly, upon application and not before 1985, the Commission will consider whether an increase in wages and salaries or changes in conditions of employment should be awarded on account of productivity. Another significant principle is that no adjustment to an award will be made by the Commission unless all the unions concerned in the award have given an undertaking that for the duration of the principles they will not pursue any extra claims, award or over award, except in compliance with the principles. The remaining principles cover such items as work value changes, standard hours, anomalies, inequities, supplementary payments and allowances and conditions. In September 1985, the Commission extended the operation of the principles beyond their expiry date of October 1985 and deferred an application for a 4 per cent increase in wages and salaries or changes in conditions of employment on account of national productivity. In a decision on the third National Wage case under the centralised wage fixation system adopted in September 1983 the Commission, in November 1985, varied awards and appropriate allowances to give effect to the overall increase of 3.8 per cent in the Consumer Price Index. Outstanding applications in connection with a 4 per cent increase in wages and salaries or changes in conditions of employment on account of national productivity and a review of the Principles were referred to a conference of interested parties.

### Award Rates of Pay

The indexes shown in the following tables, which refer to Western Australia, 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 award rates used in compiling the indexes are those prescribed for a full week's work (excluding overtime). These rates generally consist of the base rate and any allowance or loadings that are applicable to all workers under a specific award designation. Based on a representative sample of award designations, the indexes are designed to measure trends in rates payable under awards.

The data shown in the tables are published in a series titled 'Award Rates of Pay Indexes'. The series is based on the occupational structure existing in May 1976. Because the weighting structure and coverage of the indexes differs significantly from that used in the 'Wage Rate Index' series based on the occupational structure existing in 1954, it is inappropriate to make comparisons with data published in previous issues of the Year Book.

More detailed information including explanatory notes, definitions, etc. used in the indexes is contained in the monthly publication *Award Rates of Pay Indexes, Australia* (Catalogue No. 6312.0) issued by the Australian Statistician.

INDEXES OF WEEKLY AWARD RATES OF PAY — ALL INDUSTRIES (a)  
(Base: Weighted average minimum weekly award rate, June 1976 = 100.0)

End of June	Wage and salary earner series		Wage earner series	
	Adult males	Adult females	Adult males	Adult females
1980	137.9	139.4	139.0	140.8
1981	156.1	159.0	157.7	161.5
1982	175.7	178.0	178.4	179.9
1983	185.0	186.5	188.5	189.0
1984	202.4	207.0	205.6	208.4
1985	207.7	213.7	210.8	216.2

(a) The award rates used in compiling the indexes are for a full week's work (excluding overtime), as prescribed in Federal and State awards, determinations and agreements. The indexes are based on awards covering employees in private and government employment except employees in the defence forces, agriculture, forestry, fishing, hunting and private households employing staff.

WAGE EARNERS (ADULT PERSONS) — INDEXES OF WEEKLY AWARD RATES OF PAY  
(Base: Weighted average minimum weekly award rate, June 1976 = 100.0)

Industries	1980	1981	1982	1983	1984	1985
Mining	139.2	167.5	179.7	189.7	198.0	203.0
Manufacturing	148.5	167.6	189.8	199.5	207.7	213.0
Food, beverages and tobacco	144.5	169.6	189.3	201.8	210.3	215.2
Textiles, clothing and footwear	145.6	163.8	*	*	*	*
Paper, paper products, printing and publishing	146.1	159.9	*	*	*	*
Chemical, petroleum and coal products	143.7	159.1	*	*	*	*
Metal products, machinery and equipment	151.2	169.0	191.7	200.3	208.3	212.9
Basic metal products	144.5	157.6	175.0	182.2	189.3	194.9
Fabricated metal products, other machinery and equipment	154.6	173.3	197.3	206.8	215.0	220.4
Transport equipment	151.3	174.4	*	*	*	*
Other (a)	149.8	166.1	189.4	199.1	207.0	214.3
Electricity, gas and water	144.7	168.3	189.4	197.0	204.9	209.9
Construction	144.7	164.8	182.9	191.3	199.0	203.6
Wholesale trade	145.3	165.0	183.1	193.8	203.3	208.5
Retail trade	145.9	162.9	187.0	197.2	207.7	213.5
Transport and storage	147.0	170.5	188.6	198.2	206.6	210.2
Communication	141.9	165.1	192.1	200.3	208.5	215.1
Finance, property and business services	139.3	166.8	*	*	*	*
Public administration and defence (b)	147.7	168.1	188.8	200.7	209.9	216.4
Community services	148.6	168.3	192.6	203.0	212.5	217.9
Recreation, personal and other services	151.3	169.0	191.8	208.2	224.7	229.8
All industries (c)	146.4	167.0	187.4	197.5	206.5	212.0

(a) Includes ASIC Sub-divisions 25, 28 and 34. (b) Excludes employees in the defence forces. (c) Excludes employees in the defence forces, agriculture, services to agriculture and employees in private households employing staff. \* Subject to sampling variability too high for most practical purposes.

### Average Weekly Earnings

Statistics of average weekly earnings are produced quarterly, and since the September quarter 1981 have been based on employment and earnings information obtained from a sample survey of employers. The average weekly earnings statistics 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. If, for a particular survey respondent, that pay period was affected unduly by an industrial dispute, plant breakdown, fire, etc., particulars for the previous normal pay period were obtained. *Employees* are all wage and salary earners except members of the Australian permanent defence forces, employees of establishments engaged primarily in agriculture, employees in private households employing staff, employees on workers compensation or based outside Australia, self-employed persons such as working proprietors of unincorporated businesses, and sub-contractors and owners/drivers. *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. *Ordinary time earnings* refers to that part of total earnings attributable to award, standard or agreed hours of work. *Full-time employees* are those who work the agreed or award hours for a full-time employee in their occupation and who received pay for any part of the pay period. If agreed or award hours do not apply, employees are regarded as full-time if they ordinarily work 35 hours or more a week. *Adults* are all employees 21 years of age or over, and employees under 21 years of age who are paid at the full adult rate for that occupation.

Statistics of average weekly earnings are published in the quarterly publication *Average Weekly Earnings, Australia* (Catalogue No. 6302.0). The current series replaces the average weekly earnings series based principally on information from payroll tax returns which was discontinued after the September quarter 1981. Background information on the reasons for the change from the payroll tax data to a direct collection is given in *Information Paper: Review of ABS Employment Statistics* (Catalogue No. 6239.0) published on 8 July 1981.

AVERAGE WEEKLY EARNINGS OF EMPLOYEES  
(Dollars)

Reference period	Reference date	Males			Females			Persons		
		Full-time adults		All males	Full-time adults		All females	Full-time adults		All employees
		Weekly ordinary time earnings	Weekly total earnings	Weekly total earnings	Weekly ordinary time earnings	Weekly total earnings	Weekly total earnings	Weekly ordinary time earnings	Weekly total earnings	Weekly total earnings
1984 —										
November	16 November	396.90	429.00	392.00	322.90	329.70	229.40	375.40	400.10	322.60
1985 —										
February	15 February	400.80	436.20	398.80	330.30	338.00	235.90	380.60	408.00	330.50
May	17 May	410.50	445.90	401.40	339.20	346.60	234.20	389.50	416.60	329.00
August	16 August	413.50	450.70	414.30	342.40	347.90	241.20	393.40	421.50	341.90

Figures corresponding to those shown in the above table are published by the Australian Statistician in the bulletins *Average Weekly Earnings* (Catalogue No. 6302.0) and the *Monthly Summary of Statistics, Australia* (Catalogue No. 1304.0).

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 occupations and/or States. The following table shows the weighted average standard hours of work (excluding overtime) prescribed in awards, determinations and collective agreements for a full working week in respect of adult persons in all industries (excluding employees in the defence forces, agriculture, services to agriculture and employees in private households employing staff).

WEIGHTED AVERAGE STANDARD HOURS OF WORK  
DECEMBER 1984 (a)

State or Territory	Weighted average standard hours	
	Adult males	Adult females
New South Wales	38.45	38.82
Victoria	38.54	38.62
Queensland	38.94	38.78
South Australia	38.76	39.07
<b>Western Australia</b>	<b>38.71</b>	<b>38.89</b>
Tasmania	38.65	38.63
Northern Territory	38.41	38.29
Australian Capital Territory	37.66	37.51
Australia	38.58	38.74

(a) Wage and salary earners.

**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 in respect of 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. An employee who has completed at least ten years' service but less than fifteen years is entitled to *pro rata* leave, on the basis of thirteen weeks for fifteen years, if his employment is terminated by the employer for any reason other than serious misconduct; or by the employee on account of sickness, injury, or domestic or other pressing necessity. An employee forfeits his right to long service leave if he engages in alternative employment for reward during the period of leave. In the case of termination by death of an employee payment in lieu of leave may be made to his personal representative.

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

Compensation for certain workers in Western Australia who suffered injuries in the course of employment was originally provided under the provisions of the *Workers' Compensation Act 1902*. In 1912, the scope of the Act was broadened to include almost all workers. On May 3 1982, the *Workers' Compensation Act 1912-81* was repealed and replaced by the *Workers' Compensation and Assistance Act 1981*. Details of the earlier Act are contained in the 1982 and earlier editions of the Western Australian Year Book.

The *Workers' Compensation and Assistance Act 1981* 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 *Compensation (Commonwealth Government Employees) Act 1971*.

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 current Act continues the existence of the Workers' Compensation Board but restricts the Board to judicial functions. The Board consists of three members including a Chairman, appointed by the Governor on the recommendation of the Minister. The Chairman, who has the status of a Judge, must be a legal practitioner of not less than eight years practice and standing. Of the two remaining members one must be a person experienced in management affairs in commerce or industry or both and the other must be a person experienced in trade union affairs. The Minister may request The Confederation of Western Australian Industry (Incorporated) and the Trades and Labor Council of Western Australia to submit the names of persons, each of whom is qualified and willing to act as a nominee member of the Board prior to making a recommendation to the Governor.

The Board 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 Workers' Assistance Commission established by the current Act is responsible for a range of administrative functions, including those formerly carried out by the Board. The Commission consists of seven members including a Chairman. The Chairman is a nominee member appointed by the Governor on the recommendation of the Minister and must be a public servant who, in the opinion of the Minister, has had administrative experience at a senior level. The Manager of the

Commission serves as a Commission member and five other nominee members are appointed by the Governor on the recommendation of the Minister. Of these five nominee members one must be experienced in management affairs, in commerce or industry or both; one must be experienced in trade union affairs; one must be experienced in insurance business but not employed by the State Government Insurance Office; one must be employed in the State Government Insurance Office; and one must be a medical practitioner employed in the Health Department of Western Australia. Before recommending appointments to the Commission the Minister may request The Confederation of Western Australian Industry (Incorporated); the Trades and Labor Council of Western Australia; the Western Australian Regional Advisory Board of the Insurance Council of Australia Limited; the Permanent Head of the State Government Insurance Office; and the Permanent Head of the Health Department of Western Australia to submit the names of persons qualified and willing to act as Commission members.

The functions of the Commission include: participation in research into the causes, incidence and methods of prevention of accidents, injuries and diseases in respect of which compensation may be payable; encouragement of the prevention or minimisation of accidents, injuries and diseases; co-ordination 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; making recommendations to the Minister on applications by insurers and employers to function as approved insurers or self-insurers under the Act; and obtaining from all insurers and self-insurers such information as it considers desirable for the better administration of the Act.

An important aspect of the Act is the emphasis on rehabilitation. Insurers and self-insurers are required to supply the Commission with prescribed particulars with respect to any worker whose period of incapacity exceeds twelve weeks. The Commission may make further inquiries regarding the worker's disability and may require the worker to attend a medical specialist or other professional person or groups for assessment of the means and prospects of rehabilitation. The Commission may require the worker to undertake treatment by way of rehabilitation or a programme of occupational or vocational training. It may co-ordinate such a programme and authorise, in respect of the worker, expenditure not exceeding \$2,000 on occupational and vocational training (or expenditure in excess of \$2,000 in any case it considers appropriate to do so). The Commission may make arrangements with other persons or authorities for the co-ordination and use of facilities for training or treatment of workers.

The amounts of 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. As at 1 July 1985, the prescribed amount was \$72,250.

Where total incapacity for work results from the disability, the weekly payment during the incapacity is equal to the weekly earnings as defined by the Act. Where the work normally performed is subject to an industrial award or agreement, weekly earnings are taken as the total wages, salary or other remuneration (excluding overtime, bonuses and allowances but including over award and service payments) payable at the time of the incapacity for a week's work under that award. Where the work is not subject to an industrial award, or where it is subject to a system of payment by results, weekly earnings are determined by reference to an award or agreement which can be fairly applied to that type of work. In the case of partial incapacity, the weekly payment is the amount by which the weekly earnings so computed exceed the amount the worker is earning, or able to earn in some suitable employment, after the occurrence of the disability.

The total liability of the employer in respect of the aggregation of weekly and lump sum payments is limited to \$72,250 except where the Board determines that a disability to a worker has resulted in his permanent total or permanent partial incapacity for work.

Additional amounts are payable up to a maximum of 20 per cent of the prescribed amount,

i.e. \$14,450 (or more, if the Board finds that in particular circumstances this sum is inadequate) for expenses incurred in respect of first aid and ambulance services, medicines, medical or surgical attendance, hospital treatment and the like. In the event of the death of the worker funeral expenses are compensable up to an amount of \$1,100.

The Act provides for compensation in the form of a lump sum payment up to a maximum of \$72,250 in respect of specified injuries resulting in such disabilities as loss of sight, hearing or mental powers or loss of a limb or limbs. Where lump sum payments are made, all entitlement to weekly payment ceases.

Where death results from the disability and the worker leaves any adult dependants who are wholly dependent on the worker's earnings, a sum equal to 85 per cent of his residual entitlement is payable. However, payments to a wholly dependent 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 dependent 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 the following table have been compiled from a collection introduced from 1981-82 and designed to enable industrial accident statistics to be compiled on a comparable basis for each State and Australia. Prior to 1981-82 statistics of industrial accidents were derived from details of claims for workers' compensation reported to have been closed during the year ended 30 June. From 1981-82 onwards, the statistics represent all industrial accidents involving time lost from work of one day or more occurring during the year ended 30 June. 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 data are not comparable with those published in previous issues of the *Western Australian Year Book*.

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 in the course of the worker's normal duties and therefore do not include 'journey' cases, (i.e. death of, or injury to, an employee while travelling between his place of residence and place of employment) or 'recess' cases (i.e. cases which occur during work breaks). During the year ended 30 June 1983, 1,667 claims occurred in respect of 'journey' cases; and 84 claims in respect of 'recess' cases; (iv) industrial disease cases are not included.

The exclusion of self-employed persons is likely to have considerable effect in industries where self-employment is significant (e.g. retail trade, rural industries). Because of the exclusion of Commonwealth Government employees some industries are not covered (e.g. defence forces and Communication).

Reports relating to accident claims are forwarded to the Australian Bureau of Statistics by the Workers' Assistance Commission which obtains the information from insurers and self-insurers under authority of the *Workers' Compensation and Assistance Act 1981*. The accuracy of collection coverage (i.e. whether reports of all accidents involving time lost from work of one day or more are actually submitted to the Workers' Assistance Commission) is very difficult to control because of the diverse administrative systems maintained by the insurers. The data should be used with the knowledge that coverage between years may not be consistent and this may affect the validity of statistical trends which become apparent.

In 1981-82 industrial accident statistics were first collected on the basis of 'year of occurrence'. This change from the previous basis of 'year of closure' involved the acceptance of estimated time lost and cost data for claims not closed prior to the cut-off date nominated for the year. At the cut-off date for 1981-82 data almost 20 per cent of claims included were not closed, and details of time lost and cost for all claims were not released because of the high content of estimated data. Since the publication of 1981-82 data in the *Western Australian Year Book*, No. 22 — 1984 it has been established that the estimates supplied by insurers provide, for statistical purposes, acceptable approximations of actual time lost and cost. Future published tables will therefore include details of time lost and cost which are derived by adding actual data for closed claims and estimated data for unclosed claims.

Statistics in greater detail as well as analyses according to additional characteristics, are available in the publication *Industrial Accidents* (Catalogue No. 6301.5) which is issued annually by the Western Australian Office of the Australian Bureau of Statistics.

The following table give details of industrial accidents for 1982-83 according to broad industry groups.

TOTAL ACCIDENTS — INDUSTRY DIVISION, TIME LOST AND COST OF CLAIMS: 1982-83

Industry division or sub-division	Accidents		Time lost (weeks)		Total cost of claims (\$'000)	Average cost per claim (\$)
	Number	Per cent of total	Total	Average per accident		
Agriculture, forestry, fishing and hunting	1,415	4.5	6,029.2	4.3	3,878	2,740.6
Mining	3,311	10.6	13,148.0	4.0	11,027	3,330.3
Total	4,726	15.1	19,177.2	4.1	14,904	3,153.6
Manufacturing —						
Food, beverages and tobacco	2,059	6.6	5,653.6	2.7	3,412	1,657.3
Wood, wood products and furniture	763	2.4	2,627.0	3.4	1,718	2,251.8
Glass, clay and other non-metallic mineral products	733	2.3	2,593.8	3.5	1,693	2,310.0
Basic metal products	537	1.7	1,609.2	3.0	1,172	2,181.9
Fabricated metal products	2,186	7.0	6,596.0	3.0	4,477	2,048.0
Other manufacturing	2,909	9.3	8,901.6	3.1	5,600	1,925.1
Total	9,187	29.3	27,981.2	3.0	18,073	1,967.2
Electricity, gas and water	801	2.6	3,662.6	4.6	3,236	4,039.9
Construction	3,579	11.4	14,445.8	4.0	10,165	2,840.2
Wholesale and retail trade	4,149	13.2	11,911.6	2.9	6,628	1,597.4
Transport and storage	2,058	6.6	8,067.8	3.9	5,520	2,682.2
Finance, property and business services	626	2.0	2,432.8	3.9	1,411	2,253.6
Public administration and defence	1,391	4.4	6,211.8	4.5	4,673	3,359.6
Community services	3,679	11.7	17,050.2	4.6	12,269	3,334.8
Recreation, personal and other services	1,178	3.8	4,772.0	4.1	2,505	2,126.5
Other industries	3	—	8.2	2.7	3	1,107.7
Total	17,464	55.7	68,562.8	3.9	46,410	2,657.5
GRAND TOTAL	31,377	100.0	115,721.2	3.7	79,387	2,530.1

## Chapter 23

### PRICES

#### RETAIL PRICES AND PRICE INDEXES

Prices of a limited range of commodities are recorded in the Blue Books of Western Australia from the early years of settlement. 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. These statistics were used to compile the 'A' Series Index, which covered food, groceries and house rents and was first compiled in 1912 with the year 1911 as base = 1,000. Four other indexes covering a wider range of commodities and services were compiled by the Australian Statistician at different times before the current Consumer Price Index was introduced in 1960 (retrospective to the September quarter of 1948).

Retail price indexes aim to measure the changes which occur in the general level of prices in a selected field. The basic principle of a price index is to select commodities and services representative of the field to be covered, and to combine their prices at regular intervals by the use of 'weights' which represent the relative importance of the several commodities and services in the selected field taken as a whole.

The items and standards priced are revised from time to time to keep them in harmony with changing conditions. Before each quarterly collection the standards of all items are reviewed after extensive inquiries among manufacturers, wholesalers and retailers. Where changes in the items or standards priced become necessary, suitable adjustments are made in compiling price series to ensure that they reflect only changes in prices for representative goods of constant quality and not differences in prices of differing standards.

Information concerning retail price indexes and their development in Australia is given in *Year Book Australia* (Catalogue No. 1301.0) and the *Labour Report*, No. 58 — 1973 (Ref. No. 6.7) published by the Australian Statistician, Canberra.

**The Consumer Price Index.** The Consumer Price Index measures quarterly changes in the price of a 'basket' of goods and services which account for a high proportion of expenditure by metropolitan wage-and-salary-earner households. The 'basket' covers a wide range of goods and services, arranged in the following groups: Food; Clothing; Housing; Household equipment and operation; Transportation; Tobacco and alcohol; Health and personal care; and Recreation and education. Each group is in turn divided into sub-groups and expenditure classes (i.e. groupings of like items). There are 105 expenditure classes, each with its own weight or measure of relative importance. In calculating the Index, price changes for the various expenditure classes are combined using those weights. Changes in the weighting pattern have been made at approximately five-yearly intervals to account for changes in spending patterns.

The Consumer Price Index is designed to measure price changes affecting a high proportion of metropolitan wage-and-salary-earner households (i.e. households located in the State capital cities, Canberra or Darwin) which derive at least three quarters of their total income from wages and salaries. The population group for the Consumer Price Index does, however, exclude the top 10 per cent (in terms of income) of such households.

The Index actually comprises ten series of price indexes linked to form a continuous series. The tenth series (i.e. the current series) was introduced as from the June quarter 1982 and incorporates the results of a comprehensive review carried out over a period of two years. The changes introduced in the current series are described in detail in the Information Paper: *Review of the Consumer Price Index* (Catalogue No. 6450.0) published by the Australian Statistician, Canberra. A summary of the main changes are as follows:

- (a) expansion of the geographic coverage of the Consumer Price Index to include a full city index for Darwin;
- (b) a change in the reference base from 1966-67 = 100 to 1980-81 = 100;
- (c) revision of the weighting pattern of the index to reflect, in general, estimated household expenditure in 1979-80;
- (d) inclusion in the regimen of the index of the following areas of expenditure —
  - (i) holiday travel and accommodation overseas,
  - (ii) education fees,
  - (iii) child care fees, and
  - (iv) pharmaceutical prescriptions;
- (e) a change in the timing and frequency of selected price collections.

Since the Consumer Price Index is designed to measure the impact of changing prices on metropolitan wage-and-salary-earner households, price movements are monitored in the kinds of retail outlets or other establishments where such households would normally purchase goods and services. This involves collecting prices from many sources including supermarkets, department stores, footwear stores, restaurants, garages, dental surgeries and hairdressers. Items such as bus, rail and air fares, electricity and gas charges, telephone charges, and local government rates are collected from the appropriate authorities and information on rents is obtained from property management companies. Approximately 85,000 separate price quotations are collected each quarter.

Prices for the majority of items are obtained in respect of one point of time in the quarter with a concentration in the middle month. For those items which are highly weighted and/or subject to short term fluctuations, for example fresh fruit and vegetables, fresh meat, fresh fish, and bread, prices continue to be collected monthly or more frequently. The items seasonal clothing, local government rates and charges, and lawn mowers are priced only once a year.

The Consumer Price Index is compiled for each of the six State capital cities, Canberra and Darwin. The separate city indexes measure price movements within each city individually. They enable comparisons to be drawn between cities as to differences in the degree of price movement, but not as to differences in the price level.

#### CONSUMER PRICE INDEX (a)

Group and selected sub-group	Index number				
	1980-81	1981-82	1982-83	1983-84	1984-85
PERTH					
Food —	100.0	110.2	119.8	128.9	136.2
Dairy produce	100.0	112.8	125.2	129.4	132.1
Cereal products	100.0	112.2	124.0	132.9	143.0
Meat and seafoods	100.0	106.1	112.9	119.2	123.8
Fresh fruit and vegetables	100.0	114.3	120.6	141.9	148.6
Processed fruit and vegetables	100.0	108.0	118.4	127.7	136.8
Soft drinks, ice cream and confectionery	100.0	113.2	127.2	136.6	146.0
Meals out, take-away food	100.0	111.8	122.4	132.6	140.2
Other food	100.0	105.8	115.6	124.0	136.2
Clothing	100.0	107.2	114.0	120.9	128.8
Housing	100.0	109.0	118.6	124.1	131.6
Household equipment and operation	100.0	109.5	120.4	129.1	134.7
Transportation	100.0	111.9	123.5	133.9	142.8
Tobacco and alcohol	100.0	109.1	122.9	141.0	153.2
Health and personal care	100.0	130.9	159.8	156.9	125.7
Recreation and education (b)	n.a.	n.a.	105.8	111.8	115.1
All groups	100.0	111.2	122.5	131.0	136.1

## CONSUMER PRICE INDEX (a) — continued

Group and selected sub-group	Index number				
	1980-81	1981-82	1982-83	1983-84	1984-85
EIGHT CAPITAL CITIES COMBINED (c)					
Food —	100.0	108.6	118.5	127.7	134.4
Dairy produce	100.0	113.9	127.3	133.5	135.8
Cereal products	100.0	112.4	125.4	136.8	146.3
Meat and seafoods	100.0	102.5	109.2	114.5	119.6
Fresh fruit and vegetables	100.0	109.6	113.2	130.2	128.2
Processed fruit and vegetables	100.0	111.0	123.8	132.7	140.4
Soft drinks, ice cream and confectionery	100.0	114.3	128.8	139.4	148.2
Meals out, take-away food	100.0	110.1	121.4	131.8	141.2
Other food	100.0	105.7	115.5	124.8	134.8
Clothing	100.0	107.1	114.2	120.9	128.4
Housing	100.0	111.0	122.8	131.5	141.4
Household equipment and operation	100.0	110.6	123.8	132.6	138.9
Transportation	100.0	110.3	124.2	134.8	143.4
Tobacco and alcohol	100.0	109.2	124.1	139.6	151.2
Health and personal care	100.0	124.2	153.2	146.5	121.8
Recreation and education (b)	n.a.	n.a.	107.7	114.5	118.9
All groups	100.0	110.4	123.1	131.6	137.2

(a) Unless otherwise indicated, base of each Index is Year 1980-81 = 100. (b) Base: March quarter 1982 = 100.

(c) Weighted average.

In tables dealing with the Consumer Price Index, the figures appearing after the decimal point have little significance for general statistical purposes. They are inserted to avoid distortions that would occur in rounding off the figures to the nearest whole number.

Additional information on movements in the Consumer Price Index is given in the quarterly publication *Consumer Price Index* (Catalogue No. 6401.0), issued by the Australian Statistician, Canberra.

**Retail Prices.** The average retail prices of selected items of food and groceries in Perth are shown in the following table. The quantity units shown are those that were applicable in December quarter 1984. The prices shown in some cases relate to a period of less than one year.

AVERAGE RETAIL PRICES OF SELECTED ITEMS — PERTH  
(Cents)

Commodity	Unit	1980	1981	1982	1983	1984
Food —						
Milk, bottled, delivered	2 x 600 ml	58.0	67.2	74.8	78.2	80.8
Milk, powdered, full cream	1 kg can	n.a.	321.5	361.2	418.5	423.2
Cheese, processed, sliced, wrapped	500 g	n.a.	n.a.	n.a.	210.7	204.8
Butter	500 g	101.8	120.8	138.5	148.0	146.8
Bread, white loaf, sliced, supermarket sales	680 g	65.2	n.a.	n.a.	n.a.	94.7
Biscuits, dry	250 g	54.0	57.2	65.2	71.8	77.2
Breakfast cereal, corn based	500 g	93.5	104.2	116.5	129.8	142.8
Flour, self-raising	2 kg	n.a.	n.a.	n.a.	132.0	141.5
Rice, medium grain	1 kg	n.a.	n.a.	n.a.	77.0	77.0
Beef — Rib (without bone)	1 kg	382.8	408.0	405.0	461.5	478.0
Rump steak	1 kg	617.8	619.0	632.2	732.8	771.8
T-bone, with fillet	1 kg	547.8	555.0	557.2	662.2	682.5
Chuck steak	1 kg	378.0	382.0	388.8	463.2	460.2
Silverside, corned	1 kg	420.5	430.0	427.8	484.5	486.2
Sausages	1 kg	201.8	222.8	229.8	246.8	249.8
Lamb — Leg	1 kg	388.0	423.0	422.8	445.2	437.0
Loin chops	1 kg	400.0	435.0	437.8	454.5	464.5
Forequarter chops	1 kg	367.5	406.0	392.0	407.5	396.5
Pork — Leg	1 kg	379.8	419.5	495.2	499.0	504.0
Loin chops	1 kg	381.5	427.2	496.8	504.2	518.2
Chicken, frozen	1 kg	199.2	234.0	254.2	260.5	249.5
Bacon, middle rashers	250 g pkt	141.5	151.5	174.0	185.5	172.5
Beef, corned	340 g can	158.0	162.8	158.8	171.2	173.8
Salmon, pink	220 g can	120.5	123.2	127.2	131.8	131.0
Oranges	1 kg	68.2	82.8	107.8	123.5	143.2
Bananas	1 kg	106.0	119.8	119.0	134.2	151.0
Potatoes	1 kg	48.2	54.0	56.8	64.2	65.8
Tomatoes	1 kg	186.5	181.8	162.8	232.8	225.0
Carrots	1 kg	53.2	58.0	61.5	70.8	64.0
Onions	1 kg	53.0	117.2	64.8	78.8	100.2
Peaches	825 g can	73.8	82.0	89.0	103.2	107.2

AVERAGE RETAIL PRICES OF SELECTED ITEMS — PERTH — *continued*  
(Cents)

Commodity	Unit	1980	1981	1982	1983	1984
<i>Food — continued</i>						
Pineapple, sliced	450 g can	n.a.	58.0	59.5	63.2	65.8
Peas, frozen	500 g pkt	61.5	69.8	81.2	84.5	81.5
Chocolate, milk, block	200 g	99.0	101.5	112.8	126.8	134.2
Eggs, 55 g	1 dozen	127.0	143.8	147.2	152.5	155.8
Sugar, white	2 kg	88.8	93.0	102.0	113.8	123.5
Jam, strawberry	500 g jar	99.5	99.8	110.0	112.2	114.2
Tea	250 g	73.8	72.5	76.2	101.5	130.0
Coffee, instant	150 g jar	283.5	274.5	279.8	308.0	327.0
Tomato sauce	600 ml	n.a.	77.5	86.5	99.8	108.5
Margarine, table, poly-unsaturated	500 g	91.2	95.0	97.8	112.2	122.0
Baked beans (in tomato sauce)	440 g	43.0	45.0	54.2	52.0	52.0
Baby food	125 g can	22.8	26.2	30.5	30.5	28.2
<i>Household supplies —</i>						
Laundry detergent	1 kg	178.8	200.8	227.0	262.2	275.5
Dishwashing detergent	1 litre	n.a.	n.a.	n.a.	n.a.	221.5
Facial tissues	pkt of 224	n.a.	102.3	115.5	140.8	150.2
Toilet Paper	6 x 500 sheet rolls	n.a.	n.a.	n.a.	n.a.	239.2
Pet food	415 g	40.8	n.a.	n.a.	n.a.	62.0
<i>Motor vehicle operation —</i>						
Petrol, super grade	1 litre	31.8	37.1	39.9	44.1	46.5
<i>Alcoholic beverages —</i>						
Beer — Full strength, chilled	750 ml bottle	n.a.	103.8	114.2	126.0	137.2
Full strength, unchilled	12 x 750 ml bottles	n.a.	1,048.5	1,138.8	1,251.8	1,345.2
Draught beer, full strength, public bar	285 ml glass	66.0	72.2	81.2	88.8	97.8
Scotch, nip, public bar	30 ml	108.5	117.2	125.5	135.5	146.0
<i>Personal care products —</i>						
Toilet soap	2 x 125 g	74.2	76.0	74.2	88.8	95.2
Toothpaste	140 g	n.a.	n.a.	n.a.	n.a.	137.2

If a detailed analysis of price movements is to be undertaken reference should be made to the appropriate copies of the publication *Average Retail Prices of Selected Items* (Catalogue No. 6403.0).

#### WHOLESALE PRICE INDEXES OF MATERIALS USED IN BUILDING

Two building material indexes are compiled and published by the Australian Statistician. They are the Price Index of Materials used in House Building and the Price Index of Materials used in Building other than House Building. Figures for both indexes are available from July 1966 on a monthly basis and for each financial year from 1966-67, and they were first published in November 1970 and April 1969 respectively. Index numbers are produced for each State capital city, for the six State capital cities combined and from July 1981, a monthly Price Index of Materials used in Building other than House Building has been produced for Darwin. The reference base for the Price Index of Materials used in House Building is the year 1966-67 = 100.0. The Price Index of Materials used in Building other than House Building with a reference base 1966-67 = 100.0 was discontinued in January 1981 and replaced by a revised Price Index of Materials used in Building other than House Building on a reference base 1979-80 = 100.0 in February 1981. The Price Index of Materials used in Building other than House Building for Darwin has a reference base 1981-82 = 100.0. They are fixed-weights indexes calculated by the method known as 'the weighted arithmetic mean of price relatives'.

Prices used in the indexes relate to specified standards, and are obtained in all State capital cities and Darwin from representative suppliers of materials used in building. In the main they are collected as at the mid-point of the month to which the index refers.

The separate city indexes measure price movements in each State capital city and Darwin individually. They enable comparisons to be drawn between capitals as to the difference in the degree of price movement from period to period but not as to differences in price level. Figures are published to one decimal place to avoid distortions that would occur in rounding off the index numbers to the nearest whole number.

Information additional to that shown in the following sections, as well as detailed group index numbers for each State capital city, is given in the monthly publications *Price Index of Materials used in House Building* (Catalogue No. 6408.0) and *Price Index of Materials used in Building other than House Building* (Catalogue No. 6407.0) issued by the Australian Statistician, Canberra.

**House Building.** The Wholesale Price Index of Materials used in House Building measures changes in prices of selected materials used in the construction of houses. Its composition is in accordance with the usage of materials in actual houses which were selected as representative for the purpose. The index does not purport to represent buildings of any kind other than houses. The house building construction types included are those which use brick, brick veneer, timber, or asbestos-cement sheeting as the principal material for the outer walls. In all cases the selection of materials was based on local usage. The index includes some fifty items which are combined in eleven groups in addition to the 'All groups' index. Some items carry the weight of similar items not directly priced. They are described in terms of fixed specifications with the aim of recording price changes for representative materials of constant quality. The items and weights were derived from reported values of each material used in selected representative houses constructed in or about the year 1968-69 in each State capital city. The selection took account, within the four major construction types, of a range of characteristics of these houses, e.g. internal partitions, windows, roofing, etc., as well as whether such things as paths and fences were included in the job.

**WHOLESALE PRICE INDEX OF MATERIALS USED IN HOUSE BUILDING**  
(Base of each Index: Year 1966-67 = 100.0)

Group	Value weight (per cent)	Index number					
		1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
<b>PERTH</b>							
Concrete mix, cement and sand	7.94	250.9	283.0	312.0	363.3	377.2	390.9
Cement products	8.14	324.1	358.1	404.0	459.9	483.9	493.3
Clay bricks, tiles, etc.	16.44	324.8	361.5	404.3	433.1	468.3	498.3
Timber, board and joinery	29.60	311.9	355.1	393.8	426.0	455.9	492.7
Steel products	6.07	334.9	374.3	418.3	456.5	485.1	501.5
Other metal products	7.69	273.9	308.0	326.9	352.7	368.7	399.0
Plumbing fixtures, etc.	4.59	301.7	346.6	377.1	405.2	442.9	477.2
Electrical installation materials	1.76	277.2	311.9	345.5	396.5	438.5	471.0
Installed appliances	4.12	198.8	216.0	228.5	247.4	253.7	257.8
Plaster and plaster products	4.01	210.0	247.1	272.3	312.6	333.2	364.9
Miscellaneous materials	9.64	318.4	360.8	395.1	424.2	448.6	473.1
All groups	100.00	299.4	337.6	373.0	407.6	434.2	461.1
<b>SIX STATE CAPITAL CITIES COMBINED (a)</b>							
Concrete mix, cement and sand	5.73	292.8	334.1	373.8	430.9	451.3	475.7
Cement products	8.10	336.3	383.1	438.4	497.2	533.9	563.3
Clay bricks, tiles, etc.	12.85	294.8	334.9	373.9	416.1	446.7	480.8
Timber, board and joinery	36.16	331.5	377.8	406.8	434.2	473.3	526.4
Steel products	5.86	341.0	389.4	434.9	484.2	517.2	536.8
Other metal products	7.20	281.7	314.7	343.1	372.3	405.6	429.4
Plumbing fixtures, etc.	3.74	278.1	319.3	351.5	373.2	406.4	429.6
Electrical installation materials	1.63	282.1	316.0	345.9	395.6	439.9	488.4
Installed appliances	5.13	217.6	240.6	263.9	282.7	291.3	301.4
Plaster and plaster products	5.64	222.8	244.6	273.1	317.8	332.5	344.0
Miscellaneous materials	7.96	278.2	319.6	348.2	377.4	406.1	434.3
All groups	100.00	302.9	344.0	377.7	413.5	445.6	480.9

(a) Weighted average.

**Building other than House Building.** The Wholesale Price Index of Materials used in Building other than House Building measures changes in prices of selected materials used in the construction of buildings other than houses. Its composition is in accordance with the materials usage in actual building projects which were selected as representative for the purpose. The building 'use-types' (e.g. office building, factory, etc.) directly represented are flats; offices; factories; health buildings (i.e. hospitals, nurses' quarters, clinics, etc.); education buildings (i.e. schools, universities, kindergartens, etc.); and commercial premises including hotels, hostels, etc., shops, and other business premises. The index includes sixty-eight items combined into ten 'industry of origin' groups in addition to selected commodities, groups of commodities and an 'All groups' index. The following table shows indexes for selected major building materials and special combinations of building materials.

WHOLESALE PRICE INDEX OF MATERIALS USED IN BUILDING  
OTHER THAN HOUSE BUILDING  
(Base of each Index: Year 1979-80 = 100.0)

Particulars	Index number					
	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
PERTH						
Selected major building materials —						
Structural timber	100.0	116.9	128.5	141.4	154.6	171.7
Clay bricks	100.0	110.3	121.4	130.0	138.4	146.7
Ready mixed concrete	100.0	105.7	115.6	138.4	144.4	148.0
Structural steel	100.0	116.1	131.2	145.6	149.5	161.2
Aluminium windows	100.0	110.0	118.9	132.2	137.9	146.7
Builders' hardware	100.0	113.4	125.1	140.7	150.3	162.3
Special combinations of building materials —						
All electrical materials	100.0	110.8	123.3	139.5	149.2	159.7
All mechanical services components	100.0	111.6	123.9	138.5	145.8	154.9
All plumbing materials	100.0	110.3	120.4	133.7	142.9	152.0
All groups	100.0	112.2	123.8	138.4	145.4	153.2
SIX STATE CAPITAL CITIES COMBINED (a)						
Selected major building materials —						
Structural timber	100.0	113.5	123.3	133.8	144.9	160.6
Clay bricks	100.0	114.2	127.4	142.6	151.6	162.9
Ready mixed concrete	100.0	113.2	123.7	143.3	149.6	158.6
Structural steel	100.0	114.5	128.1	138.8	141.4	147.6
Aluminium windows	100.0	112.5	126.3	136.2	144.2	152.7
Builders' hardware	100.0	113.6	127.6	143.9	154.8	163.8
Special combinations of building materials —						
All electrical materials	100.0	109.7	121.9	137.4	146.4	155.3
All mechanical services components	100.0	111.0	123.5	138.3	146.5	156.2
All plumbing materials	100.0	110.7	122.1	136.0	146.3	152.8
All groups	100.0	112.9	125.4	139.6	147.3	155.6

(a) Weighted average.

Although the selected materials (or many of them) are also used in house building, in building repair, maintenance and alteration work, and in 'engineering construction' work (e.g. projects such as roads, dams, bridges and the like), the weighting pattern of the index, being designed for the specific purpose mentioned earlier, is not applicable to these other activities of the construction industry. In addition, since the weights are based on an average materials usage over the stated range of building use-types, the index is not necessarily applicable to any specific building or any of the separate use-types.

The items in the current index were selected and allocated weights in accordance with the estimated average values of materials used in the construction of buildings (other than houses) commenced in the six State capital cities in the three years ended June 1977. The estimated values were derived from data reported from a sample of actual building projects selected from ABS building commencements statistics. The same weighting pattern is used for all State capital cities and is applied to local price measures for calculating index numbers for each State capital city. The index for the six State capital cities combined is a weighted average of individual city indexes.

#### OTHER PRICE INDEXES

In addition to the price indexes already described, the Australian Statistician compiles indexes relating to prices of selected export commodities, selected import commodities, metallic materials, materials used in manufacturing industry and articles produced by manufacturing industry. Data are published in monthly releases *Export Price Indexes* (Catalogue No. 6405.0), *Price Indexes of Metallic Materials* (Catalogue No. 6410.0), *Price Index of Materials used in Manufacturing Industry* (Catalogue No. 6411.0) and *Price Indexes of Articles Produced by Manufacturing Industry* (Catalogue No. 6412.0), and the quarterly release *Import Price Index* (Catalogue No. 6414.0). Further reference to these indexes will be found in *Year Book Australia* (Catalogue No. 1301.0), published by the Australian Statistician, Canberra.

## Chapter 24

### PUBLIC FINANCE

#### COMMONWEALTH-STATE FINANCIAL RELATIONS

**Financial Agreement 1927.** Under the terms of the Financial Agreement, the Commonwealth Government took over from the States their public debts existing at 30 June 1927 and assumed responsibility for all future loan raisings by the Commonwealth and State Governments. The Commonwealth Government also agreed to contribute annually for a period of fifty-eight years from 1 July 1927 an amount of \$15,169,824 towards the interest payable on the States' debts, Western Australia's share of this amount being \$946,864.

Sinking Funds established by the Financial Agreement between the Commonwealth Government and the States were designed to redeem the States' debts as follows: (a) debt existing at 30 June 1927, in a period of fifty-eight years thereafter; (b) debt incurred after 30 June 1927 (except debt for the purpose of redemptions or conversions or the financing of revenue deficits), in a period of fifty-three years from the date of creation of the debt; (c) debt incurred to finance revenue deficits for the years 1929-30 to 1934-35, in a period of thirty-nine years from 30 June 1944; and (d) debt incurred to finance other revenue deficits, in a period of approximately seventeen years from the date of its creation.

These Sinking Funds are under the control of the National Debt Commission. Receipts of the Funds consist mainly of contributions from the Consolidated Revenue Funds of the Commonwealth and State Governments. The Commonwealth Government and the States make annual contributions towards the redemption of debt existing at 30 June 1927 and subsequent debt created over the period 1 July 1927 to 30 June 1975.

Contributions made by the Commonwealth Government and the States in respect of the States' debts are not accumulated but must be applied by the National Debt Commission, whenever expedient, to the redemption and repurchase of loan securities. Under the provisions of the Financial Agreement, repurchased or redeemed securities must be cancelled, and the debts of the States are reduced accordingly.

**Financial Agreement 1976.** The *Financial Agreement Act 1976* amended the Financial Agreement of 1927 by establishing a new scale of sinking fund contributions in respect of State debt. Under provisions of the Act, Western Australia provided an amount of \$13.0 million and the Commonwealth an amount of \$45.5 million in respect of the year 1983-84. The Act, which applied retrospectively to 30 June 1975 also provided for the transfer of \$1,000 million of State debts to the Commonwealth with effect from 30 June 1975. The amount of debt transferred under this amendment in respect of Western Australia was \$96.1 million.

**Australian Loan Council.** The Australian Loan Council was established by the Financial Agreement Act of 1928 to co-ordinate the public borrowings of the Commonwealth and State Governments. The Council has as its Chairman the Prime Minister of Australia, or a Minister nominated by him, and the other members are the Premiers of the States or, in the absence of a Premier, a Minister nominated by him. The Commonwealth and each State submits to the Council a program of its desired loan raisings during each financial year, including the amount of any revenue deficit to be funded. The Commonwealth Government's borrowings for defence purposes are expressly excluded from its submissions to the Council. If the Council decides that the total amount of the loan program for

a year cannot be borrowed at reasonable rates and conditions, it decides the amount to be borrowed during the year, and may by unanimous decision allocate this amount between the Commonwealth and the States. Where the members fail to arrive at a unanimous decision the Commonwealth is entitled to a maximum of one-fifth of the total sum to be borrowed. Of the balance, each State is entitled to an amount in the proportion which its net loan expenditure during the preceding five years bears to the aggregate for all the States.

For 1983-84 the Loan Council approved a borrowing program for the States of \$1,469 million of which \$979 million comprised borrowings and \$490 million for capital grants. Western Australia's share amounted to \$135.9 million, comprising \$90.6 million for borrowings and \$45.3 million for capital grants.

At the June 1978 meeting of the Loan Council, new guidelines were approved for its consideration of special additions to the borrowing programs of larger authorities for the purpose of financing infrastructure. The guidelines apply to Commonwealth and State public corporations and to local authorities. They do not apply to borrowings by the Commonwealth and State Governments.

Under the guidelines, each proposal for a special addition to the borrowing program is examined according to certain criteria including economic feasibility; special significance to the economic development of Australia; importance and urgency; and the need for the loan. In special circumstances, borrowing overseas may be arranged. Approval by the Loan Council of special borrowings for financing infrastructure requires the agreement of a simple majority and the Commonwealth Government.

Actual borrowing under the guidelines for Australia in 1983-84 amounted to \$79.5 million of which Western Australia received no share.

**Financial Assistance Grants.** Annual Financial Assistance Grants were made to every State from 1959-60 to 1975-76. In addition to the annual Financial Assistance Grants, special revenue assistance has been provided in some years and details of these and other payments are shown in the next table under the heading *General Purpose Grants*.

At a series of Premiers' Conferences held in February, April and June 1976 it was announced that the Financial Assistance Grants were to be replaced by arrangements under which each State would receive a share of Commonwealth personal income tax collections.

**Personal Income Tax Entitlements.** The *States (Personal Income Tax Sharing) Act 1976* which repealed the States Grants Acts of 1973, 1974 and 1975 operated with effect from the year commencing 1 July 1976 and for subsequent years. The Act provided for the States to share 33.6 per cent of personal income tax collected by the Commonwealth in each year. Each State's share was to be determined according to its estimated population at 31 December of the relevant financial year, after 'weighting' that population according to the financial ratios which applied between the States in 1975-76. It was further provided that the States' entitlements in any year would be not less than in the previous year. In addition, for a period of four years ending 30 June 1980, entitlements were not to be less in a year than the amount which would have been available in that year by the financial assistance grants authorised by the *States Grants Act 1973*. The Act also provided that the Commonwealth Government should consult with the State Governments before 30 June 1981 concerning the need for changes in the provisions of the Act.

The *States (Personal Income Tax Sharing) Amendment Act 1978* provided, subject to the guarantee arrangements contained in the principal Act, that the States' entitlements would be \$4,336.1 million for 1977-78, and for subsequent years 39.87 per cent of the net personal income tax collections for the preceding year. In the year 1983-84 Western Australia's share amounted to \$1,168.1 million. A further amendment provides for periodic reviews by a special division of the Commonwealth Grants Commission of the relativities between the States in their tax sharing entitlements. Further details are provided later in this Chapter under the heading *Commonwealth Grants Commission*.

From the Premiers' Conferences held in 1976 and 1977, a further understanding was reached that each State would be able to legislate to impose a surcharge on personal income tax, or grant

a rebate on personal income tax. In either case the Commonwealth Government would act as an agent for the State. Enabling legislation was authorised in June 1978 by the *Income Tax (Arrangements with the States) Act 1978*.

At the Premiers' Conference in December 1979, it was agreed that the provisions of the *States (Personal Income Tax Sharing) Act 1976*, as amended, should continue for the year 1980-81. However, there was to be an additional guarantee that each State would receive no less in real terms than the amount it received in 1979-80 as measured by the Consumer Price Index for the four quarters to March 1981, compared with the four quarters to March 1980. This guarantee was authorised by the *States (Personal Income Tax Sharing) Amendment Act 1980*.

The *States (Tax Sharing and Health Grants) Act 1981*, enacted in June 1981 repealed the *States (Personal Income Tax Sharing) Act 1976* and *States (Personal Income Tax Sharing) Amendment Acts of 1978 and 1980*.

The 1981 Act, agreed to between the Commonwealth, States and Northern Territory at the May 1981 special Premiers' Conference and the subsequent Premiers' Conference in June 1981, provides for a number of new features not previously included in the financial arrangements between the Commonwealth and the States. The more important of these are: (i) substitution of the former net personal income tax collection base with a total tax base after 1981-82 and (ii) new identifiable, general purpose health grants to replace the former public hospital cost-sharing arrangements with the States (other than South Australia and Tasmania) and the Northern Territory. From 1 February 1984, South Australia and Tasmania terminated their hospital cost sharing agreement and commenced receiving payments under the identified health grant provisions.

It was further agreed that there would be no change to the per capita relativities between the States in respect of the year 1981-82.

In addition a 9 per cent increase in the total basic tax sharing grants for the States and the Northern Territory was to apply and, within this 9 per cent the provision, for 1981-82 only, of rounding adjustments to the basic grants for the States to ensure each State received an increase in its estimated base grant of not less than 8 per cent.

At the Premiers' Conference held in June 1982 it was agreed that the identified health grants should continue to be distributed as provided under the *States (Tax Sharing and Health Grants) Act 1981*. However, the Conference also agreed to a proposal put forward by the Commonwealth for new tax sharing relativities. The main features of the new arrangements are: (i) the relativities so modified would be phased in over the three years ended 1984-85 and (ii) each State tax sharing grant to increase by at least 2 per cent in real terms in 1982-83 and a further 1 per cent in real terms in each of the following two years.

For the year 1984-85 Western Australia's share amounted to \$1,224.6 million, which comprised \$1,042.3 million basic tax sharing grant, \$162.0 million health grant and \$20.3 million special revenue assistance.

At the Premiers' Conference in May 1985, it was agreed to make changes to the arrangements for determining the level and distribution of these grants among the States and Northern Territory. The main features of the new arrangements are: (i) the replacement of tax sharing grants with new financial assistance grants to the States to apply for the three years ended 1987-88; (ii) the level of these grants will be adjusted for movement in prices and a real growth factor, and distributed on the basis of per capita relativities recommended by the Commonwealth Grants Commission; and (iii) 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 *Local Government (Personal Income Tax Sharing) Act 1976* provided that from 1976-77 local government would receive 1.52 per cent of personal income tax collections in the previous year. Subsequent amendments to the Act in 1979 and 1980 increased this percentage to 1.75 and 2.0 respectively. The Act also provides that allocations should be made as prescribed and have regard to the recommendation of a Local Government Grants Commission which was to be constituted in each State not later than 30 June 1978. Legislation constituting the Western Australian Local

Government Grants Commission became effective on 11 May 1978 under the authority of the *Local Government Grants Act 1978*. Western Australia's share for 1980-81, 1981-82, 1982-83 and 1983-84 amounted to \$28.2 million, \$32.9 million, \$39.9 million and \$43.1 million respectively. Further details are shown under the heading the *Local Government System* in Chapter 5.

**Commonwealth Grants Commission.** Section 96 of the Commonwealth Constitution provides that the States may be granted financial assistance. In 1933 the Commonwealth Parliament passed the Commonwealth Grants Commission Act establishing a Commission to inquire into and report on applications made by States for grants of financial aid.

In each year from 1934-35, in respect of which the Commission made its first recommendation, Western Australia received a Special Grant until it ceased to be a claimant State from and including the year 1968-69, in accordance with an agreement made between the Commonwealth and the State at a Premiers' Conference in June 1968.

The *Commonwealth Grants Commission Act 1973*, which repealed the *Commonwealth Grants Commission Act 1933* and later amendments, continued the principle of making special assistance available to a State for its own purposes and, in addition, authorised the provision of assistance to a State for local government purposes. Grants to Western Australia, for distribution among local government authorities as recommended by the Grants Commission, amounted to \$4.96 million for the year 1974-75 and \$7.52 million for 1975-76.

From 1976-77, new arrangements operated with the passing of the *Commonwealth Grants Commission Act 1976* and the *Local Government (Personal Income Tax Sharing) Act 1976*. Reference has been made in the preceding section to an amendment contained in the *States (Personal Income Tax Sharing) Amendment Act 1978* which provides for periodic reviews by a special division of the Commonwealth Grants Commission of the relativities between the States in their tax sharing entitlements. In conjunction with this Act, the *Commonwealth Grants Commission Amendment Act 1978* provided for the constitution of a division of the Commission comprising the Chairman and two members of the Commission, in addition to three associate members, one of whom would be nominated by the governments of New South Wales and Victoria and two by the governments of the four remaining States. The factors to be taken into consideration in the conduct of inquiries by the special division of the Commonwealth Grants Commission and the method of its operation are as prescribed by the two Acts mentioned.

The special division of the Commonwealth Grants Commission presented its report on State tax sharing entitlements in June 1981. The Commission found that a change was desirable in State factors which prescribe the per capita relativities between the States. However, the implications of the significant decreases in tax sharing grants payable in 1981-82 to South Australia (\$77 million), Western Australia (\$160 million) and Tasmania (\$64 million) if the distribution between the States were to be based on the Commission's recommendations, led to the decision to make no change in the per capita relativities for the year 1981-82.

The Commonwealth Grants Commission presented a report in May 1982 confirming the view expressed in their 1981 report that a change was desirable in the existing State factors. It recommended that modified relativities, in which relative health needs are to be taken into account, be phased in over the three years 1982-83 to 1984-85.

The Commission's 1982 assessments were discussed at the June 1982 Premiers' Conference and a proposal put forward by the Commonwealth for new tax sharing relativities. A condition of the Commonwealth's proposal was that no special grants would be paid during the phasing-in period. The proposal was adopted by the Conference on this basis.

In April 1985, the Commonwealth Grants Commission recommended that revised State relativities should apply from 1985-86. Agreement was reached during the 1985 Premiers' Conference on a modified set of relativities, which are to apply until the end of 1987-88. If the 1984-85 general revenue grant had been distributed on the basis of the new arrangement, Western Australia would have received \$1,194.4 million — \$9.9 million less than was actually received.

COMMONWEALTH GOVERNMENT GRANTS TO WESTERN AUSTRALIA  
CLASSIFIED BY GOVERNMENT PURPOSE CLASSIFICATION  
(\$ million)

Item	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
<b>Current grants</b>						
General public services	3.7	3.9	3.7	4.0	4.2	4.3
Public order and safety	2.7	3.1	3.4	4.6	6.7	6.5
Education —						
Primary and secondary	41.5	46.1	53.9	69.0	84.4	93.5
Tertiary education —						
University education	49.2	54.2	59.4	68.3	73.4	79.2
Other higher education	49.6	53.3	60.0	64.7	72.6	78.1
Technical and further education	5.2	5.4	10.1	11.6	14.1	14.1
Pre-school education	5.4	5.6	5.8	5.9	6.2	4.9
Other education	0.1	0.3	0.6	0.4	0.1	—
Health —						
Hospital and other institutional services and benefits	118.2	127.8	149.8	157.9	140.4	177.9
Clinic and other non-institutional services and benefits	2.6	3.0	3.9	0.1	—	—
Public health	8.9	10.2	11.1	7.4	8.2	8.8
Social security and welfare	5.8	6.2	5.1	4.7	7.3	9.5
Housing and community development —						
Housing	0.6	0.9	1.4	0.6	0.6	0.6
Community development	—	0.1	0.2	0.2	0.3	0.7
Recreation and culture	0.1	0.1	0.1	—	0.1	—
Fuel and energy	0.3	0.4	0.5	0.4	0.6	1.0
Agriculture, forestry, fishing and hunting	2.7	1.9	2.1	1.5	1.9	3.3
Transport and communication	0.2	0.2	0.2	0.2	0.3	—
Labour and employment affairs	0.1	—	—	—	8.8	33.9
Other purposes —						
Public debt transactions	0.9	0.9	0.9	0.9	0.9	1.0
General purpose inter-governmental transactions	596.4	683.7	762.4	842.9	952.9	1,060.6
Natural disaster relief	0.2	0.3	1.2	0.3	1.0	1.0
Other purposes n.e.c.	0.2	-0.2	—	—	—	—
<b>Total current grants</b>	<b>894.6</b>	<b>1,007.3</b>	<b>1,136.0</b>	<b>1,245.8</b>	<b>1,385.1</b>	<b>1,578.9</b>
<b>Capital grants —</b>						
Education —						
Primary and secondary education	21.1	11.0	14.1	16.2	16.3	18.5
Tertiary education —						
University education	5.2	3.0	3.2	3.2	3.5	5.8
Other higher education	5.9	3.8	2.8	4.5	3.6	3.5
Technical and further education	3.5	10.5	9.1	12.6	12.1	8.1
Health —						
Clinic and other non-institutional services and benefits	0.9	0.5	0.2	—	—	—
Public health	1.4	1.2	0.2	0.2	0.3	0.3
Social security and welfare	2.0	3.0	4.0	3.8	4.2	3.8
Housing and community amenities —						
Housing	4.0	12.9	11.9	11.5	25.5	35.0
Community development	—	0.1	0.2	0.3	0.3	3.2
Sewerage	—	—	—	—	12.1	7.9
Recreation and culture	0.4	0.3	0.3	0.4	0.8	0.4
Agriculture, forestry, fishing and hunting	4.4	4.2	3.9	4.9	6.8	9.8
Transport and communication —						
Road transport	67.0	71.4	78.9	85.2	103.6	142.9
Air transport	—	0.2	0.1	0.1	1.4	7.3
Other purposes —						
General purpose inter-government transactions	44.2	38.4	40.3	40.3	42.3	45.3
Natural disaster relief	1.4	1.1	1.4	1.0	0.8	1.6
Other purposes n.e.c.	0.1	-0.8	0.3	0.2	—	—
<b>Total capital grants</b>	<b>161.6</b>	<b>160.8</b>	<b>171.0</b>	<b>184.6</b>	<b>233.6</b>	<b>293.6</b>
<b>Total current and capital grants</b>	<b>1,056.2</b>	<b>1,168.1</b>	<b>1,307.0</b>	<b>1,430.4</b>	<b>1,618.7</b>	<b>1,872.5</b>

The Commonwealth also provides financial assistance for State projects by way of repayable advances. The following table shows gross and net advances received in Western Australia for the years 1978-79 to 1983-84.

COMMONWEALTH GOVERNMENT ADVANCES TO WESTERN AUSTRALIA  
CLASSIFIED BY GOVERNMENT PURPOSE CLASSIFICATION  
(\$ million)

Item	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Gross advances —						
General public services	88.4	76.8	80.6	80.6	77.5	83.6
Housing and community amenities —						
Housing	29.8	15.1	15.7	13.0	20.9	20.1
Other community amenities	—	—	—	—	—	—
Agriculture, forestry, fishing and hunting	9.4	2.6	3.5	3.4	2.6	7.8
Transport and communication	—	—	0.7	2.1	1.7	0.4
Other purposes	6.9	7.1	12.8	2.0	7.1	5.8
Total gross advances	134.5	101.7	113.3	101.2	109.8	117.7
Net advances (a) —						
General public services	70.3	57.7	60.9	59.9	55.8	61.0
Housing and community amenities —						
Housing	26.9	12.1	12.5	9.6	17.3	16.2
Other community amenities	-0.5	-0.6	-0.7	-0.9	-0.9	-0.9
Agriculture, forestry, fishing and hunting	8.2	1.4	2.0	1.6	0.8	5.8
Transport and communication —	-1.6	-2.5	-2.4	-0.5	-0.4	-3.1
Other purposes	6.5	7.1	7.4	-2.0	1.5	0.1
Total net advances	109.8	75.2	79.6	67.9	74.1	79.1

(a) Gross advances less repayments.

**Other Financial Assistance.** As well as providing general financial assistance to the States by means of grants, the Commonwealth Government allocates to them funds for specific purposes, as shown in the preceding tables which give details of payments made to Western Australia during the six-year period ended 30 June 1984. Grants in the financial year 1983-84 totalled \$1,872.5 million while net advances for the same period amounted to \$79.1 million. Social service benefits and national health benefits are paid from the National Welfare Fund. In addition, financial assistance for housing and war service land settlement is provided from the Loan Fund.

### Cash Benefits to or for Persons

The main components of cash benefits are hospital, medical, pharmaceutical, sickness and unemployment benefits, family allowance, and widows', age, invalid and repatriation pensions. These are paid from the National Welfare Fund which was established in 1943 by the National Welfare Fund Act. Further reference to the Fund will be found at the beginning of Chapter 7. Other cash benefits include scholarships and payments to trainee teachers.

The following table gives details of all cash benefits paid during the six-year period ended 30 June 1984. Cash benefits to or for persons in Western Australia increased from \$709.7 million to \$1,530.3 million over the period. Social security and welfare amounted to \$1,283.1 million in 1983-84 or 83.8 per cent of the total cash benefits, followed by Health with \$192.0 million or 12.5 per cent.

COMMONWEALTH GOVERNMENT CASH BENEFITS TO OR FOR PERSONS IN  
WESTERN AUSTRALIA CLASSIFIED BY GOVERNMENT PURPOSE CLASSIFICATION (a)  
(\$'000)

Item	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
<b>Education —</b>						
Primary and secondary education	6,566	6,875	8,544	10,122	12,715	15,223
Tertiary education —						
University education						11,721
Other higher education	8,777	8,907	8,130	8,204	9,644	11,328
Technical and further education						5,261
Other tertiary education						4,012
Other education (including pre-school)	11,279	11,510	13,403	15,241	16,443	630
<b>Total education</b>	<b>26,622</b>	<b>27,292</b>	<b>30,077</b>	<b>33,567</b>	<b>38,802</b>	<b>48,175</b>
<b>Health —</b>						
Hospital and institutional services and benefits —						
Nursing home benefits	26,390	31,149	36,418	45,754	54,000	44,864
Hospital benefits re-insurance	-2,100	-3,378	677	1,200	954	-2,700
Clinical and non-institutional services and benefits —						
Medical benefits						109,516
Other	37,342	42,135	48,754	58,881	71,699	2,238
Public health benefits						2,398
Pharmaceutical benefits	18,287	18,717	22,138	28,497	33,122	35,673
<b>Total health</b>	<b>79,919</b>	<b>88,623</b>	<b>107,987</b>	<b>134,332</b>	<b>159,775</b>	<b>191,989</b>
<b>Social security and welfare —</b>						
Benefits to ex-servicemen and their dependents						
Invalid and other permanent disabled benefits —						
Invalid pensions	46,592	54,228	63,269	74,563	86,706	106,982
Other	4,886	5,426	6,152	7,203	9,234	8,976
Old age pensions	238,241	258,650	290,394	334,791	364,234	400,380
Widows, deserted wives, divorcees and orphans benefits	36,462	40,789	46,094	52,650	57,000	63,414
Unemployment benefits	82,842	87,402	87,891	112,047	209,151	274,987
Sickness benefits	7,200	8,676	10,713	13,342	15,495	19,763
Sole parent benefits	22,996	27,590	44,108	62,803	75,364	94,337
Family and child benefits n.e.c.	88,468	89,558	84,338	93,881	124,032	140,460
Other social security and welfare benefits	6,237	8,460	11,302	12,475	16,722	13,172
<b>Total social security and welfare</b>	<b>600,991</b>	<b>655,774</b>	<b>736,975</b>	<b>868,902</b>	<b>1,092,749</b>	<b>1,283,136</b>
Other purposes	2,148	1,339	2,154	3,123	3,710	7,000
<b>Total all cash benefits</b>	<b>709,680</b>	<b>773,028</b>	<b>877,193</b>	<b>1,039,924</b>	<b>1,295,036</b>	<b>1,530,300</b>

(a) For conditions and rates applying to payment of social service benefits, health benefits, and other forms of assistance, see Chapter 7. Because of the administrative arrangements made for the payment of certain benefits it has not been practicable to allocate amounts for those benefits precisely between States. In such cases, estimates have been made.

### STATE GOVERNMENT FINANCE

The tables in the following pages relate to the financial activities of the Government of Western Australia, statutory authorities, boards, commissions and corporations, and incorporated bodies in which the State Government or its agencies have a controlling interest (other than financial enterprises).

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 all of the agencies of government not classified as public enterprises, i.e. all government departments, offices and other bodies 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.

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 programmes of expenditure.

STATE AUTHORITIES — RECEIPTS AND FINANCING TRANSACTIONS  
CLASSIFIED BY ECONOMIC TRANSACTIONS FRAMEWORK  
(\$ million)

Item	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Revenue and grants received —						
Taxes, fees, fines	399.2	447.3	512.1	594.8	667.5	808.9
Net operating surpluses of public trading enterprises	89.6	96.8	128.2	152.6	188.8	267.8
Property income —						
Income from public financial enterprises	2.5	3.2	4.0	5.1	5.8	9.7
Interest received	47.0	47.7	52.9	79.2	116.2	90.2
Other property income	73.3	84.6	102.1	108.6	136.1	202.1
Other revenue	32.6	29.9	32.1	29.2	34.3	38.6
Grants received from the Commonwealth —						
Current grants	893.3	1,006.0	1,134.3	1,243.8	1,382.5	1,576.2
Capital grants	160.9	160.1	169.8	183.7	231.3	286.3
Total revenue and grants received	1,698.5	1,875.4	2,135.5	2,397.1	2,762.5	3,279.8
Financing transactions —						
Advances received	114.3	78.4	84.3	73.8	81.5	88.2
Net borrowing —						
General government	5.3	2.2	10.2	5.4	53.2	229.6
Public trading enterprises	84.3	115.3	147.5	242.4	449.3	370.2
Deposits received (net) —						
Increase in cash balance of private trust funds	-3.7	6.4	1.5	17.5	16.9	30.1
Decrease in investments	3.0	-0.3	-3.5	-0.3	-0.2	22.6
Decrease in currency and deposits	7.5	17.6	-49.1	-141.5	31.8	-152.0
Increase in provisions —						
For depreciation	49.9	57.4	64.3	79.1	94.1	94.2
Other	8.8	5.4	13.4	19.2	41.1	37.4
Other funds available (net) including errors and omissions	11.3	23.1	21.6	16.5	19.9	51.4
Total financing transactions	280.7	305.5	290.1	312.1	787.6	771.5
Total funds available	1,979.2	2,180.9	2,425.6	2,709.2	3,550.1	4,051.3

In the preceding table, it will be seen 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 "Revenue and grants" and outlays.

The following table 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.

STATE AUTHORITIES: OUTLAY CLASSIFIED BY ECONOMIC TRANSACTION FRAMEWORK  
(\$ million)

Item	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
<b>Current outlays —</b>						
General government final consumption expenditure	1,037.2	1,174.1	1,345.9	1,489.0	1,725.8	1,940.5
Transfer payments —						
Interest paid —						
On Commonwealth advances	121.8	131.0	148.5	165.5	180.7	199.9
Other	49.6	64.3	87.5	108.5	186.4	272.3
Subsidies paid —						
To public trading enterprises	76.0	90.0	99.7	99.2	130.9	173.3
Other enterprises	4.6	6.5	10.4	8.4	8.5	14.9
Personal benefit payments	23.5	26.9	19.1	18.0	20.8	24.8
Grants —						
To non-profit institutions	53.1	60.2	75.7	88.6	108.1	127.9
To local government authorities	20.0	23.9	31.0	36.0	42.8	58.9
Total, current transfer payments	348.6	402.8	471.9	524.4	678.3	871.9
Total, current outlays	1,385.8	1,576.9	1,817.8	2,013.3	2,404.1	2,812.4
<b>Capital outlays —</b>						
Gross fixed capital expenditure —						
On new fixed assets	537.1	550.9	566.6	631.3	1,050.2	1,195.2
On secondhand fixed assets (net)	-21.1	-16.3	-25.0	-19.1	-28.7	-98.3
Increase in stocks	6.4	20.0	-2.9	11.1	18.4	4.9
Expenditure on land and intangible assets (net)	12.8	13.4	28.0	26.9	36.5	10.5
Total, capital expenditure	535.2	568.0	566.6	650.2	1,076.5	1,112.3
Transfer payments —						
Grants —						
To private sector and public financial enterprises	3.3	3.1	3.1	5.9	4.5	4.6
To local government authorities	39.6	33.3	35.7	40.9	45.3	58.8
Other	—	—	—	—	0.1	—
Total, capital transfer payments	42.9	36.4	38.9	46.9	49.9	63.4
Net advances paid —						
To public financial enterprises	—	-1.2	0.2	-0.1	-0.1	—
To private sector	15.5	0.8	2.2	-1.2	19.8	63.3
To local government authorities	-0.3	—	—	—	—	0.1
Total, net advances paid	15.2	-0.4	2.4	-1.3	19.7	63.4
Total, capital outlays	593.5	604.0	607.8	695.8	1,146.1	1,238.9
<b>TOTAL OUTLAYS</b>	<b>1,979.2</b>	<b>2,180.9</b>	<b>2,425.6</b>	<b>2,709.2</b>	<b>3,550.1</b>	<b>4,051.3</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 (eg old age pensions), subsidies paid by public to enterprises, and grants, for non-capital purposes, to local authorities and private non-profit organisations (eg 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. Because it has not been possible to make a satisfactory dissection, all expenditure on roads, including maintenance, is classified as 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 enterprise, households or government activities. The repayment of such advances are netted off advances to give net advances. These advances are included in outlays, rather than financing transactions (refer to the definition on page 461) in order to bring together all the methods governments use to achieve expenditure policies. For example, advances are made to fund State housing projects.

In the following two tables, general government final consumption expenditure and expenditure on new fixed assets are shown classified by the Government Purpose Classification.

STATE AUTHORITIES: GENERAL GOVERNMENT FINAL CONSUMPTION EXPENDITURE  
CLASSIFIED BY GOVERNMENT PURPOSE CLASSIFICATION  
(\$ million)

Item	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
General public services	54.8	64.3	90.5	92.7	115.0	127.6
Public order and safety	115.2	131.5	153.8	172.5	208.0	213.9
Education —						
Primary and secondary education	249.6	284.4	319.8	345.8	418.7	460.6
Tertiary education	141.6	158.1	177.9	200.5	230.3	249.0
Other education	40.4	46.1	53.0	77.9	65.1	73.6
Health —						
Hospital and other institutional services and benefits	264.0	297.2	344.8	348.6	380.7	438.3
Clinic and other non-institutional services and benefits	2.1	2.3	2.6	2.9	3.4	14.3
Other health	32.6	36.0	42.2	46.2	52.7	55.9
Social security and welfare	31.0	36.2	47.4	53.7	59.2	69.9
Housing and community amenities	12.0	17.9	14.4	16.4	27.8	38.2
Recreation and culture	17.1	18.6	19.8	22.0	27.0	30.6
Fuel and energy	0.3	—	0.9	0.5	0.6	-1.8
Agriculture, forestry, fishing and hunting	43.8	48.6	55.0	65.3	77.3	83.7
Mining, manufacturing and construction	11.8	11.9	11.4	17.5	24.6	28.3
Transport and communication	4.1	3.6	2.7	2.8	4.9	15.9
Other economic affairs	16.4	17.5	9.7	23.3	30.3	42.5
Other purposes	0.4	0.2	—	0.1	0.1	0.1
Total	1,037.2	1,174.1	1,345.9	1,489.0	1,725.8	1,940.5

STATE AUTHORITIES: EXPENDITURE ON NEW FIXED ASSETS  
CLASSIFIED BY GOVERNMENT PURPOSE CLASSIFICATION  
(\$ million)

Item	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
General public services	7.6	9.9	6.7	8.5	16.4	14.6
Public order and safety	16.0	18.7	24.6	18.5	21.8	15.9
Education	62.9	49.2	45.7	53.8	54.2	48.9
Health	54.2	56.8	40.6	41.4	41.8	48.5
Social security and welfare	1.0	1.1	0.9	1.0	1.8	1.2
Housing and community amenities	121.2	104.0	121.6	108.9	150.2	177.8
Recreation and culture	9.3	12.4	5.8	11.1	16.9	26.6
Agriculture, forestry, fishing and hunting	15.7	13.6	15.0	14.1	18.9	22.1
Mining, manufacturing and construction	0.6	2.8	1.9	3.0	3.0	1.8
Transport, communication, fuel and energy	246.1	281.3	302.2	367.2	723.0	832.8
Other economic affairs	0.3	0.4	1.1	2.7	2.2	4.4
Other purposes	2.0	0.7	0.6	1.0	0.1	0.7
Total	537.1	550.9	566.6	631.3	1,050.2	1,195.2

### Public Debt

Under the Financial Agreement of 1927 (as amended) all debt of the Commonwealth and State Governments, with certain minor exceptions, is represented by Commonwealth Government Securities. The information in the following table is derived from the Budget Paper *Government Securities on Issue* published by the Commonwealth Government. The figures do not include government debt not evidenced by the issue of securities, or the debt of other bodies guaranteed by Government.

### SECURITIES ISSUED ON BEHALF OF STATE GOVERNMENT

	At 30 June —						
		1979	1980	1981	1982	1983	1984
Securities on issue	\$'000	1,307,306	1,360,726	1,423,811	1,486,310	1,547,805	1,614,878
Per head of population	\$	1,051	1,070	1,104	1,127	1,145	1,175
Annual interest liability (Australian currency equivalent)	\$'000	104,910	112,798	127,613	147,113	160,757	174,416
Per head of population	\$	84	89	99	112	119	127

### 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

The following table summarises the receipts and payments (including loan transactions) of local government authorities for the years 1979-80 to 1983-84. Amounts have been shown on a gross basis wherever practicable.

SUMMARY OF LOCAL GOVERNMENT RECEIPTS AND PAYMENTS  
(\$'000)

Item	1979-80	1980-81	1981-82	1982-83	1983-84
<b>Receipts —</b>					
Rates (including penalties)	99,064.0	115,277.6	133,060.6	153,313.1	167,494.3
Fees and fines	3,638.8	3,860.4	4,429.7	4,734.8	5,276.1
Household garbage charges	9,972.0	12,058.6	14,224.1	15,640.0	18,194.3
Government grants —					
General purpose grants	23,888.5	29,926.2	34,827.3	41,709.7	44,603.3
Specific purpose grants	37,538.7	39,626.4	43,979.7	51,046.4	75,795.1
Reimbursements received —					
Roads and bridges (a)	10,232.2	10,349.6	12,647.3	15,376.4	10,305.1
Other reimbursements	5,552.8	3,685.2	4,687.9	4,677.4	5,644.1
Other revenue (b)	55,585.9	65,877.5	75,583.0	76,059.6	79,271.0
Total, receipts	245,472.9	280,661.5	323,439.6	362,557.4	406,583.3
Loans raised during the year (c)	39,416.2	41,847.1	40,341.4	42,717.4	38,634.3
<b>Payments —</b>					
Payments for goods, services and land —					
General public service	32,502.0	34,854.1	38,196.9	45,249.7	46,602.2
Public order and safety	2,986.4	2,863.5	3,643.0	4,343.4	4,960.5
Education	493.1	197.1	272.9	287.3	309.8
Health	5,517.7	6,215.8	7,104.4	8,344.3	9,109.8
Welfare	3,645.6	4,283.6	4,771.5	5,620.6	8,366.2
Housing and community amenities —					
Household and other garbage	19,637.2	21,501.9	26,366.5	32,738.0	31,030.1
Community and regional development	14,871.0	9,063.0	9,452.8	9,478.4	7,835.8
Other housing and community amenities	13,186.8	14,470.6	15,065.6	14,195.2	16,283.9
Recreation and culture —					
Public halls, civic centres	5,390.9	4,237.4	5,073.5	9,092.2	7,815.3
Recreation and sport	40,217.5	46,203.3	48,937.1	60,649.9	67,221.3
Libraries and other culture	7,501.3	11,125.2	11,660.3	10,999.0	12,448.4
Economic services —					
Transport —					
Construction, maintenance of roads/bridges	68,509.3	75,305.3	92,021.1	101,403.2	108,153.2
Road plant purchases	10,841.0	9,949.1	12,790.6	14,912.4	13,943.3
Other transport	6,141.8	8,394.6	7,699.3	17,719.3	11,432.7
Other economic services	3,350.0	4,148.4	5,592.7	4,015.7	3,558.0
Other payments for goods, services and land	7,477.2	8,751.0	8,158.6	9,797.0	10,095.3
Total payments for goods, services and land	242,268.8	261,563.9	296,806.8	348,845.6	359,165.8
Comprising — Recurrent payment	130,207.9	147,691.5	169,842.2	194,124.2	217,884.0
— Capital payment	112,060.9	113,872.4	126,964.6	154,721.4	141,281.8
Other payments from revenue — Debt charges (c)	35,217.7	39,640.9	45,737.2	55,684.7	64,035.8

(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.

Further details relating to local government finance in Western Australia are contained in the publication *Local Government* (Catalogue No. 1303.5), issued by this Office. A summary of statistics for other States may be found in the publication *Public Authority Finance — State and Local Authorities* (Catalogue No. 5504.0), issued by the Australian Statistician, Canberra.

### Loan Transactions

Under the provisions of the 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 raisings, the levying of loan rates, the expenditure of loan moneys 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.

Loan receipts and payments of local government authorities in the financial years 1979-80 to 1983-84 are included in the table above.

The following table shows the aggregate debt outstanding at 30 June of each year during the period from 1979 to 1984 in respect of 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.

LOCAL AUTHORITIES: DEBT  
(\$'000)

Item	At 30 June —					
	1979	1980	1981	1982	1983	1984
Advances from public authorities	628	540	650	5,793	377	726
Loans	213,399	236,592	260,000	272,167	294,397	304,580
Other indebtedness	43	32	438	443	283	214
Debt outstanding	214,070	237,164	261,088	278,402	295,058	305,520

TAXATION

Commonwealth Government Taxation

COMMONWEALTH GOVERNMENT TAXATION (a)  
NET COLLECTIONS IN WESTERN AUSTRALIA (\$'000)

Tax, duty, charge or levy	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Income taxes —						
Individuals (b)	986,432	1,160,617	1,383,599	1,655,800	1,808,800	1,935,700
Companies (c)	132,775	138,661	164,774	189,700	222,300	233,000
Dividend (withholding tax) (d)	1,241	1,173	1,796	2,000	2,500	4,400
Interest (withholding tax) (d)	1,960	2,251	3,338	4,000	5,700	7,800
Other income taxes	—	—	414	600	1,200	300
Total income taxes	1,122,408	1,302,702	1,553,921	1,852,100	2,040,500	2,181,200
Estate duty	5,056	2,295	1,428	400	100	—
Gift duty	86	51	24	—	—	—
Customs duties (b)	71,429	83,539	108,720	127,800	130,600	131,400
Excise duties	254,243	264,891	289,030	291,000	487,900	563,200
Sales tax (b)	108,852	109,596	123,831	163,500	196,800	224,300
Primary production taxes	24,228	29,856	34,734	33,200	36,000	36,900
Stevedoring industry charge	2,682	(e)	(e)	(e)	(e)	(e)
Pay-roll tax (f)	1	—	—	—	—	—
Departure tax	886	1,355	1,597	3,500	3,900	4,100
Oil pollution levy	155	168	159	—	—	—
Other taxes, fees, fines, etc.	2,347	4,730	5,053	7,400	8,700	10,800
Total taxation	1,592,373	1,799,183	2,118,497	2,479,000	2,904,500	3,151,900

(a) Details of the purposes and rates applicable to the main forms of Commonwealth Government taxation are given in *Year Book Australia*. (b) The amounts shown have been adjusted by offsetting remissions under special circumstances of income tax, customs duties and sales tax. The amount also includes Medibank levy payable from 1 October 1976 to 1 November 1978. (c) Includes payments in the nature of income tax from public enterprises. (d) Tax levied in respect of dividends and interest deemed paid or payable to persons not residing in Australia. (e) From 1979-80 collected through Australian Capital Territory. (f) Discontinued as Commonwealth Government tax September 1971; from that date collected by State Government (see *State and Local Authorities Taxation* below).

It is important to note that, although the figures shown in the preceding table represent the amounts of taxes actually collected in Western Australia, they do not necessarily indicate the amounts contributed by the people of the State, as moneys may be collected in one State in respect of goods consumed or assessments made in other States. Further, administrative arrangements for the collection of certain taxes are such that a large proportion of the revenue (or, as in the case of wheat tax, the whole of the revenue) is brought to account in a State other than Western Australia.

**Income Tax.** Income tax is by far the most important source of Commonwealth revenue from taxation and accounted for 70.5 per cent of all Commonwealth taxation collections in Western Australia for 1982-83. The tax is levied on the income of individuals, companies, partnerships and trusts, and certain private superannuation funds.

*Taxable income* is the amount remaining after deducting from assessable income all allowable deductions.

INCOME TAX ASSESSMENTS — INDIVIDUALS (a): WESTERN AUSTRALIA  
INCOME YEAR 1982-83 (ASSESSMENT YEAR 1983-84)

Grade of taxable income	Number of taxpayers	Taxable income	Average per taxpayer	Net tax	Average per taxpayer
\$	\$	\$'000	\$	\$'000	\$
Under 4,463	774	1,531	1,978	300	388
4,463 — 4,999	11,304	53,558	4,738	896	79
5,000 — 5,999	34,475	189,642	5,501	8,506	247
6,000 — 6,999	29,898	193,987	6,488	15,961	534
7,000 — 7,999	28,321	212,420	7,500	22,381	790
8,000 — 8,999	27,595	234,481	8,497	29,097	1,054
9,000 — 9,999	26,448	251,216	9,498	35,361	1,337
10,000 — 10,999	25,909	272,050	10,500	41,973	1,620
11,000 — 11,999	27,075	311,623	11,510	51,723	1,910
12,000 — 12,999	31,378	392,487	12,508	68,601	2,186
13,000 — 13,999	31,315	422,582	13,495	76,490	2,443
14,000 — 14,999	30,162	437,130	14,493	81,469	2,701
15,000 — 15,999	28,193	436,835	15,494	83,396	2,958
16,000 — 16,999	25,486	420,273	16,490	82,170	3,224
17,000 — 17,999	24,090	421,489	17,496	84,513	3,508
18,000 — 18,999	21,646	400,154	18,486	82,324	3,803
19,000 — 19,999	19,560	381,256	19,492	80,754	4,129
20,000 — 21,999	31,870	667,758	20,953	150,053	4,708
22,000 — 23,999	23,597	541,725	22,957	130,639	5,536
24,000 — 25,999	17,947	447,663	24,944	114,673	6,390
26,000 — 27,999	13,173	354,967	26,947	95,670	7,263
28,000 — 29,999	9,899	286,681	28,961	80,383	8,120
30,000 — 34,999	15,096	485,737	32,177	144,347	9,562
35,000 — 39,999	7,363	272,509	37,011	87,425	11,874
40,000 — 49,999	4,893	215,471	44,037	77,636	15,867
50,000 — 99,999	2,909	180,892	62,184	77,672	26,701
100,000 and over	275	46,115	167,691	24,942	90,698
Total	550,651	8,532,233	15,495	1,829,356	3,322

(a) With certain exceptions, an individual was liable to pay tax on income derived in 1982-83 only if the taxable income exceeded \$4,462.

### State and Local Authorities Taxation

The net amounts collected in Western Australia in the form of State and local authorities taxation in each year from 1979-80 to 1983-84 are shown in the table at the end of this section. Information concerning rates of tax and the relevant legislation is given below.

**BOOKMAKERS BETTING TAX.** The *Bookmakers Betting Tax Act 1954* provides for a tax on money paid or promised as the consideration for bets made by or on behalf of bookmakers. Rates of tax are prescribed as a proportion of the turnover of a racing year (1 August to 31 July). In respect of turnover of the year ended 31 July 1985 the rates applying to on-course transactions were 2 per cent of amounts up to \$100,000 and 2½ per cent of the remainder. For off-course transactions the rate was 2¼ per cent of amounts up to \$50,000, the rate payable on each additional \$50,000 of turnover increasing by ½ per cent up to \$300,000; on turnover exceeding \$300,000 the rate was 3½ per cent.

**CONTRIBUTIONS TO FIRE BRIGADES.** The *Fire Brigades Act 1942* specifies that in permanently manned fire districts, 75 per cent of the estimated expenditure of the Fire Brigades Board be contributed by insurance companies by way of a compulsory levy which is based on a declared percentage of gross premiums of each insurance company, 12½ per cent by local authorities and 12½ per cent by the State Government. In fire districts manned only by volunteers, the State Government pays 100 per cent of costs.

**ESTATE DUTY (PROBATE AND SUCCESSION DUTIES).** Following amendments to the *Death Duty Act 1973* and the *Death Duty Assessment Act 1973* no death duty is payable on the estate of a person whose death occurred on or after 1 January 1980.

**FINANCIAL INSTITUTIONS DUTY.** Financial institutions duty is imposed upon the dutiable receipts of a financial institution required to be registered under the *Financial Institutions Duty Act 1983*. The rate of duty payable at 30 June 1985 was 0.03 per cent to a maximum of \$500 on any one receipt. Concessional rates of duty may apply to certain short term dealing transactions.

**LAND TAX.** The *Land Tax Assessment Act 1976* authorises a tax, with certain specified exemptions, on every owner of land, and the rates of tax are prescribed by the *Land Tax Act 1976*; see table below.

LAND TAX — RATES OF TAX AND AMOUNTS  
PAYABLE: ASSESSMENT YEAR 1984-85

Unimproved values —		Rate	
Exceeding	Not exceeding	Tax on amount in first column	Tax per dollar on remainder
\$	\$	\$	cents
Nil	5,000	—	0.3
5,000	10,000	15	0.4
10,000	15,000	35	0.5
15,000	20,000	60	0.6
20,000	25,000	90	0.7
25,000	30,000	125	0.8
30,000	35,000	165	0.9
35,000	40,000	210	1.0
40,000	45,000	260	1.1
45,000	50,000	315	1.2
50,000	60,000	375	1.3
60,000	70,000	505	1.4
70,000	80,000	645	1.5
80,000	90,000	795	1.6
90,000	100,000	955	1.8
100,000	110,000	1,135	2.0
110,000	120,000	1,335	2.2
120,000	upwards	1,555	2.4

**LIQUOR LICENCES.** Licences and permits authorising the holder to sell or supply fermented and spirituous liquors are granted under the provision of the *Liquor Act 1970*. The Act prescribes the fees payable in respect of liquor licences and permits. The several types of licence for which the Act provides are shown in the table *Liquor Licences in Force* in Chapter 9. Annual licence fees, except in the case of a vigneron's licence, are assessed as a proportion of the gross amount paid for liquor purchased for licensed premises or, in the case of a wholesale licence and a brewer's licence, the gross amount received for liquor sold to unlicensed persons. The proportion prescribed by the Act is 8 per cent for a tavern licence or a store licence and 7 per cent for other licences. An additional annual fee of \$60 is payable in respect of a wholesale licence and a brewer's licence. The annual fee payable for a vigneron's licence is \$20.

**LOCAL GOVERNMENT RATES.** The *Local Government Act 1960* empowers municipalities to impose tax based on a rate in the dollar of the value of all land (except for certain specified exemptions) within the municipality. The method of determining the rate is described in the section *The Local Government System* in Chapter 5.

LOTTERIES PROFITS. The *Lotteries (Control) Act 1954* and the *Lotto Act 1981* empowers the Lotteries Commission to conduct lotteries and other similar devices. To maintain comparability with privately operated lotteries in other States (where profits are taxed) and because the main purpose of the Lotteries Commission is to raise revenue for charitable purposes, the whole of the profit is treated as a tax in accordance with the guidelines provided in the document, *A System of National Accounts* published by the United Nations.

METROPOLITAN REGION IMPROVEMENT TAX. The *Metropolitan Region Improvement Tax Act 1959* authorises a tax, with certain specified exemptions, on every owner of land within the Metropolitan Planning Region. (The Region is coterminous with the Perth Statistical Division; see maps inside back cover.) The rate of tax payable for the assessment year 1985-86 is one quarter of a cent for every dollar of the unimproved value of all land chargeable with the tax.

MOTOR VEHICLE DRIVERS' LICENCES. The *Road Traffic Act 1974* authorises the issue of drivers' licences to persons of a minimum age of seventeen years, specifies other conditions to be satisfied, and prescribes the fees to be paid on application for, and issue or renewal of, a licence. The fee payable on application is \$32, and \$15 on issue or on renewal for each period of twelve months, or \$40 for three years.

MOTOR VEHICLE REGISTRATION FEES. The *Road Traffic Act 1974* provides for the registration of vehicles and prescribes the licence fees to be paid in respect of the several classes of vehicles required to be registered. Fees are based on a combination of power unit and tare weight (except for motor cycles, in respect of which the fee is related to engine capacity). For example, the annual licence fee for a motor car with an engine other than a rotary type is \$1.11 per power unit and an additional \$2.12 for each 100 kilograms of the tare weight. The annual licence fee for a motor cycle is \$9.26 where the engine capacity is 250 cubic centimetres or less, and \$12.08 where the engine capacity is more than 250 cubic centimetres. A recording fee of \$9.50 is payable for the grant or renewal of any licence for a vehicle, and a fee of \$10 for the transfer of any licence.

MOTOR VEHICLE THIRD PARTY INSURANCE SURCHARGE. The *Motor Vehicle (Third Party Insurance Surcharge) Act 1962* imposes a surcharge on premiums paid in respect of policies of insurance with The Motor Vehicle Insurance Trust. At 31 December 1985 the rate of the surcharge was \$5 per annum.

OFF-ROAD VEHICLE REGISTRATION FEES. The *Control of Vehicles (Off-road areas) Act 1978* provides for the registration of off-road vehicles. At 31 December 1985 the annual fee for vehicle registration under the Act was \$6.

OMNIBUS AND COMMERCIAL VEHICLE LICENCES AND FEES. The *Transport Co-ordination Act 1966* provides for the licensing of public vehicles in the categories of omnibus, commercial goods vehicle, trailer or semi-trailer, and aircraft, as well as ships engaged in the coasting trade. Licence fees are as determined from time to time by the Minister of Transport, subject to certain maximum charges prescribed by the Act. In the case of an omnibus, for example, the fee may not exceed 6 per cent of the gross earnings, or \$10 per annum for each unit of the maximum number of passengers which it is licensed to carry, the basis of assessment being that considered by the Minister to be the more appropriate.

**PAY-ROLL TAX.** Pay-roll tax, which was formerly levied by the Commonwealth Government has been collected by the States since September 1971. In Western Australia the enabling legislation comprises the *Pay-roll Tax Assessment Act 1971* and the *Pay-roll Tax Act 1971*. The tax is payable by each employer, with certain specified exceptions, on all wages and salaries paid in excess of a specified amount. From 1 January 1986 the amount at which liability for the tax commences is \$4,230 per week or \$18,333 per month and the rate of tax varies between 4 per cent and 4.75 per cent depending on the amount of wages paid.

**PETROLEUM PRODUCTS LICENSING.** The *Transport Co-ordination Act 1966* provides for the licensing of persons engaged in wholesaling petroleum products. The licensing system requires the payment of a licence fee covering an annual licensing period commencing on 1 July, and terminating on 30 June. The actual fee payable comprises a fixed charge, currently \$500, and an amount which varies with the quantities of motor spirit and diesel fuel wholesaled by the licensee in the year up to 31 March last preceding the commencement of the licensing period. For fuel wholesaled between 1 July 1985 and 30 June 1986 the prescribed fees for each litre were 2.17 cents for motor spirit and 3.95 cents for diesel fuel.

**SOCCER FOOTBALL POOLS.** The *Soccer Football Pools Act 1984* provides for the licensing of persons engaged in the conduct of soccer football pools. The Act imposes a tax on the amount received through public subscriptions to the pools. The rate of tax payable at 1 August 1985 was 32.5 per cent.

**STAMP DUTIES.** The *Stamp Act 1921* imposes stamp duties and prescribes the rates applying to a great number of transactions relating to a wide range of property, commodities and services.

**TAXI CONTROL BOARD LICENCES.** The *Taxi-car Control Act 1985*, under which the Taxi Control Board is constituted, requires that taxi-cars operating in the Perth Metropolitan Control Area and other areas as declared shall be licensed. At 31 December 1985 these fees were \$53 for the issue or renewal of an Unrestricted Taxi-car Licence and \$32 for a Restricted Licence. For the transfer of a licence the fee, as determined by the Board, is a percentage not exceeding 10 per cent of the market value of the taxi-car licence at the time of transfer.

**TOBACCO LICENCES.** The *Business Franchise (Tobacco) Act 1975* provides for the licensing of persons engaged in tobacco wholesaling and retailing. The fee payable for a wholesale tobacco merchant's licence is \$20 plus 35 per cent of the value of tobacco sold, other than sales to another wholesaler or a group tobacco licence holder, in the course of intrastate trade during the relevant bi-monthly period. The same conditions apply to a group tobacco licence except that the licence fee is \$20 per member. For a retail tobacconist, the fee is 35 per cent of the value of tobacco sold, other than tobacco purchased in the course of intrastate trade from a licensed wholesaler, a group tobacco licence holder or another retailer.

**TOTALISATOR AGENCY BOARD BETTING TAX.** The *Totalisator Agency Board Betting Tax Act 1960* imposes a tax on all moneys paid to the Board in respect of bets made through or with the Board. The rate of tax payable at 30 June 1985 was 7 per cent.

TOTALISATOR DUTY AND LICENCES. The *Totalisator Duty Act 1905* authorises the payment of duty on the takings of totalisators operated by horse-racing clubs and prescribes the rates to be paid. Differential rates apply to totalisators operated within a radius of forty kilometres from the General Post Office, Perth and those situated outside this area. In 1984-85, the principal rates of duty payable in respect of totalisators in the former area were 9 per cent of the gross takings from win and place transactions and 7 per cent of the gross takings from wagering transactions known as 'bets other than win and place'; for totalisators outside that area, the rate was 5 per cent for all transactions. The *Totalisator Regulation Act 1911* provides for the licensing of totalisators operated by horse-racing clubs. Licence fees are prescribed by regulation and are payable annually in respect of the calendar year. For the year 1985 the fee payable was \$2 for each \$2,000 (or part of \$2,000) passing through the totalisator.

OTHER TAXES, FEES, FINES, ETC. consists of payments to public authorities by individuals and households, private non-profit organisations and corporate or quasi-corporate enterprises. The following table shows, for the years 1979-80 to 1983-84, taxes, fees and fines collected by State and local authorities according to the new 'Taxes, fees and fines classification'. Refer to catalogue number 1217.0 for further details of this classification.

STATE AND LOCAL AUTHORITIES: TAXES, FEES AND FINES BY TYPE  
(\$million)

Item	1979-80	1980-81	1981-82	1982-83	1983-84
Taxes, fees and fines —					
Employers' payroll taxes	168.0	197.3	229.8	254.0	266.7
Taxes on property —					
Taxes on immovable property —					
Land taxes	23.0	25.4	29.4	34.9	42.4
Municipal rates	99.1	112.4	133.1	151.9	165.7
Metropolitan improvement rates	4.1	4.5	5.2	6.3	7.0
Taxes on immovable property n.e.c.	0.2	0.2	0.2	0.2	0.3
Estate inheritance and gift duty	13.0	5.2	1.3	0.3	0.5
Taxes on financial and capital transactions —					
Stamp duties	71.1	93.2	104.5	106.5	129.1
Financial institutions' taxes	—	—	—	—	16.5
Taxes on provision of goods and services —					
Excises (levies on statutory corporations)	9.6	11.1	14.0	16.4	19.8
Taxes on gambling —					
Taxes on government lotteries	5.4	6.3	8.0	15.1	21.2
Race betting taxes	15.7	17.7	19.3	20.8	24.3
Taxes on insurance —					
Insurance companies' contributions to fire brigades	15.7	14.5	16.9	19.5	20.4
Third party insurance taxes	3.7	3.7	3.8	4.0	4.1
Taxes on use of goods and performance of activities —					
Motor vehicle taxes —					
Vehicle registration fees and taxes	45.9	48.0	56.2	63.3	72.7
Stamp duty on vehicle registration	6.3	7.1	11.9	16.9	29.9
Drivers' licences	5.0	5.4	9.5	9.5	11.7
Road transport and maintenance taxes	3.5	3.1	3.7	2.1	2.2
Franchise taxes —					
Petroleum products franchise taxes	16.3	24.4	29.0	33.9	41.2
Tobacco franchise taxes	9.7	10.2	11.9	16.9	46.7
Liquor franchise taxes	16.3	18.0	19.4	20.8	23.6
Fees and fines —					
Fees from regulatory services	7.0	8.1	10.0	11.9	12.7
Fines	11.5	12.5	15.2	18.9	21.1
Total taxes, fees and fines	550.0	628.4	732.3	823.9	979.8

## PENSION AND SUPERANNUATION SCHEMES

In the following table, particulars are given of pension and superannuation schemes established by the State Government, local government authorities, public corporations, the University of Western Australia, Murdoch University, and the Western Australian Institute of Technology. Particulars of the Parliamentary Superannuation Fund and the Coal Mine Workers' Pensions Fund are also included. Separate details are shown for schemes operated through separately constituted funds and for those operated through life insurance offices.

PUBLIC AUTHORITY PENSION AND SUPERANNUATION SCHEMES  
(\$'000)

Item	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
<b>Separately constituted funds —</b>						
<b>Income —</b>						
Contributions towards premiums by —						
Employees	15,893	17,598	19,314	21,235	26,841	31,548
Employers	22,397	28,628	34,347	40,466	53,582	63,239
Other income	12,382	15,414	17,944	22,292	29,325	66,670
Total	50,672	61,640	71,604	83,993	109,748	161,458
<b>Expenditure —</b>						
Benefits to contributors	29,170	36,395	41,432	49,797	64,055	73,330
Other expenditure	152	393	516	1,141	4,628	5,967
Total	29,322	36,788	41,948	50,938	68,683	79,297
<b>Schemes operated through life insurance offices —</b>						
<b>Income —</b>						
Contributions towards premiums by —						
Employees	2,958	3,304	3,575	r 3,837	3,070	1,745
Employers	4,849	5,295	5,644	r 5,944	4,179	2,705
Other income	1,907	2,274	5,113	r 3,531	4,955	2,809
Total	9,714	10,873	14,332	r 13,312	12,204	7,259
<b>Expenditure —</b>						
Benefits to contributors	1,796	2,340	4,346	r 3,039	2,657	2,518
Other expenditure (including premiums)	8,074	9,060	8,139	r 8,479	7,938	4,261
Total	9,870	11,400	12,485	r 11,518	10,595	6,779
<b>Assets of separately constituted funds —</b>						
<b>Cash and deposits —</b>						
Deposits with Treasury	6,241	6,103	5,091	7,422	6,399	19,898
Other deposits and cash	110	763	134	1,453	3,484	41,715
<b>Public authority securities —</b>						
Australian Government	163	180	183	312	4,913	7,682
Other	89,853	99,960	114,421	123,230	133,597	99,376
<b>Mortgages —</b>						
Housing	1,993	5,679	4,146	31,194	37,883	38,053
Other	8,460	11,511	19,935	23,509	35,382	42,044
Loans to building societies	259	1,000	914	554	1,338	1,984
Company shares, debentures and notes	7,434	6,403	8,470	10,885	24,653	26,417
Other assets	20,902	28,569	37,078	25,506	46,531	98,958
Total	135,416	160,170	190,373	224,064	294,180	376,128
Less sundry creditors, etc.	1,066	970	1,517	2,696	26,880	44,353
Accumulated funds	134,350	159,201	188,857	221,368	267,300	331,775

The Western Australian Government and many local government authorities and public corporations have established pension and superannuation schemes for eligible employees and their dependants, to which both employers and employees contribute. These schemes are operated either through separately constituted funds or through life insurance offices.

The *Superannuation and Family Benefits Act 1938* applies to employees of State Government Departments and some other public authorities. The Act establishes The Superannuation Fund and a Provident Account under the management of a Superannuation Board. Contributions made by the State are paid from the Consolidated Revenue Fund.

The *Local Government Superannuation Act 1980*, effective from 29 December 1983, repeals the *Superannuation, Sick, Death, Insurance, Guarantee and Endowment (Local Governing Bodies' Employees) Funds Act 1947*. It establishes a single fund (the Local Government Superannuation Fund) under the management of the Local Government Superannuation Board to provide superannuation and other benefits to employees of municipalities or county or regional councils constituted under the *Local Government Act 1960*.

The *Parliamentary Superannuation Act 1970* establishes a Parliamentary Superannuation Fund to provide superannuation, pensions and other benefits for former Members of the Parliament of Western Australia and their dependants. The Fund is financed from contributions paid by members and moneys appropriated from the Consolidated Revenue Fund.

The *Coal Mine Workers (Pensions) Act 1943* establishes a Coal Mine Workers' Pensions Fund to provide pensions and other benefits for persons formerly engaged in coal mining and for their dependants. The Fund is financed from contributions paid by employees and employers.

## Chapter 25

### PRIVATE FINANCE

#### CURRENCY

The power to legislate with respect to currency, coinage and legal tender and the issue of paper money is vested by the Constitution in the Commonwealth Parliament. This power was originally exercised by the Commonwealth Government under the Coinage Act of 1909 and the Australian Notes Act of 1910. These Acts and later amendments were superseded by the *Reserve Bank Act* 1959 and the *Currency Act* 1965 when a decimal currency system was adopted in Australia with effect from 14 February 1966.

Prior to 14 February 1966 the Australian currency was based on the system then in use in the United Kingdom, and therefore had as its unit the pound ( £ ) divided into twenty shillings (s.) each of twelve pence (d.). The *Currency Act* 1965 provided for the adoption of a monetary unit known as the 'dollar', which is divided into 100 minor units, or 'cents'. Coins were originally issued in denominations of 50 cents, 20 cents, 10 cents, 5 cents, 2 cents and 1 cent. A 1 dollar coin was released in May 1984. The *Reserve Bank Act* 1959 authorised the issue of notes in the denomination of 1 dollar, 2, 5, 10, 20, and 50 dollars, or in any other denomination that the Treasurer determines and notes were issued in all of these. In March 1984 a 100 dollar note was released. The 1 dollar note was withdrawn following the issue of the 1 dollar coin.

Australian notes are legal tender in Australia to any amount, the 1 dollar coin for amounts not exceeding 10 dollars, coins of the denominations of 5, 10, 20 and 50 cents for amounts not exceeding five dollars, and two-cent and one-cent coins for amounts up to and including 20 cents.

#### Rates of Exchange

The following table shows the average telegraphic transfer selling rates of exchange for Australia on a selection of overseas countries. The figures appearing in the table, which are averages of daily quotations, are based on rates quoted by the Commonwealth Trading Bank of Australia.

OVERSEAS EXCHANGE RATES — TELEGRAPHIC TRANSFER SELLING RATES FOR AUSTRALIA ON OVERSEAS COUNTRIES: YEAR ENDED JUNE 1984

Country	Currency	Number to \$A1	Country	Currency	Number to \$A1
Austria	Schillings	16.88	Netherlands	Guilders	2.704
Belgium (a) —			New Caledonia	Francs	132.57
Financial rate	Francs	49.47	New Zealand	Dollars	1.375
Convertible rate	Francs	48.85	Norway	Kroner	6.80
Canada	Dollars	1.1260	Pakistan	Rupees	11.80
China, People's Republic of	Renminbi	1.9317	Philippine Islands	Pesos	11.842
Denmark	Kroner	8.74	Singapore	Dollars	1.904
Fiji	Dollars	0.932	South Africa	Rands	1.0747
France	Francs	7.341	Spain	Pesetas	136.94
Germany, Federal Republic of	Deutsche Marks	2.407	Sri Lanka	Rupees	21.99
Greece	Drachmae	88.17	Sweden	Kronor	7.106
Hong Kong	Dollars	6.953	Switzerland	Francs	1.962
India	Rupees	9.482	Thailand	Bahts	20.54
Italy	Lire	1,465	United Kingdom	Pounds	0.619
Japan	Yen	210.35	United States of America	Dollars	0.9032

(a) The 'convertible' rate applies to trade transactions accompanied by documentation; in respect of other transactions the 'financial' rate applies.

## 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.

**Commonwealth Banking Institutions**

Prior to the operation of the Reserve Bank Act and the Commonwealth Banks Act, passed by the Commonwealth Parliament in 1959, the Commonwealth banking institutions were the Commonwealth Bank, the Commonwealth Trading Bank and the Commonwealth Savings Bank. The Commonwealth Bank, in addition to performing the functions of a central bank, controlled the Australian note issue through a Note Issue Department and also provided special banking facilities through the Rural Credits Department, the Mortgage Bank Department and the Industrial Finance Department. The policy of the Banks was determined by a Commonwealth Bank Board.

The *Reserve Bank Act* 1959 repealed the Commonwealth Bank Acts, the first of which was passed in 1911, and established the Reserve Bank of Australia under the control of a Reserve Bank Board. The Reserve Bank was constituted as the central bank and took over the Note Issue Department and the Rural Credits Department of the former Commonwealth Bank. The function of the Rural Credits Department is to make available to statutory authorities or co-operative associations of primary producers advances to assist the marketing or processing of primary products.

The *Commonwealth Banks Act* 1959 constituted the Commonwealth Banking Corporation, which came into being on 14 January 1960 as the authority responsible for the operations of the Trading Bank, the Savings Bank and a new Development Bank. The Development Bank was formed basically from the Mortgage Bank Department and the Industrial Finance Department of the Commonwealth Bank, to provide finance and advice to persons to assist them in primary production or in the establishment or development of industrial undertakings, particularly small enterprises.

**Trading Banks**

At 30 June 1985 the trading banks conducting business in Western Australia comprised the Commonwealth Bank of Australia, the Australia and New Zealand Banking Group Limited, the Westpac Banking Corporation, the National Australia Bank Limited, the Bank of New Zealand, the Banque Nationale de Paris, the Australian Bank Limited, and The Rural and Industries Bank of Western Australia (General Banking Department).

The operations of trading banks are governed by the *Banking Act* 1959 (Commonwealth) which places them under a degree of control by the central bank, the Reserve Bank of Australia.

TRADING BANKS — AVERAGES OF DEPOSITORS' BALANCES AND BANK ADVANCES  
(\$'000)

Particulars	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Depositors' balances —						
Commonwealth Government and State						
Government —						
Fixed	171,242	158,948	142,073	270,570	289,323	265,246
Current —						
Bearing interest	2,057	2,526	3,305	2,227	1,501	1,531
Not bearing interest	4,251	4,843	6,207	5,177	4,498	3,146
Other than Commonwealth Government and State						
Government —						
Fixed	773,628	797,802	1,001,677	1,308,850	1,647,996	1,730,982
Current —						
Bearing interest	43,947	55,035	52,515	59,337	75,502	115,663
Not bearing interest	626,729	723,647	820,730	874,914	858,865	888,082
Total	1,621,852	1,742,801	2,026,507	2,521,072	2,877,685	3,004,651
Loans, advances and bills discounted (a)	1,368,657	1,678,121	1,943,299	2,288,020	2,571,177	2,874,000
Ratio of loans, advances, etc. to total balances (per cent)	84.4	96.3	95.9	90.8	89.3	95.7

(a) Excludes loans to authorised dealers in the short-term money market.

The table above shows the averages of total amounts on deposit with the trading banks and of their outstanding advances during each of the years 1978-79 to 1983-84. The figures relate to Western Australian business only and represent the annual average of amounts as at the close of business each Wednesday. The information is prepared from returns furnished under the requirements of the *Banking Act* 1959 by all trading banks except The Rural and Industries Bank of Western Australia, which supplies information by special arrangement.

In the following table, which relates to Western Australian business only, the average amount on deposit with each trading bank and the average of its outstanding advances during the month of June 1984 are shown, together with the number of branches and agencies of each bank at 30 June 1984.

TRADING BANKS — BRANCHES, AGENCIES, DEPOSITS AND ADVANCES: JUNE 1984

Bank	Number of branches (a)	Number of agencies (a)	Depositors' balances (b)			Loans, advances, and bills discounted (b) (c)
			Not bearing interest	Bearing interest	Total	
			\$'000	\$'000	\$'000	\$'000
Major trading banks —						
Commonwealth Trading Bank of Australia	87	34	168,364	265,297	433,660	325,919
Australia and New Zealand Banking Group Limited	79	24	142,514	274,751	417,264	416,228
Westpac Banking Corporation	143	21	280,735	474,017	754,751	689,031
National Commercial Banking Corporation of Australia Limited (d)	98	21	141,792	228,899	370,691	456,999
Total, Major trading banks	407	100	733,403	1,242,963	1,976,366	1,888,177
Other trading banks —						
Bank of New Zealand	1	—	177	54	231	2,044
Banque Nationale de Paris	1	—	2,397	6,367	8,764	13,934
Australian Bank Limited	1	—	5,217	21,186	26,403	55,495
The Rural and Industries Bank of Western Australia (General Banking Department)	87	26	157,255	909,408	1,066,662	1,006,485
Total, Other trading banks	90	26	165,046	937,014	1,102,060	1,077,957
TOTAL, ALL TRADING BANKS	497	126	898,449	2,179,976	3,078,425	2,966,134

(a) At 30 June. (b) Averages based on amounts at close of business each Wednesday. (c) Excludes loans to authorised dealers in the short-term money market. (d) Renamed the National Australia Bank Limited, October 1984.

In July 1984 the outstanding advances of the trading banks, excluding The Rural and Industries Bank of Western Australia, the Australian Bank Limited, the Bank of New Zealand and the Banque Nationale de Paris, amounted in total to \$1,930 million. Business advances represented \$1,136 million, personal advances \$761 million, advances to non-profit organisations \$10 million, and to public authorities other than the Commonwealth Government and the State Government \$22 million. Business advances were mainly for rural industry (\$428 million), for retail and wholesale trade (\$183 million) and for manufacturing (\$73 million). Of the personal advances, loans for the building or purchasing of homes accounted for \$70 million.

The following table contains particulars of the average weekly debits to customers' accounts in each year from 1978-79 to 1983-84 and in each quarter of those years. The figures represent the total of all cheques and charges debited to accounts of customers of all trading banks and, in addition, the Rural Credits Department of the Reserve Bank of Australia and the Commonwealth Development Bank of Australia. Debits to Commonwealth Government and State Government accounts at city branches are excluded as they are subject to abnormal influences. The figures are derived by averaging the debits made during weeks ended on Wednesdays during the several periods shown.

**TRADING BANKS**  
**AVERAGE WEEKLY DEBITS TO CUSTOMERS' ACCOUNTS (a)**

Particulars	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
WEEKLY AVERAGE (\$ million)						
Average for quarter ended —						
September	1,155.2	1,354.3	1,649.4	2,116.0	2,570.8	2,926.6
December	1,108.7	1,437.0	1,849.7	2,163.2	2,554.9	3,020.6
March	1,164.2	1,530.6	1,846.7	2,381.3	2,815.3	3,009.4
June	1,266.7	1,531.3	1,959.3	2,486.1	2,663.7	3,218.3
Average for year	1,173.7	1,463.3	1,826.3	2,283.4	2,651.2	3,043.7
PER HEAD OF MEAN ESTIMATED RESIDENT POPULATION (dollars)						
Average for quarter ended —						
September	939.1	1,084.2	1,296.3	1,620.9	1,916.7	2,140.4
December	898.1	1,145.6	1,445.5	1,645.2	1,894.7	2,200.9
March	939.5	1,214.9	1,433.9	1,799.2	2,078.4	2,185.5
June	1,018.0	1,209.8	1,511.5	1,865.7	1,957.0	2,329.8
Average for year	948.8	1,163.9	1,422.4	1,730.9	1,961.7	2,214.3

(a) Excludes debits to Commonwealth Government and State Government accounts at city branches.

### The Rural and Industries Bank of Western Australia

The Rural and Industries Bank of Western Australia was established by the State Government under the Rural and Industries Bank Act of 1944 to replace the former Agricultural Bank of Western Australia. The Bank consists of a General Banking Department and a Government Agency Department, and management is vested in five Commissioners. Since 1956, the General Banking Department has conducted savings bank business through a Savings Bank Division.

### Savings Banks

At 30 June 1985 savings banks operating in Western Australia comprised the Commonwealth Savings Bank of Australia, The Rural and Industries Bank of Western Australia (Savings Bank Division), the Australia and New Zealand Savings Bank Limited, the Bank of New Zealand Savings Bank Limited, the National Australia Savings Bank Limited and the Westpac Banking Corporation Savings Bank Limited.

Individual depositors may not operate on their savings bank accounts by cheque, but cheque accounts are generally available to non-profit organisations such as friendly, co-operative and charitable societies. Interest is paid on deposits with savings banks and no charge is made for the keeping of accounts. A school savings bank service is provided and its operations, except for the number of accounts open at the end of each year, are included in the figures shown in the following table which shows savings bank transactions for each of the years 1978-79 to 1983-84.

### SAVINGS BANK TRANSACTIONS

Particulars		1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Deposits (a)	\$'000	2,447,263	2,744,802	3,284,206	4,108,144	5,381,294	6,277,704
Withdrawals (a)	\$'000	2,415,916	2,721,126	3,214,273	4,054,517	5,116,046	6,134,794
Excess of deposits over withdrawals	\$'000	31,347	23,676	69,933	53,627	265,248	142,910
Interest added to accounts	\$'000	53,770	58,879	73,654	100,265	129,841	160,925
Accounts open at end of year (b)	No.	1,539,416	1,579,722	1,647,837	1,741,114	1,835,917	1,961,811
Depositors' balances at end of year —							
Total	\$'000	1,133,627	1,216,182	1,360,315	1,514,207	1,910,538	2,214,373
Average per operative account	\$	736	770	826	870	1,041	1,129
Average per head of estimated resident population	\$	909	958	1,046	1,133	1,400	1,600

(a) Includes inter-branch transfers. (b) Excluding inoperative accounts (i.e. accounts of less than \$2 which have not been operated on for more than two years).

The following table, which relates to Western Australian business only, shows the number of branches and agencies of each of the savings banks at 30 June 1984. The amount of depositors'

balances held by each bank at the end of June 1984 is also shown. This information, together with similar particulars for each of the other Australian States, is published monthly in the *Commonwealth of Australia Gazette*, and is prepared from returns furnished under the requirements of the *Banking Act 1959* by all savings banks except The Rural and Industries Bank of Western Australia (Savings Bank Division), which supplies information by special arrangement.

SAVINGS BANKS — BRANCHES, AGENCIES AND DEPOSITS  
JUNE 1984

Bank	Number of branches (a)	Number of agencies (a)	Depositors' balances (b) \$'000
Commonwealth Savings Bank of Australia	92	596	748,751
The Rural and Industries Bank of Western Australia (Savings Bank Division)	87	549	516,700
Other savings banks —			
Australia and New Zealand Savings Bank Limited	79	176	226,087
Bank of New Zealand Savings Bank Limited	1	—	89
National Australia Savings Bank Limited	98	52	230,487
Westpac Banking Corporation Savings Bank Limited	143	467	492,259
Total, Other savings banks	321	695	948,922
TOTAL, ALL SAVINGS BANKS	500	1,840	2,214,373

(a) At 30 June. (b) Particulars for the Commonwealth Savings Bank and The Rural and Industries Bank of Western Australia (Savings Bank Division) relate to 30 June, and those for other savings banks to the last Wednesday in June.

In December 1969 approval was given by the Reserve Bank of Australia to a proposal for the establishment of a new type of savings bank account on which interest could be paid at rates above the general deposit rate paid by savings banks. The holder of such an account is required to comply with certain conditions relating to its operation, these conditions varying between banks. The maximum rate of interest payable on these 'investment' accounts at 30 June 1984 was 10.5 per cent per annum. In 1980 'statement' accounts were introduced which also offered interest at rates above the general deposit rate. They are ordinary call accounts but details of transactions are made available to depositors on bank statements issued regularly or on demand. The maximum rate of interest payable on these 'statement' accounts at 30 June 1984 was 11.0 per cent per annum.

### Bank Interest Rates

The following table shows bank interest rates current at 30 June 1984, the dates from which they became operative, and the rates which were applicable prior to those dates, for both loans and deposits.

#### BANK INTEREST RATES AT 30 JUNE 1984

Particulars	Rate per annum	Date from which operative	Previous rate per annum
	per cent		per cent
LENDING RATES			
Trading banks —			
Overdraft —			
Less than \$100,000 (a)	12.00-14.50	February — 1984	13.00-14.00
\$100,000 and over	(b) 14.50-15.00	June — 1984	15.00-15.25
Unsecured personal loans (c)	9.00-9.75	February — 1983	9.25-9.75
Commonwealth Development Bank of Australia —			
Term Loans—			
Less than \$100,000	14.50	May — 1984	14.00
\$100,000 and over	(d)	September — 1981	12.50
Reserve Bank of Australia, Rural Credits Department	(e) 14.25-16.00	April — 1984	(e) 13.25-15.00
Savings banks —			
New housing loans to individuals for owner occupation	11.50-12.00	November — 1983	12.00
Other loans —			
Less than \$100,000 (a)	14.50	March — 1982	13.50
\$100,000 and over	(d)	March — 1972	7.75

BANK INTEREST RATES AT 30 JUNE 1984 — *continued*

Particulars	Rate per annum	Date	Previous rate
	per cent	from which operative	per annum per cent
DEPOSIT RATES			
Trading banks —			
Fixed deposits of less than \$50,000 —			
30 days and less than 3 months	10.00-12.25	June — 1984	10.00-13.00
3 months and less than 6 months	10.10-12.50	June — 1984	10.10-13.00
6 months and less than 2 years	10.50-12.50	April — 1984	10.00-12.50
2 years and less than 4 years	10.75-12.50	April — 1984	10.50-12.00
Fixed deposits of \$50,000 and over	(d)	December — 1980	10.00
Certificates of deposit of \$50,000 and over —			
3 months to 4 years	(d)	September — 1974	6.50
Savings banks —			
Passbook accounts —			
\$4,000 and under	3.75-5.00	December — 1978	3.75-5.25
Over \$4,000	5.00-6.25	April — 1975	6.00-6.50
Statement accounts (f)	3.75-11.00	October — 1983	3.75-11.50
Investment accounts (g)	8.75-10.50	January — 1984	9.00-10.50

(a) Maximum rate(s). (b) Indicator rates reported by major trading banks, used as a basis for setting rates on individual loans. (c) Flat rate. (d) Actual rates are a matter for negotiation between banks and their customers. (e) Standard range of rates on new loans. (f) Statement accounts are ordinary call accounts but details of transactions are made available to depositors on bank statements issued regularly or on demand. A variety of interest rates is offered by banks, the higher rates being generally obtained on larger balances. (g) Subject to special notice and minimum balance requirements.

## INSURANCE

**General Insurance**

General insurance is available to the public in Western Australia from a number of companies and, in some fields, from the State Government Insurance Office. There is also a Motor Vehicle Insurance Trust whose activities are confined to motor vehicle third party insurance.

The *Insurance Act 1973* (Commonwealth) established a comprehensive system of supervision of general insurance business throughout Australia. The Act prescribes minimum standards of financial soundness and authorises the investigation of any insurer who fails to meet the required standards or who appears to be likely to fall below those standards. The Act provides for the appointment of an Insurance Commissioner who is responsible, subject to any directions of the Treasurer, for the administration of the legislation.

The State Government Insurance Office covers fire, marine and general insurance risks for State Government instrumentalities and semi-government and local government authorities. It also conducts some classes of insurance business for the general public, the principal transactions being employers' liability (workers' compensation) and comprehensive motor vehicle insurance.

The following table gives details of general insurance transactions during each of the years from 1977-78 to 1982-83. The amounts shown as 'Premiums' represent the full amount receivable in respect of policies issued or renewed during the year, less stamp duty, returns, rebates and bonuses paid or credited to policy holders during the year. They are not adjusted to provide for premiums unearned at the end of the year and consequently the amounts differ from 'earned premium income' appropriate to the year. The amounts shown as 'Claims' include provision for outstanding claims and represent claims or losses incurred during the year. Salvage and other amounts recoverable have been deducted. The transactions of The Motor Vehicle Insurance Trust are included and they are also shown separately in the table in the section *Motor Vehicle Third Party Insurance*.

GENERAL INSURANCE (a)  
(\$'000)

Particulars	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
<b>Premiums —</b>						
Fire	18,375	17,286	18,640	21,669	23,691	23,852
Crop	2,977	3,811	4,585	4,362	6,661	10,330
Houseowners' and householders'	18,771	20,108	22,926	27,240	30,951	35,961
Marine	6,221	7,183	8,355	9,053	9,193	9,453
Motor vehicle comprehensive	64,065	68,809	73,404	80,206	92,845	102,633
Compulsory third party	27,211	35,122	39,392	55,114	74,456	91,185
Employers' liability	73,199	72,375	69,278	72,135	77,848	117,103
Public liability	3,957	4,299	4,894	6,086	7,325	9,365
Personal accident	5,163	5,440	5,892	6,233	6,898	8,133
Other	18,103	20,454	23,413	26,280	33,514	33,818
<b>Total, Premiums</b>	<b>238,042</b>	<b>254,887</b>	<b>270,779</b>	<b>308,378</b>	<b>363,382</b>	<b>441,833</b>
<b>Claims —</b>						
Fire	9,291	13,165	13,102	15,380	12,619	16,566
Crop	3,248	3,025	4,321	1,326	10,230	9,633
Houseowners' and householders'	11,875	15,544	14,420	15,719	15,804	17,519
Marine	3,296	5,613	6,344	6,164	6,367	6,383
Motor vehicle comprehensive	44,098	49,574	49,932	54,821	66,609	70,597
Compulsory third party	40,657	53,261	65,049	98,239	86,964	119,824
Employers' liability	63,354	46,172	44,315	72,874	96,419	129,336
Public liability	1,817	1,899	2,765	3,539	4,794	3,819
Personal accident	2,050	2,424	3,109	3,174	3,767	4,413
Other	7,890	9,668	11,214	13,333	16,378	13,419
<b>Total, Claims</b>	<b>187,576</b>	<b>200,345</b>	<b>214,571</b>	<b>284,569</b>	<b>319,951</b>	<b>391,509</b>

(a) Excludes premium and claim details for brokers. Transactions of The Motor Vehicle Insurance Trust and the State Government Insurance Office are included.

### Life Insurance

Life insurance business throughout Australia is regulated by the *Life Insurance Act 1945* (Commonwealth), which requires companies to be registered by the Life Insurance Commissioner appointed under the Act. The purpose of the Act, which supersedes State legislation, is to place life insurance business on a uniform basis throughout the Commonwealth and to afford protection to policy holders.

### LIFE INSURANCE

Year	New policies issued			Policies discontinued or reduced			Policies, etc. existing at end of year		
	Policies	Sum insured	Annual premiums	Policies	Sum insured	Annual premiums	Policies	Sum insured	Annual premiums
	Number	\$m	\$m	Number	\$m	\$m	Number	\$m	\$m
<b>ORDINARY AND INDUSTRIAL BUSINESS</b>									
1977-78	51,772	1,006.6	10.8	62,406	438.9	7.7	656,632	4,883.5	78.6
1978-79	50,850	1,137.8	11.6	67,030	471.9	9.3	641,111	5,583.8	81.3
1979-80	47,526	1,243.6	12.6	73,942	772.6	10.5	617,297	6,051.3	83.7
1980-81	37,837	1,113.8	12.3	71,963	837.7	10.6	583,177	6,325.0	85.3
1981-82	34,417	1,124.3	12.3	70,595	905.8	12.1	546,999	6,543.5	85.4
1982-83	33,549	1,202.2	12.7	66,994	985.8	12.7	513,554	6,760.1	84.8
<b>SUPERANNUATION BUSINESS (a)</b>									
1977-78	10,799	634.4	14.8	5,135	190.5	5.3	66,371	1,694.2	45.6
1978-79	9,839	458.3	10.9	5,380	234.8	6.3	70,843	1,916.4	50.0
1979-80	11,718	602.3	14.4	9,588	325.6	8.5	73,035	2,219.2	56.0
1980-81	15,430	977.5	19.7	8,342	322.5	8.0	80,064	2,851.7	67.7
1981-82	15,550	1,374.4	24.7	29,127	440.5	11.0	66,487	3,785.7	81.5
1982-83	12,709	1,361.5	28.0	5,180	498.1	11.5	74,016	4,649.0	97.8
<b>ORDINARY, INDUSTRIAL AND SUPERANNUATION BUSINESS</b>									
1977-78	62,571	1,641.0	25.6	67,541	629.4	13.0	723,003	6,577.7	124.2
1978-79	60,689	1,596.1	22.5	72,410	706.7	15.6	711,954	7,500.2	131.3
1979-80	59,244	1,845.9	27.0	83,530	1,098.2	19.0	690,332	8,270.5	139.7
1980-81	53,267	2,091.3	32.0	80,305	1,160.2	18.6	663,241	9,176.7	153.0
1981-82	49,967	2,498.7	37.0	99,722	1,346.3	23.1	613,486	10,329.2	166.9
1982-83	46,258	2,563.7	40.7	72,174	1,483.9	24.2	587,570	11,409.1	182.6

(a) Includes investment-linked superannuation business.

In terms of total sums insured, life insurance policies relate predominantly to ordinary endowment or whole-of-life insurance and superannuation, although an appreciable volume of industrial business is also undertaken.

### Motor Vehicle Third Party Insurance

Third party insurance in connection with motor vehicle accidents became compulsory on 1 July 1944 under the provisions of the Motor Vehicle (Third Party Insurance) Act of 1943. The Motor Vehicle Insurance Trust was established by an amendment to the Act in 1948. The *Motor Vehicle (Third Party Insurance) Amendment Act 1982* altered the composition of the Trust to comprise the general manager of the State Government Insurance Office, the Under Treasurer or a person nominated by him, a person nominated by the governing body of the Royal Automobile Club of W.A. (Incorporated) and two persons having relevant experience and knowledge nominated by the Minister.

#### THE MOTOR VEHICLE INSURANCE TRUST (\$'000)

Revenue and expenditure	Pool (a) for the year —					
	1978-79r	1979-80r	1980-81r	1981-82r	1982-83r	1983-84
Revenue —						
Premiums	35,118	39,370	55,109	74,444	87,990	93,669
Interest received	11,834	18,894	26,286	37,411	33,947	20,530
Total, Revenue	46,952	58,265	81,395	111,855	121,935	114,199
Expenditure —						
Claims (b)	57,000	66,160	80,114	96,305	105,925	117,767
Commission	80	85	86	90	127	128
Management expenses	845	921	1,012	1,173	1,445	1,648
Re-insurance expenses	94	93	86	111	173	354
Taxation	31	33	36	43	56	69
Total, Expenditure	58,049	67,291	81,335	97,724	107,726	119,965

(a) Figures are revised to 30 June 1985.

(b) Includes estimate for claims outstanding and an allowance for claims not notified.

The Trust administers a Motor Vehicle Insurance Fund in which approved insurers participate. Premiums received from motor vehicle third party insurance and revenue from other sources constitute annual 'pools' and, after payment of claims and other expenses appropriate to each pool, the resulting profit or loss is shared by the participating insurers, which include the State Government Insurance Office. These shares cannot be finally determined until the last claim is paid and it is usually several years before a pool has satisfied all the claims attributable to it. For this reason, the figures given in the previous table are subject to progressive revision as the business of each pool approaches finality.

### Health Insurance Organisations

Health insurance is offered by a number of organisations which provide one or more types of benefit covering such items as hospital and medical fees and funeral expenses to or on behalf of contributing members and their dependants. They include societies registered under the *Friendly Societies Act 1894* and other organisations registered under the *National Health Act 1953* (Commonwealth).

Benefits are available in a wide range to meet the cost, either wholly or in part, of such services as treatment by a general or specialist medical practitioner (including surgical operations and obstetrical attention), X-ray, cardiographic and pathological examinations, physiotherapy, dental treatment, hospital care, home nursing and ambulance transport. Members of friendly societies may contribute also for the supply of medicines and some societies maintain endowment assurance funds and supplementary death benefit funds.

The following tables give details, for the years 1978-79 to 1983-84, of the membership and the financial activities of friendly societies registered under the *Friendly Societies Act*. 'Benefit' members are those who contribute to the Sick and Funeral Fund of a society and 'other' members are principally those who pay only for medical and hospital benefits.

## FRIENDLY SOCIETIES — NUMBER, MEMBERS AND SICKNESS BENEFITS

Particulars	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Registered societies	11	10	10	10	10	10
Branches	215	215	207	213	205	181
Members at end of year —						
Benefit members of sick and funeral funds	10,955	10,845	10,299	9,820	9,404	9,022
Total members (all benefits)	70,748	70,100	63,536	55,152	54,946	37,749
Sickness benefits (a) —						
Number of members paid	707	76	70	—	—	—
Number of weeks of sick pay	21,497	3,177	3,217	—	—	—

(a) From 1979-80 only two societies continued to pay sickness benefits.

FRIENDLY SOCIETIES — REVENUE AND EXPENDITURE  
(\$'000)

Particulars	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Revenue —						
Fees, contributions and levies	14,066	16,982	16,560	19,152	21,509	18,182
Interest, dividends and rent	320	381	437	528	568	537
Other	864	1,480	1,203	1,328	1,377	1,344
Total, Revenue	15,250	18,843	18,200	21,008	23,454	20,063
Expenditure —						
Sick pay	25	2	2	—	—	—
Medical attendance and medicine	13,490	16,078	16,789	17,486	20,932	18,378
Death benefits	74	103	106	111	119	112
Administration	834	960	1,000	1,137	1,213	1,248
Other	715	766	869	1,311	1,297	1,152
Total, Expenditure	15,138	17,909	18,766	20,045	23,561	20,890
Balance of funds at end of year	7,536	8,470	7,904	11,573	14,165	12,458

## 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. They also provide a means of investment for shareholder members, trustee funds and other depositors. The funds of the societies may be in the form of payment for fully-paid shares, subscriptions for contributing shares, money placed on deposit, or negotiated loans. Another important source of revenue became available to the societies in 1956-57 when, under the *Housing Agreement Act 1956* (Commonwealth), it was provided that moneys should be allocated to approved institutions from Commonwealth Government funds advanced to the States for housing. The current legislation, the *Housing Assistance Act 1984* makes provision for financial assistance to the States for the ten years ended 30 June 1994. Moneys received by the States under this Act may be made available to home purchasers through Building Societies as well as other lending agencies.

The *Building Societies Act 1976* established a Building Societies Advisory Committee of six members, comprising the Registrar of Building Societies as chairman and five other members appointed by the Minister. Of the five members, one shall be the Commissioner for Consumer Affairs or an officer of the Department of Consumer Affairs nominated by the Commissioner, three shall be persons each having experience in the conduct and management of a society or societies, and one shall be a person having extensive financial knowledge or experience but who is unconnected with the business of making loans for housing purposes.

The functions of the Committee, as set out in the Act, are to submit recommendations to the Minister for the more effective operation of societies; to make recommendations and submit proposals to the Minister from time to time with respect to the administration of the Act and the model rules under the Act; to investigate and report to the Minister on such other matters relating to societies and the provision of funds for home finance as may be referred to it by the Minister; to make

recommendations to the Minister with respect to the functions and powers of societies; to advise the Registrar on any matters referred to it by him; and to perform such other functions as may be prescribed.

The following table shows particulars of the activities of permanent and terminating building societies registered in Western Australia for the years 1978-79 to 1983-84.

#### BUILDING SOCIETIES (a)

Particulars	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
PERMANENT SOCIETIES						
Number of societies	10	10	10	9	9	8
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Liabilities —						
Withdrawable shares	858,380	966,319	1,020,465	1,129,730	1,265,212	1,374,872
Deposits	681,851	812,817	994,100	1,030,780	948,426	861,647
Loans	31,804	33,365	34,864	29,678	26,751	25,119
Other	29,492	36,989	50,775	71,075	71,773	83,841
Total, Liabilities	1,601,527	1,849,490	2,100,204	2,261,263	2,312,162	2,345,479
Assets —						
Amount owing on loans	1,270,625	1,491,983	1,650,304	1,793,793	1,743,068	1,664,158
Deposits	209,507	170,132	214,263	168,426	128,996	44,805
Bills, bonds and other securities	99,246	162,811	202,718	256,783	381,842	583,316
Other	22,149	24,564	32,919	42,261	58,256	53,200
Total, Assets	1,601,527	1,849,490	2,100,204	2,261,263	2,312,162	2,345,479
Expenditure —						
Interest paid and payable	129,819	153,629	182,917	241,250	279,807	254,858
Other	23,609	26,606	30,757	38,611	46,079	55,381
Total, Expenditure	153,428	180,235	213,674	279,861	325,886	310,239
Income —						
Interest received and receivable	155,397	183,081	218,856	287,877	336,771	319,494
Other	5,626	7,074	7,336	8,349	7,962	10,028
Total, Income	161,023	190,155	226,192	296,226	344,733	329,522
TERMINATING SOCIETIES						
Number of societies	534	500	484	444	342	220
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Liabilities —						
Loans —						
Banks	28,527	30,284	30,739	31,144	29,496	32,476
Government (b)	79,941	88,784	94,070	99,654	109,872	116,845
Other	17,427	18,852	19,442	19,857	19,661	23,167
Other	2,585	2,854	3,039	2,977	2,763	3,134
Total, Liabilities	128,480	140,773	147,290	153,631	161,791	175,622
Assets —						
Amount owing on loans (c)	115,597	126,696	129,721	131,632	139,213	150,705
Other	12,883	14,078	17,569	21,999	22,578	24,916
Total, Assets	128,480	140,773	147,290	153,631	161,791	175,621
Expenditure	8,462	9,438	10,717	12,586	14,418	15,380
Income	8,829	9,790	11,067	12,629	14,859	15,757

(a) The financial years shown do not relate to a uniform accounting period, the actual period varying according to the financial year adopted by individual societies. (b) Loans received by societies through the Commonwealth and State Housing Agreement. (c) Net of borrowing members' subscriptions for actuarial societies. Actuarial societies are those in which repayments of an advance are not normally offset against the advance until the sum of total subscriptions plus interest on these subscriptions equals the advance.

#### INSTALMENT CREDIT FOR RETAIL SALES

The statistics in the following tables cover all types of instalment credit schemes which relate primarily to the financing of retail sales of goods in which repayment is made by regular predetermined instalments. Types of schemes covered include hire purchase, time payment, budget account and personal loans which relate primarily to the financing of retail sales of goods. In these statistics the term 'retail sales' relates to retail sales by retail establishments coming within the scope of the Censuses of Retail Establishments conducted periodically by the Australian Statistician, Canberra (see Chapter 18).

Credit schemes which do not involve repayment by regular predetermined instalments, lay-bys, and all credit transactions which relate mainly to the financing of 'producer' type goods such as plant, machinery and motor vehicles which would normally be used for *commercial* purposes are outside the scope of these statistics. In addition, the instalment credit transactions of businesses covered by these statistics which relate primarily to the financing of sales of land, buildings, property improvements, travel and services such as repair and maintenance work, and schemes involving rental or leasing are not included.

In the following tables, statistics of type of business have been classified according to 'Finance companies' and 'Other businesses'. A definition of the former term is given in the section *Finance Companies*. Most of the businesses included in the category 'Other businesses' are those operating retail establishments which come within the scope of the Census of Retail Establishments and which provide instalment credit for retail sales of consumer commodities. The remaining businesses comprise unincorporated finance businesses, and businesses other than wholesalers and manufacturers, whose financing activities would generally be regarded as ancillary to some other function.

INSTALMENT CREDIT FOR RETAIL SALES — AMOUNT FINANCED  
HOUSEHOLD AND PERSONAL GOODS  
(\$ million)

Year	Finance companies			Other businesses			All businesses		
	Hire purchase	Other instalment credit	Total	Hire purchase	Other instalment credit	Total	Hire purchase	Other instalment credit	Total
1978-79	8.0	17.6	25.6	5.1	14.4	19.4	13.1	31.9	45.0
1979-80	9.2	24.6	33.9	5.1	8.1	13.2	14.4	32.8	47.1
1980-81	13.9	26.7	40.6	5.6	8.2	13.8	19.5	34.8	54.4
1981-82	9.6	30.6	40.2	6.6	7.9	14.5	16.2	38.5	54.8
1982-83	9.0	31.3	40.2	4.7	13.2	17.9	13.7	44.5	58.1
1983-84	10.9	42.8	53.7	3.8	16.4	20.3	14.7	59.2	73.9

INSTALMENT CREDIT FOR RETAIL SALES — AMOUNT FINANCED  
MOTOR VEHICLES, ETC.: ALL BUSINESSES  
(\$ million)

Year	Hire purchase				Other instalment credit				Total hire purchase and other instalment credit
	Cars and station wagons			Total	Cars and station wagons			Total	
	New	Used	Other (a)		New	Used	Other (a)		
1978-79	35.3	75.4	16.9	127.5	3.7	6.0	1.4	11.1	138.7
1979-80	31.1	59.7	12.4	103.3	1.7	5.6	1.2	8.5	111.8
1980-81	39.0	59.3	16.2	114.5	2.1	7.6	2.5	12.2	126.6
1981-82	51.6	72.1	22.9	146.6	1.5	7.6	1.9	11.0	157.5
1982-83	48.0	69.3	29.4	146.7	1.0	6.4	1.7	9.0	155.8
1983-84	64.3	84.1	27.8	176.3	1.5	5.7	2.3	9.6	185.8

(a) Includes new and used motor cycles, boats, caravans, trailers, motor parts and accessories.

INSTALMENT CREDIT FOR RETAIL SALES  
BALANCES OUTSTANDING (a)  
(\$ million)

At 30 June —	Type of business		Total
	Finance companies	Other businesses	
1979	316.8	11.9	328.8
1980	308.3	6.9	315.2
1981	319.2	7.6	326.8
1982	375.9	8.1	384.0
1983	394.4	9.2	403.6
1984	450.2	7.8	458.0

(a) Includes hiring charges, interest and insurance.

In interpreting movements in outstanding balances, it should be noted that these movements are determined not only by new amounts financed and cash collections under existing agreements, but also by other liquidations of balances such as rebates allowed for early payouts and bad debts written off.

### FINANCE COMPANIES

Information relating to the lending operations of finance companies in Western Australia is given in the following tables. A comprehensive account of the scope of the statistics, definitions, and more complete details of the transactions of finance companies are given in the annual bulletin *Finance Companies: Assets, Liabilities, Income and Expenditure* (Catalogue No. 5616.0) and the monthly statement *Finance Companies* (Catalogue No. 5614.0), published by the Australian Statistician, Canberra.

For the purpose of these statistics, finance companies are defined as companies which are engaged mainly in providing to the general public (businesses as well as persons in their private capacity) credit facilities of the following types: hire purchase and other instalment credit for retail sales; personal loans; wholesale finance; other consumer and commercial loans; factoring; leasing of business equipment and plant; and bill of exchange transactions. Figures in the following tables relate only to those finance companies which individually, or as a group of related finance companies, had balances outstanding in the prescribed types of finance agreements of \$5 million or more. The finance companies covered in these statistics, in so far as they provide credit for retail sales, are also included in the statistics shown in the preceding section *Instalment Credit for Retail Sales*.

**Amount Financed.** The following table shows the amount financed, according to type of agreement, i.e. instalment credit for retail sales, wholesale finance, personal loans, other consumer and commercial loans, in Western Australia for the years 1978-79 to 1983-84.

FINANCE COMPANIES  
AMOUNT FINANCED: TYPE OF AGREEMENT  
(\$ million)

Year	Instalment credit for retail sales	Wholesale finance	Personal loans	Other consumer and commercial loans		Total
1978-79	164.3	473.5	37.8	370.8		1,046.3
1979-80	145.6	476.5	44.8	416.3		1,083.2
1980-81	167.2	517.6	61.5	585.1		1,331.3
1981-82	197.7	632.1	69.8	628.9		1,528.5
1982-83	196.0	576.5	74.4	455.2		1,302.1
1983-84	239.5	676.5	95.9	604.9		1,616.9

**Collections and other Liquidations of Balances.** The following table shows the collections and other liquidations of balances, according to type of agreement, i.e. instalment credit for retail sales, wholesale finance, and other consumer and commercial loans, made by finance companies in Western Australia for the years 1978-79 to 1983-84.

FINANCE COMPANIES  
COLLECTIONS AND OTHER LIQUIDATIONS OF BALANCES  
(\$ million)

Year	Instalment credit for retail sales	Wholesale finance	Personal loans	Other consumer and commercial loans		Total all contracts
				Contracts including charges	Contracts excluding charges	
1978-79	236.4	475.9	46.3	207.1	205.4	1,171.2
1979-80	239.8	485.6	56.2	210.2	232.9	1,224.7
1980-81	240.1	552.2	57.2	244.6	272.6	1,366.7
1981-82	253.2	618.0	75.3	302.5	391.4	1,640.3
1982-83	293.8	610.3	90.5	341.9	421.6	1,758.2
1983-84	327.2	704.1	106.0	505.7	331.6	1,974.7

**Balances Outstanding.** The following table shows the balances outstanding in Western Australia, according to type of agreement, and the total balances outstanding at the end of each year from 1978-79 to 1983-84.

FINANCE COMPANIES  
BALANCES OUTSTANDING: TYPE OF AGREEMENT  
(\$ million)

Year	Instalment credit for retail sales	Wholesale finance	Personal loans	Other consumer and commercial loans		Total all contracts
				Contracts including charges	Contracts excluding charges	
1978-79	316.8	161.3	60.7	343.3	204.5	1,086.7
1979-80	308.3	161.1	70.1	378.0	269.6	1,187.1
1980-81	319.2	132.9	96.4	504.6	392.5	1,445.5
1981-82	375.9	162.5	121.9	578.2	480.1	1,718.6
1982-83	394.4	142.2	136.1	593.0	361.9	1,627.6
1983-84	450.2	128.9	152.9	594.0	349.6	1,675.7

**Business Plant and Equipment on Lease.** The following table shows the initial capital cost of business plant and equipment on lease and the balances outstanding in Western Australia at the end of each year from 1978-79 to 1983-84.

FINANCE COMPANIES  
BUSINESS PLANT AND EQUIPMENT ON LEASE  
(\$ million)

Year	Initial capital cost of goods newly leased during year	Balances outstanding at end of year
1978-79	226.6	482.1
1979-80	279.2	628.1
1980-81	351.6	791.0
1981-82	284.2	828.6
1982-83	214.9	744.0
1983-84	274.8	709.9

### BANKRUPTCY

Under the provisions of the *Bankruptcy Act 1966* (Commonwealth), which is administered by the Attorney-General, the State of Western Australia is a proclaimed Bankruptcy District and Western Australia's District Registry of the Federal Court of Australia has federal jurisdiction in bankruptcy matters. There is a Registrar in Bankruptcy whose duties include the holding of public sittings for the examination of bankrupts, the examination of witnesses, the issuing of bankruptcy notices and creditors' petitions, and such other duties as are specified in the Act or delegated to him by the Court. Another bankruptcy officer is the Official Receiver, who acts under the general authority and direction of the Court and whose duties relate to the conduct of the debtor and to the realisation and administration of his estate.

The bankruptcy of an estate may result from a petition by either the debtor or the creditors. In cases where it appears certain that the assets of a deceased estate will be insufficient to meet the debts, the executor or a creditor may petition to have the estate administered in bankruptcy.

Compositions, deeds of assignment and deeds of arrangement are provided for in the Act. A debtor may call a meeting of his creditors and either compound with them to pay a certain sum in the dollar as full settlement of his debts or enter into a deed of arrangement allowing him a specified time in which to pay. On the other hand, his creditors may require him to execute a deed of assignment, by which control of his affairs passes to a trustee registered under the Act, or to file a petition in bankruptcy.

The following table relates to bankruptcy proceedings during each of the years from 1978-79 to 1983-84.

## BANKRUPTCY PROCEEDINGS

Year	Bankruptcies (a)				Compositions, arrangements and assignments without sequestration		
	On petition of —		Assets (\$'000)	Liabilities (\$'000)	Number	Assets (\$'000)	Liabilities (\$'000)
	Creditors	Debtors					
1978-79	19	389	1,166	5,908	91	2,344	4,571
1979-80	26	555	2,670	10,228	121	4,685	8,311
1980-81	42	584	2,473	11,582	101	2,269	7,472
1981-82	32	517	5,515	11,620	146	2,388	5,622
1982-83	51	678	2,804	34,652	256	4,833	20,701
1983-84	45	660	3,928	25,738	261	9,627	33,841

(a) Includes orders for administration of deceased persons' estates.

## OFFICE OF TITLES

The Office of Titles was established under the provisions of the *Transfer of Land Act 1893*. The Act provides for the appointment of a Commissioner of Titles, a Deputy Commissioner of Titles and a Registrar of Titles. The principal functions of the Office are the registration and recording of all instruments and dealings affecting privately-owned land or land alienated from the Crown, the certification and issue of titles to lands, and the maintenance of a register of legal ownership.

The number of documents accepted for registration during the year ended 30 June 1984 was 226,066.

## OFFICE OF TITLES

Particulars	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Number of registrations —						
Certificates of title —						
Crown grant	2,056	1,547	1,146	1,501	1,427	1,448
Other	27,361	28,905	26,810	25,276	23,137	21,889
Leases —						
Crown	463	436	382	339	344	452
Other	40	33	41	50	78	49
Transfers	53,400	57,495	63,417	60,029	49,429	60,216
Mortgages	55,485	59,095	62,566	58,580	52,688	64,730
Discharges of mortgages	44,548	47,960	53,778	55,455	52,100	61,131
Caveats lodged	12,066	12,848	11,735	11,244	10,397	10,845
Amount of consideration —	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Transfers	1,737,786	1,959,002	2,726,514	2,768,483	2,091,954	2,880,952
Mortgages	1,797,147	2,313,716	2,925,700	2,881,357	2,844,908	4,257,105
Fees collected	3,606	3,925	5,123	6,097	5,821	7,627
Expenditure	2,858	3,317	3,856	4,404	4,942	5,595
Assurance Fund —						
Amount of credit at 30 June	397	423	458	521	564	646

## PUBLIC TRUST OFFICE

The *Public Trustee Act 1941* established the Public Trust Office which is administered by the Public Trustee.

The principal functions of the Public Trustee are the administration of the estates of deceased persons, including intestate estates; the management of the affairs of certain persons rendered incapable by mental illness or other infirmity; and the receipt of moneys under the control or order of the Supreme Court of Western Australia, to be invested and used for the maintenance, education or other benefit of the persons entitled thereto. The Public Trustee receives from the Workers' Compensation Board funds to be held in trust for investment and to be paid out at the direction of the Board. He may also act in the capacity of agent in cases of need.

## PUBLIC TRUST OFFICE

Particulars	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Matters accepted for administration —						
Estates of —						
Deceased persons	1,455	1,413	1,386	1,270	1,252	1,256
Mentally incapable persons	93	117	111	146	149	168
Infirm persons	54	85	93	91	141	121
Uncared-for property	—	—	2	2	—	—
Court trusts	139	145	142	124	161	186
Workers' compensation	86	101	68	96	79	70
Agencies	35	47	75	67	103	145
Total	1,862	1,908	1,877	1,796	1,885	1,946
Matters on hand at 30 June	6,242	6,204	6,078	5,766	6,081	6,351
Value of transactions —	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Trust moneys received	27,800	31,043	34,459	33,159	39,130	43,360
Trust moneys paid	24,264	27,250	32,355	29,936	35,758	40,964
Unclaimed moneys paid to Consolidated Revenue Fund	91	98	162	279	315	274
Value of estates and other matters on hand at 30 June	79,440	88,796	97,389	110,741	120,403	134,583

## CORPORATE AFFAIRS DEPARTMENT

The Commissioner for Corporate Affairs is responsible, subject to the Minister, for the administration of the Companies (Western Australia) Code, the *Business Names Act 1962*, the *Associations Incorporation Act 1895* and the *Bills of Sale Act 1899*.

## CORPORATE AFFAIRS DEPARTMENT

Particulars	1979	1980	1981	1982	1983	1984
Number of registrations effected —						
Local companies (a)	3,191	5,224	7,401	5,445	2,867	3,521
Other companies	485	506	719	75	20	17
Business names	30,760	33,383	35,355	37,006	38,079	38,393
Associations	246	308	258	365	414	851
Bills of sale and liens —						
Registrations	84,803	86,357	88,899	84,939	82,818	95,452
Satisfactions entered	689	769	812	703	770	911
Amount of bills of sale and liens —	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Registrations	517,453	502,099	741,371	667,936	776,201	406,584
Satisfactions entered	11,758	35,144	39,857	51,445	87,242	45,093
Fees collected (b)	3,261	3,610	4,458	5,497	6,931	8,845

(a) Companies incorporated in Western Australia. (b) Year ended 30 June.

## LOTTERIES AND BETTING

## Lotteries

The Lotteries Commission was established under the provisions of the *Lotteries (Control) Act 1932*. The legislation currently in force is the *Lotteries (Control) Act 1954*. The Commission, as constituted by the Act, consists of four members appointed by the Minister. The principal functions of the Commission are to conduct lotteries and other similar devices in Western Australia to raise money for charitable purposes, and to control lotteries conducted by other persons. More recently, the *Lotto Act 1981* was enacted to provide for the conduct of lotto games by the Commission either in its own right or in association with like authorities in other States. In 1982 an amendment to the *Lotteries (Control) Act* was enacted to provide for the conduct of instant lotteries.

The Acts require that all prizes distributed in lotteries and lotto games conducted by the Commission shall be cash prizes. It is further provided that the total expenses of conducting lotteries and lotto games in any year, including commission payable on ticket sales and the remuneration of members of the Commission, shall not exceed 25 per cent of the gross amount received from the sale of tickets.

The Commission is required to pay 20 per cent of all moneys received in respect of lotteries and lotto games into a special account, which is kept at the Treasury in terms of the *Hospital Fund*

*Act 1930.* Moneys received from instant lotteries are paid into the Sports — Cultural Instant Lottery Account also kept at the Treasury. The *Lotteries (Control) Act 1954* provides for half of the surplus moneys to be paid to the Minister of Sport and Recreation to be distributed among bodies engaged in sport and the other half to the Minister for the Arts for distribution among bodies engaged in the conduct of cultural organisation. Moneys remaining to the credit of the Commission after meeting all outgoings authorised by the Act may, with the consent of the Minister, be applied to any approved charitable purpose or in the purchase, improvement or maintenance of lands and buildings for the purposes of the Act.

LOTTERIES COMMISSION — FINANCIAL TRANSACTIONS  
(\$'000)

Particulars	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
GENERAL ACCOUNT						
Receipts —						
Sale of standard lottery tickets	21,400	21,098	19,900	18,698	14,000	11,699
Sale of instant lottery tickets	..	..	..	..	32,000	42,348
Lotto subscriptions	2,344	7,814	13,159	23,958	33,964	49,750
Total	23,744	28,912	33,059	42,656	79,964	103,796
Expenses —						
Prize money	14,529	17,367	19,873	25,892	48,214	62,590
Commission on ticket sales	1,796	2,202	2,541	3,303	6,257	8,170
Administration	1,583	1,675	1,971	2,066	3,655	4,929
Total	17,908	21,245	24,385	31,262	58,126	75,689
Surplus available for distribution	5,836	7,668	8,674	11,394	21,838	28,107
ACCUMULATED FUNDS ACCOUNT						
Balance at beginning of year	1,115	1,976	2,993	2,476	3,479	5,687
Surplus available for distribution	5,836	7,668	8,674	11,394	21,838	28,107
Unclaimed prizes	356	406	549	451	260	675
Rent and interest received	566	685	878	1,365	1,901	2,215
Other	1,567	12	1	25	—	19
Total	9,440	10,746	13,095	15,711	27,478	36,703
Grants approved	6,564	7,718	10,619	12,232	21,791	27,761
Lotto fund	—	—	—	—	—	—
Prizes paid	27	—	—	—	—	—
Other	873	35	—	—	—	—
Total	7,464	7,753	10,619	12,232	21,791	27,761
Balance at end of year	1,976	2,993	2,476	3,479	5,687	8,942
AMOUNT OF GRANTS PAID						
Hospitals and medical and health services	5,428	5,842	7,836	8,219	12,247	} 15,905
Infant health services	15	9	26	13	97	
Sport and cultural activities	..	..	..	..	5,700	} 6,700
Homes, orphanages and mission centres	548	468	555	772	731	
Other charitable organisations	873	878	1,879	1,452	2,131	} 3,161
Total	6,865	7,197	10,296	10,456	20,906	

LOTTO GAMES — NUMBER OF GAMES AND COUPON SALES

Particulars	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Number of games	18	50	50	50	50	89
Number of coupons sold	'000 1,044	3,519	5,637	8,844	11,397	14,983
Receipts from coupon sales	\$'000 2,344	7,814	13,159	23,958	33,964	49,750

INSTANT LOTTERIES —  
NUMBER OF GAMES AND COUPON SALES

Particulars	1982-83	1983-84
Number of games	64	85
Number of coupons sold '000	32,000	42,348
Receipts from coupon sales \$'000	32,000	42,348

## LOTTERIES COMMISSION — NUMBER OF CONSULTATIONS AND TICKET SALES

Year	Type of lottery									Total
	\$20	\$10	\$8	\$5	\$4	\$3	\$2	\$1	50c	
NUMBER OF CONSULTATIONS										
1978-79	1	2	—	4	2	—	26	94	—	129
1979-80	2	1	—	3	1	—	26	90	—	123
1980-81	1	2	—	2	—	—	28	93	—	126
1981-82	—	1	3	3	—	—	28	82	—	117
1982-83	—	1	—	5	—	—	24	57	—	87
1983-84	—	—	—	7	—	—	41	—	—	48
NUMBER OF TICKETS SOLD ('000)										
1978-79	100	200	—	400	200	—	2,600	9,400	—	12,900
1979-80	200	100	—	300	100	—	2,600	9,000	—	12,300
1980-81	100	200	—	200	—	—	2,800	9,300	—	12,600
1981-82	—	100	800	300	—	—	2,800	8,199	—	12,199
1982-83	—	100	—	500	—	—	2,400	5,700	—	8,700
1983-84	—	—	—	700	—	—	4,100	—	—	4,800
RECEIPTS FROM TICKET SALES (\$'000)										
1978-79	2,000	2,000	—	2,000	800	—	5,200	9,400	—	21,400
1979-80	3,998	1,000	—	1,500	400	—	5,200	9,000	—	21,098
1980-81	2,000	2,000	—	1,000	—	—	5,600	9,300	—	19,900
1981-82	—	1,000	2,400	1,500	—	—	5,599	8,199	—	18,698
1982-83	—	1,000	—	2,500	—	—	4,800	5,700	—	14,000
1983-84	—	—	—	3,500	—	—	8,200	—	—	11,700

**Betting**

The *Betting Control Act 1954* and the *Totalisator Agency Board Betting Act 1960* provide for the regulation and control of betting and bookmaking on horse racing and greyhound racing in Western Australia.

The *Betting Control Act* authorises the Totalisator Agency Board to issue licences enabling the holder to carry on the business of bookmaking on a race-course or at registered premises, and betting by or with a person not so licensed is unlawful.

The *Totalisator Agency Board Betting Act* gives the Totalisator Agency Board authority to regulate and control off-course betting on totalisators through the Board and betting with the Board. The Board consists of eight members, one of whom is the General Manager of the Board. The other seven members are appointed by the Governor and comprise a chairman nominated by the Minister, three persons nominated by The Western Australian Turf Club, and three persons nominated by the Western Australian Trotting Association.

The application of the Act is confined to areas declared by proclamation to be 'totalisator agency regions'. The first agency established by the Board was opened on 18 March 1961. At 31 July 1983 there were 177 agencies in operation.

The Board derives its principal revenues from commission on bets and from a duty of 1½ per cent on the gross takings of every totalisator, as provided by the *Totalisator Duty Act 1905*. The Board may also borrow money, subject to the approval of the Treasurer. The *Totalisator Agency Board Betting Act* requires that the Board shall pay to The Western Australian Turf Club, the Western Australian Trotting Association and the Greyhound Racing Control Board the funds remaining after meeting all taxes and other specified items of expenditure.

Details of taxes, licence fees and duties payable in connection with horse racing are shown in Chapter 24 and the amounts collected during the six-year period ended 30 June 1982 appear in the table *State and Local Authorities: Taxation by Type of Tax* also in Chapter 24.

The following table shows the amounts invested on totalisators on race-courses and through agencies of the Totalisator Agency Board, and amounts invested with licensed bookmakers, during each of the six years 1978-79 to 1983-84.

**TOTALISATOR INVESTMENTS  
AND INVESTMENTS WITH LICENSED BOOKMAKERS**

Type of investment	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Totalisator investments —						
On course	36,239	37,479	39,801	40,002	43,850	45,757
Off course (a)	190,245	201,919	232,585	261,488	273,525	292,146
Total	226,484	239,398	272,386	301,490	317,375	337,903
Investments with licensed bookmakers —						
On course	105,711	101,588	108,579	109,763	125,272	148,619
Total	105,711	101,588	108,579	109,763	125,272	148,619
All investments —						
On course	141,950	139,066	148,380	149,765	169,122	194,376
Off course	190,245	201,919	232,585	261,488	273,525	292,146
Total	332,195	340,985	380,965	411,253	442,647	486,522
	\$	\$	\$	\$	\$	\$
Per head of mean estimated resident population	269	271	297	312	328	354

(a) Investments made through agencies of the Totalisator Agency Board.

**THE STOCK EXCHANGE OF PERTH LIMITED**

The following table gives details of turnover during each of the five years 1978-79 to 1983-84.

**THE STOCK EXCHANGE OF PERTH LIMITED  
TURNOVER OF STOCKS AND SHARES  
(Figures supplied by The Stock Exchange of Perth Limited)**

Particulars	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
NUMBER OF SHARES TRADED						
	'000	'000	'000	'000	'000	'000
Ordinary —						
Industrial	36,892	r 55,648	r 84,736	62,764	78,400	116,443
Oil	26,166	120,640	r 263,321	193,869	190,689	341,289
Mining	115,498	300,702	r 493,422	179,141	523,354	666,399
Preference —						
Industrial	83	80	} (a) 31	n.a.	n.a.	n.a.
Mining	3	4				
Total	178,644	r 477,074	r 841,478	435,774	792,443	1,124,131
VALUE OF TURNOVER						
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Shares —						
Ordinary —						
Industrial	46,468	r 102,620	r 127,957	114,673	75,143	241,094
Oil	7,033	50,912	r 143,683	49,325	30,645	85,110
Mining	r 42,496	185,938	r 273,336	50,699	159,594	203,586
Preference —						
Industrial	114	86	} r 97	193	186	73
Mining	4	17				
Total	r 95,997	r 339,470	r 544,976	214,890	265,567	529,813
Commonwealth and semi-government loans	r 8,424	1,013	r 349	465	615	977
Debentures, unsecured notes, etc.	r 1,673	2,435	r 783	r 186	204	1,131
Total	r 10,097	3,448	r 1,133	650	819	2,108
Total value of turnover	r 106,212	r 343,021	r 546,206	r 215,541	266,386	531,920

(a) Figure relates to part year trading only.

The Stock Exchange of Perth commenced operations in 1889, and conducted business at a number of locations before moving in December 1968 to its present quarters at Exchange House. At 30 June 1985 there were thirty-eight members of the Exchange, and Perth was the Home Exchange for 178 companies.

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.

The Perth Second Board also pioneered the concept of a two-tiered voting system, by which management control may be maintained by the original principals while keeping return on capital relative to the size of equity investment.

By June 1985, twenty-nine companies were listed on the Second Board, with initial capital raisings of \$45.7 million.

## Chapter 26

### STATISTICAL SUMMARY

The following pages contain a historical summary of some of the more important statistics relating to Western Australia.

The first year shown on each page is the earliest for which any series on that page is available.

Figures shown in these tables are the latest available at the time of publication; in some cases they may not be strictly comparable with those shown in earlier years.

## 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)		Popula- tion of Perth Statistical Division (b) (d)
	Males	Females	Persons	Recorded natural increase (e)	Estimated net migration (f)	Total increase (g)		Year ended —		
						Number	Per cent (h)	30 June	31 Dec- ember	
1829	769	234	1,003	n.a.	n.a.	n.a.	n.a.			(000)
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
1941	246,842	226,371	473,213	4,906	-5,769	-863	-0.18	474,180	473,988	260.0
1942	246,816	229,839	476,655	3,791	-349	3,442	0.73	474,833	476,619	265.6
1943	246,389	231,875	478,264	5,137	-3,528	1,609	0.34	476,989	476,745	272.3
1944	249,301	235,474	484,775	5,857	654	6,511	1.36	478,271	481,498	281.2
1945	251,590	238,498	490,088	5,418	-105	5,313	1.10	484,720	487,510	289.0
1946	255,310	241,663	496,973	7,277	-392	6,885	1.40	489,982	492,771	297.9
1947	261,653	247,109	508,762	8,119	3,670	11,789	2.37	497,006	502,951	307.3
1948	268,304	253,695	521,999	8,246	4,991	13,237	2.60	508,747	514,621	315.8
1949	280,273	263,911	544,184	8,721	13,464	22,185	4.25	521,932	532,603	331.4
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	666,998	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	r 733.0
1972	558,030	534,574	1,092,604	14,780	7,875	22,257	2.08	1,068,972	1,081,634	r 753.5
1973	568,500	545,482	1,113,982	12,700	8,910	21,378	1.96	1,091,845	1,101,921	r 773.6
1974	584,552	561,439	1,145,991	12,506	19,700	32,009	2.87	1,113,723	1,127,887	r 801.4
1975	594,518	572,885	1,167,403	12,411	9,410	21,412	1.87	1,142,777	1,155,499	r 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	r 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	666,730	652,229	1,318,959	13,905	21,088	35,454	2.76	1,284,014	1,301,238	935.8
1982	682,907	668,438	1,351,345	14,066	18,320	32,386	2.46	1,319,220	1,336,588	959.4
1983	694,434	680,466	1,374,900	r 14,718	r 8,837	23,555	1.74	1,351,447	1,363,890	976.0
1984	703,434	690,531	1,393,965	13,122	5,943	19,065	1.39	1,374,552	1,384,085	991.1

(a) Estimates for years prior to 1982 are based on final census results; those for 1982 and later are subject to revision. (b) Figures for 1971 and later refer to the estimated resident population. (c) Minus sign (-) denotes decrease. (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. 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. (f) Interstate and overseas. (g) For the years 1972 to 1981 discrepancies between the sum of natural increase and net migration, and total increase, are due to 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	Live births registered (b)	Deaths registered (b)(c)	Natural increase (d)	Rate per 1,000 of mean population (a)				Infant mortality	
					Marriages	Births	Deaths (c)	Natural increase (d)	Number (e)	Rate (f)
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	13.85	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	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
1931	2,741	8,549	3,681	4,868	6.34	19.77	8.51	11.26	355	41.53
1932	2,904	7,965	3,715	4,250	6.68	18.31	8.54	9.77	355	44.57
1933	3,374	7,874	3,790	4,084	7.69	17.95	8.64	9.31	290	36.83
1934	3,682	7,801	4,076	3,725	8.32	17.64	9.21	8.42	319	40.89
1935	3,940	8,119	4,118	4,001	8.82	18.17	9.22	8.95	326	40.15
1936	4,242	8,479	4,230	4,249	9.38	18.75	9.35	9.39	358	42.22
1937	4,169	8,609	4,065	4,544	9.12	18.82	8.89	9.94	323	37.52
1938	4,153	9,141	4,234	4,907	8.95	19.71	9.13	10.58	309	33.80
1939	4,195	9,036	4,336	4,700	8.93	19.23	9.23	10.00	369	40.84
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	12,105	4,753	7,352	10.49	24.57	9.65	14.57	376	31.06
1947	5,282	12,874	4,723	8,151	10.50	25.60	9.39	16.21	398	30.92
1948	5,186	12,931	4,685	8,246	10.08	25.13	9.10	16.02	331	25.60
1949	4,951	13,511	4,790	8,721	9.30	25.37	8.99	16.37	357	26.42
1950	5,434	14,228	5,058	9,170	9.74	25.50	9.07	16.44	386	27.13
1951	5,390	14,794	5,288	9,506	9.29	25.49	9.11	16.38	425	28.73
1952	5,389	15,413	5,209	10,204	8.97	25.66	8.67	16.99	384	24.98
1953	5,032	15,862	5,072	10,790	8.10	25.54	8.17	17.37	378	23.83
1954	5,204	15,928	5,364	10,564	8.13	24.89	8.38	16.51	359	22.54
1955	5,145	16,623	5,379	11,244	7.83	25.29	8.18	17.11	373	22.44
1956	5,080	16,916	5,572	11,344	7.53	25.08	8.26	16.82	384	22.70
1957	4,897	16,924	5,297	11,627	7.12	24.62	7.71	16.91	357	21.09
1958	5,038	16,731	5,554	11,177	7.20	23.90	7.94	15.97	360	21.52
1959	5,387	17,111	5,497	11,614	7.57	24.04	7.72	16.32	345	20.16
1960	5,323	16,926	5,697	11,229	7.36	23.41	7.88	15.53	366	21.62
1961	5,150	17,078	5,729	11,349	6.98	23.15	7.77	15.39	336	19.67
1962	5,466	17,064	5,810	11,254	7.23	22.58	7.69	14.89	380	22.27
1963	5,755	17,290	5,976	11,314	7.40	22.23	7.68	14.55	353	20.42
1964	6,023	16,685	6,429	10,256	7.55	20.93	8.06	12.86	328	19.66
1965	6,448	16,186	6,274	9,912	7.91	19.85	7.70	12.16	351	21.68
1966	7,002	17,194	6,902	10,292	8.25	20.25	8.13	12.12	343	19.95
1967	7,430	18,023	6,779	11,244	8.44	20.48	7.71	12.78	314	17.42
1968	8,086	19,541	7,468	12,073	8.83	21.34	8.16	13.18	398	20.37
1969	8,993	20,754	7,350	13,404	9.41	21.72	7.69	14.03	453	21.83
1970	9,227	21,618	7,543	14,075	9.28	21.74	7.59	14.16	459	21.23
1971	9,382	24,239	7,806	16,433	8.91	23.02	7.41	15.61	464	19.14
1972	9,120	22,177	7,441	14,736	8.43	20.50	6.88	13.62	348	15.69
1973	9,102	20,510	7,845	12,665	8.26	18.61	7.12	11.49	394	19.21
1974	9,295	20,207	7,778	12,429	8.24	17.92	6.90	11.02	327	16.18
1975	9,026	20,338	7,972	12,366	7.81	17.60	6.90	10.70	271	13.32
1976	9,517	20,670	7,740	12,930	8.07	17.53	r 6.57	10.97	273	13.21
1977	10,063	20,651	7,899	12,752	8.35	r 17.15	r 6.56	r 10.59	251	12.15
1978	9,404	20,611	7,794	12,817	r 7.66	r 16.79	r 6.35	r 10.44	230	11.16
1979	9,239	20,469	8,020	12,449	r 7.41	r 16.42	r 6.43	r 9.98	247	12.07
1980	9,594	20,607	8,166	12,441	r 7.56	r 16.24	r 6.43	r 9.80	239	11.60
1981	10,111	21,877	7,993	13,884	7.77	16.81	6.14	10.67	193	8.82
1982	10,455	22,236	8,187	14,049	7.82	r 16.64	r 6.13	10.51	204	9.17
1983	10,519	23,087	8,369	14,718	7.71	16.93	6.14	10.79	179	7.75
1984	9,920	21,625	8,503	13,122	p 7.17	p 15.62	p 6.14	p 9.48	232	10.73

(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) Births and deaths figures for 1982 and earlier years are on a State of registration basis. Figures for 1983 are based on State of usual residence. (c) Excludes deaths of defence personnel, whether in Australia or overseas, between September 1939 and June 1947. (d) Excess of Live births registered over Deaths registered. (e) Deaths under 1 year of age; included in Deaths registered. (f) Per 1,000 live births.

PUBLIC REVENUE AND EXPENDITURE: CONSOLIDATED REVENUE FUND  
(\$'000)

Year (a)	Revenue					Expenditure					Total expenditure	
	Common-wealth funds	Public utilities	Departmental (b)	Taxation	Territorial (c)	Total revenue	Public utilities	Interest and sinking fund	Departmental			
									Education	Health	Other	
1840					5	34			n.a.			30
1850					4	38			n.a.			33
1860					35	140						123
1870	n.a.	n.a.	n.a.	n.a.	40	196	n.a.		7	n.a.	n.a.	226
1880					72	360		40	19			409
1890					217	829		144	23			803
1900		2,612	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
1921	1,188	7,517	1,618	1,911	875	13,579	6,290	4,459	980	590	2,231	14,953
1922	1,168	7,787	1,822	1,762	870	13,814	6,120	4,875	1,112	540	2,172	15,278
1923	1,166	8,000	2,092	1,975	807	14,415	5,847	5,150	1,126	538	2,100	15,226
1924	1,171	8,776	2,173	2,347	925	15,731	6,065	5,668	1,161	544	2,229	16,190
1925	1,176	9,154	2,576	2,448	1,004	16,763	6,195	6,193	1,171	587	2,191	16,880
1926	1,177	9,280	2,831	2,836	1,083	17,616	6,577	6,596	1,010	610	2,400	17,815
1927	2,306	9,941	3,274	2,423	1,102	19,502	6,958	6,590	1,294	604	3,351	19,445
1928	1,618	10,589	3,205	2,593	1,222	19,616	7,467	6,358	1,337	606	3,246	19,669
1929	1,623	10,772	3,312	2,740	1,029	19,896	7,885	6,671	1,358	634	3,278	20,448
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	8,251	1,747	506	5,780	27,102
1945	8,044	13,618	3,402	1,715	697	27,998	10,064	8,185	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	8,208	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 Outlay' on a later 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 outstanding	Sinking fund
1860	—	—	—	—	—	—	—	4	—
1870	—	—	—	—	—	—	—	—	—
1880	(c) 549	—	(d) 38	—	—	n.a.	(d) 802	722	n.a.
1890	3	6	2	2	(e) 76	n.a.	32	2,735	170
1900	302	395	949	—	110	1,757	23,349	754	—
1910	908	174	199	152	626	2,058	46,575	5,139	—
1920	242	204	94	21	4,765	5,327	93,644	13,656	—
1921	398	237	427	50	4,061	5,173	98,079	15,283	—
1922	1,207	183	435	89	2,996	4,910	109,920	16,740	—
1923	1,359	240	402	37	4,740	6,779	116,972	17,562	—
1924	1,303	278	871	177	5,244	7,874	125,532	18,747	—
1925	1,243	362	1,301	182	5,110	8,198	128,987	19,970	—
1926	1,540	439	1,357	156	4,667	8,157	140,022	21,309	—
1927	1,559	382	884	235	4,901	7,960	141,212	17,514	—
1928	1,902	530	1,132	256	4,577	8,397	152,856	17,798	—
1929	1,825	528	1,092	182	4,255	7,882	(f) 138,711	(f) 1,983	—
1930	1,819	529	610	108	4,226	7,291	142,389	2,081	—
1931	878	257	420	—	1,457	3,012	153,130	2,621	—
1932	263	155	1,152	—	1,055	2,624	159,416	2,618	—
1933	374	485	1,355	69	1,838	4,121	167,029	2,693	—
1934	659	492	1,606	196	2,344	5,297	171,696	743	—
1935	997	610	2,155	213	1,103	5,076	177,180	1,048	—
1936	946	602	2,487	169	700	4,903	180,688	1,138	—
1937	491	352	2,303	178	741	4,064	184,666	1,292	—
1938	950	201	1,843	183	1,144	4,321	187,424	614	—
1939	441	184	1,777	230	640	3,272	190,945	719	—
1940	200	104	1,615	732	974	3,624	192,461	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 Suspend 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. (f) Reduction due to operation of Financial Agreement Act of 1928.

NOTE. This table has been replaced by a new series 'State and Local Authorities: Receipts and Outlay' on a later page.

## 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. Expenditure on these items in Western Australia was \$341,014 in 1943-44 (maternity allowances \$322,710, funeral benefits \$18,304) and \$374,302 in 1944-45 (maternity allowances \$348,164, funeral benefits \$26,138). 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 (c)	Total expend- iture from National Welfare Fund (d)
	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 cam- paign (b)		
Age and invalid	Wid- ows'										
1946	3,721	405	2,570	144	7,186	248	—	—	—	248	7,435
1947	4,010	391	2,958	339	8,165	716	—	20	—	736	8,901
1948	5,131	484	2,898	203	9,150	730	—	2	—	732	9,883
1949	5,842	561	3,620	165	10,644	979	—	24	22	1,025	11,670
1950	6,176	594	4,607	306	12,215	1,000	—	69	148	1,244	13,477
1951	6,877	632	6,539	242	14,882	1,044	14	496	473	2,047	16,955
1952	8,213	733	6,956	118	16,620	1,023	151	1,004	627	134	19,625
1953	9,684	808	8,106	444	19,681	1,102	237	1,108	1,201	185	23,584
1954	10,750	870	7,766	399	20,435	1,314	590	1,396	1,214	213	25,235
1955	11,519	902	8,138	286	21,516	1,491	1,156	1,537	967	253	26,967
1956	13,363	1,062	9,368	374	24,887	1,559	1,461	1,626	1,017	273	30,845
1957	14,508	1,225	8,923	896	26,281	1,544	1,590	1,624	1,123	316	32,503
1958	16,154	1,415	9,143	1,265	28,725	1,858	1,746	2,006	1,041	305	35,708
1959	17,244	1,601	10,396	1,673	31,681	2,571	1,917	2,794	1,272	364	40,679
1960	19,833	1,827	9,720	1,504	33,652	3,351	2,241	3,178	1,163	458	44,079
1961	21,586	2,104	11,402	1,309	37,180	3,817	2,339	3,630	1,111	448	48,812
1962	24,344	2,371	10,205	1,887	39,575	3,996	2,455	4,809	873	526	52,270
1963	25,582	2,377	10,485	2,006	41,203	4,189	2,657	5,161	885	584	54,705
1964	27,373	3,115	12,994	1,978	46,223	4,705	2,808	5,242	839	615	60,460
1965	29,413	3,463	13,406	1,401	48,450	4,987	3,716	5,294	822	637	64,635
1966	30,760	3,602	13,624	872	49,648	5,286	4,345	5,870	758	619	67,316
1967	33,794	4,011	15,498	855	55,001	5,881	4,944	6,719	600	698	74,666
1968	36,418	4,346	14,845	758	57,295	6,598	5,265	7,117	862	850	78,894
1969	39,404	4,786	15,540	795	61,729	7,401	5,600	8,702	645	797	85,828
1970	44,637	5,600	17,894	1,039	70,725	9,153	6,373	9,836	828	797	98,577
1971	48,979	6,172	16,423	1,699	75,279	10,256	9,782	11,215	800	835	109,216
1972	57,374	7,180	18,188	4,298	89,623	14,492	13,800	12,418	907	997	133,770
1973	76,188	10,064	21,407	8,372	119,622	19,062	15,958	13,258	824	1,086	171,763
1974	98,011	13,409	19,009	8,314	147,040	21,222	16,478	16,153	803	596	205,778
1975	138,812	18,459	19,085	24,944	213,981	(e) 25,758	19,437	19,830	1,023	..	284,016

(a) A number of endowments are paid every twelve weeks. Although in most years there are four such payments, there are some years in which five payments are made. (b) 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. (c) Excludes some relatively minor expenditure not allocable among States. In 1974-75 such costs, for Australia as a whole, amounted to \$6.63 million and comprised \$1.63 million for the supply of blood products; radio-active isotopes, \$2.44 million; hearing aids for school children and pensioners, \$1.72 million; poliomyelitis vaccine, \$0.27 million; and other vaccines, \$0.57 million. (d) See footnote (c). (e) Includes expenditure of \$857,000 covering the operating deficits of certain nursing homes.

NOTE. This table has been replaced by a new series 'Commonwealth Government Cash Benefits to or for Persons in Western Australia' on the next page.

## 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 earlier pages.

(\$ million)

Year ended 30 June	Receipts and financing transactions					Outlay					Total 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	
1974	196.9	32.8	84.0	394.2	116.9	824.7	368.5	308.6	139.8	7.9	824.7
1975	268.9	41.3	100.7	552.9	211.6	1,175.4	551.5	427.8	171.4	24.7	1,175.4
1976	340.4	67.1	99.7	772.5	121.1	1,400.7	720.8	461.2	201.0	17.8	1,400.7
1977	392.5	37.6	121.0	844.6	233.8	1,629.5	861.8	513.3	237.3	17.2	1,629.6
1978	446.3	81.1	168.5	974.5	241.0	1,911.4	992.1	583.4	317.0	18.8	1,911.4
1979	492.3	90.6	172.7	1,056.2	293.7	2,105.4	1,093.5	647.1	349.3	15.5	2,105.4
1980	550.0	97.4	185.3	1,168.1	331.1	2,331.9	1,248.8	680.7	402.8	-0.4	2,331.9
1981	628.4	128.0	213.0	1,307.0	303.6	2,580.1	1,433.0	679.5	465.2	2.4	2,580.1
1982	732.3	152.6	249.5	1,430.3	316.0	2,880.7	1,585.6	779.5	516.8	-1.3	2,880.7
1983	823.9	188.8	316.4	1,618.7	814.7	3,762.5	1,840.2	1,234.5	668.2	19.6	3,762.5
1984	979.8	267.9	359.8	1,874.4	761.8	4,243.7	2,065.6	1,265.8	849.6	62.8	4,243.7

(a) Includes gross fixed capital expenditure, increase in stocks and expenditure on land and intangible assets (net).

## COMMONWEALTH GOVERNMENT CASH BENEFITS TO OR FOR PERSONS IN WESTERN AUSTRALIA

NOTE. This series replaces 'National Welfare Fund: Expenditure in Western Australia' on the previous page.

(\$'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-Servicemen and dependants	Old 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

## SOCIAL SERVICE BENEFICIARIES AND REPATRIATION PENSIONS: WESTERN AUSTRALIA

Year ended 30 June	Social service benefits						Repatriation pensions					
	Pensioners (a)			Family allowance (a) (b)			Disability		Service			
	Age (c) (d)	Invalid (c) (d)	Total Age and Invalid	Widow	Under 16 years of age (e) (f)	Students (g)	Total	Un-employment benefit (h)	Number (a) (i)	Amount paid \$'000	Number (a) (j)	Amount paid \$'000
1910	2,361	..	2,361						n.a.	n.a.		
1920	4,791	1,788	6,579						22,311	1,087		
1930	8,913	3,284	12,197						28,407	1,586		
1931	10,461	3,554	14,015						28,063	1,575	not applicable	
1932	11,458	3,790	15,248						26,345	1,397		
1933	11,097	3,827	14,924						25,475	1,259		
1934	11,854	4,122	15,976						24,940	1,255		
1935	12,840	4,290	17,130				not applicable		24,436	1,304		
1936	13,740	4,482	18,222						23,882	1,326	375	5
1937	14,453	4,634	19,087						22,886	1,361	923	47
1938	15,332	4,863	20,195						23,375	1,379	1,204	73
1939	16,278	5,116	21,394						22,617	1,394	1,454	92
1940	19,024	3,454	22,478						21,449	1,370	1,489	103
1941	19,423	3,425	22,848						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	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	275,910	7,865	57,047	11,564	7,754	3,177
1965	42,706	8,615	51,321	4,926		279,642	279,642	8,844	55,920	11,447	7,780	3,320
1966	43,876	8,575	52,451	5,071		286,534	286,534	8,769	54,560	12,637	7,757	3,571
1967	45,741	8,307	54,048	5,228		295,628	295,628	10,697	52,967	11,889	7,674	3,612
1968	48,850	8,310	57,160	5,482		306,492	306,492	10,999	51,193	11,934	7,586	3,777
1969	50,432	8,413	58,845	5,559		318,147	318,147	11,446	49,526	13,061	7,298	4,071
1970	56,017	7,933	63,950	6,086		322,058	322,058	11,539	47,993	12,811	7,783	4,491
1971	58,224	8,155	66,379	6,392		333,848	333,848	13,737	46,514	13,140	7,767	4,769
1972	60,523	8,485	69,008	6,795		343,455	343,455	15,452	45,079	14,413	7,864	5,298
1973	68,701	9,518	78,219	7,948		346,769	346,769	17,821	44,093	15,462	9,599	7,394
1974	76,124	10,406	86,530	8,763		343,404	343,404	17,585	42,807	17,363	10,669	10,191
1975	79,831	10,961	90,792	9,442		349,702	349,702	18,924	41,747	21,845	11,814	15,149
1976	84,087	12,265	96,352	10,027		352,998	352,998	20,151	37,149	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	n.a.		377,113	28,638	34,920	33,411	23,704	59,328
1982	103,397	17,195	120,592	12,654			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

(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 30 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.

## BANKING AND PERMANENT BUILDING SOCIETIES

Year	Trading banks		Savings banks (a)		Permanent building societies (b)				
	De-positors' balances (c)	Loans (other than loans to authorised dealers in the short-term money market), 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	Total
						With-drawable shares	Deposits	Amount owing on loans	
	\$'000	\$'000	\$m		\$'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		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	n.a.	367,665	23,457				
1940	42,219	47,529		233,649	23,720				
1941	47,099	45,617		238,820	25,042				
1942	51,918	43,638		250,153	27,642				
1943	61,135	37,827		279,469	37,769				
1944	71,529	33,462		301,225	51,581				
1945	74,846	31,504		316,565	63,526				
1946	(e) 66,652	(e) 33,726	(f) 11.6	340,737	76,578				
1947	72,490	45,388	14.2	349,091	73,250				
1948	82,032	48,754	17.4	358,709	72,365				
1949	100,971	49,904	21.4	365,130	75,070				
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				
1961	190,094	146,244	75.7	577,619	161,424	n.a.	n.a.	n.a.	
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	
1977	1,376,813	927,709	814.4	1,466,200	960,548	646,176	383,451	851,896	
1978	1,448,206	1,163,207	975.9	1,511,092	1,048,510	747,307	508,710	1,046,718	
1979	1,621,852	1,368,657	1,173.7	1,539,416	1,133,627	858,380	681,851	1,270,625	
1980	1,742,801	1,678,121	1,463.3	1,579,722	1,216,182	966,319	812,817	1,491,983	
1981	2,026,507	1,943,299	1,826.3	1,647,837	1,360,315	1,020,465	994,100	1,650,304	
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	
1983	2,877,685	2,571,177	2,651.2	1,835,917	1,910,538	1,265,212	948,426	1,743,068	
1984	3,004,651	2,874,000	3,043.7	1,961,811	2,214,373	1,374,872	861,647	1,664,158	
1985	3,622,307	3,342,663	3,857.6	2,051,681	2,402,828	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). (e) Average for nine months to 30 June. (f) Ten months ended June 1946.

## TRANSPORT; CUSTOMS AND EXCISE

Year	State Government railways (a)			Private railways	Customs and excise gross revenue (b)			Shipping (b) (c)		
	Route kilometres at end of year (d)	Operating revenue (e)	Operating expenses (e)	Paying goods and livestock carried (e)	Route kilometres at end of year (b) (f)	Customs	Excise	Total	Clearances to ports outside the State	Net tons (g)
		\$'000	\$'000	'000 tonnes		\$'000	\$'000	\$'000	Number	'000
1870	—	—	—	—	—	81	—	81	131	68
1880	55	5	8	2	61	186	—	186	168	126
1890	303	90	103	62	620	356	—	356	267	420
1900	2,181	2,519	1,723	1,406	1,003	1,889	63	1,952	747	1,606
1910	3,452	3,275	2,194	2,278	1,452	1,543	213	1,756	726	2,372
1920	5,695	4,584	4,001	2,656	1,477	1,311	799	2,110	729	2,659
1930	6,616	7,318	6,226	3,587	1,363	3,882	1,527	5,409	794	3,932
1940	7,051	7,112	5,657	2,702	1,337	3,769	2,395	6,164	805	3,751
1941	7,051	7,144	5,516	2,646	1,312	2,934	3,149	6,083	556	3,087
1942	7,051	7,993	6,052	2,681	1,316	2,273	3,757	6,030	492	2,508
1943	7,051	8,836	6,895	2,545	1,366	1,646	5,569	7,215	312	1,467
1944	7,051	8,773	7,592	2,601	1,334	1,661	6,225	7,886	385	1,580
1945	7,051	8,552	7,529	2,951	1,284	1,783	5,705	7,488	382	1,528
1946	7,051	8,213	8,053	2,771	1,136	2,707	6,508	9,215	490	2,473
1947	6,997	8,092	8,848	2,618	1,221	4,377	6,894	11,271	572	2,646
1948	6,997	9,198	11,140	2,903	1,189	5,784	9,264	15,048	752	3,431
1949	6,954	10,430	13,405	2,781	1,181	6,987	10,254	17,241	950	4,678
1950	6,843	12,944	15,003	2,889	1,246	10,166	10,943	21,109	1,006	5,272
1951	6,804	14,392	17,238	3,082	1,210	10,839	11,973	22,812	1,060	5,552
1952	6,619	18,327	21,331	3,112	1,210	14,045	16,312	30,357	1,045	5,524
1953	6,611	15,945	24,175	2,661	1,165	9,908	18,395	28,303	1,025	5,407
1954	6,616	22,749	27,512	3,257	1,220	12,241	19,447	31,688	1,005	5,320
1955	6,616	25,061	27,871	3,461	1,204	12,196	21,812	34,008	1,136	6,144
1956	6,629	26,548	29,986	3,854	1,168	8,473	24,092	32,565	1,268	6,776
1957	6,626	28,088	32,023	4,291	1,136	5,504	30,078	35,582	1,244	6,531
1958	6,626	25,950	29,685	3,647	925	5,476	32,547	38,023	1,219	6,499
1959	6,626	27,400	29,865	3,976	925	4,800	32,398	37,198	1,282	6,607
1960	6,630	30,077	30,816	4,605	832	5,614	33,634	39,248	1,403	7,234
1961	6,635	33,076	31,103	4,911	755	7,470	33,835	41,305	1,598	8,547
1962	(h) 6,198	35,608	31,527	5,428	(i) 898	7,156	35,705	42,861	1,687	8,962
1963	(h) 6,111	33,429	31,150	4,870	888	8,996	35,944	44,940	1,528	8,252
1964	(h) 5,918	35,190	32,250	5,271	665	10,369	37,839	48,208	1,580	8,627
1965	6,008	36,686	32,920	5,313	(j) 34	10,692	43,349	54,041	1,560	8,593
1966	6,030	43,669	35,985	6,486	(k) 460	15,251	53,536	68,787	1,711	9,528
1967	6,140	49,120	40,170	7,999	455	13,569	58,176	71,745	1,690	10,977
1968	6,140	52,773	42,623	9,053	455	19,468	62,903	82,371	1,770	12,916
1969	6,157	50,558	44,503	9,078	(l) 882	21,202	69,289	90,490	1,848	15,372
1970	6,161	57,240	48,550	10,837	884	24,649	76,637	101,286	2,165	21,005
1971	6,175	61,917	53,205	13,457	884	32,262	88,978	121,240	2,499	27,765
1972	6,116	64,846	57,112	13,867	884	30,072	101,883	131,955	2,425	28,734
1973	6,168	64,793	61,011	13,706	(m) 1,220	25,714	106,054	131,768	2,481	34,291
1974	6,192	79,861	74,403	15,059	1,222	30,612	138,197	168,809	2,655	40,122
1975	6,075	108,309	96,406	16,348	(n) 1,181	44,114	148,310	192,424	2,739	45,361
1976	6,163	132,312	110,893	17,812	1,179	46,767	183,838	230,605	2,613	42,040
1977	6,165	138,311	123,382	19,003	1,155	63,037	203,852	266,889	2,562	43,067
1978	5,764	150,588	140,426	18,625	1,150	68,118	216,929	285,047	2,547	42,010
1979	5,764	155,966	152,627	19,288	1,155	71,704	256,486	328,190	2,679	43,974
1980	5,773	175,735	172,979	21,388	1,159	83,620	260,299	343,919	2,122	n.a.
1981	5,773	182,373	186,156	20,271	1,160	110,939	283,499	394,438	1,903	n.a.
1982	5,609	213,566	209,552	19,776	1,181	128,866	198,397	327,263	1,798	n.a.
1983	5,610	226,199	227,439	19,791	1,177	130,752	379,889	510,641	2,476	n.a.
1984	5,623	228,339	246,552	19,870	1,177	133,088	492,117	625,205	1,768	n.a.
1985	5,563	258,307	261,938	22,085	1,285	176,416	496,172	672,588	n.y.a.	n.a.

(a) From 1900, year ended 30 June. (b) From 1915, year ended 30 June. (c) From 1967 excludes vessels of 200 net tons and under. For 1979, figures relate to movements foreign direct or via other Australian ports. From 1980, figures relate to foreign direct movements only. (d) Open for general and passenger traffic. (e) From 1942 includes operations of Railway Road Services, which began in November 1941. (f) From 1900 to 1964 includes 446 kilometres of line open for general and passenger traffic. (g) From 1980, clearances by net tons has not been collected. (h) Decrease due to proclamations of closure issued by authority of the *Railways (Cue-Big Bell and other Railways) Discontinuance Act 1960*. (i) Increase due to the transfer of all government-operated timber railways to private control. (j) Decrease due to transfer of Midland Railway Company to Western Australian Government Railways and to closure of timber and mining railways. (k) Increase due to opening of Goldsworthy-Port Hedland, Tom Price-Dampier and Westmine-Tilley iron ore railways. (l) Increase due to opening of Newman-Port Hedland iron ore railway. (m) Increase due to opening of Pannawonica-Cape Lambert iron ore railway and extensions to Goldsworthy and Tom Price railways. (n) Decrease due to closure of Westmine-Tilley iron ore railway and timber railways.

MOTOR VEHICLE REGISTRATIONS; EXPORTS OF WHEAT

Year	New motor vehicles registered (a)				Motor vehicles on register (b)				Wheat exports (c)	
	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	Quantity (tonnes)	Value (\$'000)
1860									1	—
1870									—	—
1880					n.a.				408	8
1890									—	—
1900									27	—
1910									54,839	813
1920					3,404				249,049	5,083
1930	n.a.	n.a.	n.a.	n.a.	31,130	11,358	7,707	50,195	679,109	12,258
1931					27,741	10,880	6,777	45,398	1,155,028	10,577
1932					28,608	12,094	6,700	47,402	1,003,383	10,647
1933					27,969	12,626	6,700	47,295	835,381	9,323
1934					28,761	13,937	6,284	48,982	635,755	6,834
1935					30,578	15,530	6,597	52,705	678,647	7,844
1936					32,329	17,362	6,861	56,552	405,430	5,607
1937					34,180	19,919	6,977	61,076	375,030	7,255
1938					36,386	22,596	7,079	66,061	599,776	9,667
1939	3,297	1,814	568	5,679	38,039	24,441	7,199	69,679	615,452	6,055
1940	2,871	1,517	399	4,787	38,907	25,026	6,789	70,722	417,214	4,669
1941	1,015	632	200	1,847	36,995	24,788	6,704	68,487	404,314	5,858
1942	250	353	74	677	29,022	21,625	4,057	54,704	266,005	4,021
1943	218	151	57	426	29,750	21,189	3,935	54,874	139,833	2,111
1944	19	1,102	109	1,230	30,295	22,459	4,324	57,078	328,138	5,813
1945	40	597	192	829	30,635	23,943	4,501	59,079	642,015	14,955
1946	101	456	271	828	31,408	28,904	6,799	67,111	367,682	11,696
1947	1,354	1,126	678	3,158	32,879	32,097	8,199	73,175	185,102	8,964
1948	2,963	1,975	1,059	5,997	35,596	35,285	8,877	79,758	525,857	33,809
1949	4,684	3,122	1,769	9,575	40,119	38,901	10,974	89,994	500,793	28,100
1950	8,926	4,707	2,346	15,979	48,632	43,206	12,897	104,735	585,406	33,384
1951	8,201	6,610	2,802	17,613	56,235	47,908	14,535	118,678	830,346	51,688
1952	8,836	5,750	2,740	17,326	64,277	52,627	16,047	132,951	730,002	45,728
1953	6,879	4,881	1,416	13,176	69,917	56,445	15,565	141,927	634,639	40,347
1954	9,926	5,601	1,258	16,785	78,312	60,362	15,243	153,917	185,066	11,272
1955	12,394	5,993	1,202	19,589	90,255	63,870	14,662	168,787	526,212	27,478
1956	10,100	5,203	1,089	16,392	99,206	62,809	12,959	174,974	619,779	28,860
1957	9,321	4,418	1,192	14,931	104,506	63,315	12,731	180,552	1,273,578	61,291
1958	10,140	5,562	1,702	17,404	111,825	63,598	12,631	188,054	725,131	40,861
1959	10,389	5,140	2,071	17,600	119,957	65,588	12,814	198,359	639,647	33,113
1960	13,492	5,695	1,949	21,136	130,476	68,702	12,876	212,054	999,164	49,442
1961	15,161	5,542	1,080	21,783	141,612	70,974	12,589	225,175	1,428,272	71,280
1962	17,082	5,833	902	23,817	155,447	74,224	12,390	242,061	2,010,766	104,356
1963	23,175	6,367	754	30,296	169,800	75,500	11,500	256,800	1,380,372	72,197
1964	24,958	7,013	628	32,599	186,200	77,700	10,200	274,100	1,497,453	77,881
1965	23,304	6,897	553	30,754	197,800	78,500	8,900	285,200	1,102,420	56,955
1966	23,418	9,170	706	33,294	212,600	83,300	8,400	304,300	1,887,996	96,515
1967	27,922	9,404	1,158	38,484	231,200	86,300	8,400	325,900	2,312,777	126,91
1968	33,368	10,448	1,525	45,341	252,300	90,800	8,900	352,000	2,373,195	121,764
1969	35,379	11,018	1,539	47,936	275,300	94,500	9,600	379,400	1,521,376	77,987
1970	37,764	11,138	1,945	50,847	301,000	99,900	10,800	411,700	1,814,787	8,593
1971	37,769	10,872	2,718	51,359	328,500	104,900	12,200	445,600	2,670,890	130,564
1972	37,274	9,819	3,985	51,078	346,300	104,600	14,200	465,100	2,587,504	128,132
1973	36,904	11,425	4,914	53,243	364,400	107,400	16,800	488,600	2,249,934	111,744
1974	40,302	12,241	7,062	59,605	389,300	112,700	21,000	523,000	2,139,973	211,333
1975	41,474	13,693	6,613	61,780	414,800	125,000	24,600	564,400	3,241,895	409,758
1976	40,338	15,863	5,731	61,932	437,200	140,000	27,600	604,800	3,215,792	375,897
1977	44,363	17,362	3,887	65,612	473,731	153,174	28,022	654,927	3,009,101	316,258
1978	40,990	16,538	3,339	60,867	500,365	167,107	28,051	695,523	3,795,969	351,190
1979	40,882	14,025	2,713	57,620	518,705	174,064	26,916	719,685	2,208,985	257,414
1980	40,232	13,716	4,600	58,548	535,613	179,844	29,531	744,988	4,205,774	615,944
1981	41,660	15,223	6,088	62,971	552,552	187,599	33,009	773,160	2,634,951	422,443
1982	42,329	16,079	5,835	64,243	573,400	197,344	35,213	805,957	3,826,760	594,992
1983	38,812	15,043	5,147	59,002	576,893	196,539	35,852	809,284	5,031,977	845,855
1984	39,737	15,199	3,969	58,905	592,495	201,754	35,770	830,019	3,637,624	632,247
1985	46,070	17,956	4,310	68,336	615,442	214,649	36,229	866,320	4,543,782	850,090

(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) From 1920, year ended 30 June; from 1978, excludes interstate exports. (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.

## EXPORTS OF CERTAIN COMMODITIES (a)

Year (b)	Wool				Meats — Fresh, chilled or frozen					
	Greasy (c)		Degreased		Beef and veal		Mutton and lamb		Pigmeat	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	tonnes	\$'000	tonnes	\$'000	tonnes	\$'000	tonnes	\$'000	tonnes	\$'000
1840	23	5	—	—	—	—	—	—	—	—
1850	141	31	—	—	—	—	—	—	—	—
1860	298	99	—	—	—	—	—	—	—	—
1870	811	179	(d)	(d)	—	—	—	—	—	—
1880	1,970	543	—	—	—	—	—	—	—	—
1890	3,161	523	—	—	—	—	—	—	—	—
1900	3,927	505	198	36	(e)	(e)	(e)	(e)	(e)	(e)
1910	11,692	1,894	191	40	—	—	—	—	—	—
1920	25,530	7,218	1,504	657	300	33	—	—	—	—
1930	28,022	5,422	465	136	5,162	272	—	—	—	—
1931	31,478	4,652	629	121	5,132	244	388	35	95	7
1932	29,298	4,540	892	151	5,098	235	958	103	554	53
1933	30,931	4,871	1,222	236	6,534	276	174	15	430	37
1934	31,751	9,131	1,237	491	5,716	234	613	49	303	29
1935	36,537	6,479	1,565	348	5,476	233	2,258	236	542	55
1936	35,602	8,892	1,398	451	7,727	321	2,521	282	703	65
1937	26,455	7,854	1,110	475	5,092	249	2,066	247	592	67
1938	24,245	5,877	1,227	446	5,191	314	3,949	470	373	52
1939	31,030	6,072	1,636	469	7,485	497	5,341	638	580	80
1940	29,610	7,603	1,655	661	4,826	329	4,665	533	2,263	324
1941	9,064	2,601	1,270	518	5,583	407	4,396	496	6,015	851
1942	34,355	9,836	2,235	1,030	3,576	327	3,684	435	4,670	682
1943	12,934	4,163	1,239	594	—	—	3,985	458	1,053	155
1944	31,145	10,842	2,095	917	1,445	190	6,664	763	1,568	238
1945	23,613	8,082	2,216	1,025	1,202	168	4,002	410	1,697	254
1946	49,070	17,136	5,328	2,778	4,317	558	2,269	275	3,401	545
1947	34,104	15,561	7,918	4,960	6,358	691	4,081	409	1,306	248
1948	36,380	27,801	7,291	5,443	6,353	604	5,079	584	303	53
1949	38,972	36,717	6,163	6,352	8,056	840	4,607	608	624	179
1950	37,832	40,071	7,934	10,852	8,625	1,183	2,392	485	163	59
1951	36,619	96,493	5,014	16,066	7,699	1,221	939	217	279	113
1952	41,483	57,291	5,150	10,389	6,028	1,135	1,044	301	424	232
1953	45,772	67,759	5,717	11,363	5,016	1,437	6,589	1,463	463	303
1954	45,677	71,346	5,406	10,914	6,148	1,748	3,309	875	215	152
1955	43,796	59,296	6,015	11,267	6,776	2,038	3,225	1,328	1,049	532
1956	51,387	57,894	7,595	12,419	7,601	2,343	6,602	2,156	743	482
1957	49,252	71,251	8,503	16,259	4,127	1,221	5,788	1,741	733	588
1958	43,750	57,224	8,417	15,462	11,025	3,302	5,083	1,900	2,324	1,462
1959	50,408	46,313	9,872	12,224	10,535	4,342	9,944	3,177	1,983	1,178
1960	50,396	58,137	12,442	19,820	13,597	6,742	8,735	2,378	1,188	953
1961	59,830	59,290	11,851	15,552	12,413	6,141	11,367	3,901	1,894	1,501
1962	62,094	68,177	11,490	15,688	12,544	6,299	8,468	2,436	3,151	2,025
1963	59,617	66,401	11,441	15,706	17,268	9,382	7,428	2,401	2,061	1,404
1964	72,240	97,138	10,388	17,101	20,528	11,497	5,385	1,895	861	718
1965	68,861	83,030	10,245	15,264	19,360	11,730	5,040	1,981	571	516
1966	87,853	101,905	9,845	13,223	18,115	12,108	10,319	4,357	420	376
1967	97,098	114,052	9,788	12,943	16,912	11,987	9,652	3,723	565	470
1968	113,224	113,868	11,484	12,549	16,821	12,995	13,153	4,745	547	474
1969	132,034	142,065	12,354	15,885	20,210	16,939	21,523	7,218	642	564
1970	120,224	117,952	12,554	17,024	23,645	21,508	29,661	11,271	1,437	1,175
1971	119,137	89,752	9,251	8,537	20,257	17,626	24,244	9,396	1,126	895
1972	145,803	109,263	13,481	11,197	24,435	22,528	42,994	17,645	2,503	1,995
1973	136,110	204,455	10,346	16,264	33,325	36,614	39,853	26,103	7,630	6,382
1974	112,536	242,357	8,577	20,973	34,778	43,039	27,189	23,682	5,939	5,772
1975	102,621	148,153	11,448	19,478	31,083	25,993	33,240	22,107	2,283	3,037
1976	140,581	207,528	12,667	23,773	35,732	32,693	52,120	34,009	2,451	3,696
1977	154,779	291,142	14,895	40,022	53,051	53,291	60,373	48,913	1,292	1,968
1978	112,075	219,402	10,996	31,919	57,827	64,896	42,532	40,885	620	984
1979	136,136	282,985	14,049	43,481	51,932	90,216	26,250	31,059	382	693
1980	124,746	316,614	16,516	61,943	41,372	93,547	44,699	51,230	204	460
1981	115,542	311,973	19,987	86,078	40,672	87,669	44,142	57,515	144	334
1982	110,689	319,462	16,619	74,905	38,399	73,673	25,367	37,057	225	446
1983	110,674	335,373	13,279	56,771	41,659	88,972	29,073	43,133	99	344
1984	r 107,308	r 340,257	r 14,203	65,950	r 32,492	80,442	r 26,000	39,114	r 282	829
1985	122,023	430,752	18,652	925,552	30,327	77,403	21,329	33,808	150	567

(a) From 1980 figures relate to foreign exports only. (b) From 1920, year ended 30 June. (c) For 1890 and earlier years includes degreased wool for which figures are not available separately. (d) See note (c). (e) Separate particulars not available. Total exports of fresh meats were 84 tonnes valued at \$9,164.

EXPORTS OF CERTAIN COMMODITIES (a)

Year (b)	Flour (c)		Butter		Potatoes		Fresh fruit (d)	Cattle	Sheep (e)
	Quantity	Value	Quantity	Value	Quantity	Value	Value	Value	Value
	tonnes	\$'000	tonnes	\$'000	tonnes	\$'000	\$'000	\$'000	\$'000
1860	11	—	—	—	71	1	—	—	4
1870	—	—	—	—	26	—	—	—	—
1880	n.a.	2	—	—	—	—	—	—	—
1890	—	—	—	—	—	—	—	1	2
1900	47	1	4	1	113	1	1	—	2
1910	2,559	49	77	12	18	—	11	16	9
1920	117,254	5,045	38	17	1,637	54	300	73	28
1926	83,333	2,581	—	—	1,647	43	464	30	31
1927	85,294	2,314	1	—	1,540	44	669	32	50
1928	77,208	2,009	1	—	436	12	384	70	58
1929	72,265	1,780	36	14	1,327	32	1,067	38	52
1930	62,659	1,540	21	7	5,037	151	312	1	46
1931	77,713	1,266	20	5	4,897	47	604	3	25
1932	80,061	1,156	663	179	724	14	861	3	28
1933	78,159	1,105	1,042	280	487	5	665	1	35
1934	58,599	781	1,000	195	1,708	17	673	—	26
1935	77,986	1,127	1,042	148	2,375	49	826	1	44
1936	60,633	972	1,033	246	8,440	121	905	1	47
1937	78,150	1,662	738	183	7,107	119	670	1	56
1938	73,629	1,605	1,642	472	5,030	55	549	—	74
1939	80,766	1,165	1,875	462	14,961	282	1,175	1	73
1940	83,159	1,301	1,873	490	11,953	214	740	—	65
1941	107,588	2,185	1,748	460	18,501	373	282	2	112
1942	77,087	1,681	1,676	428	10,452	213	114	1	97
1943	70,412	1,581	169	47	6,410	139	139	1	—
1944	96,941	2,344	919	262	772	22	96	27	—
1945	92,438	2,505	964	369	17,939	581	132	2	1
1946	106,088	4,667	1,283	502	13,219	446	488	2	91
1947	117,661	7,628	920	383	12,939	484	1,445	27	362
1948	127,002	11,326	2,043	1,000	18,623	681	1,688	10	347
1949	119,025	10,516	2,075	1,047	13,723	431	1,452	11	374
1950	105,065	8,335	1,475	864	10,090	384	1,780	5	426
1951	144,914	11,774	498	312	11,181	506	2,295	9	616
1952	146,584	13,669	144	93	13,514	733	2,853	23	631
1953	159,883	15,090	155	126	12,860	750	4,556	23	501
1954	134,126	11,704	170	141	16,026	1,300	3,300	29	568
1955	109,172	7,219	168	142	9,020	512	3,845	68	612
1956	117,409	7,766	255	206	2,275	171	3,393	177	625
1957	115,658	7,474	177	156	7,728	736	4,598	243	923
1958	101,448	6,907	200	169	13,998	832	3,725	308	841
1959	94,854	6,337	178	166	8,577	368	3,609	396	764
1960	79,697	5,100	191	183	9,612	436	2,437	325	845
1961	122,839	7,840	303	247	7,821	437	4,636	318	881
1962	88,889	5,891	756	532	10,328	632	2,818	55	1,254
1963	67,652	4,645	247	228	18,032	810	4,982	160	1,495
1964	62,677	4,396	138	126	9,925	353	4,016	331	1,433
1965	83,826	5,926	166	159	12,935	841	5,165	427	1,376
1966	49,130	3,378	1,062	732	21,362	1,393	4,838	283	1,633
1967	34,804	2,507	192	201	17,478	692	5,704	381	1,771
1968	41,918	2,944	225	232	13,142	622	4,068	1,229	2,191
1969	35,100	2,433	231	254	21,944	1,149	6,552	972	2,943
1970	31,173	2,257	216	243	19,888	831	6,054	760	2,876
1971	26,670	1,958	266	325	9,390	510	7,208	1,159	2,710
1972	18,882	1,345	234	297	8,600	371	5,245	1,865	3,871
1973	9,798	859	237	311	(f) 4,911	(f) 334	6,135	1,661	7,959
1974	11,232	1,380	228	278	(g) 9,576	(g) 1,113	5,835	2,111	12,539
1975	19,281	3,439	190	281	8,527	1,217	7,547	1,498	12,862
1976	11,658	2,022	224	345	12,196	1,636	6,047	1,464	14,436
1977	11,355	2,051	180	310	7,190	1,127	5,285	2,533	(h) 34,905
1978	8,291	1,481	164	245	5,853	390	5,976	3,071	35,985
1979	7,872	1,660	134	225	2,735	373	8,703	3,182	45,915
1980	(i) 4,342	(i) 1,055	(i) 38	(i) 63	(i) 5,292	(i) 616	(i) 10,314	1,748	91,763
1981	4,952	1,279	1	5	3,824	585	9,506	2,899	100,340
1982	1,578	594	4	8	5,466	947	10,783	3,039	94,825
1983	1,086	343	20	64	7,274	1,278	r 12,655	5,476	94,630
1984	r 3,127	r 833	r 61	165	r 2,806	756	r 10,013	5,824	92,700
1985	3,140	876	53	145	5,084	946	10,220	3,432	82,430

(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 maslin; from 1978, figures include meal and flour of all cereal grains. (d) Includes tomatoes for 1933 and earlier years. (e) Includes sheep for breeding purposes. (f) Some interstate details for 1973 included in 1974. (g) See footnote (f). (h) Excludes interstate exports. Details are not available for publication. (i) Figures represent foreign exports only.

## EXPORTS OF CERTAIN COMMODITIES (a)

Year (b)	Skins and hides		Timber (c)		Rock lobster tails (d)		Pearl-shell (e)		Iron and steel (f)
	Value	Quantity	Value	Quantity	Value	Quantity	Value		
	\$'000	'000 cu m	\$'000	tonnes	\$'000	tonnes	\$'000		
1850	1	—	2	—	—	—	—	—	
1860	—	2	10	—	—	—	—	—	
1870	—	6	35	—	—	75	19	—	
1880	8	19	133	—	—	731	79	—	
1890	49	33	164	—	—	1,257	173	—	
1900	150	162	916	—	—	749	173	7	
1910	482	342	1,945	—	—	1,488	492	5	
1920	1,246	143	931	—	—	1,702	671	16	
1930	738	186	1,615	—	—	984	331	3	
1931	539	117	1,015	—	—	1,032	334	2	
1932	395	87	722	—	—	622	194	1	
1933	480	63	523	—	—	1,049	294	1	
1934	771	115	972	—	—	856	196	7	
1935	640	151	1,270	—	—	987	189	3	
1936	1,061	159	1,356	—	—	984	214	3	
1937	1,143	161	1,397	—	—	928	247	7	
1938	985	214	1,860	—	—	1,259	336	12	
1939	736	162	1,436	—	—	1,149	212	15	
1940	745	143	1,251	—	—	856	153	31	
1941	580	172	1,546	—	—	696	153	35	
1942	772	148	1,369	—	—	590	142	19	
1943	348	100	1,189	—	—	6	1	5	
1944	680	103	1,216	—	—	2	1	23	
1945	537	81	1,131	—	—	—	—	100	
1946	1,274	96	1,429	—	—	13	8	9	
1947	2,131	98	1,719	—	—	127	120	99	
1948	2,048	102	2,230	—	—	342	340	89	
1949	2,134	91	1,986	n.a.	(g) 500	415	367	59	
1950	2,329	81	1,949	518	463	355	248	95	
1951	5,294	66	1,783	1,436	1,517	345	274	83	
1952	3,194	68	2,075	1,311	1,861	417	406	58	
1953	3,942	112	4,147	1,329	2,085	535	612	357	
1954	3,295	109	4,480	1,461	2,342	623	708	279	
1955	2,921	99	3,847	1,532	2,490	700	820	602	
1956	3,274	129	5,598	1,601	3,022	811	999	530	
1957	4,650	132	6,215	1,618	3,514	1,101	1,391	1,174	
1958	3,898	158	7,496	2,136	3,965	1,147	1,381	2,470	
1959	3,489	183	8,415	2,715	5,281	789	772	4,218	
1960	4,767	174	7,760	2,996	6,499	637	707	11,198	
1961	3,828	157	7,175	2,316	5,881	573	502	12,781	
1962	4,580	161	7,528	3,607	9,778	453	320	13,826	
1963	4,339	155	7,241	3,490	8,910	388	289	15,107	
1964	4,966	149	6,813	3,416	9,211	168	112	15,029	
1965	4,177	133	6,279	2,672	10,592	162	133	17,933	
1966	5,447	69	3,687	3,193	13,821	155	123	14,458	
1967	5,377	139	7,475	3,643	13,873	218	189	15,658	
1968	4,699	85	4,947	3,919	17,989	212	147	11,442	
1969	6,013	88	5,068	3,038	17,133	212	125	27,002	
1970	7,968	96	5,666	2,976	15,695	255	173	34,306	
1971	5,395	79	4,808	3,155	19,413	196	132	34,571	
1972	5,356	101	6,440	3,425	24,626	202	123	36,415	
1973	13,945	113	7,087	3,171	20,919	218	131	36,529	
1974	13,536	100	7,407	2,656	18,511	145	105	60,811	
1975	11,195	109	9,252	3,328	25,258	170	137	71,493	
1976	13,728	94	9,823	3,128	27,777	163	123	60,765	
1977	24,708	78	10,152	4,071	47,061	137	90	74,508	
1978	21,147	59	8,885	3,902	48,043	172	182	50,285	
1979	29,280	66	10,508	4,170	51,064	103	123	72,591	
1980	(h) 34,716	72	12,226	3,626	50,448	307	811	83,447	
1981	17,467	32	7,050	2,858	42,480	305	928	42,423	
1982	16,736	25	5,830	3,532	65,643	211	642	6,645	
1983	18,783	18	4,813	3,841	71,760	211	734	2,959	
1984	23,998	20	5,251	4,039	84,749	145	483	2,473	
1985	27,629	22	7,173	3,263	100,725	119	445	741	

(a) From 1981 figures relate to foreign exports only. (b) From 1920, year ended 30 June. (c) Excludes plywood and veneers and small quantities of timber for which details are not recorded. For the years 1910 to 1921, figures are approximate. (d) For years 1950 to 1952, foreign exports only. For 1953 to 1960 includes small interstate consignments of cooked whole rock lobsters. (e) From 1973, foreign exports only. (f) Principally pig-iron, cast iron and basic shapes and sections of iron and steel. (g) Estimated. (h) Figures represent foreign exports only.

## EXPORTS OF CERTAIN COMMODITIES (a)

Year (b)	Gold mint bullion (c)		Lead and zinc ores (d) (e)	Tin ore and concentrates	Asbestos (crude and fibre)		Iron ore and concentrates		Ilmenite concentrates (including leucosene) (f)	
	Quantity	Value (g)	Value	Value	Quantity	Value	Quantity	Value	Quantity	Value
	kg	\$'000	\$'000	\$'000	tonnes	\$'000	'000 tonnes	\$'000	'000 tonnes	'000
1850	—	—	—	—	—	—	—	—	—	—
1860	—	—	2	—	—	—	—	—	—	—
1870	—	—	29	—	—	—	—	—	—	—
1880	—	—	31	—	—	—	—	—	—	—
1890	715	173	4	11	—	—	—	—	—	—
1900	31,103	7,589	—	76	—	—	—	—	—	—
1910	10,389	2,835	4	93	—	—	—	—	—	—
1920	1,275	452	102	129	—	—	—	—	—	—
1930	4	1	19	29	—	—	—	—	—	—
1936	23,981	13,385	—	18	—	—	—	—	—	—
1937	28,273	15,819	—	16	—	—	—	—	—	—
1938	33,436	18,598	1	20	281	37	—	—	—	—
1939	36,360	21,240	1	11	272	26	—	—	—	—
1940	36,329	24,056	2	14	188	17	—	—	—	—
1941	37,386	25,096	2	12	148	15	—	—	—	—
1942	30,326	20,590	2	6	74	7	—	—	—	—
1943	23,514	15,744	1	5	89	8	—	—	—	—
1944	10,855	7,250	1	6	92	8	—	—	—	—
1945	—	—	1	5	386	36	—	—	—	—
1946	—	—	—	8	1,081	104	—	—	—	—
1947	—	—	5	12	637	65	—	—	—	—
1948	11,073	7,656	146	17	1,201	148	—	—	—	—
1949	—	—	235	31	1,178	179	—	—	—	—
1950	2	2	272	49	894	204	—	—	—	—
1951	—	—	263	62	1,568	378	—	—	—	—
1952	12,286	13,143	1,369	107	2,620	709	53	102	—	—
1953	23,608	24,798	1,681	153	3,006	990	553	1,079	—	—
1954	13,001	13,230	270	97	3,200	986	592	1,157	—	—
1955	19,222	19,338	108	146	3,792	788	589	1,149	—	—
1956	12,752	12,842	888	322	7,534	1,440	480	936	—	—
1957	23,950	24,119	960	293	10,727	2,140	334	649	—	—
1958	6,470	6,511	410	166	11,743	2,920	446	870	89	1,011
1959	4,106	4,118	238	304	10,737	2,166	598	1,169	66	648
1960	18,662	18,738	229	415	15,407	3,111	809	1,601	90	713
1961	78,754	79,271	83	325	10,776	2,364	1,035	2,101	132	1,198
1962	14,090	12,195	45	563	12,850	2,753	1,069	2,209	159	1,441
1963	12,970	13,048	33	532	12,610	2,799	1,495	2,898	183	1,717
1964	11,975	12,045	18	1,080	8,069	1,767	1,381	2,743	263	2,571
1965	15,956	16,127	662	1,229	11,131	2,210	1,562	3,040	330	3,194
1966	25,909	26,147	124	1,521	8,064	1,702	2,657	6,967	430	4,181
1967	14,930	15,107	177	2,214	5,985	1,229	8,530	50,890	443	4,440
1968	11,602	11,816	58	2,330	—	—	14,563	104,506	462	4,645
1969	11,228	12,701	161	1,843	65	8	19,898	151,797	557	5,751
1970	12,037	13,874	41	1,386	56	4	31,542	233,580	573	6,068
1971	14,665	15,760	—	1,511	45	10	46,273	341,702	563	6,631
1972	17,646	21,950	—	2,043	40	3	48,658	347,500	580	7,416
1973	16,314	30,193	6	2,277	—	—	66,036	420,255	595	7,696
1974	10,093	27,393	15	2,732	—	—	79,286	488,239	728	9,774
1975	9,263	36,666	—	3,019	—	—	88,070	699,843	672	9,893
1976	13,659	50,527	—	2,538	—	—	83,090	772,199	647	9,995
1977	9,980	36,863	—	3,939	81	39	84,939	900,987	1,184	20,155
1978	10,344	50,906	—	4,947	(i) —	(i) —	80,128	935,018	986	17,653
1979	n.a.	(j) 99,708	—	5,074	(i) —	(i) —	84,016	978,315	883	17,475
1980	n.a.	(j) 56,317	220	5,841	—	—	76,725	1,025,660	1,119	25,433
1981	1,279	22,024	—	2,469	—	—	72,756	1,069,087	929	23,726
1982	5,054	72,060	11,285	1,057	—	—	72,532	1,195,486	890	25,003
1983	9,536	141,340	14,925	1,234	—	—	64,551	1,405,840	780	21,986
1984	21,312	r 308,580	18,420	127	—	—	r 80,942	1,551,299	1,068	35,176
1985	23,036	308,424	17,407	—	—	—	87,670	1,796,578	1,009	36,473

(a) From 1980 figures relate to foreign exports only. (b) From 1920, year ended 30 June. (c) Gold sold abroad before consignment is not recorded as an export until actually shipped. (d) Includes silver-lead and silver-lead-zinc ores and concentrates. (e) 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. (f) From 1972, figures exclude foreign exports of beneficiated ilmenite; from 1978, figures also exclude interstate exports of all ilmenite and leucosene. (g) Includes additional premiums on sales of industrial gold. (h) Foreign details are not available for publication. (i) Represents foreign exports only. (j) 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
1926	15,792	17,133	32,925	25,223	2,876	28,100	4,826	..	1,064
1927	18,894	17,858	36,752	26,135	2,810	28,946	7,806	..	1,358
1928	18,023	18,553	36,575	32,505	2,674	35,179	1,396	..	1,302
1929	18,906	21,201	40,108	30,603	2,411	33,014	7,094	..	1,358
1930	17,758	19,805	37,563	32,009	2,213	34,223	3,341	..	1,316
1931	9,165	13,639	22,804	33,306	1,550	34,856	..	12,052	1,095
1932	6,926	15,854	22,780	29,633	1,826	31,459	..	8,679	1,133
1933	9,542	16,740	26,282	28,037	1,916	29,953	..	3,671	1,122
1934	8,889	18,554	27,443	31,132	2,427	33,559	..	6,116	1,024
1935	10,203	20,290	30,493	30,002	2,650	32,652	..	2,158	1,106
1936	12,688	22,073	34,761	33,023	3,665	36,688	..	1,928	1,095
1937	14,144	24,742	38,886	34,592	6,361	40,953	..	2,067	1,029
1938	15,986	25,879	41,865	38,944	6,057	45,001	..	3,135	1,200
1939	12,275	25,329	37,604	34,149	10,815	44,964	..	7,360	1,049
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	11,60
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	r 1,449,694	2,337,808	r 3,787,502	r 3,854,047	635,388	r 4,489,434	..	r 701,933	126,176
1981	1,663,378	2,841,110	4,504,488	3,791,114	812,996	4,604,110	..	99,622	144,285
1982	2,535,112	3,141,096	5,676,208	3,907,613	888,540	4,796,153	880,055	..	134,198
1983	r 2,523,046	3,160,789	r 5,683,835	4,766,649	1,155,698	5,922,347	..	r 238,512	129,484
1984	1,935,552	r 3,638,883	r 5,574,436	r 5,060,377	1,410,145	6,470,522	..	r 896,086	110,614
1985	2,155,271	4,291,229	6,446,500	6,070,017	1,507,370	7,575,387	..	1,128,887	119,958

(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.

LAND TENURE; LIVESTOCK; WOOL PRODUCTION

Year	Land alienated and land in process of alienation (a)	Land held under lease or licence (a) (b)	Livestock (c)				Wool production (d)	
	'000 hectares	'000 hectares	Horses	Cattle	Sheep	Pigs	Quantity	Gross value (e)
			'000	'000	'000	'000	tonnes	\$'000
1829	212	—	—	—	1	—	n.a.	—
1830	256	—	—	1	8	—	n.a.	—
1840	647	—	1	2	31	2	n.a.	—
1850	538	—	3	13	128	3	n.a.	—
1860	614	2,251	10	32	260	11	298	n.a.
1870	593	4,953	22	45	609	13	811	—
1880	860	18,179	35	64	1,232	24	1,970	—
1890	2,159	42,388	44	131	2,525	29	3,161	—
1900	2,679	35,360	68	339	2,434	62	4,323	—
1910	r 7,376	r 67,992	134	825	5,159	58	13,210	2,141
1920	r 9,581	r 106,125	179	850	6,533	61	18,947	4,552
1930	r 14,571	r 91,624	157	813	9,883	101	32,451	4,829
1940	r 13,010	r 84,710	130	789	9,516	218	32,362	7,889
1941	12,995	84,968	124	840	9,773	163	35,211	8,328
1942	12,895	85,607	(f)	(f)	(f)	(f)	43,417	11,935
1943	12,812	85,810	113	831	10,424	152	46,611	12,741
1944	12,797	86,076	107	871	11,013	164	38,166	10,512
1945	12,836	85,928	97	853	10,050	164	37,225	10,424
1946	12,861	85,860	88	834	9,766	138	36,525	16,094
1947	13,061	87,910	81	812	9,787	102	40,609	29,277
1948	13,016	90,169	75	816	10,444	93	(g)	(g)
1949	13,178	91,256	69	864	10,873	81	42,533	37,720
1950	13,515	82,101	59	865	10,923	79	42,071	47,237
1951	13,902	82,918	55	841	11,362	90	46,680	118,068
1952	14,296	83,587	53	852	12,188	86	52,681	64,027
1953	14,911	83,218	50	846	12,475	76	54,760	75,121
1954	15,213	84,432	49	830	13,087	101	58,497	82,567
1955	15,385	86,450	47	861	13,411	107	56,324	67,985
1956	15,507	87,332	45	897	14,128	99	67,932	69,642
1957	15,746	89,111	45	957	14,887	140	67,301	90,283
1958	15,925	88,388	44	997	15,724	151	68,504	75,228
1959	16,180	92,311	41	1,000	16,215	115	71,376	59,407
1960	16,343	92,640	41	1,030	16,412	131	72,979	75,302
1961	16,637	94,479	40	1,100	17,151	176	82,652	73,863
1962	17,079	99,722	40	1,218	18,314	174	83,159	79,283
1963	17,484	99,364	39	1,298	18,727	131	80,366	80,071
1964	17,848	99,771	39	1,299	20,165	128	95,053	116,331
1965	18,287	99,444	37	1,258	22,392	137	91,170	93,275
1966	18,737	99,764	35	1,271	24,427	144	108,116	115,183
1967	19,192	100,581	n.a.	1,357	27,370	161	119,681	121,509
1968	19,504	100,976	n.a.	1,427	30,161	183	131,379	116,653
1969	19,620	100,716	n.a.	1,546	32,901	220	164,307	158,264
1970	19,761	102,957	29	1,681	33,634	250	144,527	120,819
1971	19,545	103,389	—	1,781	34,709	278	151,808	92,009
1972	19,531	103,218	—	1,975	34,405	427	170,219	135,137
1973	19,539	102,711	—	2,182	30,919	476	140,649	225,041
1974	19,493	101,408	—	2,330	32,451	344	143,147	251,712
1975	19,505	99,899	n.a.	2,544	34,476	264	172,659	218,859
1976	18,686	100,053	—	2,654	34,771	260	174,807	242,027
1977	18,723	99,360	—	2,464	31,158	242	156,237	291,358
1978	18,779	99,319	—	2,271	29,823	237	143,127	258,034
1979	18,905	97,074	—	2,092	30,265	271	150,284	286,601
1980	18,958	98,139	41	2,065	30,431	293	147,840	348,214
1981	r 19,070	r 97,987	39	2,033	30,764	289	160,096	401,030
1982	19,091	r 98,108	37	1,942	30,268	263	145,126	378,540
1983	r 19,151	r 97,947	35	1,754	30,164	300	148,190	392,740
1984	18,969	99,444	33	1,730	29,518	300	138,423	404,251
1985	n.y.a.	n.y.a.	31	1,673	31,574	274	166,559	499,172

(a) From 1910 to 1946 at 30 June; for earlier years and from 1947 at 31 December. (b) Comprises allocations by Lands Department and certain leases and licences issued by Mines and Forests Departments. Apparent decrease in 1950 due mainly to revisions in records of Lands Department. (c) At 31 December for 1941 and earlier years; from 1943, the figures shown relate to 31 March. (d) Comprises shorn, dead and fellmongered wool. Excludes wool exported on skins. For 1947 and earlier, year ended 31 December; figures shown for 1949 to 1964 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. (f) Due to changes in recording procedures (see footnote (c)), figures for 1942 are not available. (g) Due to changes in recording procedures (see footnote (d)), figures for 1948 are not available.

## AGRICULTURE

Area and production of principal grain crops									
Year (a)	Wheat		Production			Oats		Barley	
	Total area used for crops (b)		Yield per hectare	Total	Gross value	Area	Production	Area	Production
	'000 hectares	'000 hectares	tonnes	'000 tonnes	\$'000	'000 hectares	'000 tonnes	'000 hectares	'000 tonnes
1840	1	1	1.11	1	—	n.a.	n.a.	n.a.	n.a.
1850	3	2	n.a.	n.a.	—	n.a.	n.a.	n.a.	n.a.
1860	10	6	1.00	6	n.a.	—	—	1	1
1870	22	11	0.79	9	—	1	1	2	2
1880	26	11	0.62	7	—	—	—	2	2
1890	28	14	0.92	13	—	1	1	2	2
1900	81	30	0.70	21	310	2	2	1	1
1910	346	236	0.68	161	2,162	25	14	1	1
1920	730	516	0.65	333	11,023	78	37	4	3
1930	1,939	1,601	0.91	1,456	12,201	111	60	7	4
1931	1,604	1,278	0.88	1,130	14,430	108	64	6	4
1932	1,725	1,371	0.83	1,137	13,554	116	65	6	3
1933	1,707	1,288	0.79	1,015	12,004	139	72	10	7
1934	1,554	1,119	0.66	734	10,123	166	77	11	5
1935	1,508	1,028	0.62	635	9,747	181	83	13	9
1936	1,559	1,042	0.56	586	11,902	187	63	16	10
1937	1,687	1,225	0.81	986	14,830	156	79	18	13
1938	1,895	1,381	0.73	1,003	8,984	172	85	30	21
1939	1,735	1,202	0.93	1,112	15,526	183	96	34	22
1940	1,614	1,062	0.54	573	8,648	174	59	27	16
1941	1,545	1,073	0.95	1,021	15,615	165	97	28	22
1942	1,127	709	0.79	561	10,080	138	66	20	12
1943					(c)				
1944	1,110	634	0.71	450	9,531	145	72	25	16
1945	1,115	614	0.71	434	8,319	163	70	31	20
1946	1,163	743	0.77	570	15,871	160	74	27	15
1947	1,429	982	0.66	648	22,048	172	66	27	12
1948	1,593	1,117	0.84	939	50,265	200	98	25	17
1949	1,660	1,161	0.85	987	42,122	215	127	26	22
1950	1,737	1,171	0.89	1,048	51,339	237	132	28	22
1951	1,834	1,289	1.05	1,358	65,328	237	144	24	21
1952	1,824	1,253	0.87	1,089	58,984	266	140	23	16
1953	1,877	1,214	0.80	965	55,194	337	189	43	40
1954	1,812	1,168	0.93	1,030	55,423	297	174	85	62
1955	2,041	1,206	0.77	933	43,655	354	174	105	64
1956	2,118	1,170	1.24	1,449	68,840	442	300	136	106
1957	2,080	1,119	0.78	874	44,055	425	189	139	85
1958	2,230	1,197	0.75	901	45,912	467	250	124	81
1959	2,434	1,332	1.18	1,569	77,639	538	410	130	123
1960	2,583	1,505	1.06	1,597	82,361	502	356	170	161
1961	2,734	1,627	1.07	1,739	92,290	538	396	219	193
1962	2,823	1,773	1.01	1,788	100,023	498	366	199	165
1963	2,965	1,944	1.01	1,973	107,023	476	367	158	137
1964	2,714	1,878	0.76	1,424	74,389	455	324	121	92
1965	2,950	2,085	0.82	1,717	88,557	466	254	123	84
1966	3,419	2,489	1.12	2,780	153,050	502	422	167	147
1967	3,463	2,569	1.09	2,809	153,157	487	401	151	152
1968	3,595	2,690	1.08	2,911	170,102	469	359	168	159
1969	3,840	2,952	1.04	3,060	151,306	442	416	224	208
1970	3,916	2,747	0.66	1,815	90,961	461	281	364	273
1971	3,831	2,361	1.25	2,957	153,227	520	520	632	769
1972	3,751	2,042	1.06	2,165	115,934	454	414	911	1,000
1973	3,855	2,437	0.82	2,003	109,399	297	212	744	640
1974	4,133	2,978	1.41	4,211	461,049	325	383	510	626
1975	3,758	2,810	1.17	3,277	361,211	262	250	387	329
1976	4,207	3,171	1.30	4,122	427,507	320	386	419	505
1977	4,416	3,314	0.98	3,249	290,489	372	347	452	553
1978	4,910	3,609	0.82	2,945	292,901	415	416	614	751
1979	4,993	3,706	1.19	4,400	546,827	427	491	616	778
1980	5,280	4,121	0.91	3,739	571,158	370	399	523	632
1981	5,547	4,333	0.77	3,315	508,734	382	384	535	504
1982	5,963	4,593	1.05	4,803	762,706	432	442	580	576
1983	6,379	4,865	1.14	5,534	982,505	461	534	603	717
1984	6,526	4,746	0.91	4,316	702,330	448	456	771	797
1985	6,723	4,652	1.41	6,580	1,210,964	351	460	965	1,431

(a) Figures shown for 1942 and earlier are for the year ended last day of February in the following year; those shown for 1944 and later are for the season ended 31 March. (b) Excludes pasture hay and from 1967 also excludes lucerne. (c) Due to the change in recording procedures (see footnote (a)) figures for 1943 are not available.

## PRIMARY PRODUCTION — MISCELLANEOUS

Year	Hay (all kinds) (a)		Gold production (b) (c)		Coal production (c)		Average values f.o.b.	
	Area '000 hectares	Production '000 tonnes	Quantity '000 grams	Value \$'000	Quantity '000 tonnes	Value \$'000	Wool (greasy)	Wheat (per
							per kg (d)	tonne (e)
							cents	\$
1860	2	8	—	—	—	—	—	19.83
1870	7	21	—	—	—	—	—	..
1880	8	20	—	—	—	—	n.a.	18.37
1890	9	25	622	171	—	—	—	..
1900	42	106	43,980	12,015	120	110	—	5.51
1910	71	182	45,753	12,494	266	227	16.20	14.85
1920	108	268	19,222	6,951	469	701	28.26	26.33
1930	161	500	13,001	3,729	509	770	19.37	16.69
1931	154	460	15,894	5,996	439	672	14.77	8.42
1932	169	493	18,849	8,807	423	541	15.50	11.48
1933	194	520	19,813	9,773	465	580	15.74	11.18
1934	167	470	20,248	11,118	508	557	28.75	10.79
1935	200	513	20,186	11,404	546	636	17.73	11.79
1936	193	420	26,314	14,747	574	663	24.98	14.62
1937	175	457	31,135	17,488	563	681	29.70	20.29
1938	165	445	36,329	20,726	615	750	24.25	15.08
1939	160	484	37,760	23,686	567	726	19.58	8.95
1940	169	381	37,044	25,393	548	729	25.68	11.19
1941	132	421	34,494	23,703	566	779	28.70	14.49
1942	102	282	26,376	17,731	590	923	28.64	15.12
1943	(f)	(f)	16,982	11,421	541	979	32.19	15.09
1944	114	319	14,494	9,800	567	1,166	34.81	17.71
1945	133	344	14,588	10,021	552	1,146	34.24	23.30
1946	114	292	19,191	13,280	652	1,460	34.92	31.81
1947	112	284	21,897	15,151	743	1,680	45.64	48.42
1948	93	272	20,684	14,314	745	1,760	76.41	64.33
1949	92	281	20,155	15,926	763	1,944	94.20	56.11
1950	87	276	18,973	18,933	827	2,575	105.91	57.03
1951	72	231	19,533	19,451	862	3,434	263.50	62.25
1952	70	215	22,706	23,696	843	4,915	138.10	62.64
1953	92	295	25,629	26,598	900	6,146	148.04	63.57
1954	89	299	26,469	26,627	1,034	7,178	156.20	60.90
1955	117	310	26,189	26,749	919	6,179	135.39	52.22
1956	109	390	25,256	26,405	843	5,448	112.66	46.57
1957	98	293	27,900	29,102	852	5,105	144.67	48.12
1958	137	392	26,967	28,357	885	4,561	130.80	56.35
1959	135	462	26,967	28,388	926	4,713	91.87	51.76
1960	129	440	26,625	28,140	937	4,878	115.37	49.48
1961	115	387	27,122	28,584	778	3,361	99.10	49.91
1962	119	402	26,717	28,115	934	3,962	109.80	51.90
1963	138	460	24,883	26,375	916	3,970	111.38	52.30
1964	117	395	22,177	23,383	1,003	4,679	134.47	52.01
1965	123	396	20,497	22,381	1,010	4,410	120.58	51.66
1966	118	421	19,564	23,316	1,078	4,562	116.00	51.12
1967	119	424	17,916	21,690	1,079	4,765	117.46	54.88
1968	129	428	15,925	19,407	1,104	4,817	105.69	51.31
1969	138	508	14,961	19,040	1,120	4,853	107.60	51.26
1970	202	576	12,310	15,811	1,178	5,407	98.11	47.72
1971	190	673	10,736	13,674	1,190	5,653	75.33	48.88
1972	177	653	10,848	14,835	1,188	5,855	74.94	49.52
1973	224	664	9,264	16,718	1,154	6,422	150.21	49.67
1974	220	734	7,173	19,183	1,197	7,237	215.36	98.75
1975	164	508	6,305	29,788	1,879	12,511	144.37	126.39
1976	163	536	7,644	27,141	2,157	17,613	147.62	116.89
1977	169	560	7,619	31,586	2,339	21,896	188.10	105.10
1978	191	597	13,653	64,741	2,435	24,846	195.76	(g) 92.52
1979	184	586	12,231	78,313	2,406	34,484	207.87	(g) 116.53
1980	208	636	11,598	158,253	3,039	54,464	(g) 253.81	(g) 146.45
1981	240	703	10,532	165,376	3,127	63,100	(g) 270.01	(g) 160.32
1982	255	711	16,135	178,566	3,435	75,132	(g) r 288.61	(g) 155.48
1983	252	754	r 22,992	r 334,802	3,903	95,529	(g) r 303.41	(g) 168.10
1984	238	676	26,183	365,453	3,942	106,325	(g) r 317.08	(g) r 173.81
1985	226	747	37,425	508,892	3,673	109,120	(g) 353.01	(g) 187.09

(a) See footnote (a) on preceding page. (b) 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. (c) From 1969 figures relate to year ended 30 June. (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. (f) See footnote (c) on previous page. (g) Foreign exports only.

VALUE OF PRIMARY COMMODITIES PRODUCED  
(Excluding Mining)  
(\$'000)

Gross value of primary commodities produced (excluding mining) (b)						
Year (a)	Agri- culture	Dairying, poultry farming and bee keeping	Pastoral (c)	Hunting	Forestry	Fisheries (d)
1920	17,466	2,065		9,008	n.a.	n.a.
1930	24,503	3,433		10,800	2,159	544
1931	17,756	3,170		8,845	1,809	485
1932	20,985	3,311		8,023	1,312	427
1933	20,495	3,338		8,056	1,183	430
1934	19,022	3,315		13,369	1,648	406
1935	16,366	3,927		9,456	2,399	373
1936	17,045	3,897		12,639	2,653	464
1937	18,871	4,170		11,437	3,032	592
1938	21,071	4,494			2,957	561
1939	17,077	4,716	9,326	131	2,899	562
1940	22,210	5,230	11,463	139	2,660	539
1941	14,477	5,960	11,460	241	3,160	479
1942	18,707	7,664	11,958	276	2,950	255
1943	17,534	7,971	16,155	190	3,277	347
1944	18,021	8,473	18,156	225	3,150	330
1945	20,466	8,709	15,385	215	3,152	438
1946	26,237	8,933	15,948	281	3,358	635
1947	32,367	9,790	21,986	465	3,305	1,135
1948	64,317	11,964	37,036	395	3,649	1,379
1949	58,231	12,975	—	—	4,024	1,432
1950	63,008	14,155	62,307	393	4,501	1,649
1951	87,752	18,778	131,920	499	6,741	2,505
1952	86,791	21,289	83,584	488	8,517	3,286
1953	87,127	22,328	92,964	461	7,155	—
1954	86,533	21,762	101,566	609	7,678	3,808
1955	77,164	—	87,435	335	8,116	4,383
1956	109,709	22,433	89,293	361	10,474	4,915
1957	80,170	23,240	112,885	277	10,305	5,563
1958	87,293	23,500	94,118	175	11,046	6,530
1959	126,672	22,838	81,639	125	10,903	7,818
1960	131,052	24,696	100,255	288	10,919	8,621
1961	140,003	25,917	101,051	579	11,082	8,569
1962	148,765	26,400	105,310	511	11,104	10,689
1963	157,948	27,387	107,280	376	10,877	11,219
1964	123,342	28,723	148,701	632	11,462	10,187
1965	139,426	30,884	125,837	775	12,093	15,218
1966	215,949	32,899	157,249	836	12,731	15,733
1967	218,206	33,022	159,857	986	13,300	16,525
1968	234,020	35,485	158,754	1,236	14,076	21,954
1969	218,643	38,801	210,780	1,211	13,465	23,717
1970	156,738	40,460	176,387	1,098	13,632	19,660
1971	262,391	42,330	146,198	834	16,174	25,127
1972	216,969	45,170	199,443	838	14,660	30,817
1973	203,417	50,136	321,111	2,132	14,607	28,158
1974	587,628	59,649	369,636	1,739	15,264	30,494
1975		835,885		1,657	19,995	35,130
1976		996,633		1,744	23,404	51,079
1977		959,160		2,622	26,349	69,094
1978		993,889		2,675	24,529	88,340
1979		1,343,932		4,842	27,612	96,055
1980		1,572,744		3,699	33,366	85,597
1981		1,678,031		n.a.	n.a.	82,764
1982		1,874,267		n.a.	n.a.	99,254
1983		2,196,230		n.a.	n.a.	126,208
1984		1,940,843		n.a.	n.a.	141,425
1985		2,678,403		n.a.	n.a.	163,347

(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 collection. Lines indicate these breaks in continuity. (b) Estimated value of recorded production based on wholesale prices realised at the principal market. (c) In addition the following amounts were paid as interim distribution of profits under the 1939-1945 War-time Wool Disposals Plan: in 1949, \$3,629,478; in 1951, \$3,629,478; in 1952, \$2,325,324; in 1953, \$368,104; in 1954, \$2,120,460; and in 1955, \$1,797,090. Separate State figures are not available for distributions made from 1956 to 1958 when payments were virtually complete. (d) Figures for 1979 exclude pearling and whaling. (e) Separate details not available. (f) From 1975 this dissection has been contracted to the single industry 'Agriculture'.

FACTORIES (a)

Year (b)	Persons employed (c)		Wages and salaries (d)	Output (e)	Net production (f)	Production of selected commodities						Timber from logs (l)
	Fac-tories	No.				Bricks (g)	Scoured wool (h)	Bacon and ham (i)	Butter (j)	Flour (plain)	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
1941	2,056	22,734	9,441	43,650	18,034	45,505	3,867	2,325	6,454	136,010	431	347
1942	1,938	23,980	10,999	47,904	20,201	34,247	2,709	2,773	7,103	122,777	589	345
1943	1,799	25,813	12,956	53,475	22,906	8,926	3,455	4,172	6,549	114,554	735	328
1944	1,807	28,101	14,835	58,417	25,023	6,296	4,437	4,391	6,254	144,967	804	287
1945	1,931	29,146	15,228	63,481	25,920	10,003	4,274	5,051	5,767	146,683	835	275
1946	2,280	30,256	15,768	68,046	27,653	24,150	3,899	4,646	5,694	151,310	824	278
1947	2,615	33,806	18,210	76,540	31,497	37,758	5,417	4,677	6,052	160,323	1,033	330
1948	2,788	35,967	21,471	91,252	36,768	44,986	5,334	4,018	7,086	177,352	1,035	351
1949	2,925	38,354	25,856	106,835	42,948	50,378	6,467	3,610	7,078	164,623	884	336
1950	3,023	40,733	30,586	127,956	52,088	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)	(m)	(m)	(m)	(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	n.a.	2,074	375
1978	2,037	65,740	629,095	3,031,505	1,208,749	357,391	13,308	5,666	2,212	n.a.	1,812	386
1979	2,202	65,232	670,772	3,498,828	1,321,683	381,092	16,129	5,516	1,373	n.a.	2,364	341
1980	2,301	65,987	734,204	4,259,065	1,643,325	404,954	20,128	5,930	995	n.a.	2,866	349
1981	2,426	68,870	869,223	4,902,236	1,876,664	381,909	21,645	6,062	834	n.a.	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	n.a.	3,417	257
1984	2,408	61,997	1,047,393	5,922,692	2,136,745	n.p.	17,053	6,807	1,269	n.a.	3,665	265

(a) Prior to 1968-69 a factory was defined for statistical purposes as any establishment engaged in the processes of manufacturing, assembling, treating or repairing and in which four or more persons were employed during any period of the year, or power other than manual was used. For 1968-69 and later, direct comparisons of statistics of number of factories, persons employed, wages and salaries, output and net production with those for earlier years are not possible (see introduction to Chapter 17). Figures for 1974-75 and later, exclude details of single establishment enterprises with less than four persons (see Section *Manufacturing Statistics*). (b) From 1930 year ended 30 June. (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 include all types of standard size bricks. Prior to 1929-30, they also include firebricks and blocks. From 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) A census of manufacturing establishments was not conducted in respect of the year ended 30 June 1971.

## INDUSTRIAL DISPUTES; WAGE RATES; UNEMPLOYMENT BENEFIT

Year	Industrial disputes (a)				Minimum wage rate index numbers (b)		Unemployment benefit (c)
	Number of disputes	Workers involved (e)	Working days lost (man-days)		Adult male wage earners (d)		
			Number	Average per worker involved	Weekly	Hourly	Persons on benefit (f)
		'000	'000	No.			
1920	45	12.0	166.6	13.87			
1930	2	0.5	27.1	57.85			
1931	13	3.9	24.0	6.12			
1932	8	2.7	11.1	4.16	n.a.	n.a.	
1933	10	3.9	16.9	4.31			
1934	10	3.5	17.8	5.11			
1935	11	3.6	72.0	19.98			
1936	19	4.7	32.4	6.87			
1937	12	1.7	14.4	8.65			n.a.
1938	7	3.6	43.8	12.01			
1939	7	1.3	14.1	11.25	35.6	32.0	
1940	4	3.0	7.4	2.44	36.8	33.1	
1941	3	0.3	0.8	2.79	39.0	35.4	
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	(g) 29,000
1980	368	69.4	191.0	2.75	145.7	145.8	(g) 29,800
1981	r 364	r 72.9	r 244.0	r 3.39	166.1	166.2	28,638
1982	436	63.6	162.4	2.55	187.6	190.3	31,636
1983	300	42.3	270.6	6.40	197.2	200.9	50,992
1984	406	r 69.2	r 119.2	1.72	205.9	210.7	(g) 59,400
1985	358	48.7	92.9	1.91	218.4	223.6	(g) 57,900

(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 — Base: weighted average wage rate for Australia, June 1976 = 100. (c) Payment commenced 1 July 1945. (d) Excludes workers in rural industry. (e) Includes workers indirectly involved, i.e. those thrown out of work at an establishment where a stoppage occurred but not themselves parties to the dispute. (f) Year ended 30 June; average number of persons on benefit at end of each week. (g) 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	
1951	15.4	21.0	13.6						17.2	17.1	
1952	19.2	25.4	15.9						21.0	21.0	
1953	22.0	26.6	18.2						23.2	22.9	
1954	23.3	26.6	19.6						23.9	23.4	
1955	24.0	26.7	21.7						24.4	23.6	
1956	24.4	27.0	22.5						25.0	24.5	
1957	25.5	27.5	22.5						26.2	25.9	
1958	25.1	28.1	22.9	n.a.	n.a.	n.a.	n.a.	n.a.	26.4	26.2	
1959	25.3	28.5	23.7						26.6	26.6	
1960	26.0	28.8	24.3						27.1	27.3	
1961	27.3	29.5	25.8						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		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	

(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.

## BUILDING COMPLETED (a)

Year ended 30 June	Houses (b) (c)		Other residential buildings (b) (c)		Alterations and additions (d) to residential buildings	Non-residential buildings (e)				Total all building (e)
	Number (f)	Value (e)	Number of units	Value (e)	Value (e)	Factories	Offices	Educational	Total	
		\$'000		\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
1946	860	1,452	2	4		144				492
1947	1,792	3,516	—	—		98				716
1948	2,771	5,784	—	—		176				872
1949	3,244	7,592	—	—		440				1,822
1950	3,509	8,974	101	194		446				1,536
							n.a.	n.a.		
1951	5,160	15,032	305	606		410				2,258
1952	6,577	24,466	215	300		1,402				4,086
1953	7,965	37,988	100	334		1,668				7,514
1954	7,627	39,768	22	834		1,734				10,968
1955	8,792	48,422	316	1,176		6,250				18,594
1956	7,760	45,084	584	2,564		3,756	842	2,162		19,708
1957	5,030	29,054	365	1,502	(g)	2,210	2,002	1,162		16,292
1958	6,196	36,526	171	712		2,526	3,906	1,110		17,286
1959	5,846	34,410	212	840		2,792	2,384	4,584		25,274
1960	5,997	35,454	263	986		2,368	1,544	5,838		23,800
1961	5,973	38,102	440	1,580		4,736	4,118	7,956		32,368
1962	6,082	39,470	265	1,342		3,038	2,902	6,014		27,260
1963	6,593	45,780	642	2,984		4,912	1,588	7,724		37,664
1964	7,276	51,774	1,295	5,596		5,384	5,996	6,226		35,498
1965	7,445	57,238	1,841	9,046		6,816	2,820	8,044		40,816
1966	7,265	58,089	1,624	9,096		9,631	10,576	8,459		62,993
1967	8,272	78,078	1,742	9,322		9,841	7,093	10,477		74,735
1968	9,858	97,370	2,392	12,577		15,061	14,608	12,051		85,456
1969	12,840	133,276	3,491	22,406		15,845	10,885	14,122		99,152
1970	13,933	151,300	5,596	40,519		16,615	14,294	13,297		111,577
1971	11,900	149,267	5,013	39,964	404	18,006	39,736	20,589		175,377
1972	13,209	165,548	1,595	13,913	1,187	21,336	19,360	16,325		150,790
1973	13,660	163,396	920	7,308	1,842	15,594	21,245	24,767		151,468
1974	12,517	176,410	3,546	32,828	2,763	23,430	19,034	21,846		139,163
1975	10,994	198,605	3,300	38,882	4,427	18,216	18,443	39,965		170,105
1976	12,080	253,756	2,948	43,989	8,714	22,387	45,695	58,285		227,299
1977	15,155	394,991	6,152	113,875	15,405	26,640	43,533	29,497		226,433
1978	12,685	378,760	4,681	98,949	21,496	34,611	18,166	46,109		234,046
1979	11,148	349,145	3,507	74,864	30,512	43,997	33,250	56,349		339,272
1980	11,648	380,933	4,156	93,236	33,317	51,514	49,865	33,232		301,934
1981	10,120	375,465	4,531	107,977	37,477	37,010	75,000	29,650		308,813
1982	9,440	398,495	5,255	164,979	51,937	52,647	131,507	39,936		495,550
1983	9,070	372,469	4,020	143,401	47,351	45,235	152,105	37,674		464,288
1984	10,340	407,438	2,124	75,872	41,033	18,966	74,985	45,070		351,050
1985	14,000	583,915	3,735	115,278	51,912	27,917	55,579	30,714		357,471

(a) From 1981 figures are not strictly comparable with those for earlier periods. For details see Chapter 19. (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. (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 dwellings as appropriate.

## WESTERN AUSTRALIA IN RELATION TO AUSTRALIA

Particulars	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	31 Dec. 1984 p	1,393,965	15,648,861	8.9
Population increase (b)	number	1984 p	19,065	184,626	10.3
Rate of population increase (b)	per cent	1984 p	1.4	1.2	..
Births registered (b) (c)	number	1984	21,625	234,034	9.2
Deaths registered (b) (c)	number	1984	8,503	109,914	7.7
Marriages registered	number	1984	9,920	108,655	9.1
Divorce — Dissolutions granted	number	1984	4,069	43,012	9.5
Employed labour force (d)	'000	Jan, 1986	632.2	6,719.0	9.4
Average weekly earnings — all male employees (e)	\$	August 1985	414.3	403.1	..
Unemployed on benefit	number	30 June 1985	54,028	561,400	9.6
Industrial disputes — Working days lost	'000	1985	92.9	1,256.2	7.4
Employee organisations membership	'000	Dec. 1984	244.2	3,028.5	8.1
Area under crop	'000 hectares	1983-84	6,526	21,961	29.7
Area under sown pasture	'000 hectares	1983-84	7,454	26,147	28.5
Area of—					
Wheat for grain	'000 hectares	1983-84	4,746	12,931	36.7
Oats for grain	'000 hectares	1983-84	448	1,772	25.3
Barley for grain	'000 hectares	1983-84	771	3,109	24.8
Hay	'000 hectares	1983-84	238	1,758	13.5
Fruit and vineyards	'000 hectares	1983-84	9	172	5.1
Livestock —					
Sheep	'000	31 Mar 1984	29,518	139,242	21.2
Cattle	'000	31 Mar 1984	1,730	22,161	7.8
Pigs	'000	31 Mar 1984	300	2,527	11.9
Production —					
Wheat for grain	'000 tonnes	1983-84	4,316	21,764	19.8
Wool (f)	tonne	1983-84	144,747	732,262	19.8
Meat (g)	'000 tonnes	1983-84	209	2,345	8.9
Whole milk (h)	mil. litres	1983-84	232	5,923	3.9
Butter (h)	tonne	1984-85	1,582	113,939	1.4
Value of agricultural commodities produced	\$m	1983-84	1,941	15,317	12.7
Mining establishments — Value added (i)	\$m	1983-84	(j) 1,914	8,825	21.7
Iron ore production	'000 tonnes	1984-85	87,726	91,441	95.9
Black coal production	'000 tonnes	1984-85	(k) 3,673	130,182	2.8
Crude oil production	'000 cu m	1984-85	(l) 1,366	30,919	4.4
Manufacturing establishments (m) —					
Number (j)	..	1983-84	2,408	27,470	8.8
Employment — Average over whole year	'000	1983-84	62.0	1,009.4	6.1
Wages and salaries paid (i)	\$m	1983-84	1,047.4	17,461.1	6.0
Value added (i)	\$m	1983-84	2,136.7	34,229.3	6.2
New dwelling units commenced (n)	number	1984-85	18,330	152,720	12.0
Value of all building commenced (n)	\$m	1984-85	1,593.6	14,823.1	10.8
Foreign imports	\$m f.o.b.	1984-85	2,155.3	30,021.8	7.2
Foreign exports	\$m f.o.b.	1984-85	6,070.0	30,742.5	19.7
Foreign cargo discharged	'000 revenue tonnes	1984-85	4,990.8	29,665.4	16.8
	'000 gross wt tonnes	1984-85	4,541.0	23,507.7	19.3
Foreign cargo loaded	'000 revenue tonnes	1984-85	100,672.7	225,078.1	44.7
	'000 gross wt tonnes	1984-85	100,519.0	224,144.6	44.8
Motor vehicles on register	'000	30 June 1985	866.3	9,118.3	9.5
New motor vehicles registered	'000	1984-85	68.3	720.7	9.5
Road traffic accidents — Persons killed	number	1985	243	2,930	8.3
Retail sales (excluding motor vehicles, etc.)	\$m	1984-85	4,192.2	(o) 47,028.0	8.9
Savings bank deposits per head	\$	30 June 1985	1,707	2,467	..
Household income per head	\$	1984-85	11,200	11,543	..
Age and invalid pensions (including wives and spouse carers pensions)	number	30 June 1985	136,167	1,690,357	8.1
Disability and service pensions (including dependants)	number	30 June 1985	69,767	800,820	8.7
Student enrolment —					
Government schools (q)	number	1 July 1984	209,099	2,260,551	9.2
Non-government schools (q)	number	1 July 1984	55,855	757,169	7.4
Universities	number	30 April 1985	13,452	174,817	7.7
Colleges of Advanced Education	number	30 April 1985	22,260	(s) 195,503	11.4

(a) Based on Estimated Resident Population. (b) Figures for 1984-85 are abnormally low, due to late registrations in N.S.W. (c) Based on State of usual residence. (d) In civilian employment. Excludes defence forces and employees in agriculture and private domestic service, and trainee teachers. (e) Not comparable with 'Average weekly earnings per employed male unit' previously published. (f) In terms of greasy wool. Comprises shorn wool, fleeced wool and wool exported on skins. (g) Dressed carcass weight. Excludes offal. (h) Source: Australian Dairy Corporation. (i) See definitions at the beginning of Chapter 15. (j) Excludes establishments predominantly engaged in quarrying sand and gravel. (k) As reported to Department of Mines. (l) Source: Department of Resources and Energy. (m) See Chapter 17. Excludes details for single establishments employing less than four persons. Excludes electricity and gas establishments. (n) Source: Building Activity Survey. Number of new dwelling units has been rounded to nearest ten. (o) Excludes details of Northern Territory. (q) Source: National Schools Statistics Collection. (s) Relates to all students enrolled in advanced education courses.

## 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.

Article	Year Book
Aboriginal population, history of	1984, pp. 1-8
Agriculture, Institute of, University of Western Australia	1975, pp. 217-18
Air pollution and the weather	1975, pp. 63-5
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
Electoral Divisions (Commonwealth), origin of names of	1970, p. 530
Electoral Provinces and Electoral Districts (State)	1976, pp. 116-17
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
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Acacia	1965, pp. 59-60
'Christmas tree' ( <i>Nuytsia floribunda</i> )	1962, p. 51
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Proteaceae family in Western Australia	1974, pp. 52-4
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Fremantle, Port of	1970, pp. 441-3
Geraldton, Port of	1972, pp. 447-9
Government administration, Commonwealth	1973, p. 542
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 1831, 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
Hydrocarbon Exploration on the North-West Shelf	1976, pp. 37-9
Industrial Development, Department of	1974, p. 403
Integrated Economic Censuses, 1968-69	1971, pp. 552-64

(a) Commencing with the present series: No. 1 — 1957.

ARTICLES PUBLISHED IN PREVIOUS ISSUES (a) — *continued*

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Kuri Bay pearls	1974, pp. 558-9
Labour Force Survey	1971, pp. 508-10
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. 553-6
Meteorites, Western Australian	1973, pp. 34-5
Meteorological services —	
History of	1960, pp. 34-5
Provision of	1966, pp. 46-7
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Police Department, history of	1973, pp. 113-16
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Origin and development	1968, pp. 360-1
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Rents (weekly) of unfurnished houses and flats	1973, p. 216
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Settlement at King George's Sound, early history of	1977, pp. 556-9
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Wheat, development of production	1968, p. 270

(a) Commencing with the present series: No. 1 — 1957.

## MAPS PUBLISHED IN PREVIOUS ISSUES (a)

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Areas of current development	1970, <i>facing</i> p. 336
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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Electricity supplies	1967, <i>facing</i> p. 320
Epicentres of large earthquakes	1971, p. 33
General map of the State showing statistical divisions, local government areas, roads, railways, air routes and isohyets	1973, <i>inside back cover</i>
General map of the State showing physical features, roads, railways and airfields	1975, <i>inside back cover</i>
Perth Statistical Division	1978, <i>facing</i> p. 112
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(a) Commencing with the present series: No. 1 — 1957.

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Catalogue number	Title of publication
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1302.5	Western Australian Pocket Year Book (\$2.60)
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1305.5	Monthly Summary of Statistics (monthly)
1306.5	Western Australia in Brief
<b>POPULATION, VITAL STATISTICS, MIGRATION AND SOCIAL</b>	
3203.5	Estimated Resident Population in Local Government Areas
3204.5	Estimated Resident Population in Local Government Areas: Preliminary
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4503.5	Court Statistics — Childrens' Courts
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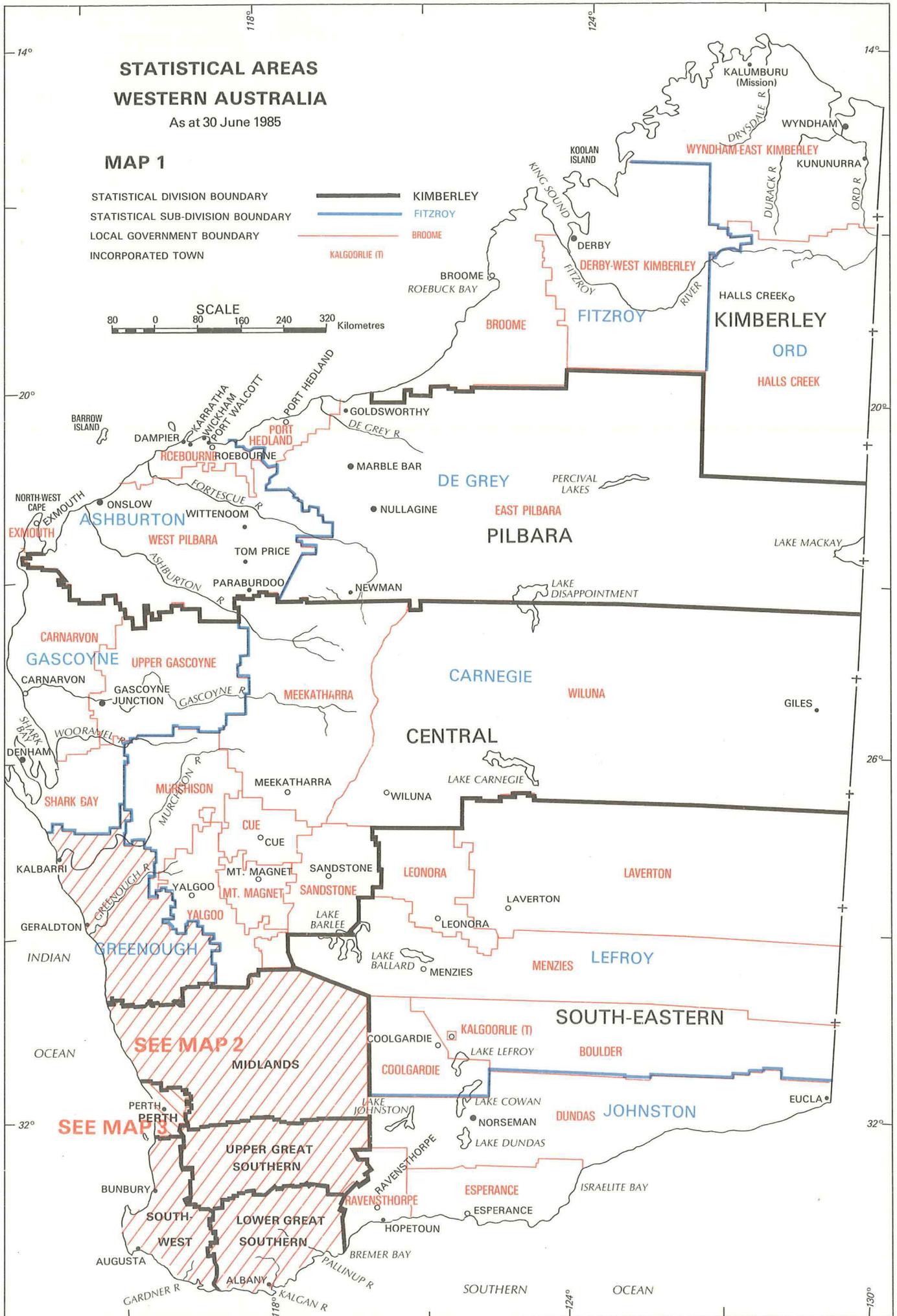
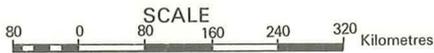
# STATISTICAL AREAS WESTERN AUSTRALIA

As at 30 June 1985

MAP 1

STATISTICAL DIVISION BOUNDARY  
 STATISTICAL SUB-DIVISION BOUNDARY  
 LOCAL GOVERNMENT BOUNDARY  
 INCORPORATED TOWN

**KIMBERLEY**  
**FITZROY**  
**BROOME**  
 KALGOORLIE (T)



SEE MAP 2  
 SEE MAP 3

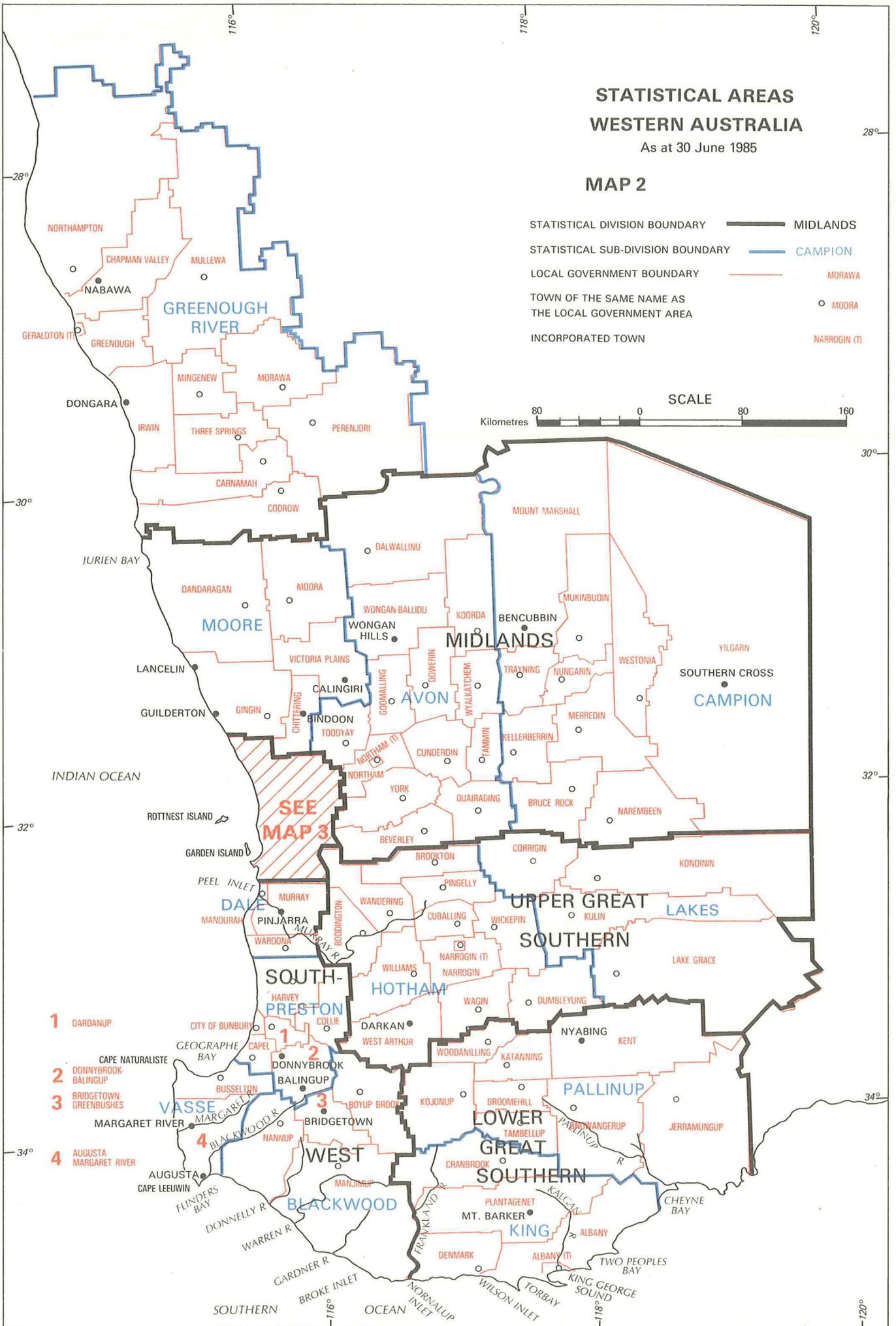
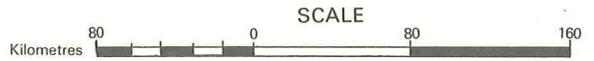
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# STATISTICAL AREAS WESTERN AUSTRALIA

As at 30 June 1985

## MAP 2

- STATISTICAL DIVISION BOUNDARY  MIDLANDS
- STATISTICAL SUB-DIVISION BOUNDARY  CAMPION
- LOCAL GOVERNMENT BOUNDARY  MORAWA
- TOWN OF THE SAME NAME AS THE LOCAL GOVERNMENT AREA  MOORA
- INCORPORATED TOWN  NARROGIN (T)



SEE MAP 3

- 1 DARDANUP
- 2 DONNYBROOK  
BALINGUP
- 3 BRIDGETOWN  
GREENBUSHES
- 4 AUGUSTA  
MARGARET RIVER

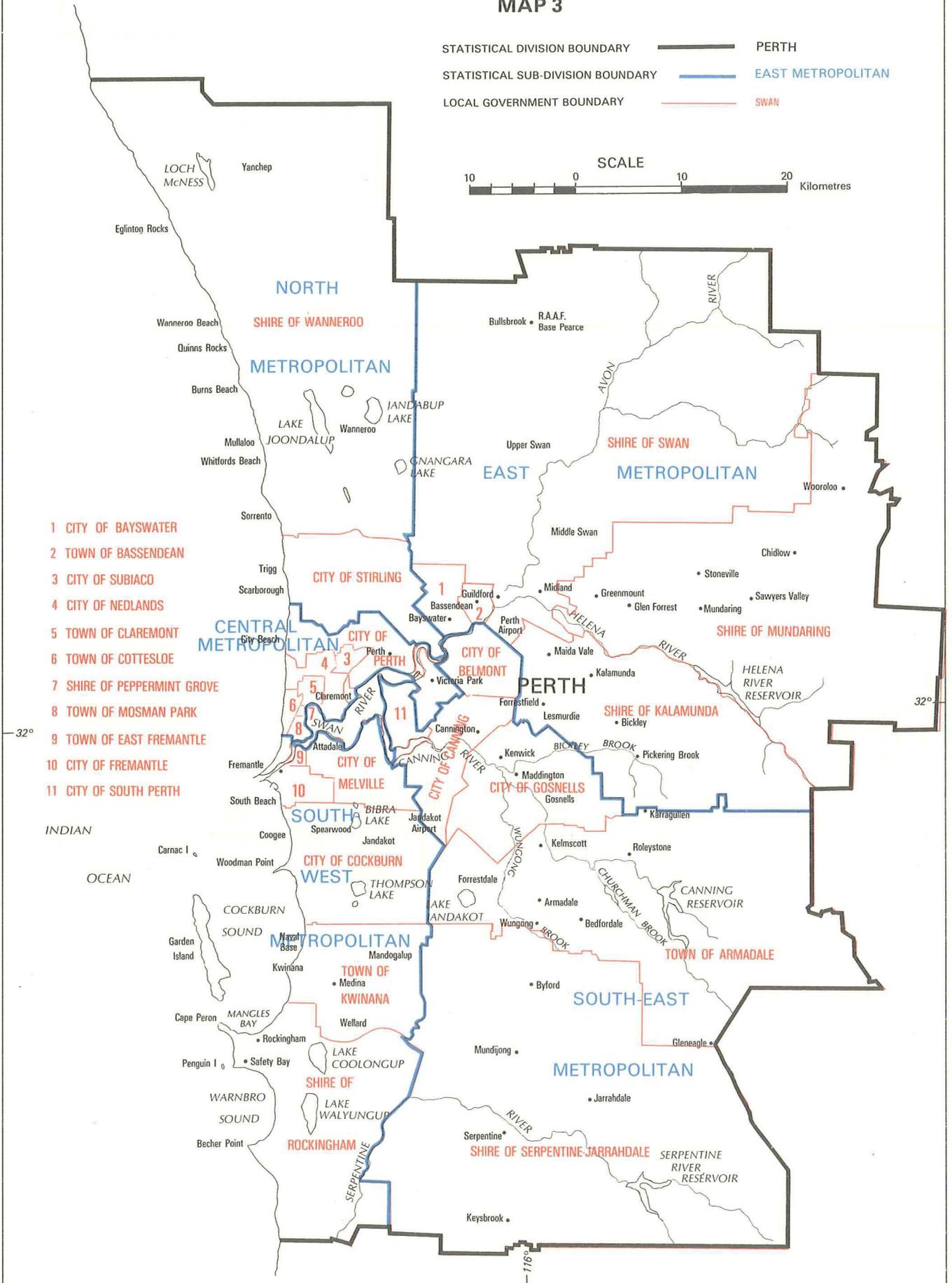
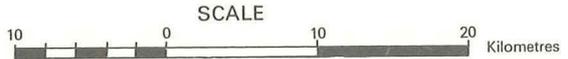
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# STATISTICAL AREAS WESTERN AUSTRALIA

As at 30 June 1985

## MAP 3

STATISTICAL DIVISION BOUNDARY ——— PERTH  
 STATISTICAL SUB-DIVISION BOUNDARY ——— EAST METROPOLITAN  
 LOCAL GOVERNMENT BOUNDARY ——— SWAN



- 1 CITY OF BAYSWATER
- 2 TOWN OF BASSEDEAN
- 3 CITY OF SUBIACO
- 4 CITY OF NEDLANDS
- 5 TOWN OF CLAREMONT
- 6 TOWN OF COTTESLOE
- 7 SHIRE OF PEPPERMINT GROVE
- 8 TOWN OF MOSMAN PARK
- 9 TOWN OF EAST FREMANTLE
- 10 CITY OF FREMANTLE
- 11 CITY OF SOUTH PERTH

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