



1992

Western Australian

Year Book

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WESTERN AUSTRALIAN YEAR BOOK

1992

Cover: The pink cockatoo (*cacatua leadbeateri*), often called Major Mitchell's cockatoo after the famous explorer Sir Thomas Mitchell. To be found sporadically distributed throughout arid and semi-arid areas of the State.

Design: Shaan Coutinho

Frontispiece: The formidable yet spectacular Zuytdorp cliffs, Shark Bay region. The cliffs bear the name of the Dutch ship *Zuytdorp*, wrecked near this site in 1712.

Photograph: Jiri Lochman, Lochman Transparencies

Endpapers: Reproduced from John Arrowsmith's 1833 map of Perth.

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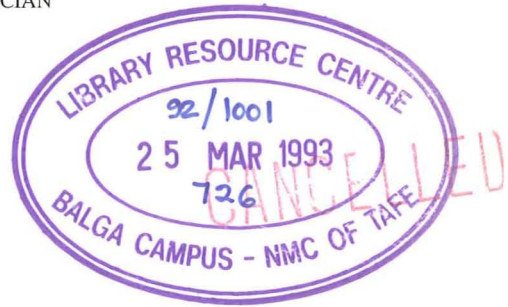


WESTERN AUSTRALIAN YEAR BOOK

No. 29— 1992

B. N. PINK

DEPUTY COMMONWEALTH STATISTICIAN
AND GOVERNMENT STATISTICIAN



AUSTRALIAN BUREAU OF STATISTICS
WESTERN AUSTRALIAN OFFICE

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CONTENTS

	General information	vii
	Preface	viii
	The Flag of Western Australia	ix
	The Coat of Arms of Western Australia	x
	The Emblems of Western Australia	x
1	HISTORY OF WESTERN AUSTRALIA	
2	PHYSICAL FEATURES AND GEOLOGY	
	The Geomorphological Framework of Western Australia	2-1
3	CLIMATE AND METEOROLOGY	
4	FLORA AND FAUNA	
	The Vegetation of Western Australia	4-1
	The Fauna of Western Australia	4-14
	Insects	4-26
5	GOVERNMENT	
6	POPULATION AND VITAL STATISTICS	
	Population	6-1
	Vital Statistics	6-6
7	SOCIAL WELFARE	
8	HEALTH	
9	LAW, ORDER, EMERGENCY SERVICES AND PUBLIC SAFETY	
10	EDUCATION AND SCIENCE	
	Education	10-1
	Science	10-10
11	CULTURE, RECREATION AND TOURISM	
	Culture	11-1
	Recreation	11-7
	Tourism	11-10
12	WATER	
13	AGRICULTURE, FORESTRY AND FISHING	
	Agriculture	13-1
	Forestry	13-16
	Fisheries	13-18

14	MINING	
15	ENERGY	
16	MANUFACTURING	
17	INTERNAL TRADE AND SERVICES	
18	HOUSING AND CONSTRUCTION	
19	TRANSPORT AND COMMUNICATION	
	Transport	19-1
	Communications	19-9
20	FOREIGN AND INTERSTATE TRADE	
21	EMPLOYMENT AND INDUSTRIAL CONDITIONS	
22	PRICE INDEXES, PRICES AND HOUSEHOLD EXPENDITURE	
23	PUBLIC FINANCE	
24	PRIVATE FINANCE	
25	CENTRAL STATISTICAL DIVISION PROFILE	
	The Gascoyne Region	25-1
	Geraldton Mid-West Region	25-8
26	STATISTICAL SUMMARY	
27	APPENDIX	
	SPECIAL ARTICLES INCLUDED IN THIS ISSUE	
	Western Australia in Peril	1-10
	Hon. Carmen Lawrence M.L.A.	5-7
	1991 Census of Population and Housing	6-7
	Dance Triennium 1990-92	11-6
	Pertn Landfill Gas Project	15-5

GENERAL INFORMATION

Symbols

The following symbols mean:

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

Other forms of usage

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

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PREFACE

The *Western Australian Year Book* is a general reference work presenting authoritative information on almost every aspect of life in Western Australia. In addition to descriptive and statistical material on the social, demographic and economic structure of the State, the *Year Book* also contains chapters on history, geography, climate, vegetation and fauna, and government.

The *Year Book* is illustrative of a wide range of social and economic data available from the Australian Bureau of Statistics. This information is available in printed publications; on microfiche, magnetic tape, floppy disk or CD—ROM; electronically through PCAUSSTATS or DISCOVERY; or through ABS information consultants.

This Office maintains an Information Consultancy Service that places emphasis on providing information tailored to support informed decision making, research and discussion within Government and the community generally. Consultants are available to discuss client's requirements and to work together with them to achieve the best solution for their information needs.

Publications and other statistical products can be purchased from the ABS Bookshop. Clients can also arrange to be placed on a publications subscription service to receive ABS publications on a regular basis. The publications of the Western Australian Office are listed in the Appendix.

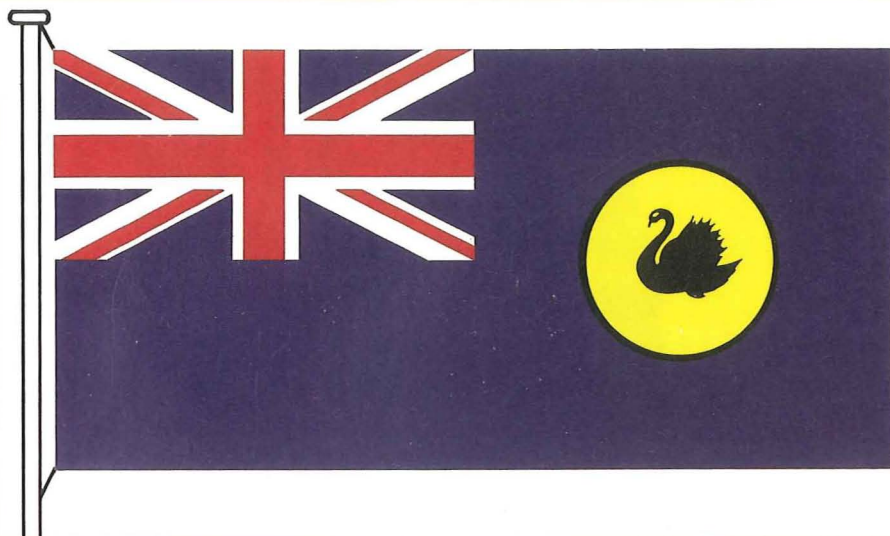
The ABS library holds all ABS publications and other statistical material. Selected libraries in the Perth Metropolitan area and major regional centres also hold a comprehensive range of ABS publications.

Production of the *Year Book* requires a range of skills and considerable effort. I gratefully acknowledge the valuable assistance given by individuals, businesses, government agencies and other organisations who have written articles, updated tables and text or supplied photographs and maps. I would also express my appreciation to Shaan Coutinho, the designer of this year's striking cover, the staff of CDC Graphics and Advance Press and ABS staff for their valuable contributions. This 1992 edition was compiled by Publishing editor Pauline Bazen, with excellent contributions and support from Larry Dunning and Greg Colgan.

May 1992

B.N. PINK
Deputy Commonwealth Statistician
and Government Statistician

The Flag of Western Australia



HISTORY OF THE FLAG OF THE STATE OF WESTERN AUSTRALIA

The black swan has long been associated with Western Australia. Vlamingh, who explored the Swan River in 1697, gave it the name on account of the number of swans found upon it, and for a number of years after the foundation of the settlement, it was generally referred to as the Swan River Colony.

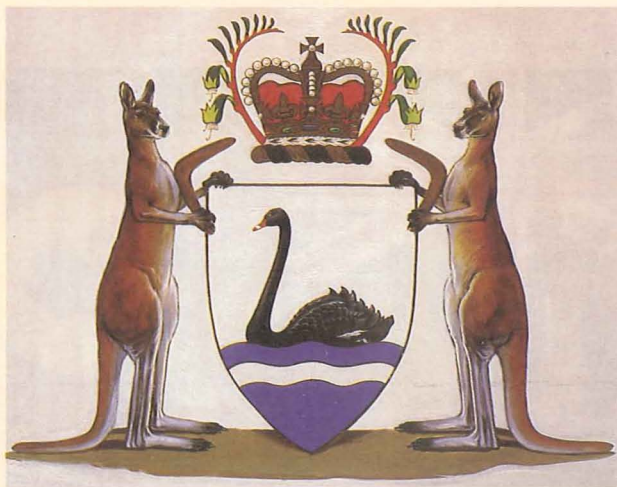
It is not surprising, therefore, that the Black Swan should come to be accepted as the emblem of the State. It appears on Bank notes, issued in the early thirties on account of shortage of specie, and on the "Swan River Guardian" newspaper, first published in 1836; the Royal Arms, with the Swan below, appears at the head of the first issue of the Western Australian Government Gazette of 20th February, 1836. A design showing the Black Swan was selected for the first Western Australian postage stamps, issued in

1854. On 17th August, 1869, an Order in Council was issued authorising the Governors of Colonies to fly the Union flag with the Arms or Badge of the Colony in the centre.

A circular from the Secretary of State notified the Governors of this fact, and Frederick A. Weld, Governor of Western Australia, in a despatch dated 3rd January 1870, submitted a sketch of the badge which it was proposed to adopt - ie, a black swan on a yellow background. The use of this badge was confirmed by a later Governor, William C.F. Robinson, in a despatch of 1875.

In September 1912, when the Royal Warrant was issued granting Armorial Ensign and Supporters to the Commonwealth of Australia, the Black Swan was used as the emblem of Western Australia.

The Coat of Arms of Western Australia



The Coat of Arms of Western Australia was granted by Her Majesty, Queen Elizabeth II, by Royal Warrant dated the 17th day of March, 1969.

The Emblems of Western Australia

MANGLES' KANGAROO PAW (*Anigosanthos Manglesii* D.Don)



Mangles' Kangaroo Paw was first collected in the Swan River Colony in the early years of its settlement, and was described by D. Don in 1836. It is a low sub-shrub, with leaves usually 0.3-0.6 of a metre in length, rather broad and tapering to an acute apex.

The flowering stem may reach 1.1 metres in height and bears a number of large flowers at its summit. The stem is clothed with woolly hairs of a deep red or purple colour, while the hairs on the flowers are of a metallic green with the exception of the swollen base where they are similar in colour to the stem. Occasionally, the base of the flower may be yellowish in colour.

Mangles' Kangaroo Paw occurs naturally from the Murchison River in the north to the vicinity of Busselton in the south, and eastwards to Lake Muir. In the Darling Range it is common on lateritic soils while in a small form it extends eastwards as far as Merredin. The species is common in King's Park, Perth, and in the surrounding bushland.

Flowering usually commences in August and extends through to early October.

The Emblems of Western Australia

BLACK SWAN
(*Cygnus atratus*)



Although it is found throughout Australia, the Black Swan has been regarded with special affection by many generations of Western Australians and has long been used to identify things Western Australian.

The plumage is black, often with a brownish tinge, but the flight quills are white and very prominent when the bird is in flight. The beak is red with a white band near the tip and the legs and feet are dark grey. Males and females are similar in size and appearance but males can be identified in flight by their larger neck and, when swimming, hold their neck more erect.

Nests are a bulky collection of sticks and rushes found in fresh or brackish swamps and lakes. Between four to eight eggs are laid and these are pale green, becoming paler as incubation proceeds. Incubation takes thirty-five days.

NUMBAT OR BANDED ANTEATER
(*Myrmecobius fasciatus*)



The Numbat is one of Western Australia's most attractive marsupials. The population is mainly confined to the south-west of Western Australia.

The Numbat's preferred habitat is Wandoo forest where the ground is littered with fallen branches and hollow logs. Here the Numbat finds both shelter and food and can be observed during daylight hours searching for termites in the logs and soil. Termites are the main food of the Numbat and are exposed by the animal's sharp claws and then licked up by its exceptionally long tongue.

The Numbat is reddish brown with a generous sprinkling of white hairs, and across the rump are several prominent white bars between which the hair is dark. Through the eye there is a prominent dark stripe which is framed above and below by long white streaks. The tail is often carried erect with the hair fluffed out like a bottle brush.

Chapter 1

HISTORY OF WESTERN AUSTRALIA

1826 to 1850 — Early Settlement in Western Australia	1-2
1850 to 1890 — Convictism; Its Impact on the Colony	1-4
1890 to 1900 — Ten Years of Responsible Government; Gold Rushes	1-4
1901 to 1929 — Federation; World War I; Centenary	1-6
1929 to 1945 — World Depression; World War II	1-9
1942: Western Australia in Peril	1-10
The Home Front, 1942	1-11
1946 to 1960 — A State Growing Up	1-12
1960 to 1991 — The Mineral Boom; A State Comes of Age	1-13
1992 to... — Where To Now?	1-14
References	1-14

Chapter 1

HISTORY OF WESTERN AUSTRALIA

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

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

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

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

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

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

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

constant reports. He called this land 'New Holland'.

In 1621 a British ship, the *Trail*, was wrecked near the Montebello Islands and was probably the first British ship to reach Western Australia; but it was not until William Dampier's visit in the *Cygnat* that the attention of the British Government was drawn to 'New Holland'. Dampier was one of a group of buccaneers who, having cause to repair their vessel, beached her in King Sound. On returning to England he wrote of his experiences and impressions of 'New Holland' in a book *New Voyages Around the World*. On the strength of this the British Government then commissioned Dampier to make a further voyage of exploration. This he did, again visiting the north-west coast in 1699.

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

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

coastline and many names today — Baudin, Freycinet, Hamelin — bear witness to their presence.

1826 TO 1850 — EARLY SETTLEMENT IN WESTERN AUSTRALIA

It was this interest of the French that stirred the British into action. In a move designed primarily to forestall the French who they feared planned to annex the territory for themselves, Major Edmund Lockyer was sent in command of a small military garrison from Sydney to what is now Albany. The purpose of this move was not, as yet, to formally claim the area of Western Australia for Britain but rather to merely 'keep trespassers out'. However, when Lockyer and his party anchored in King George Sound on 25 December 1826 they did, in fact, establish the first British settlement in what is now Western Australia.

In 1827 Captain Stirling was despatched from Sydney in HMS *Success* to explore the area around the Swan River. He wrote very favourably in his report regarding its suitability for settlement. Nevertheless the British Government at first firmly rejected the idea of a settlement. Stirling had cause to return to London in 1828 and whilst there was able to arouse the interest of a syndicate of capitalists who were prepared to invest large sums of money in the new Colony. In addition to this Stirling made frequent visits to the Colonial Office

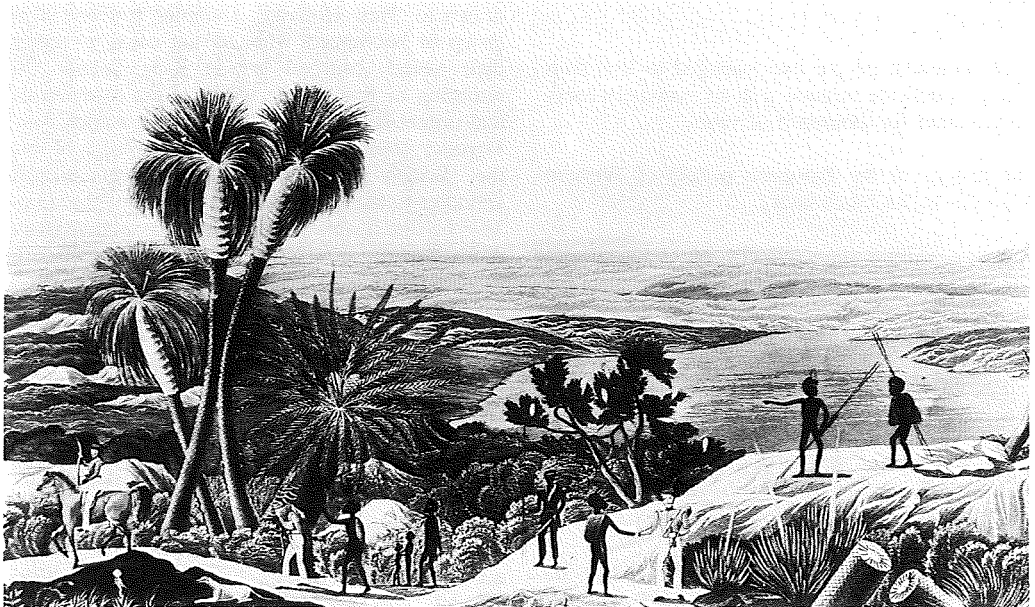
with convincing evidence that there was considerable public support for a colony as well as rumours that the French still had thoughts of 'New Holland' for themselves.

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

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

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

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



Panoramic View of King George's Sound, Part of the Colony of Swan River 1834. After Robert Dale; Robert Havell, Engraver. Collection, Art Gallery of Western Australia

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

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

The European settlers were so blinded by the belief in the superiority of their own culture that they brought their whole life-style with them — society, religion and technology. Little wonder then that they were unable to see the existence among the Aborigines of any cultural achievement.

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

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

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

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

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

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

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

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

opened in the same year. There were social and economic institutions such as banks, a civil court and churches.

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

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

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

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

1850 TO 1890 — CONVICTISM; ITS IMPACT ON THE COLONY

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

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

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

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

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

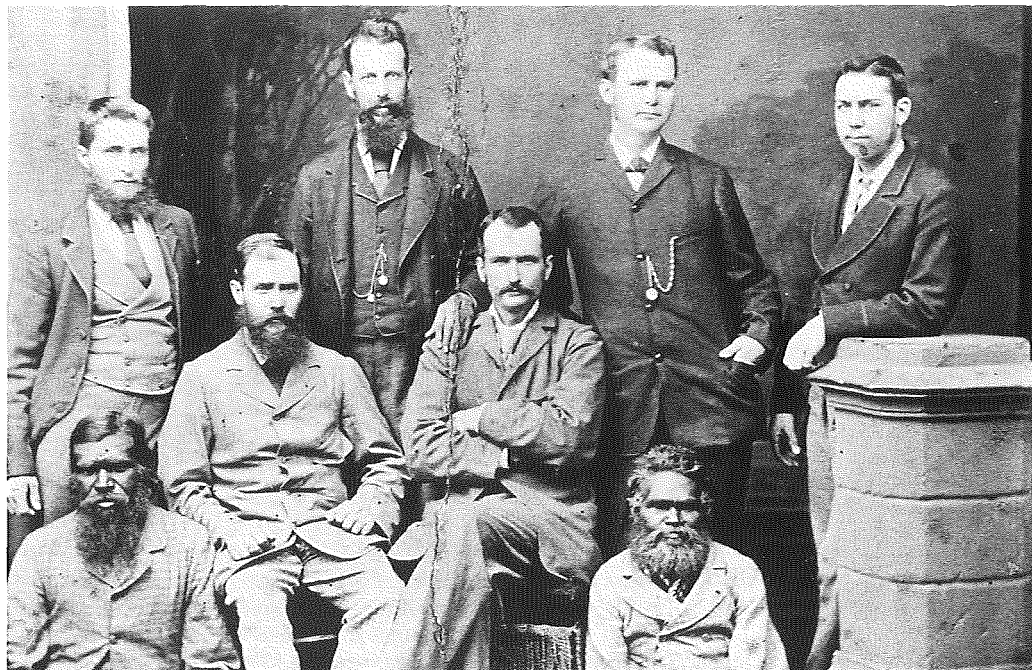
Representative government was inaugurated in 1870 with the new Legislative Council comprising twelve elected members and six nominees.

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

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

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

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



Members of the Forrest Expedition of 1879.
Photo: Battye Library, Ref. 66175P.

1890 with John Forrest commissioned to form the first Ministry.

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

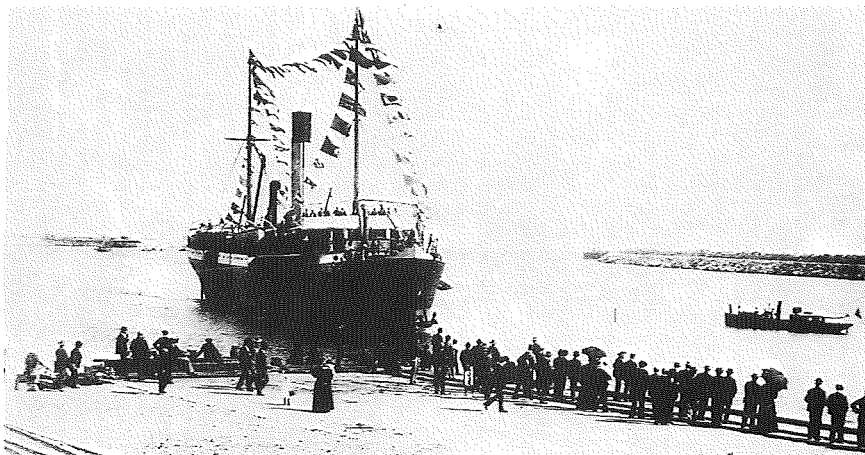
From 1888 to 1891 there was a series of small gold rushes in the Colony leading to a significant rise in annual revenue. Also in 1891 the Colony's first Engineer-in-Chief was appointed — C.Y. O'Connor, a highly skilled engineer and a man of vision.

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

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

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

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



The Official Opening of Fremantle Harbour, May 4th, 1897.
Photo: Battye Library, Ref. 1257P.

scheme, took his own life in 1902 before the pipeline was completed.

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

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

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

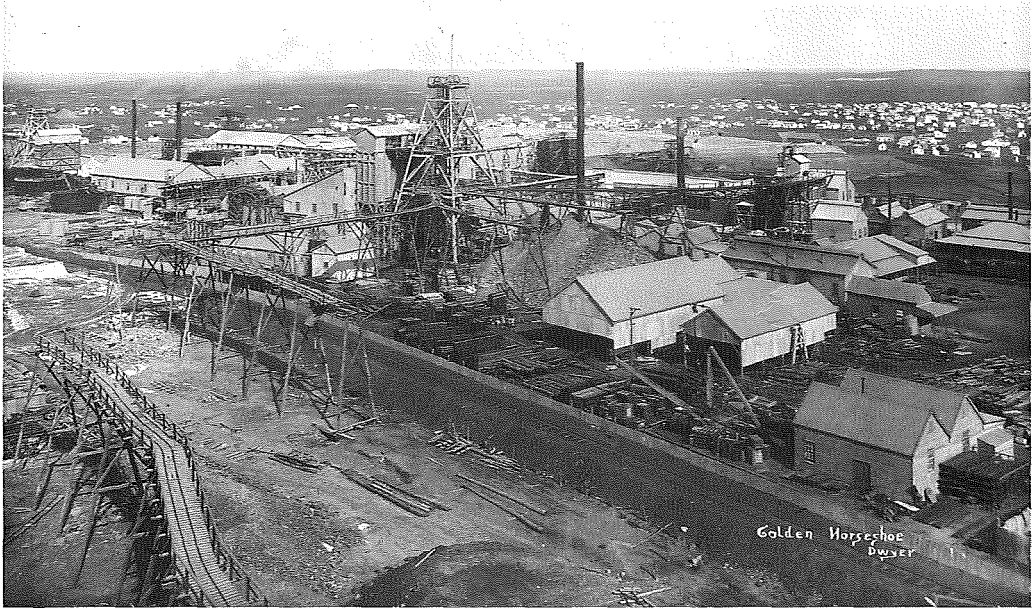
Although the colonial land owners still controlled the parliament it became obvious that the influx of men and new ideas from outside had irreversibly changed the character of the Colony. Now it was much more in line with the rest of Australia. It was not therefore surprising that a referendum on the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

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

1901 TO 1929 — FEDERATION; WORLD WAR I; CENTENARY

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

Politically, with the departure of John Forrest for the federal arena and the arrival among the gold seekers of some very experienced trade unionists from the east, there came a period of unstable Ministries. This led finally to the formation of the political party system. A Trades and Labour Congress held in 1899 decided on the formation of a Political Party which captured six seats in the Legislative Assembly at the 1901 elections. The Labour Party rapidly became a strong



Golden Horseshoe Goldmine, Kalgoorlie, early 1900's.
Photo: Battye Library, Ref. 5816B/63.

parliamentary force virtually compelling the other factions to join together to form a Liberal Party.

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

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

Western Australia was very much in favour of the Commonwealth Government decision to support Britain in the 1914—18 War providing more volunteers for overseas military service in proportion to population than any other State.

Perhaps this was because Western Australia had a higher proportion of British migrants and single men — perhaps this was also the reason why Western Australia returned the highest 'Yes' vote in the referendum on conscription in 1916.

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

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

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



Unemployed mending clothes, The Great Depression.
Photo: Batty Library, Ref. 3728B/120
Reproduction Rights Courtesy of The West Australian

Wheat growing was being consciously fostered as the staple industry. Access to finance was readily available through the Agricultural Bank, railways were being extended into the wheatbelt areas. There was large scale assisted migration from United Kingdom in association with further settlement of the wheatbelt in the 1920s; and superphosphate fertiliser, the answer to the infertility of the wheatbelt soils, was being manufactured within the State from 1910. Apart from setbacks due to droughts the wheat industry continued to expand with production reaching 36.4 million bushels in 1927 and 39.1 million bushels in 1929, both being the highest in the Commonwealth for those years.

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

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

Influential womens's organisations active in this period helped to bring about social legislation particularly in the areas of public health and child welfare. A Children's Hospital was opened in Perth in 1909 and the King Edward Memorial Hospital for Women in 1916, due much to the agitation of Edith Cowan who, in 1921 was to become Australia's first woman member of parliament.

And so by 1929, the State's centenary year, with over 50 per cent of the population living in the Perth metropolitan area and Western Australia a relatively comfortable place to live in, it was with a considerable degree of satisfaction that the State was able to look back on its first 100 years of progress.

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

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

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

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

No wonder then that at a referendum in 1933 over two-thirds voted to leave the Federation. However, a delegation despatched to London to seek secession from the British Parliament found its petition rejected by this Parliament on the grounds of constitutional impossibility.

It was clear that the Commonwealth Government, which had by this time far reaching financial and economic powers, held responsibility for dealing with the depression. However, it seemed unable to

bring in any course of action to combat the problem. In 1933 all States adopted the 'Premiers' Plan', at least a unified course of action. Whether the improved conditions reached by 1935 had much to do with the Plan or were the result of Australia 'importing' recovery from overseas is a moot point.

For those in regular employment even the 1930s brought a modest increase in real living standards by way of greater use of telephones, refrigerators, motor cars and the general improvement in transport and communication and other services. It was however, the war of 1939-45 which brought regular employment for all, followed by hitherto unknown prosperity in the post-war period.

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

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

The implementation of war related measures (refer to the 1942: W.A. in Peril article), the introduction of the Uniform Tax Scheme making the Commonwealth the sole taxing authority in the income tax field and the extension of federal social services did, nevertheless, all help to bind Western Australia more closely into the Commonwealth.

1942: Western Australia in Peril

The fall of Singapore and the bombing of Darwin in early 1942, shocked West Australians into realising how vulnerable they were to the southward advance of the Japanese. A tabling of the main events and developments of 1942, provides an insight into a State preoccupied with contributing to the national war effort, and defending itself from attack.

A CRITICAL YEAR

Garrison Battalions are allotted to Sectors, including Albany, Bunbury, Fremantle, Geraldton, Kalgoorlie and the North West.

Further development of fixed defences at Fremantle, Rottneest, Coogee and Leighton.

Contraction of the gold industry. Manpower is released for essential services. Of 13,000 men employed by the gold industry in 1940, only 8,000 are still employed one year later.

Creation of the State Ministry of Civil Defense. The Ministry organises Air Raid Precautions; a body of volunteers called to enforce blackout regulations. All over the State, windows are boarded up, and slit trenches are dug in backyards and public parks. Alarms and searchlights are installed and volunteers are organised into teams of fire spotters.

Civilian registration of all persons aged sixteen years and over.

The munitions factory complex at Welshpool commences production. Once operating at peak capacity, the munitions industry makes an important contribution to the national war effort.

During the first years of the war, full employment is achieved and women play an increasingly significant role as industrial workers.

Rationing of clothing, tea and sugar. Ration books and identity cards are issued. Each individual was allocated the following quantities—

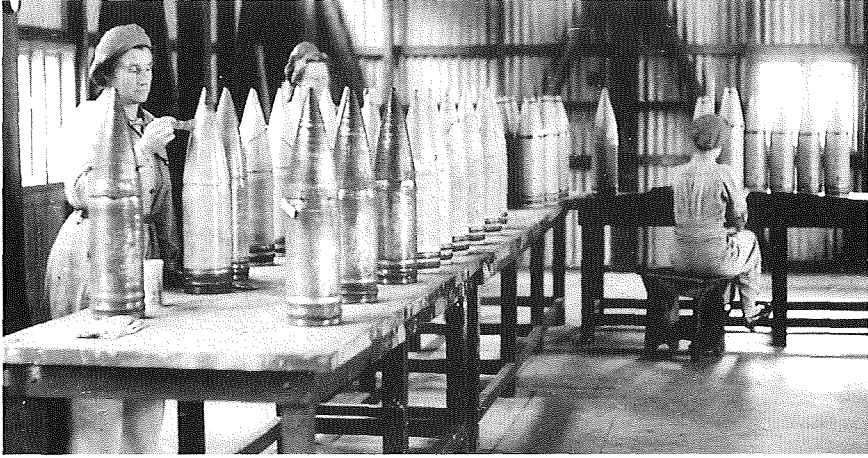
- Tea: by coupon (one half pound per five weeks)
- Sugar: one pound per week.
- Clothing: 112 coupons per year.

A Commonwealth Daylight Saving Scheme is introduced. The primary objective of this scheme is to conserve power supplies. In 1943, WA is exempted from the scheme.

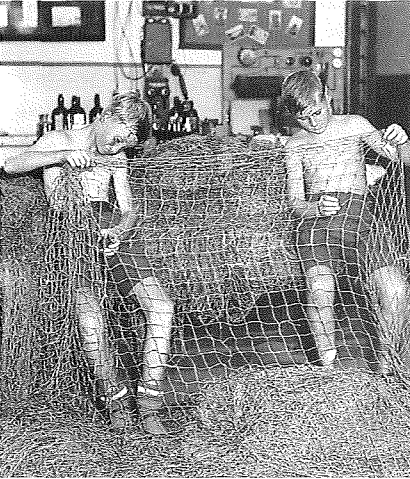
Attacks by Japanese aircraft on Broome, Wyndham and Port Hedland. The attack on Broome is the most severe and results in the loss of at least 100 lives, including women and children.

The Home Front, 1942

①



②



① Women working on artillery shells.

② Boys making camouflage nets.

③ Red Cross Emergency Service Corps Transport Section on the Esplanade. Decontamination suits.

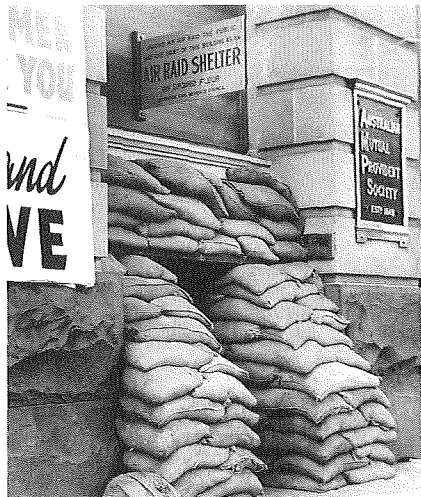
④ Air raid shelter, Perth, April 1942.

Photographs courtesy *The West Australian*.

③



④



1946 TO 1960 – A STATE GROWING UP

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

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

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

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

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

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

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

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

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

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

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

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



Berthing 'British Crusader' at Kwinana Oil Refinery, 1955
Photo: Battye Library, Ref. 3968B/4.

1960 TO 1991 — THE MINERAL BOOM; A STATE COMES OF AGE

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

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

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

The State Governments of these years have been given credit for much of this achievement. They had fought hard for the establishment of the first industries at Kwinana. The Commonwealth had been persuaded to provide large sums of money for development of the north, the standard rail link

with the eastern States and expanding roles in areas such as housing, hospitals etc. They had been able to attract to the State the vast quantities of private capital needed to finance the development of its mineral resources.

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

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

Development of the State's resources continues; diamonds are mined in the Kimberleys; there have been ups and downs in the gold mining industry; proposals for more mineral sands mining and plans for further industrial development. The shift has been away from the more traditional

agricultural industries toward the mining sector. Along with this has been a rapid growth in the areas providing the services required by this now highly sophisticated society.

At June 1990 the estimated population of Perth was 1,193,130, more than double what it was in 1965; but what a vastly different population! With a very high proportion of migrant-born inhabitants it is a culturally diversified and highly cosmopolitan population in the 1990s.

As the trade of Australia and, in particular Western Australia, becomes more and more closely tied to Pacific countries Perth's situation midway between Singapore and Sydney becomes highly strategic. Perth has a new international airport with over forty international flights per week. There is a highly developed communication system — the world is as close as the nearest telephone or telex machine. The State of Western Australia can no longer be considered as isolated in any sense of the word.

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

1992 TO... — WHERE TO NOW?

This process of continued growth and development has created serious problems — the problems of pollution of the sea, the land, the rivers and the atmosphere by factories as well as the ubiquitous motor vehicle; and the general degradation of the land by what can now be seen

as agricultural malpractices — over clearing, overstocking and the use of massive amounts of artificial fertilisers to name a few. The obvious extent and the rate of increase of this degradation and pollution is attracting the attention of Governments and public alike.

The practices carried out with impunity in colonial days with no obvious deleterious effect on the environment at the time can be destructive when carried out over a long period on an ever increasing scale.

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

REFERENCES

- Bolton, G.C., *Western Australia*, in Aplin, G.,m Foster, S.G. and McKernana, M. (eds.), *Australians, A Historical Dictionary*. Sydney: Fairfax, Syme & Weldon Associates, 1987.
- Official Year Book of Western Australia*, No 2 — 1960. Chapter 1 — A Historical Review.
- de Garis, K.K., *Discovery, colonisation and Development, Western Australia — A Historical Survey in Western Australian Year Book*, No. 8 — 1969.
- Stannage, C.T. (ed.), *A New History of Western Australia*. Nedlands: University of Western Australia Press, 1981.
- West Australian Year Book*, No. ? 1967, page 13.
- Crowley, F.K., *Australia's Western Third*, 1960, Macmillan and Co Ltd, London.

Chapter 2

PHYSICAL FEATURES AND GEOLOGY

THE GEOMORPHOLOGICAL FRAMEWORK OF WESTERN AUSTRALIA	2-1
Morphotectonic Development and Geomorphological Regions	2-1
Cenozoic: The Development of the Present Landsurface	2-13
Glossary	2-17
References	2-18

Chapter 2

PHYSICAL FEATURES AND GEOLOGY

The Geomorphological Framework of Western Australia

Contributed by K-H. Wyrwoll M.Sc., PH.D., Department of Geography, University of Western Australia

Western Australia covers some one-third of the Australian landmass. Its overall geomorphological development is closely tied to the long-term geological evolution of this part of the Australian continent. This becomes most apparent when the continental-scale geomorphology of the State is considered, and questions asked such as: 'How did the coastal outline of Western Australia develop?'. The major continental-scale geomorphological divisions of the State largely correspond to the major tectonic diversions. But the control of geology on geomorphology is equally evident in more regional-scale considerations, and this is the result of long periods of relatively uninterrupted sub-aerial weathering. A selection of relevant references are given at the end of this Chapter.

In addition to the tectonic and lithological controls, the geomorphology of Western Australia, has been strongly influenced by its climatic history, and especially the global and regional climatic changes of the Cenozoic. The climates of the Cenozoic have left a strong imprint on the landscape, as witnessed by widespread eolian, fluvial and marine depositional sequences and landforms. These sequences include the extensive areas of desert dunes, such as in the Great Sandy Desert, widespread river deposition and floodplain formation, such as along the Gascoyne and Fitzroy rivers, and Quaternary coastal deposits which dominate the geomorphology of the Swan Coastal Plain and the Shark Bay region.

MORPHOTECTONIC DEVELOPMENT AND GEOMORPHOLOGICAL REGIONS

The general correspondence between the continental-scale geomorphology and geology, and their link to the development of Western Australia as a landmass is expressed in the major morphotectonic divisions of the State (Diagram 2.1 and Table 2.1). The regional-scale geomorphology is most conveniently considered in

terms of 'landform regions' (Diagrams 2.2 and Table 2.2), which frequently show some correspondence to regional-scale geological divisions.

A major geomorphological difference between Western Australia and other continental masses is the lack of Phanerozoic orogeny, and particularly Late Phanerozoic orogeny. In fact, large parts of Western Australia have been relatively stable for over 1,000 million years (1 Ga). However, little remains of the original landsurfaces, and the regions have been so reduced in their relief as to lose much of the erosional potential.

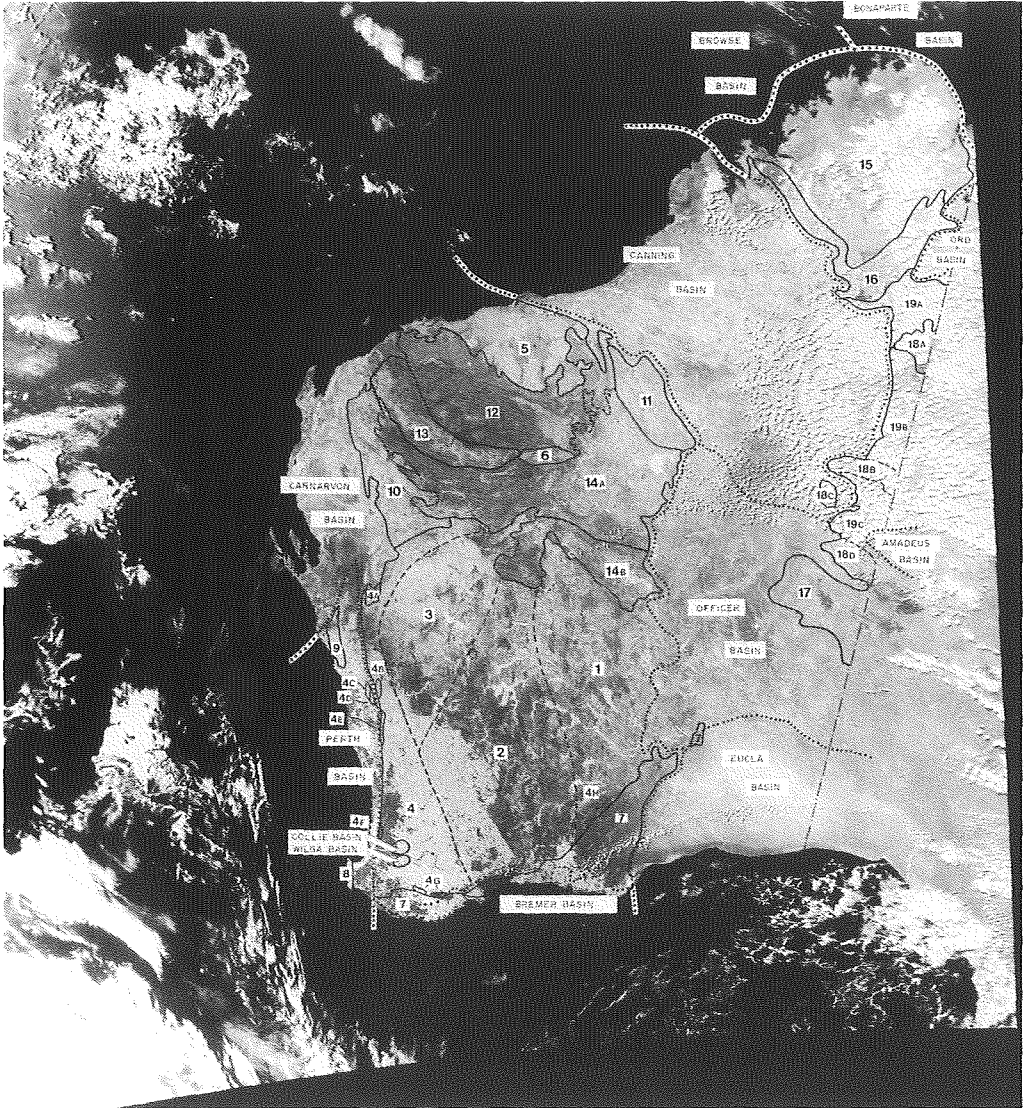
The antiquity of the landsurface of Western Australia is exemplified by the Yilgarn Block, which with the Pilbara and Kimberley Blocks, formed the geological framework of Western Australia, and controlled much of the long-term and broad-scale geomorphological evolution of the State.

The geomorphology of the Yilgarn Block is essentially one of an erosional plain, in which lithological differences and major tectonic

PHYSICAL FEATURES AND GEOLOGY

DIAGRAM 2.1

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



PHYSICAL FEATURES AND GEOLOGY

TABLE 2.1 – MORPHOTECTONIC DIVISIONS OF WESTERN AUSTRALIA
(To be used in conjunction with diagram 2.1)

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

PHYSICAL FEATURES AND GEOLOGY

TABLE 2.2 - THE MAJOR GEOMORPHOLOGICAL DIVISIONS OF WESTERN AUSTRALIA

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

PHYSICAL FEATURES AND GEOLOGY

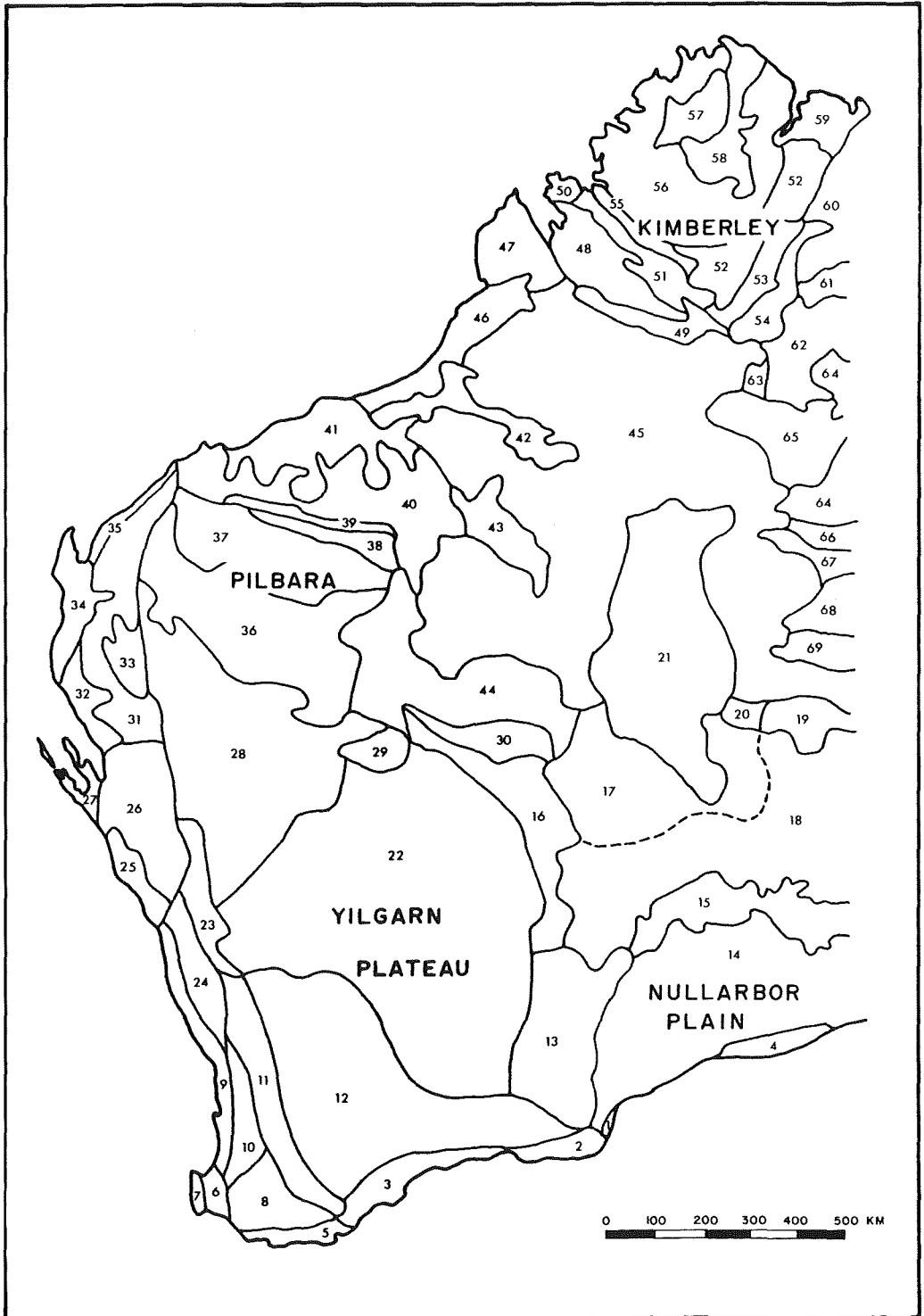
TABLE 2.2 – THE MAJOR GEOMORPHOLOGICAL DIVISIONS OF WESTERN AUSTRALIA -continued

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

PHYSICAL FEATURES AND GEOLOGY

DIAGRAM 2.2

The major geomorphological divisions of Western Australia. The numbers correspond to those given in Table 2.2 (after Jennings, J.N. and Mabbutt, J.A., 1986: in Jeans, D.N., (ed), Australia—A Geography (Volume One) The Natural Environment).



lineaments are accentuated in their erosional expression. Not surprisingly, the resistant banded iron formations often form prominent ridges. Similarly, large granite domes are prominent features in the western areas of the Yilgarn Block. Even the larger dykes (e.g. the Jimberlana Dyke, of the Norseman region) have a clear topographic expression. Other regional-scale lithological differences are also well marked topographically, for example, the paired metamorphic belts of the Perth-Northam area, which are related to the Northam Plateau.

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

Unlike the Yilgarn Block, the Kimberley Block is largely covered by the later Proterozoic sediments and volcanic rocks which form the Kimberley Basin, and consequently little is known of its geology. It is known however, that the block has remained stable since circa 2.1 Ga. The geomorphology of the Kimberleys is dominated by a series of plateaus on which major structural lineaments have strongly controlled drainage net evolution. Surficial depositional elements are generally suppressed, but important Cenozoic alluvial sequences are found, some of which contain diamonds.

The Pilbara Block consists of large granitoid batholiths, some 3-3.5 Ga old, associated with older greenstone belts.

The southern part of the Pilbara Block is overlain by the Fortescue Group of the Hamersley Basin which is dated at 2.7 Ga, suggesting that major stabilisation had by then taken place. The geomorphology of the block is characterised by erosional plains, in which the lithological controls of the solid geology are clearly expressed. The corestone plains and granite domes reflect the large batholiths.

The Proterozoic saw the development of a number of block-marginal mobile belts and the formation of sedimentary basins which led to the deposition of an intracratonic platform cover. The Hamersley Basin is the oldest sedimentary basin and the deposition of the basin infill straddles the Archaean/Proterozoic boundary (2.5 Ga). The Hamersley Basin itself was probably cratonized by circa 2.0 Ga.

The geomorphological continuity of the Hamersley Basin is interrupted by the Fortescue Valley (a possible graben), in which alluvial deposition has taken place. Large alluvial fans debouch out of the bounding escarpments into the valley. To the north of the Fortescue River, the Chichester Range is the geomorphological expression of the Fortescue Group. To the south, the Hamersley Group forms a strongly defined, dissected plateau, on which structural and lithological controls have developed a distinctive terrain (Diagram 2.4).

The Gascoyne Province and Ashburton Trough are the two elements of a complex orogenic zone or mobile belt—the Capricorn Orogen—joining the Pilbara Craton to the Yilgarn Block. In the northern part, the orogen consists of folded sediments of the Ashburton Trough. The major structural elements are indicated by the ridge arrangement of the erosional geomorphology.

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

The Albany-Fraser Province is a mobile belt which delimits the southern part of the Yilgarn Block. It has been dated at 1.2- 2.1 Ga. Along the western margin of the Yilgarn Block the basement is generally concealed by a thick sequence of Phanerozoic sediments, and is only exposed in the Naturaliste and Northampton blocks.

The Kimberley Block and bounding Halls Creek and King Leopold mobile zones of northwestern Australia are part of the wider North Australian Craton. These mobile belts have a very pronounced geomorphological expression (Diagram 2.5).

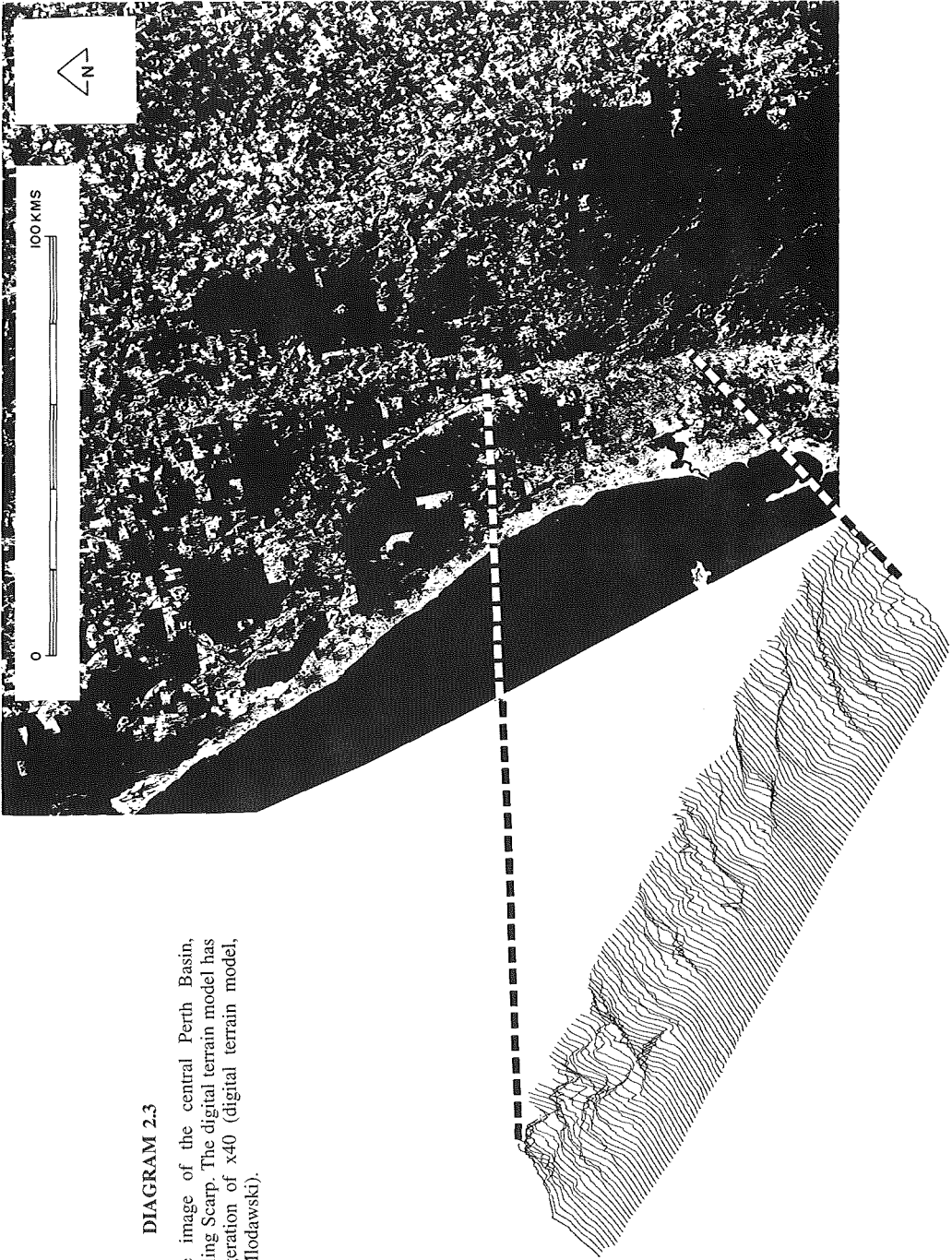


DIAGRAM 2.3

Landsat satellite image of the central Perth Basin, showing the Darling Scarp. The digital terrain model has a vertical exaggeration of x40 (digital terrain model, courtesy of G. Mlodawski).

DIAGRAM 2.4

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



By the end of the Precambrian the morphotectonic framework, which was to control much of the future continental-scale geomorphological evolution of Western Australia, was essentially in place. In this framework the Yilgarn and Pilbara blocks and the associated mobile belts and sedimentary basins, are now combined and constitute the Western Australian Shield. The Shield was to remain the dominant morphotectonic element of the geology of Western Australia, and from at least the end of the Precambrian, large parts of this region were to remain as relatively stable landsurfaces.

Our present understanding of the Early Palaeozoic morphotectonic development of Western Australia is incomplete. However, it is clear that at that time Australia was then part of the Gondwana supercontinent, and that during the Early Cambrian, Gondwana generally experienced

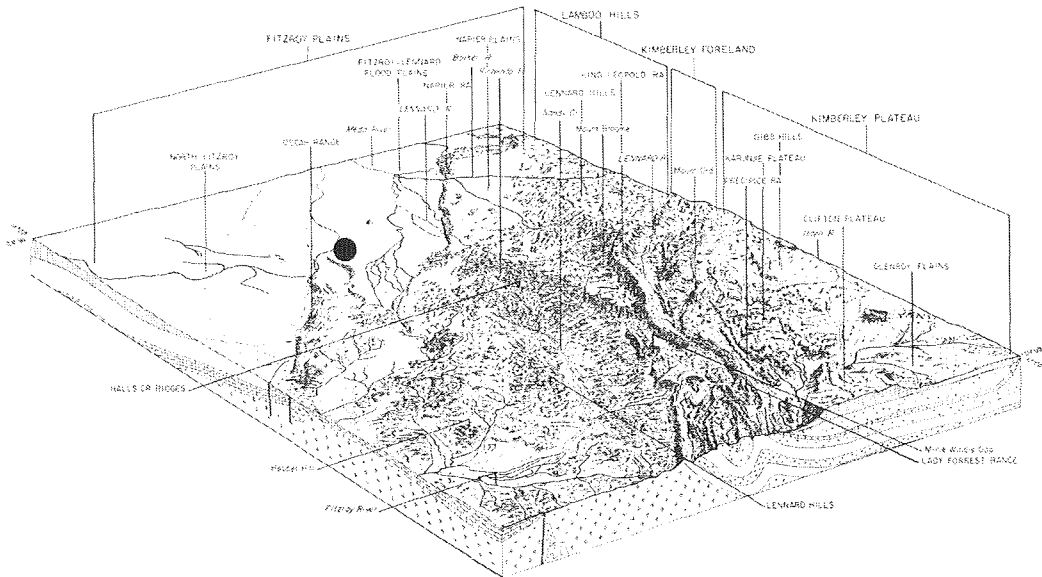
continental drift and seafloor spreading. In the region which was to become the northwest margin of Australia, plates diverged, releasing extensive tholeiitic flood basalts. From the Cambrian on there was a southward migration of marine deposition with time, which may reflect the progressive southward opening of a divergent margin, with the development of failed arms off it.

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

PHYSICAL FEATURES AND GEOLOGY

DIAGRAM 2.5

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



facies. Karst forms are well developed in some of the more massive limestones.

During the Early Permian, regions which were to contain the northern and western margins of Western Australia, subsided and extensive deposition occurred in the sedimentary basins. Widespread glaciation throughout much of Western Australia during the Early Permian is well documented. Glacial sediments are widely found in a stratigraphic context in the sedimentary basins, from Collie in the south to the Bonaparte Gulf in the north. But outliers of glacial deposits are also known on the Precambrian Shield, which indicate that the Early Permian ice sheet covered much of present-day Western Australia. An ice-cap covering an area of as much as 2.5 million square kilometres is possible but this is not to suggest that it was continuous. For the geomorphological development of Western Australia, Permian widespread glaciation was important. It provided a fresh start for surface denudation processes—just as the Cenozoic ice age has removed much of the weathered mantle that had previously covered the Canadian Shield. Similarly, isostatic adjustments had important geomorphological repercussions. It is not, however, at all certain that any large glacial erosional forms remain in the present landscape of Western Australia.

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

Along the present western margin, the Triassic saw the development of graben structures, which controlled deposition—grabens were active particularly in the Late Triassic.

During the Jurassic, graben development was less active than in the Triassic. During the Middle Jurassic Gondwana began to break-up, with a mid-ocean spreading ridge entering the north-west coast of Australia. The Perth Basin underwent renewed graben development in the Late Jurassic, and this was the fore-runner of a later episode of rifting.

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

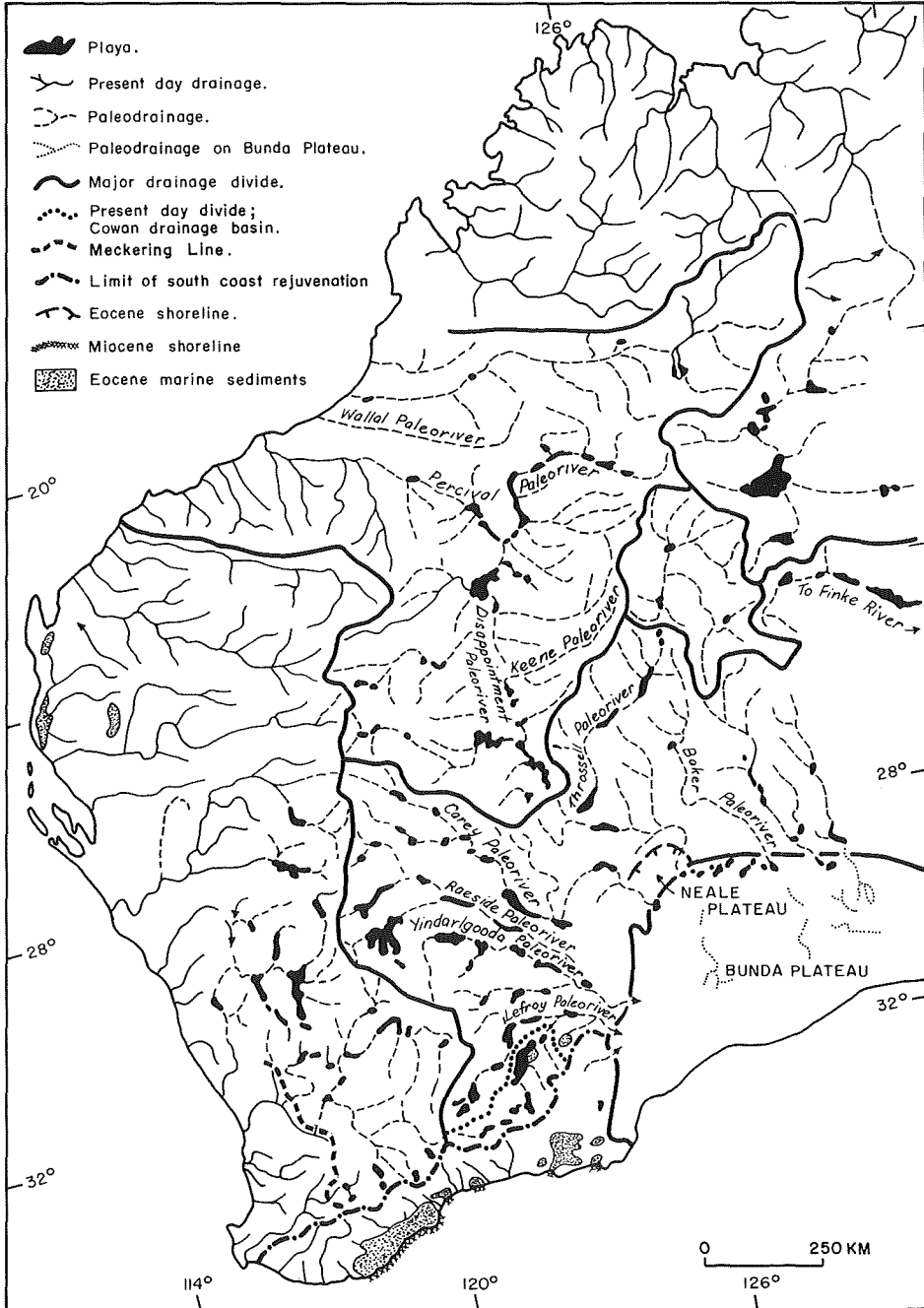
During the Late Cretaceous the southern margin of Australia was controlled by a series of graben structures parallel to the coast. However, these were less pronounced along the southern margins of Western Australia, and here Late Cretaceous sedimentation was largely restricted to the Eucla Basin.

The spatial relationship of deposits of Cretaceous age to the present geomorphology indicates that major elements in the landscape may be older than 100 Ma. From the distribution of Late Cretaceous sediments it is clear that some of the present valleys, which cut through the scarps of the Darling and Dunsborough faults, were already in existence at that time. There is similar evidence that the lower Murchison River valley may have existed in the Cretaceous. Evidence of the upstream extension of Triassic sediments along the Greenough River valley, suggests that some of the drainage in the southern Carnarvon Basin/northern Perth Basin may have existed in the Triassic. Large playa systems with complex depositional and marginal deflation features are widespread in Western Australia. They are frequently related to a network of palaeochannels which were probably active during the Late Cretaceous. From the combined evidence it is clear that major elements of geomorphology of Western Australia are much older than generally accepted for other parts of the world. In fact, it seems that some elements of the geomorphology of the present landsurface may have survived the break-up of the Gondwana supercontinent.

PHYSICAL FEATURES AND GEOLOGY

DIAGRAM 2.6

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



CENOZOIC: THE DEVELOPMENT OF THE PRESENT LANDSURFACE

The morphotectonic framework of Western Australia was in place by the beginning of the Tertiary, but nevertheless, marine transgressions during the Paleocene, Eocene and Miocene significantly modified large areas of the western and southern margins of Western Australia (Diagram 2.6).

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

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

Although the morphotectonic framework of Western Australia was established by the Early Tertiary, the details of the geomorphology of the landsurface were still quite different from those of today. This is evidenced by the existence of an extensive palaeochannel network which is thought to have been still active at that time (Diagram 2.6); and climate generally was quite different from that of today. The occurrence of the mangrove palm, *Nipa*, in the Eocene Kings Park Formation suggests that sea surface temperatures may have been warm as 20° – 25° C, significantly warmer than today. Pollen, in Late Eocene sediments, show that over southern Western Australia the vegetation resembled tropical to subtropical rainforest. Similar conditions prevailed over southern Western Australia throughout much of the Oligocene. Early Miocene precipitation was probably high, but more arid conditions set in during the Middle Miocene. By the Late Miocene the arid climates that now prevail over much of Western Australia, had been established, and Australia had essentially reached its present geographical position.

The climates of the Early and Middle Tertiary were conducive to deep weathering; and this is likely to have taken place during the Eocene (?), but certainly the Oligocene and Early-Middle Miocene. Deep weathering resulted in a weathered regolith and extensive laterite formation. The landsurface of much of Western Australia, bears a

DIAGRAM 2.7

Uplifted reef-complexes along the western margin of the Cape Range (after van de Graaff, W.J.E., Denman, P.D. and Hocking, R.M., 1976: Geological Survey of Western Australia Annual Report for 1975).

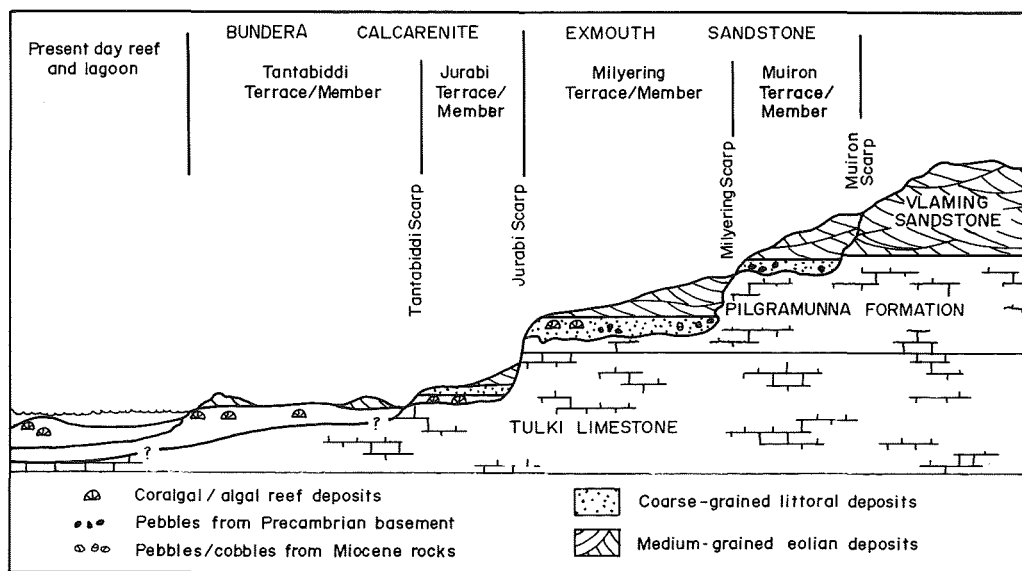
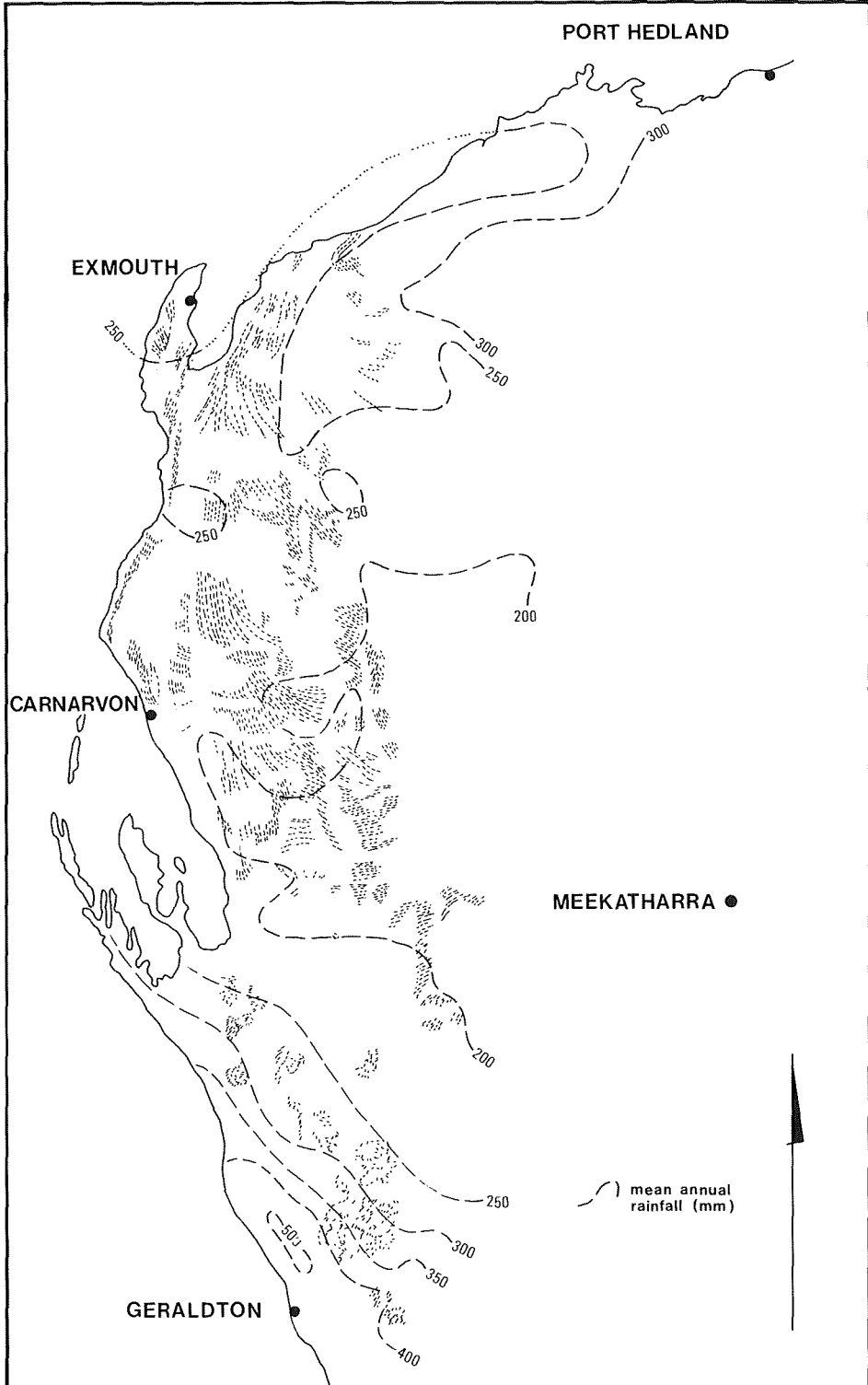


DIAGRAM 2.8

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



strong imprint of the deep weathering event of the Tertiary, and its control on subsequent geomorphological development is well manifested in etchplain development.

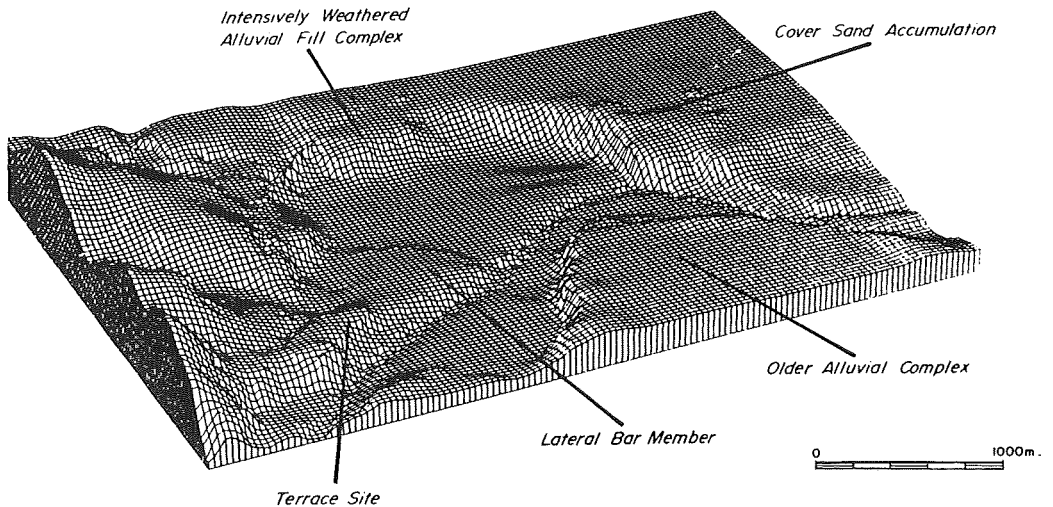
It was traditionally thought that, in terms of tectonics, Western Australia had been essentially stable during much of the Cenozoic. But with the recognition of the South West Seismic Zone, the Jarradale Axis and Ravensthorpe Ramp (Diagram 2.6) and other features, this view has been modified. The most striking geomorphological expression of Cenozoic tectonic activity is in the Exmouth Gulf—Cape Range area. Here, three ranges—the Cape Range, Rough Range and Giralia Range—correspond to anticlinal axes initiated during post- Middle Miocene times by reverse movement on underlying normal faults. The Cape Range is the dominant of the three, reaching a height of some 300 m. The range has been deeply dissected during uplift, which has continued to the present. This is witnessed by warped and uplifted Quaternary reef complexes which now form a staircase along the western flank of the range (Diagram 2.7). On the Yilgarn Block, fault scarps a metre or so high and tens of kilometres long have formed within historic times. Such fault scarps are rapidly eroded and are only incomplete indicators of past seismic activity.

The Late Cenozoic left a significant geomorphological imprint on the landscape as a result of the climatic changes which occurred during this time. The importance of deep weathering to our understanding of the geomorphology is fundamental, but equally striking is the geomorphological expression of the arid climates which first set in during the Late Tertiary. Repeated extensions of the arid zone occurred during the Pleistocene, and resulted in the development of desert dune sequences, which are now stabilised and are found well outside their climatic range (Diagram 2.8). Although no convincing dates are available for these events, it is generally thought that arid zone advances were coincident with global glacial maxima, and that the last massive extension of the arid zone took place at about 18,000 years before present (Ka BP).

Quaternary changes in climate caused variations in the hydrology and sediment supply characteristics of streams. These changes controlled alluvial deposition and resulted in formation of alluvial fills and terrace complexes along the major rivers of Western Australia. The Gascoyne, Fitzroy and at a smaller scale the Swan River, all possess well-developed terrace forms flanking their present courses (Diagram 2.9). In the Geraldton area,

DIAGRAM 2.9

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



PHYSICAL FEATURES AND GEOLOGY

TABLE 2.3 — GEOLOGICAL TIME SCALE

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

extensive alluvial deposition, linked to changes in sediment yield processes, took place during the early part of the Late Quaternary. It is now known, from radiocarbon dates, that significant parts of the Swan and Helena river terraces fill were deposited since circa 40 Ka BP. In the Carnarvon Basin, the large wedge of sediments associated with the avulsion of the lower Gascoyne River was deposited over the last 120 Ka.

During the Late Cenozoic, global ice volume changes significantly altered sea level. Thus, during the last interglacial-glacial-interglacial cycle, from about 130 Ka to present, sea level along the Western Australian coast ranged from +8m at 120 Ka to -150 m at 18 Ka BP, and reached its present level (or slightly above) by 6.5 Ka BP. These changes in sea level have influenced geomorphological evolution along many coastal areas in Western Australia.

During the Late Tertiary or Early Pleistocene, shoreline complexes now at heights of 115-90 m (Eneabba and Ridge Hill Shelf) and 20-80 m (Yoganup Formation) were deposited in the Perth Basin. They are the initial sequences of a series of coastal barriers which formed in the Perth Basin throughout the Quaternary. At present there is evidence for possibly three major Pleistocene barrier complexes.

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

Significant geomorphological modifications have taken place over many parts of Western Australia in the last 150 years, linked to European land use practises: consequently rates of sediment yield may well be by an order of magnitude higher than earlier in the Late Cenozoic. Widespread erosion is evident in many catchments and high rates of sediment supply are changing the hydraulic and sediment regimes of streams. Wind erosion is equally widespread, and in the most severely affected catchments, such as the Gascoyne, the loss of the vegetation cover has resulted in the local mobilisation of former desert dunes, giving rise to fears of desertification.

GLOSSARY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

REFERENCES

Bowler, J.M. (1976), Aridity in Australia: age, origins and expressions in aeolian landforms and sediments. *Earth Science Reviews* 12, 279-310.

Bunting, J.A. (1986), Geology of the Eastern Part of the Nabberu Basin, Western Australia. *Geological Survey of Western Australia Bulletin* 131

Butt, C.R.M. (1981), The nature and origin of the laterite weathering mantle, with particular reference to Western Australia, in Doyle, H.A., Glover, J.E. and Groves, D.I. (eds), *Geophysical prospecting in deeply weathered terrains*. Geology Department and University Extension, The University of Western Australia, 11-29.

Collins, L.B. and Baxter, J.L. (1984), Heavy mineral-bearing strandline deposits, associated with high-energy beach environments, southern Perth Basin, Western Australia. *Australian Journal of Earth Sciences*, 31, 287-292.

Fairbridge, R.W. and Finkl, C.W. (1978), Geomorphic analysis of the rifted cratonic margins of Western Australia. *Zeitschrift fr Geomorphologie* 22, 369-389.

Gee, R.D. (1979), Structure and tectonic style of the Western Australian Shield. *Tectonophysics*. 58, 327-369.

Geological Survey of Western Australia (1975), The Geology of Western Australia. *Geological Survey of Western Australia, Memoir* 2.

Glover, J.E. and Groves, D.I. (eds) (1981), Archaean geology: Second International Symposium, Perth. *Geological Society of Australia Special Publication* No. 7.

Harris, L.B., (1987), A tectonic framework for the Western Australian Shield and its significance to gold mineralization: a personal view, in Ho. S.E. and Groves, D.I. (eds), *Recent advances in understanding Precambrian gold deposits*. Geology Department and University Extension, The University of Western Australia, 1-27.

Ho, S.E. and Groves, D.I. (eds) (1987), *Recent advances in understanding Precambrian gold deposits*. Geology Department and University Extension, The University of Western Australia.

Hocking, R.M., Moors, H.T. and van de Graaff, W.J.E. (1987), Geology of the Carnarvon Basin Western Australia. *Geological Survey of Western Australia, Bulletin* 133.

Jackson, M.J. and van de Graaff, W.J.E. (1981), Geology of the Officer Basin, Western Australia *Bureau of Mineral Resources, Bulletin* 206.

Jaques, A.L., Lewis, J.D. and Smith, C.B. (1986), The kimberlites and lamproites of Western Australia. *Geological Survey of Western Australia. Bulletin* 132.

Johnstone, M.H., Lowry, D.C., and Quilty, P.G. (1973), The geology of southwestern Australia—a review. *Journal of Royal Society, Western Australia*, 56, 5-15.

Logan, B.W., Davies, G.R., Read, J.F. and Cebulski, D.E. (1970), Carbonate sedimentation and environments, Shark Bay, Western Australia. *American Association Petroleum Geologists, Memoir* 13.

- Lowry, D.C. (1970), The geology of the Western Australian part of the Eucla Basin. Geological Survey Western Australia, Bulletin 122.
- NcNaughton, N.J. and Dahl, M. (1987), A geochronological framework for gold mineralisation in the Yilgarn Block, Western Australia, in Ho, S.E. and Groves, D.I. (eds), *Recent advances in understanding Precambrian gold deposits*. Geology Department and University Extension, 29-49.
- Department of Mines (1987), *An overview of mining in Western Australia*, 44p.
- Muhling, P.C. and Brakel, A.T. (1985), Geology of the Bangemall Group. *Geological Survey of Western Australia*, Bulletin 128.
- Mulcahy, M.J. (1973), Landforms and soils of southwestern Australia. *Journal Royal Society of Western Australia*, 56, 16-22.
- Playford, P.E., Cockbain, A.E. and Low, G.H. (1976), Geology of the Perth Basin, Western Australia. *Geological Survey of Western Australia*, Bulletin 124.
- Plumb, K.A. (1979), The tectonic evolution of Australia. *Earth-Science Reviews*, 14, 205-249.
- Purcell, P.G. (ed) (1984), The Canning Basin, W.A. *Proceedings of Geological Society of Australia/Pet Expl. Soc. Aust. Symposiums Perth*.
- Quilty, P.G. (1984), Mesozoic and Cenozoic history of Australia as it affects the Australian biota, in Cogger, H.S. et al, (eds), *Arid Australia*. Australian Museum, Sydney, 7-55.
- Trendall, A.F. (1983), The Hamersley Basin, in Trendall, A.F. and Morris, R.C. (eds), *Iron-formation, facts and problems*. Elsevier, 69-123.
- Twidale, R.R., Horwitz, R.C. and Campbell, E.M. (1985), Hamersley landscapes of the north-west of Western Australia. *Review de Geologie Dynamique et de Geographie Physique*, 26, 173-186.
- van de Graaff, W.J.E. (1981), Paleogeographic evolution of a rifted cratonic margin : south-west Australia—discussion. *Palaogeography, Palaeo-climatology, Palaeoecology*, 34, 163-172.
- van de Graaff, W.J.E., Crowe, R.W.A., Bunting, J.A. and Jackson, M.J. (1977), Relict Early Cainozoic drainages in arid Western Australia, *Zeitschrift fr Geomorphologie*, 21, 379-400.9
- Veevers, J.J., (ed) (1984), Phanerozoic earth history of Australia, Oxford, Clarendon Press.

Chapter 3

CLIMATE AND METEOROLOGY

Pressure Systems	3-1
Rainfall	3-3
Temperature	3-7
Thunderstorms	3-13
Evaporation	3-13
Growing Season Rainfall	3-13
Snow	3-15
Metropolitan Climate	3-15

Chapter 3

CLIMATE AND METEOROLOGY

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

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

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

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

PRESSURE SYSTEMS

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

In winter this system moves northward, bringing clear skies with fine sunny days and easterly winds to the tropics. With this northward movement, westerly winds on the southern side of the anticyclones extend over the southern part of

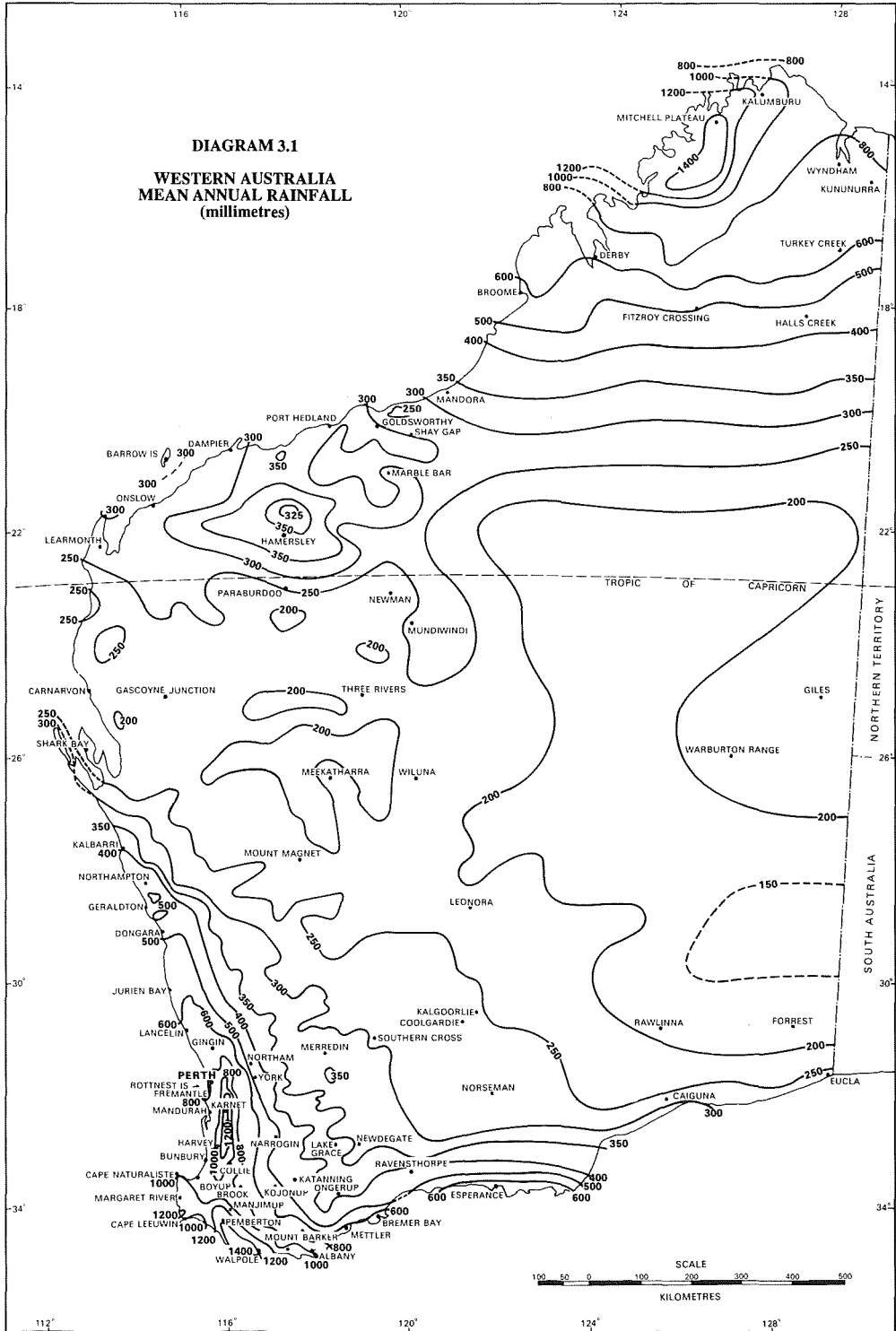
the State, bringing with them cool cloudy weather and rain. In mid-winter the northern fringe of the 'Roaring forties' extends to Western Australia and there are frequent westerly gales in the south coastal belt.

These westerly winds are maintained by a series of depressions (low pressure systems with clockwise winds), which move eastward well south of the Western Australian coast, and others which originate in the Indian Ocean and move south-eastward past Cape Leeuwin. The extent to which westerlies affect the State depends largely on the intensity and the position of these depressions.

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

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

CLIMATE AND METEOROLOGY



CLIMATE AND METEOROLOGY

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 November to April), tropical cyclones bring strong winds and heavy rains 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 before turning southward to threaten the mainland.

Cyclones 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 dissipate at sea without ever crossing the coast. Those that move inland usually start to weaken 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 because of the heavy and widespread rain which generally accompanies them. The heaviest fall ever recorded in one day in Western Australia, 747 millimetres, was received at Whim Creek from a cyclone in 1898.

RAINFALL

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

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

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

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

<i>Reporting station and characteristic</i>	<i>Jan.</i>	<i>Feb.</i>	<i>Mar.</i>	<i>Apr.</i>	<i>May</i>	<i>June</i>	<i>July</i>	<i>Aug.</i>	<i>Sept.</i>	<i>Oct.</i>	<i>Nov.</i>	<i>Dec.</i>	<i>Year</i>
COASTAL													
Wyndham (New site) (a)—													
Rainfall (mm)— Average	161	193	153	23	10	2	7	—	8	18	57	109	740
Highest	329	369	428	119	98	23	84	—	78	75	174	226	1,101
Lowest	47	43	—	—	—	—	—	—	—	—	2	15	63
Highest one day	89	77	140	74	48	23	49	—	78	38	84	87	140
Wet days— Average number	15	14	11	3	1	—	—	—	1	3	6	9	63
Broome—													
Rainfall (mm)— Average	175	162	92	25	30	19	5	2	2	2	9	41	564
Highest	825	427	439	226	176	208	72	23	24	28	50	279	1,228
Lowest	5	8	—	—	—	—	—	—	—	—	—	—	139
Highest one day	351	182	204	107	119	127	55	12	13	15	37	210	351
Wet days— Average number	11	11	7	3	3	2	1	1	1	1	1	5	47
Port Hedland M.O. (b)—													
Rainfall (mm)— Average	58	94	46	23	28	18	10	4	1	1	4	17	304
Highest	454	360	251	352	170	125	81	35	9	8	67	219	627
Lowest	—	—	—	—	—	—	—	—	—	—	—	—	45
Highest one day	387	329	152	111	156	53	46	25	3	7	59	169	387
Wet days— Average number	5	7	4	2	3	3	2	1	1	1	1	2	32

For footnotes, see end of table.

CLIMATE AND METEOROLOGY

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

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
COASTAL (continued)													
Onslow—													
Rainfall (mm)— Average	27	46	49	19	45	43	18	10	1	1	2	4	266
Highest	261	539	415	279	259	227	222	107	25	27	56	61	998
Lowest	—	—	—	—	—	—	—	—	—	—	—	—	15
Highest one day	192	356	283	157	124	111	76	62	17	21	30	38	356
Wet days— Average number	2	3	3	2	3	4	2	2	—	—	—	—	21
Carnarvon M.O. (b)—													
Rainfall (mm)— Average	13	21	15	12	39	49	44	18	6	7	5	1	230
Highest	157	149	93	89	195	161	180	51	22	53	81	5	557
Lowest	—	—	—	—	—	1	—	1	—	—	—	—	75
Highest one day	66	78	77	76	95	96	82	35	17	25	81	4	96
Wet days— Average number	2	3	2	3	5	7	7	5	3	3	1	1	42
Geraldton—													
Rainfall (mm)— Average	6	14	15	26	71	112	95	67	30	20	10	5	471
Highest	64	131	89	100	282	286	243	131	81	109	47	59	843
Lowest	—	—	—	1	—	25	24	11	—	—	—	—	220
Highest one day	36	69	88	48	62	109	72	59	39	71	24	51	109
Wet days— Average number	2	2	3	6	10	14	15	13	9	7	4	2	87
Perth (Bureau of Meteorology)—													
Rainfall (mm)— Average	9	12	19	46	123	182	173	135	80	54	22	14	869
Highest	115	166	145	149	308	476	425	318	199	200	73	81	1,339
Lowest	—	—	—	—	14	55	62	12	9	1	—	—	509
Highest one day	55	87	77	67	76	99	76	74	52	55	39	47	99
Wet days— Average number	3	3	4	8	14	17	18	17	14	11	6	4	119
Bunbury—													
Rainfall (mm)— Average	11	12	22	46	128	183	171	124	80	54	26	14	871
Highest	157	103	91	175	288	412	417	302	201	195	84	80	1,365
Lowest	—	—	—	—	10	36	49	21	—	5	—	—	484
Highest one day	115	86	66	61	79	82	95	62	58	39	38	27	115
Wet days— Average number	2	2	4	7	14	18	20	17	14	11	7	4	119
Albany M.O. (b)—													
Rainfall (mm)— Average	23	23	28	65	96	99	124	106	82	79	48	25	798
Highest	141	62	85	127	260	224	215	174	133	172	117	97	966
Lowest	3	4	6	21	47	45	55	52	43	37	6	5	628
Highest one day	80	36	52	52	40	38	65	44	44	53	29	42	80
Wet days— Average number	8	8	11	14	18	19	21	21	18	15	13	10	176
Esperance—													
Rainfall (mm)— Average	14	27	25	48	77	80	98	88	55	50	39	17	618
Highest	35	80	82	155	186	162	193	145	119	117	87	85	868
Lowest	2	—	1	6	18	33	23	39	16	16	21	1	468
Highest one day	25	70	31	34	51	61	45	31	28	77	42	24	77
Wet days— Average number	5	6	6	10	12	14	15	15	13	11	8	6	121
Eucla—													
Rainfall (mm)— Average	14	19	21	25	31	29	24	26	21	19	17	14	260
Highest	95	182	127	205	104	155	83	82	85	74	114	116	433
Lowest	—	—	—	—	—	2	—	2	—	1	—	—	112
Highest one day	54	115	51	41	75	36	26	38	40	33	42	65	115
Wet days— Average number	3	4	6	7	10	10	10	9	8	6	5	4	82
WHEAT BELT													
Carnamah—													
Rainfall (mm)— Average	11	15	21	23	51	82	70	54	28	18	11	9	393
Highest	103	103	180	121	170	231	188	192	83	73	91	57	783
Lowest	—	—	—	—	2	13	11	12	1	—	—	—	204
Highest one day	97	78	153	89	74	61	43	79	33	40	71	50	153
Wet days— Average number	2	2	3	5	9	13	14	11	8	5	3	2	77

For footnote, see end of table.

CLIMATE AND METEOROLOGY

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

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
WHEAT BELT (continued)													
Wongan Hills—													
Rainfall (mm)— Average	11	16	20	23	53	75	70	52	28	19	11	9	389
Highest	114	111	166	81	188	220	174	131	97	66	60	59	675
Lowest	—	—	—	—	1	17	8	8	2	—	—	—	161
Highest one day	69	80	81	62	64	70	41	34	37	36	39	57	81
Wet days— Average number	2	2	3	5	8	12	13	12	8	6	3	2	76
Kellerberrin—													
Rainfall (mm)— Average	10	15	22	22	43	58	53	41	26	19	12	13	334
Highest	100	127	152	110	119	163	123	100	76	77	86	67	661
Lowest	—	—	—	—	—	15	11	3	2	1	—	—	172
Highest one day	52	108	103	58	41	53	38	40	24	37	45	57	108
Wet days— Average number	2	2	3	5	8	12	13	11	8	6	3	2	75
Southern Cross—													
Rainfall (mm)— Average	14	20	21	21	34	41	38	30	19	16	15	12	281
Highest	113	137	169	128	119	183	107	88	106	79	75	72	577
Lowest	—	—	—	—	—	5	6	1	—	—	—	—	118
Highest one day	63	84	61	44	55	43	36	40	25	55	51	40	84
Wet days— Average number	3	3	3	5	8	10	11	9	6	5	3	2	68
Northam—													
Rainfall (mm)— Average	8	13	19	24	57	84	85	62	36	25	12	9	434
Highest	118	190	189	88	148	233	221	170	129	100	70	66	711
Lowest	—	—	—	—	1	10	20	3	3	—	—	—	194
Highest one day	102	116	126	75	65	67	54	33	31	58	32	50	126
Wet days— Average number	2	2	3	5	10	15	16	14	10	7	4	2	90
Wandering—													
Rainfall (mm)— Average	10	15	20	35	79	118	115	94	61	43	19	14	623
Highest	156	244	122	121	195	368	324	270	192	130	65	106	1,051
Lowest	—	—	—	—	11	25	34	14	8	1	—	—	297
Highest one day	115	138	104	51	61	85	69	53	40	43	48	64	138
Wet days— Average number	3	3	4	7	13	17	17	16	13	11	6	4	114
Narrogin—													
Rainfall (mm)— Average	10	17	21	30	65	92	89	69	47	34	18	13	505
Highest	155	237	128	121	167	300	243	185	121	128	79	95	741
Lowest	—	—	—	—	10	25	25	16	7	2	—	—	269
Highest one day	150	115	114	63	68	71	81	42	36	49	38	58	115
Wet days— Average number	2	3	4	6	11	15	15	14	11	9	5	3	98
Katanning—													
Rainfall (mm)— Average	13	17	22	31	61	79	76	63	46	37	21	16	482
Highest	217	225	134	162	148	214	174	173	123	115	98	74	782
Lowest	—	—	—	1	7	21	22	13	4	5	—	—	273
Highest one day	116	126	70	106	59	70	38	44	37	50	55	55	126
Wet days— Average number	3	4	5	7	13	17	18	16	13	10	6	4	116
OTHER INLAND													
Halls Creek M.O. (b)—													
Rainfall (mm)— Average	149	124	71	22	14	5	7	3	5	16	32	69	517
Highest	501	484	381	162	105	87	71	49	85	92	175	208	922
Lowest	13	3	2	—	—	—	—	—	—	—	1	4	250
Highest one day	202	124	100	88	62	36	48	42	37	61	97	120	202
Wet days— Average number	13	12	8	3	2	1	1	1	1	3	6	10	61
Marble Bar—													
Rainfall (mm)— Average	76	79	56	21	23	23	12	6	1	4	10	36	347
Highest	310	337	389	241	187	165	134	46	24	116	71	243	798
Lowest	—	—	—	—	—	—	—	—	—	—	—	—	12
Highest one day	152	121	305	125	91	105	63	32	24	84	61	150	305
Wet days— Average number	7	7	5	2	2	2	2	1	—	1	2	4	35

For footnote, see end of table.

CLIMATE AND METEOROLOGY

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

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
OTHER INLAND (continued)													
Meekatharra M.O. (b)—													
Rainfall (mm)— Average	26	31	23	13	25	35	22	11	6	6	13	9	220
Highest	129	142	166	66	96	187	166	56	41	62	113	32	441
Lowest	—	—	—	—	—	1	—	—	—	—	—	—	66
Highest one day	103	57	58	37	37	114	62	23	17	25	82	24	103
Wet days— Average number	4	4	4	4	5	6	6	4	2	2	2	3	46
Laverton—													
Rainfall (mm)— Average	22	25	30	22	25	25	16	14	9	7	15	15	221
Highest	142	144	122	205	124	126	66	85	67	50	152	135	452
Lowest	—	—	—	—	—	—	—	—	—	—	—	—	66
Highest one day	75	87	67	54	52	40	33	41	44	49	91	71	91
Wet days— Average number	3	3	4	3	5	5	4	4	2	2	3	3	41
Kalgoorlie M.O. (b)—													
Rainfall (mm)— Average	22	28	20	19	27	32	26	20	15	16	18	14	257
Highest	186	308	143	99	110	186	83	70	98	84	115	60	488
Lowest	—	—	—	—	—	2	2	2	1	—	—	—	108
Highest one day	154	178	70	50	45	57	28	40	44	77	77	27	178
Wet days— Average number	3	4	4	5	7	8	9	7	5	4	4	3	63
Rawlinna—													
Rainfall (mm)— Average	13	17	20	17	18	19	14	16	13	13	13	15	188
Highest	210	123	85	114	81	131	59	155	85	64	81	117	497
Lowest	—	—	—	—	—	—	—	—	—	—	—	—	77
Highest one day	100	73	48	58	31	38	25	66	72	31	65	49	100
Wet days— Average number	2	3	3	3	5	5	5	5	4	3	3	3	44
Collie—													
Rainfall (mm)— Average	16	15	24	50	129	187	182	142	100	68	32	16	961
Highest	243	178	105	183	270	474	440	414	249	213	106	81	1,467
Lowest	—	—	—	0	15	56	52	31	15	2	1	—	598
Highest one day	74	106	84	63	62	91	69	73	58	49	48	32	106
Wet days— Average number	3	3	5	9	17	20	22	20	17	14	8	5	143
Manjimup—													
Rainfall (mm)— Average	20	20	31	64	137	177	179	149	108	79	47	24	1,035
Highest	92	117	138	194	269	332	320	323	257	165	122	78	1,761
Lowest	—	—	1	8	26	80	43	49	24	9	3	—	650
Highest one day	79	44	89	77	79	83	50	54	59	53	49	32	89
Wet days— Average number	5	6	7	11	17	20	22	20	17	14	10	7	156
Pemberton—													
Rainfall (mm)— Average	21	20	38	81	155	199	219	165	118	92	62	35	1,205
Highest	82	86	128	213	337	365	391	388	214	189	160	92	1,712
Lowest	1	1	5	6	36	116	130	50	45	13	6	3	802
Highest one day	60	30	77	81	77	59	91	61	45	44	45	42	91
Wet days— Average number	6	6	8	12	18	20	22	21	18	16	12	9	168
Mount Barker—													
Rainfall (mm)— Average	23	24	36	56	86	98	107	92	81	72	43	29	746
Highest	182	179	129	234	243	209	261	173	157	160	155	87	1,095
Lowest	1	1	4	4	16	43	22	33	18	16	3	1	431
Highest one day	105	72	56	139	71	68	72	48	45	54	64	44	139
Wet days— Average number	7	7	10	13	17	19	21	20	18	16	11	9	168

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

CLIMATE AND METEOROLOGY

TABLE 3.2 – ANNUAL RAINFALL AT REPRESENTATIVE STATIONS
(millimetres)

Station	1986	1987	1988	1989	1990	1991	Long term average (a)
Albany M.O. (b)	740	667	956	961	908	760	811
Broome M.O. (b)	339	528	482	309	195	766	563
Bunbury	665	529	843	666	571	797	871
Carnamah	388	274	388	300	477	368	390
Carnarvon M.O. (b)	210	103	108	160	204	251	227
Collie	638	620	(c)	759	837	994	960
Esperance M.O. (b)	651	572	552	773	568	466	626
Eucla	312	204	361	248	368	233	259
Geraldton M.O. (b)	558	460	466	427	429	495	472
Giles M.O. (b)	200	260	234	421	156	238	260
Halls Creek M.O. (b)	457	699	508	205	497	811	511
Kalgoorlie M.O. (b)	280	306	272	180	300	168	256
Katanning	397	330	517	462	440	502	484
Kellerberrin	337	272	333	269	347	294	330
Leonora	233	261	244	130	254	174	223
Manjimup	791	715	(c)	(c)	—	985	1,032
Marble Bar	266	330	620	373	194	207	345
Meekatharra M.O. (b)	303	289	186	328	209	115	221
Mount Barker	618	535	830	710	659	584	745
Narrogin	387	453	534	443	556	508	505
Newman	177	302	326	213	197	200	310
Northam	445	391	404	347	467	464	433
Onslow	432	180	180	200	224	242	263
Pemberton	997	869	1,388	1,186	1,260	1,224	1,204
Perth (Bureau of Meteorology)	930	768	912	738	786	949	869
Port Hedland M.O. (b)	167	153	533	568	97	213	314
Southern Cross	331	274	382	278	329	252	283
Wandering	507	472	598	516	594	618	622
Wongan Hills	401	377	477	335	452	463	388
Wyndham	683	872	663	461	610	505	730

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

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. Although at Marble Bar the yearly mean maximum of 35.3°C is very similar to that of Wyndham, its 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, the highest temperature on record being 50.7°C 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

CLIMATE AND METEOROLOGY

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. In Mundiwindi, which lies almost in the tropics, -5.3°C has been recorded.

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.

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

The average number of days with temperatures of 2.0°C or below (see Table 3.3) provides an indication of frost frequency.

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

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
COASTAL													
Wyndham New Site (a)—													
Mean max. $^{\circ}\text{C}$	37.1	36.0	36.0	35.9	33.6	31.0	30.8	33.9	36.3	38.8	39.3	38.7	35.5
Mean min. $^{\circ}\text{C}$	26.3	25.8	25.3	23.5	20.9	17.8	16.8	19.4	22.8	25.6	26.9	27.1	23.1
Highest max. $^{\circ}\text{C}$	45.3	43.9	43.3	41.7	39.4	37.8	36.2	39.6	41.1	45.0	45.4	45.4	45.4
Lowest min. $^{\circ}\text{C}$	18.7	16.7	18.3	17.1	11.1	9.6	8.9	8.3	15.2	17.6	14.4	18.3	15.0
No. of days 30.0°C and over	31	27	30	29	28	20	21	28	30	30	30	31	335
No. of days 40.0°C and over	6	3	2	—	—	—	—	—	1	9	14	11	46
No. of days 2.2°C or lower	—	—	—	—	—	—	—	—	—	—	—	—	—
Broome—													
Mean max. $^{\circ}\text{C}$	33.4	32.9	34.0	34.2	31.4	29.0	28.6	30.2	31.9	32.8	33.6	34.0	32.1
Mean min. $^{\circ}\text{C}$	26.2	25.9	25.3	22.6	18.3	15.0	13.6	15.0	18.4	22.1	24.9	26.4	21.2
Highest max. $^{\circ}\text{C}$	44.1	42.7	42.2	41.7	38.7	36.2	35.0	38.1	39.9	42.8	44.3	44.8	44.8
Lowest min. $^{\circ}\text{C}$	17.8	15.2	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	29	27	30	29	23	11	10	16	21	24	29	31	280
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	1	1	1	3
No. of days 2.2°C or lower	—	—	—	—	—	—	—	—	—	—	—	—	—
Port Hedland—													
Mean max. $^{\circ}\text{C}$	36.2	36.1	36.7	35.0	30.3	27.4	26.8	28.9	32.1	34.3	36.1	36.7	33.0
Mean min. $^{\circ}\text{C}$	25.4	25.3	24.3	21.1	17.0	13.8	12.0	12.9	15.2	17.9	21.1	23.8	18.9
Highest max. $^{\circ}\text{C}$	47.5	47.1	44.5	42.4	38.8	34.4	33.8	36.8	41.0	43.7	47.4	47.9	47.9
Lowest min. $^{\circ}\text{C}$	18.1	16.3	15.8	12.2	7.0	4.7	3.2	3.7	8.4	11.1	12.4	16.6	3.2
No. of days 30.0°C and over	31	27	30	28	17	5	3	10	22	26	28	31	272
No. of days 40.0°C and over	5	4	5	1	—	—	—	—	—	2	6	6	29
No. of days 2.2°C or lower	—	—	—	—	—	—	—	—	—	—	—	—	—
Roeboorne—													
Mean max. $^{\circ}\text{C}$	38.5	37.8	37.4	35.1	30.1	26.8	26.4	28.7	32.3	35.1	37.8	38.9	33.6
Mean min. $^{\circ}\text{C}$	26.1	26.1	25.2	22.0	18.2	15.0	13.4	14.4	16.7	19.4	22.6	24.9	20.2
Highest max. $^{\circ}\text{C}$	47.8	47.6	45.7	43.4	39.6	34.3	33.3	37.9	41.6	45.0	47.4	47.6	47.8
Lowest min. $^{\circ}\text{C}$	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	28	18	4	3	11	24	29	30	31	265
No. of days 40.0°C and over	12	9	8	2	—	—	—	—	—	4	10	13	58
No. of days 2.2°C or lower	—	—	—	—	—	—	—	—	—	—	—	—	—
Onslow—													
Mean max. $^{\circ}\text{C}$	35.9	35.8	35.5	33.3	28.8	25.4	24.8	26.5	29.2	31.6	34.0	35.4	31.3
Mean min. $^{\circ}\text{C}$	23.5	24.0	23.0	20.0	15.8	12.8	11.2	12.1	13.9	16.3	19.0	21.4	17.6
Highest max. $^{\circ}\text{C}$	47.7	48.3	46.4	43.8	39.0	32.7	32.3	35.3	38.3	44.7	46.1	47.5	48.3
Lowest min. $^{\circ}\text{C}$	15.8	15.1	14.7	10.0	5.6	2.9	3.1	4.6	5.5	7.4	10.0	9.4	2.9
No. of days 30.0°C and over	30	27	29	26	10	—	—	2	11	19	24	28	206
No. of days 40.0°C and over	6	5	4	—	—	—	—	—	—	1	3	6	19
No. of days 2.2°C or lower	—	—	—	—	—	—	—	—	—	—	—	—	—
Carnarvon—													
Mean max. $^{\circ}\text{C}$	31.3	32.4	31.2	28.7	25.8	23.2	22.0	22.7	24.3	25.8	27.1	29.0	26.7
Mean min. $^{\circ}\text{C}$	22.4	23.3	22.0	19.0	14.8	12.4	11.1	11.6	13.9	16.3	18.5	20.4	17.2
Highest max. $^{\circ}\text{C}$	47.7	46.9	45.3	41.1	36.2	31.8	30.7	31.6	38.4	42.4	43.4	45.4	47.7
Lowest min. $^{\circ}\text{C}$	15.9	17.1	13.4	9.5	6.1	3.6	2.4	3.5	5.9	8.8	10.7	12.6	2.4
No. of days 30.0°C and over	16	18	16	9	3	—	—	—	2	4	5	8	82
No. of days 40.0°C and over	2	3	1	—	—	—	—	—	—	—	—	1	7
No. of days 2.2°C or lower	—	—	—	—	—	—	—	—	—	—	—	—	—

For footnote, see end of table.

CLIMATE AND METEOROLOGY

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

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
COASTAL (continued)													
Geraldton—													
Mean max. °C	31.7	32.4	30.8	27.3	23.7	20.7	19.4	20.0	22.0	24.3	26.9	29.3	25.7
Mean min. °C	18.4	19.1	17.8	15.3	12.6	10.9	9.3	8.9	9.2	10.9	13.7	16.2	13.5
Highest max. °C	47.7	47.3	44.3	39.4	36.6	29.2	35.5	31.6	36.8	40.7	42.2	46.7	47.7
Lowest min. °C	10.2	10.0	8.9	6.9	2.1	0.5	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	77
No. of days 40.0°C and over	4	3	1	—	—	—	—	—	—	—	—	1	9
No. of days 2.2°C or lower	—	—	—	—	—	—	—	—	—	—	—	—	—
Perth—													
Mean max. °C	29.6	30.0	28.0	24.6	20.9	18.3	17.4	18.0	19.5	21.4	24.6	27.4	23.3
Mean min. °C	17.9	18.1	16.7	14.3	11.7	10.1	9.0	9.2	10.3	11.7	14.0	16.3	13.3
Highest max. °C	45.8	46.2	42.3	37.6	32.4	28.1	26.3	27.8	32.7	37.3	40.3	42.3	46.2
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	11	3	—	—	—	—	—	1	5	9	58
No. of days 40.0°C and over	1	1	—	—	—	—	—	—	—	—	—	—	2
No. of days 2.2°C or lower	—	—	—	—	—	—	—	—	—	—	—	—	—
Bunbury—													
Mean max. °C	27.6	27.8	25.9	22.9	19.8	17.6	16.8	17.1	18.1	19.9	22.9	25.5	21.8
Mean min. °C	15.1	15.4	14.3	12.2	10.4	9.2	8.4	8.4	9.2	10.3	12.2	13.9	11.4
Highest max. °C	41.2	40.1	38.3	33.9	28.7	25.1	23.2	24.2	28.8	33.6	37.7	38.6	41.2
Lowest min. °C	5.6	5.2	4.1	2.6	0.1	0.3	-2.2	0.6	-1.1	0.6	4.0	3.6	-2.2
No. of days 30.0°C and over	9	9	5	—	—	—	—	—	—	—	2	5	30
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of days 2.2°C or lower	—	—	—	—	—	—	—	—	—	—	—	—	—
Albany—													
Mean max. °C	25.3	25.1	24.2	21.5	18.6	16.6	15.8	16.0	17.3	18.9	20.8	23.5	20.2
Mean min. °C	13.5	14.3	13.1	11.5	9.7	8.1	7.5	7.4	7.8	9.0	10.6	12.3	10.2
Highest max. °C	45.6	41.6	40.5	38.8	32.6	24.8	22.5	24.1	27.8	33.1	38.1	41.0	45.6
Lowest min. °C	5.6	5.1	4.5	3.3	1.9	—	-0.2	1.4	0.7	1.8	2.9	3.6	-0.2
No. of days 30.0°C and over	4	4	4	1	—	—	—	—	—	—	1	2	16
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	—	—	—	1
No. of days 2.2°C or lower	—	—	—	—	—	—	—	—	—	—	—	—	1
Esperance Post Office—													
Mean max. °C	26.2	26.4	25.2	23.1	20.2	17.9	17.1	17.7	19.2	21.1	22.9	24.8	21.4
Mean min. °C	15.5	16.0	14.9	13.1	10.3	8.9	8.2	8.5	9.4	10.6	12.7	14.4	11.7
Highest max. °C	44.7	46.7	42.5	40.1	34.5	26.3	27.6	29.4	34.4	40.1	42.1	44.4	46.7
Lowest min. °C	8.3	8.0	7.5	5.7	2.9	2.2	2.36	2.5	2.7	3.6	5.8	7.2	-0.6
No. of days 30.0°C and over	5	4	5	3	1	—	—	—	—	2	3	3	26
No. of days 40.0°C and over	1	1	—	—	—	—	—	—	—	—	—	1	3
No. of days 2.2°C or lower	—	—	—	—	—	—	—	—	—	—	—	—	1
Eucla—													
Mean max. °C	25.5	25.3	24.9	23.3	20.9	18.7	17.8	18.9	20.9	22.6	23.4	24.4	21.8
Mean min. °C	16.5	16.8	15.9	13.4	10.4	8.1	7.0	7.4	9.0	11.1	13.3	15.0	11.9
Highest max. °C	50.7	48.9	44.4	41.4	36.3	33.3	32.1	34.9	40.0	43.1	46.7	49.3	50.7
Lowest min. °C	3.5	6.6	4.6	2.0	—	-2.2	-2.2	-1.6	-0.6	-0.3	2.8	3.3	-2.2
No. of days 30.0°C and over	6	5	5	4	1	—	—	—	2	6	6	6	41
No. of days 40.0°C and over	2	1	1	—	—	—	—	—	—	—	1	1	6
No. of days 2.2°C or lower	—	—	—	—	—	—	1	1	—	—	—	—	2
WHEAT BELT													
Carnamah—													
Mean max. °C	35.9	35.5	32.7	27.3	22.3	18.9	17.7	19.0	22.1	25.7	29.8	33.4	26.7
Mean min. °C	18.3	18.9	17.0	13.7	10.5	8.6	7.2	7.1	8.1	10.2	13.0	15.8	12.1
Highest max. °C	48.1	46.3	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	26	24	21	8	1	—	—	—	1	5	14	23	124
No. of days 40.0°C and over	5	6	1	—	—	—	—	—	—	—	1	3	16
No. of days 2.2°C or lower	—	—	—	—	—	—	—	—	—	—	—	—	1

For footnote, see end of table.

CLIMATE AND METEOROLOGY

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

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
WHEAT BELT (continued)													
Wongan Hills—													
Mean max. °C	34.4	33.9	30.6	25.9	21.1	17.9	16.9	17.6	20.4	24.8	28.7	32.4	25.2
Mean min. °C	17.9	18.2	16.2	13.1	9.6	7.6	6.5	6.5	7.5	10.1	12.9	15.7	11.4
Highest max. °C	47.4	44.5	43.5	39.2	34.7	26.0	25.4	27.2	35.2	39.4	41.8	44.2	47.4
Lowest min. °C	8.8	9.6	5.6	2.8	-0.6	0.5	-0.9	-0.5	0.2	0.6	4.3	5.3	-0.9
No. of days 30.0°C and over	25	22	17	6	—	—	—	—	—	4	11	21	108
No. of days 40.0°C and over	4	3	1	—	—	—	—	—	—	—	—	2	10
No. of days 2.2°C or lower	—	—	—	—	—	1	2	3	1	—	—	—	7
Kellerberrin—													
Mean max. °C	34.1	33.3	30.2	25.2	20.7	17.5	16.3	17.3	20.2	24.7	28.6	32.1	25.0
Mean min. °C	17.5	17.6	15.6	12.2	8.8	7.3	6.1	5.8	6.7	9.3	12.7	15.6	11.3
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	24	20	15	5	—	—	—	—	1	5	11	19	102
No. of days 40.0°C and over	4	2	—	—	—	—	—	—	—	—	—	1	7
No. of days 2.2°C or lower	—	—	—	—	1	2	4	5	2	—	—	—	13
Southern Cross—													
Mean max. °C	34.6	33.7	30.7	25.7	20.5	17.1	16.3	18.0	21.9	25.4	29.7	33.2	25.7
Mean min. °C	17.1	17.1	15.0	11.3	7.4	5.7	4.3	4.7	6.4	9.1	12.7	15.5	10.4
Highest max. °C	46.1	47.2	44.4	39.6	33.3	27.5	26.7	30.6	34.8	39.3	43.4	45.9	47.2
Lowest min. °C	5.6	5.6	3.4	-1.1	-3.3	-4.3	-5.0	-3.9	-3.3	-1.1	1.1	3.4	-5.0
No. of days 30.0°C and over	26	21	17	6	—	—	—	—	1	6	13	22	112
No. of days 40.0°C and over	4	2	1	—	—	—	—	—	—	—	—	1	8
No. of days 2.2°C or lower	—	—	—	—	2	5	7	8	3	1	—	—	26
Northam—													
Mean max. °C	34.0	33.6	30.6	25.9	20.8	17.7	16.7	17.8	20.4	23.7	28.3	32.1	25.1
Mean min. °C	17.1	17.1	15.4	12.0	8.5	6.4	5.4	5.7	7.0	9.0	12.5	15.4	10.9
Highest max. °C	46.2	46.7	43.9	39.5	35.1	27.2	25.0	28.0	34.6	39.4	44.1	45.6	46.7
Lowest min. °C	7.3	7.5	5.5	-0.6	-2.7	-3.9	-2.1	-1.1	-1.0	-0.4	2.1	5.6	-3.9
No. of days 30.0°C and over	25	21	17	5	—	—	—	—	—	4	10	21	107
No. of days 40.0°C and over	4	3	—	—	—	—	—	—	—	—	—	2	10
No. of days 2.2°C or lower	—	—	—	—	1	3	4	4	2	—	—	—	14
Wandering—													
Mean max. °C	31.7	31.0	28.2	23.5	18.9	16.0	15.1	16.0	18.1	21.3	25.8	29.5	22.8
Mean min. °C	13.7	13.7	12.0	8.9	6.3	5.0	4.1	4.0	4.8	6.2	9.1	11.9	8.2
Highest max. °C	45.6	44.6	41.9	37.2	33.2	25.0	23.8	26.1	30.9	36.9	39.8	42.8	45.6
Lowest min. °C	3.3	2.8	-0.6	-2.2	-5.6	-5.7	-4.4	-3.9	-3.5	-2.6	-1.7	1.0	-5.7
No. of days 30.0°C and over	20	17	11	2	—	—	—	—	—	2	7	16	76
No. of days 40.0°C and over	2	1	—	—	—	—	—	—	—	—	—	1	3
No. of days 2.2°C or lower	—	—	—	1	6	7	9	10	9	5	1	—	48
Narrogin—													
Mean max. °C	30.8	30.0	27.2	22.4	18.2	15.3	14.6	15.1	17.3	21.2	24.9	28.9	22.0
Mean min. °C	14.7	14.9	13.6	10.9	8.1	7.0	5.8	5.6	6.2	8.1	10.7	12.9	9.5
Highest max. °C	43.7	42.8	40.9	36.1	32.2	26.2	22.2	24.9	36.4	37.8	42.1	43.2	43.7
Lowest min. °C	4.3	3.9	3.3	—	-1.4	-2.7	-2.7	-2.7	-3.0	-1.7	—	1.8	-3.0
No. of days 30.0°C and over	16	13	8	1	—	—	—	—	—	1	5	12	57
No. of days 40.0°C and over	1	1	—	—	—	—	—	—	—	—	—	—	2
No. of days 2.2°C or lower	—	—	—	—	1	2	3	4	3	1	—	—	14
Katanning—													
Mean max. °C	30.3	29.4	26.7	22.6	18.3	15.4	14.4	15.4	17.7	20.6	25.0	28.4	22.1
Mean min. °C	13.6	13.7	12.5	10.2	7.9	6.5	5.4	5.5	6.4	7.6	10.0	12.1	9.2
Highest max. °C	43.8	44.6	41.7	36.1	32.3	24.1	22.2	23.8	30.6	37.8	41.1	43.3	44.6
Lowest min. °C	5.0	3.3	1.7	0.6	-1.1	-2.1	-3.9	-2.2	-1.2	-0.6	1.7	2.7	-3.9
No. of days 30.0°C and over	16	13	9	1	—	—	—	—	—	1	5	12	58
No. of days 40.0°C and over	1	1	—	—	—	—	—	—	—	—	—	—	2
No. of days 2.2°C or lower	—	—	—	—	1	3	4	4	3	1	—	—	13

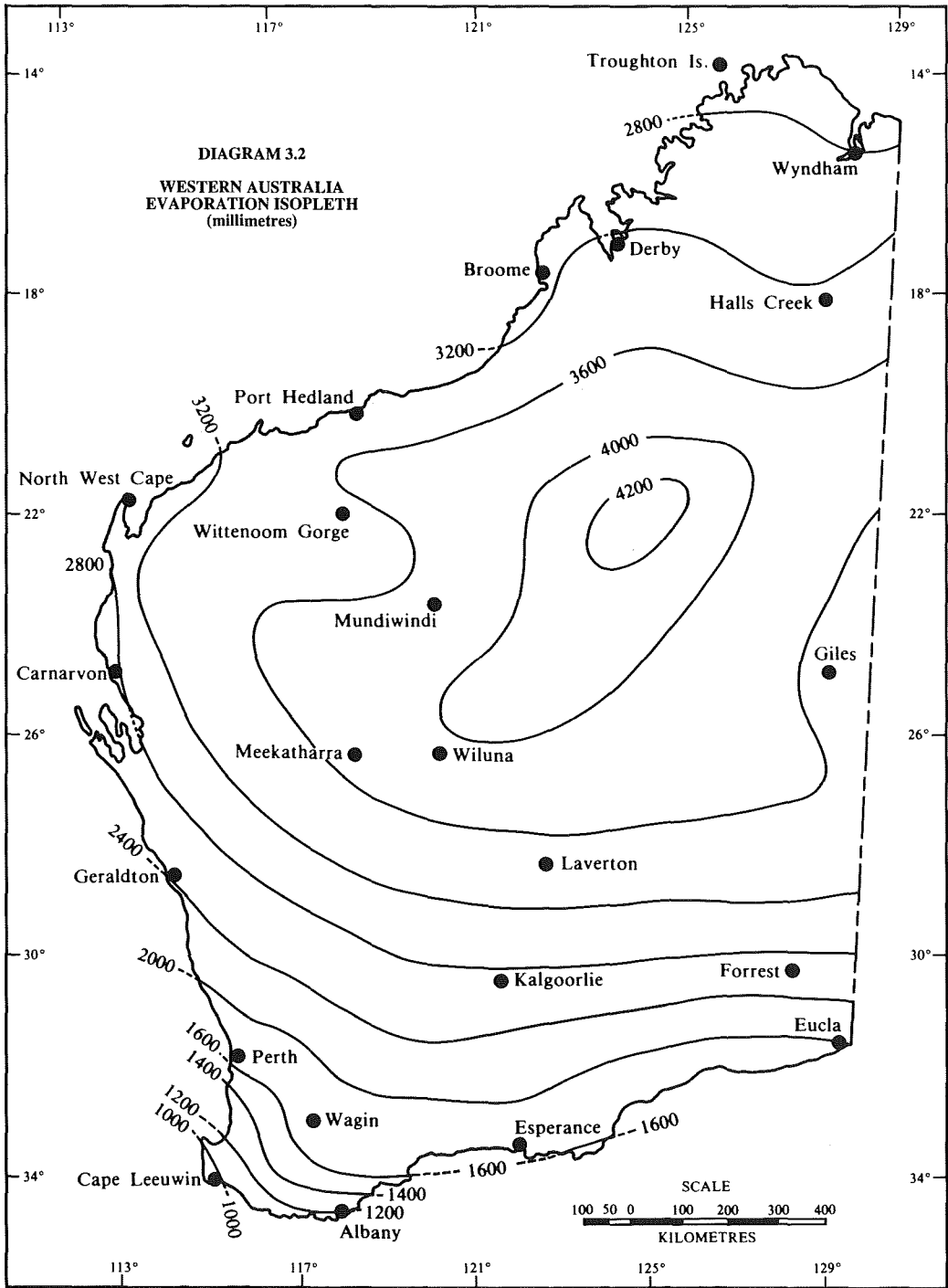
For footnote, see end of table.

CLIMATE AND METEOROLOGY

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

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
OTHER INLAND													
Halls Creek—													
Mean max. °C	36.8	35.8	35.6	33.8	29.8	27.3	27.0	29.9	33.6	36.9	38.4	38.2	33.8
Mean min. °C	24.1	23.6	22.6	20.2	16.6	13.5	12.2	14.7	18.5	22.6	24.3	24.7	19.9
Highest max. °C	44.3	43.8	42.2	39.9	37.2	35.0	34.0	37.8	40.2	43.8	45.0	44.9	44.9
Lowest min. °C	15.6	12.2	11.0	7.2	2.4	0.2	-1.1	0.4	3.0	8.9	11.7	12.1	-1.1
No. of days 30.0°C and over	29	27	29	27	17	7	6	17	27	30	30	30	279
No. of days 40.0°C and over	6	3	1	—	—	—	—	—	—	3	9	9	31
No. of days 2.2°C or lower	—	—	—	—	—	—	—	—	—	—	—	—	—
Marble Bar—													
Mean max. °C	41.0	40.0	39.1	36.0	30.6	27.0	26.7	29.5	33.8	37.4	40.5	41.6	35.3
Mean min. °C	26.1	25.6	24.7	21.2	16.4	12.9	11.6	13.2	16.6	20.1	23.6	25.4	19.8
Highest max. °C	49.2	48.3	46.7	45.0	39.5	35.6	35.0	37.2	42.6	45.6	47.2	48.3	49.2
Lowest min. °C	18.9	13.9	15.3	11.1	5.6	1.1	2.2	3.9	5.6	10.0	14.4	17.2	1.1
No. of days 30.0°C and over	30	27	31	28	19	5	5	13	26	30	30	30	273
No. of days 40.0°C and over	19	14	13	3	—	—	—	—	—	8	17	23	94
No. of days 2.2°C or lower	—	—	—	—	—	—	—	—	—	—	—	—	—
Meekatharra—													
Mean max. °C	38.1	36.6	34.6	29.1	23.3	19.4	18.6	21.0	25.3	29.1	33.1	36.3	28.6
Mean min. °C	24.2	23.7	21.5	16.9	11.7	8.7	7.3	8.3	11.5	14.8	18.5	22.0	15.8
Highest max. °C	44.8	45.2	43.7	38.8	36.0	28.3	28.8	32.6	37.7	40.2	42.3	45.0	45.0
Lowest min. °C	12.2	12.3	10.3	5.8	1.7	-3.1	-0.2	—	3.5	5.2	5.2	11.1	-3.1
No. of days 30.0°C and over	29	26	27	14	2	—	—	—	4	14	23	29	169
No. of days 40.0°C and over	11	6	2	—	—	—	—	—	—	—	1	5	25
No. of days 2.2°C or lower	—	—	—	—	—	—	1	—	—	—	—	—	1
Laverton—													
Mean max. °C	35.8	34.8	31.9	27.2	22.1	18.5	17.8	20.0	24.5	28.0	32.1	34.9	27.4
Mean min. °C	20.5	20.0	18.0	13.9	9.5	6.6	5.2	6.4	9.5	12.8	16.6	19.3	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	22	20	11	2	—	—	—	3	13	20	25	147
No. of days 40.0°C and over	8	4	2	—	—	—	—	—	—	—	2	3	18
No. of days 2.2°C or lower	—	—	—	—	1	2	6	4	—	—	—	—	12
Kalgoorlie—													
Mean max. °C	33.6	31.9	29.6	25.1	20.4	17.5	16.5	18.3	22.0	25.5	28.9	32.1	25.3
Mean min. °C	18.2	17.7	15.9	12.4	8.3	6.2	4.8	5.4	7.8	10.8	13.9	16.6	11.5
Highest max. °C	46.5	46.1	44.5	39.2	33.3	27.6	28.1	30.6	36.8	40.7	41.7	45.0	46.5
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	—	—	—	—	2	6	12	21	100
No. of days 40.0°C and over	3	2	1	—	—	—	—	—	—	—	—	2	8
No. of days 2.2°C or lower	—	—	—	—	1	4	8	6	1	—	—	—	20
Rawlinna—													
Mean max. °C	32.9	31.9	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	15.6	15.5	14.3	11.5	8.1	5.9	4.6	5.3	7.6	9.8	12.4	14.4	10.3
Highest max. °C	47.9	46.4	44.7	40.0	35.0	31.3	29.7	33.9	39.3	41.7	45.6	45.7	47.9
Lowest min. °C	5.6	5.0	6.1	1.7	—	-2.7	-2.3	-3.2	-0.6	0.7	0.8	5.1	-3.2
No. of days 30.0°C and over	22	17	14	8	1	—	—	1	3	9	14	19	106
No. of days 40.0°C and over	5	3	2	—	—	—	—	—	—	—	1	3	13
No. of days 2.2°C or lower	—	—	—	—	1	3	7	4	1	—	—	—	16
Collie—													
Mean max. °C	30.5	30.1	27.3	23.2	18.9	16.3	15.5	16.3	18.1	20.7	24.8	28.3	22.7
Mean min. °C	13.2	13.1	11.5	8.7	6.3	5.0	4.2	4.5	5.8	7.4	9.7	11.7	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	18	15	9	2	—	—	—	—	—	1	5	12	63
No. of days 40.0°C and over	1	—	—	—	—	—	—	—	—	—	—	—	2
No. of days 2.2°C or lower	—	—	—	1	3	6	8	9	5	2	—	—	34

For footnote, see end of table.



CLIMATE AND METEOROLOGY

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

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
OTHER INLAND (continued)													
Manjimup—													
Mean max. °C	27.0	26.9	24.5	20.7	17.2	15.1	14.2	14.8	16.4	18.6	21.6	24.6	19.9
Mean min. °C	13.0	13.2	12.3	10.4	8.6	7.3	6.3	6.3	7.0	8.2	10.0	11.5	9.2
Highest max. °C	42.7	41.6	38.9	33.6	29.2	22.9	21.7	24.7	28.1	33.3	37.4	38.8	42.7
Lowest min. °C	5.6	4.4	3.3	1.6	-0.6	0.2	-2.8	-1.1	-0.6	0.6	1.7	4.4	-2.8
No. of days 30.0°C and over	10	9	5	1	—	—	—	—	—	—	2	6	33
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of days 2.2°C or lower	—	—	—	—	—	1	1	1	—	—	—	—	2
Pemberton—													
Mean max. °C	26.0	26.1	24.1	20.6	17.6	15.6	14.7	15.1	16.5	18.6	21.1	23.6	20.0
Mean min. °C	13.0	13.5	12.5	10.7	9.1	8.1	7.1	6.8	7.3	8.4	10.1	11.8	9.7
Highest max. °C	43.2	41.7	38.9	33.9	28.3	23.2	22.0	25.6	28.3	30.6	37.0	38.5	43.2
Lowest min. °C	4.4	4.4	3.9	2.7	—	-0.4	-1.4	-1.1	-0.3	0.6	2.1	3.9	-1.4
No. of days 30.0°C and over	8	7	4	1	—	—	—	—	—	1	1	4	29
No. of days 40.0°C and over	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of days 2.2°C or lower	—	—	—	—	—	1	—	1	1	—	—	—	3
Mount Baker—													
Mean max. °C	26.2	25.9	24.0	21.0	17.6	15.2	14.2	15.0	16.8	18.7	21.8	24.3	20.1
Mean min. °C	12.6	12.8	12.1	10.4	8.4	6.9	5.8	5.9	6.8	7.9	9.7	11.3	9.2
Highest max. °C	43.9	43.2	40.6	37.2	32.2	23.3	22.2	24.4	28.9	35.6	39.3	40.0	43.9
Lowest min. °C	4.4	5.3	4.8	2.8	1.0	—	-0.6	0.5	—	1.7	3.5	5.0	-1.3
No. of days 30.0°C and over	9	8	6	1	—	—	—	—	—	1	2	6	32
No. of days 40.0°C and over	1	—	—	—	—	—	—	—	—	—	—	—	1
No. of days 2.2°C or lower	—	—	—	—	—	—	1	1	1	—	—	—	2

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

THUNDERSTORMS

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

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

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

EVAPORATION

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

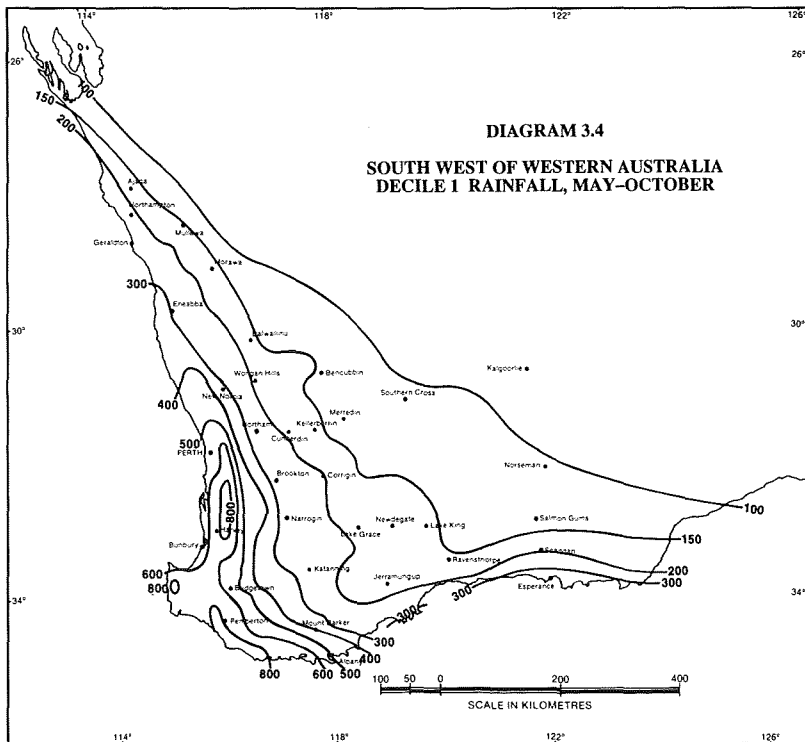
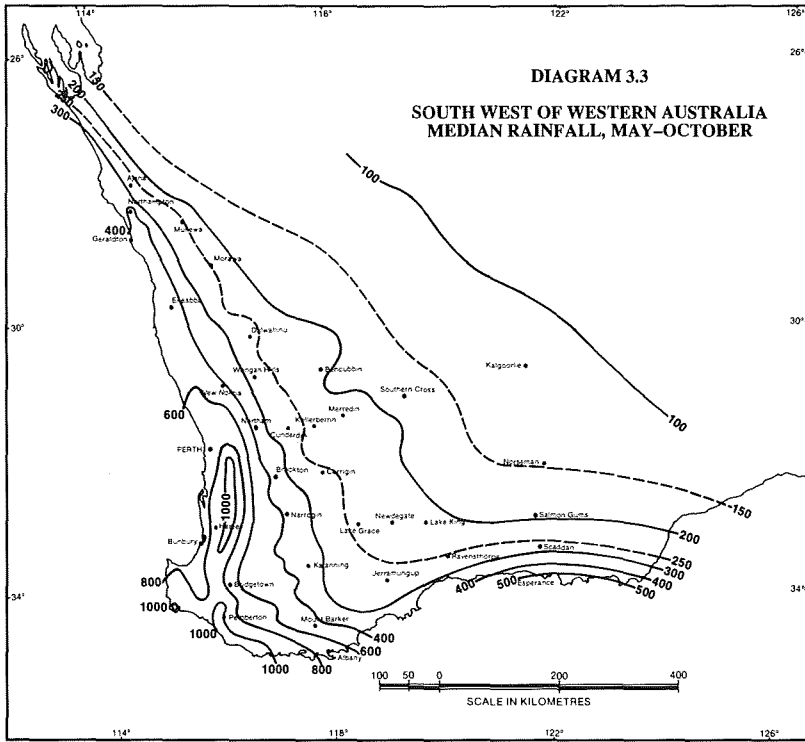
It is least in the winter months, amounting in July to less than fifty millimetres in the far south-west, and to about 225 millimetres in the northern tropics. In January, when evaporation is highest, it totals about 200 millimetres on the far south coast and reaches 500 millimetres in the East Gascoyne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

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

GROWING SEASON RAINFALL

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

CLIMATE AND METEOROLOGY



CLIMATE AND METEOROLOGY

SNOW

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

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 46.2°C (23 February 1991) and the lowest 1.2°C (7 July 1916).

TABLE 3.4 – CLIMATOLOGICAL DATA – PERTH BUREAU OF METEOROLOGY

Month	Prevaling direction		Wind Speed		Temperature		Relative humidity (Saturation = 100%)		Sunshine Mean daily amount	Cloud (proportion of sky covered)— Mean of readings at 9 a.m. 3 p.m. and 9 p.m.	Evaporation Mean daily amount		
	9 a.m.	3 p.m.	Average	High-est	Highest in sun	Lowest terrestrial	Mean	At 3 p.m.					
Number of years of observations													
	30 (a)		94	63	63		81		30 (a)		94 years	30 (a)	24 (b)
			km/h	km/h	°C	date	°C	date	%	%	hours	%	mm
Jan.	E	SSW	17.5	89	80.7	22/1914	4.2	20/1925	53	43	10.6	29	8.1
Feb.	ENE	SSW	17.2	113	78.7	4/1934	4.3	1/1913	52	43	10.0	31	7.6
Mar.	E	SSW	16.2	113	75.0	19/1918	2.6	(c)	57	46	8.9	35	6.2
Apr.	ENE	SSW	13.7	130	69.4	8/1916	-0.7	26/1960	60	48	7.3	42	4.0
May	NE	WSW	13.5	119	63.3	4/1925	-3.9	31/1964	68	58	5.9	54	2.7
June	N	NW	13.5	128	57.5	9/1914	-3.4	27/1946	72	63	4.9	59	2.0
July	NNE	W	14.2	137	56.2	13/1915	-3.8	30/1920	73	63	5.3	56	2.0
Aug.	N	WNW	15.1	156	62.8	29/1921	-3.0	18/1966	71	60	6.2	56	2.5
Sept.	ENE	SSW	15.1	113	67.5	29/1916	-2.7	(d)	64	57	7.2	4.9	3.5
Oct.	SE	SW	16.1	104	71.8	19/1954	-1.2	16/1931	64	54	8.4	48	4.9
Nov.	E	SW	17.2	102	75.0	30/1925	-1.1	1/1968	57	47	9.8	39	6.3
Dec.	E	SSW	17.7	102	76.0	11/1927	3.3	29/1957	54	46	10.5	32	7.4
Year—4.4													
Average	E	SSW	15.6	..	..	..	..	..	62	52	7.9	44	4.8
Extremes	..	..	..	156	80.7	22/1/14	-3.9	31/5/64	..	..	..	..	..

(a) Standard 30 year's normal (1911-1940). (b) Class A Pan 1968-1991. Correction of + 7% applied for bird screen. (c) Recorded on 8 March 1903 and 16 March 1967. (d) Recorded on 8 September 1952 and 6 September 1956.

Chapter 4

FLORA AND FAUNA

THE VEGETATION OF WESTERN AUSTRALIA	4-1
Formations and Alliances	4-2
Botanical Provinces and Districts	4-2
Northern Flora and Fauna	4-9
Southern Flora and Fauna	4-11
References	4-13
THE FAUNA OF WESTERN AUSTRALIA	4-14
Extinct Faunas	4-14
Contemporary Faunas	4-16
Arachnids and Myriapods	4-24
References	4-25
INSECTS	4-26
References	4-27

Chapter 4

FLORA AND FAUNA

The Vegetation of Western Australia¹

Contributed by T.E.H. Aplin and P.G. Wilson

(Western Australian Herbarium, Department of Conservation and Land Management)

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

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.² The vegetation of Western Australia is determined by these varying climatic

patterns, although local changes in geology, soils, topography and drainage may affect the structure and/or the floristic composition of plant communities. The delineation of the present day vegetation also reflects the past tectonic and climatic history of the Australian continent.

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

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

2 See Chapter 3, Climate and Meteorology

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

FORMATIONS AND ALLIANCES

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

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 in Diagram 4.1.

TABLE 4.1 – PLANT COMMUNITIES – MAJOR STRUCTURAL FORMATION

<i>Life-form and height of tallest stratum</i>	<i>Projective foliage cover of tallest stratum, as per cent</i>	<i>Description</i>
Trees over 30 m	70-100 30-70 10-30 under 10	High closed forest High open forest High woodland High open woodland
Trees 10-30 m	70-100 30-70 10-30 under 10	Closed forest Open forest Woodland Open woodland
Trees under 10 m	70-100 30-70 10-30 under 10	Low closed forest Low open forest Low woodland Low open woodland
Shrubs over 2 m	70-100 30-70 10-30 under 10	Closed scrub Open scrub High shrubland High open shrubland

TABLE 4.1 – PLANT COMMUNITIES – MAJOR STRUCTURAL FORMATION — continued

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

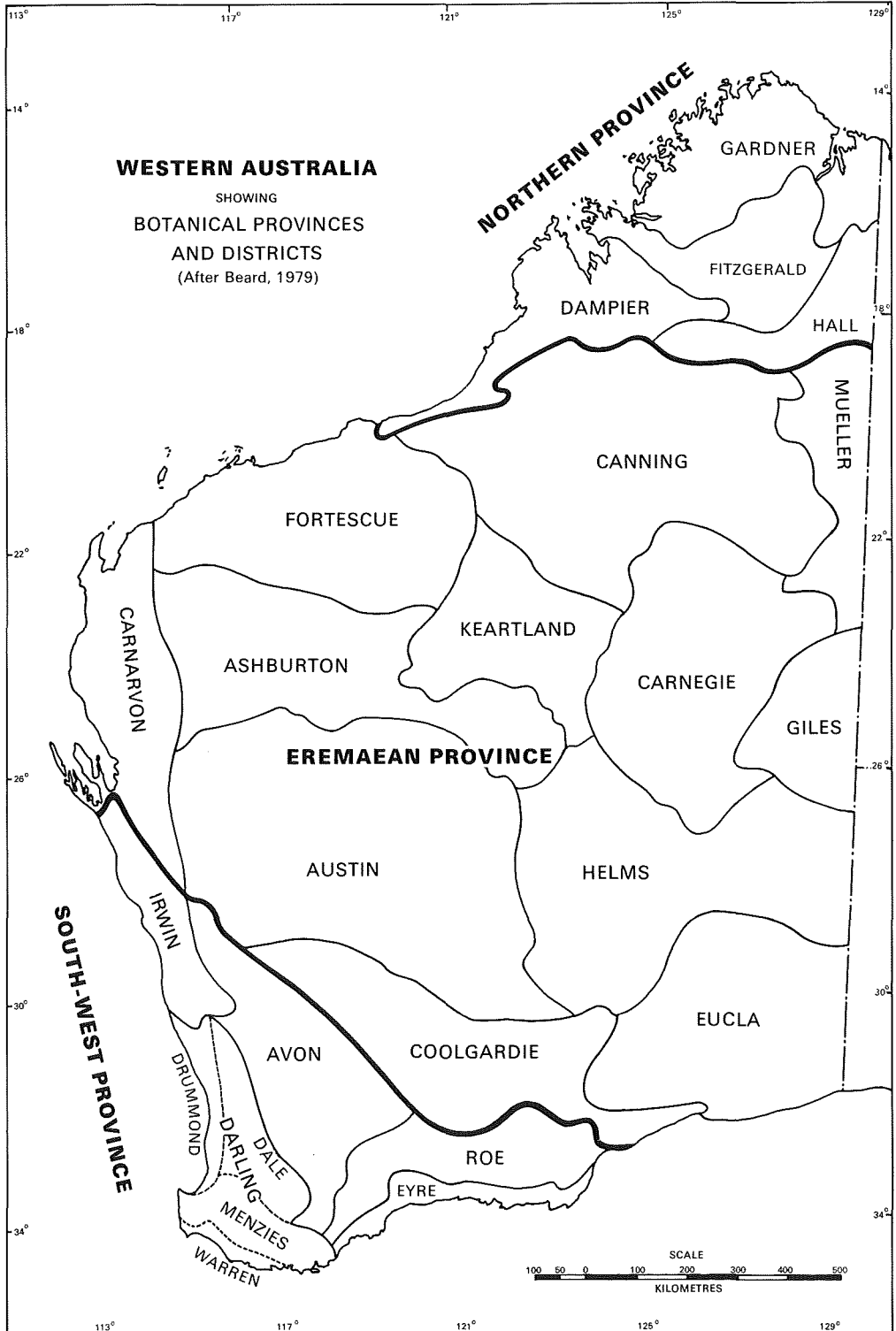
The Northern Province

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

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

DIAGRAM 4.1



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

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

Other alliances and associations found in the Gardner botanical district are *Terminalia* spp.-*Dichanthium* spp. woodland and grassland communities, on soils of heavy texture; *E. brevifolia*, *E. argillacea* and *Melaleuca viridiflora* associations on 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 leucadendra* (Cadjaput) fringe gullies, while semi-deciduous vine thickets with lianes such as *Aristolochia*, *Capparis*, *Cansjera*, *Adenia* and *Canavalia* occur in small pockets.

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

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

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

The upland 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 interfluvies and hillfoot slopes to the south-east. The drainage floors usually carry low open woodland formations of *E. dichromophloia* and *E. tectifera* alliances. The grass layer includes the genera *Chrysopogon*, *Sehima*, *Sorghum* and *Dichanthium*.

The Dampier botanical district contains extensive areas of sandy plains which lack surface drainage. The dominant layer in the vegetation is composed of *Acacia*, the more important species being *A. tumida*, *A. eriopoda*, *A. pachycarpa*, *A. holosericea* and *A. monticola*. *E. dichromophloia* and *E. zygophylla* make up the tallest stratum of the low woodland formation containing these *Acacia* species. Other tree genera include *Gyrocarpus*, *Atalaya*, *Hakea*, *Grevillea*, *Lysiphillum*, *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 Eremaean Province

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

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

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

The Carnarvon Botanical District. The Carnarvon botanical district, a sedimentary basin in which the exposed surface rocks range from Permian to Recent in age, is mostly low-lying. The vegetation on the northern plains consists of *Acacia xiphophylla* high open shrubland with *Triodia basedowii* as ground cover. On the sand plains the vegetation is predominantly *Acacia pyrifolia* open shrubland, with scattered *Owenia reticulata*, and with *Triodia pungens* and *Plectrachne schinzii* as ground cover. On Cape Range *E. dichromophloia* low open woodland, with *Triodia pungens* and *T. wiseana*, is to be seen.

Acacia species such as *A. coriacea*, *A. ramulosa*, *A. sclerosperma*, *A. xiphophylla*, *A. tetragonophylla*, *A. grasbyi* and *A. ligulata* form high open shrubland or low open woodland communities with shrub species of other genera over a wide area of this botanical district. On alluvial flats the low shrub understory 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 make up the desert region of Western Australia.

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

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

The Carnegie Botanical District. The Carnegie district carries extensive areas of *A. aneura*, with *Danthonia* and seasonal ephemerals. On the rises of the lateritic plains hummock grasslands of *Triodia basedowii* and high shrublands with *E. kingsmillii* merge in with the *A. aneura* which tend to thin out. Desert Bloodwood, *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 Helms Botanical District. The Helms district contains extensive areas of *A. aneura* alliance. A high shrubland formation characterised by *E. youngiana* alliance is also well developed. Associated with the shrubland community are other tall shrubs such as *Hakea*, *Acacia*, *Melaleuca*, *Grevillea* and other *Eucalyptus* species. Patches of open woodland of *E. gongylocarpa* are restricted apparently to areas where the sand is deeper. The hummock grass associated with *E. youngiana* and *E. gongylocarpa* is *Triodia basedowii*.

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

with a similar formation in the Coolgardie botanical district.

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

The South-West Province

The South-West Province, which receives its rainfall in winter and has a warm to cool temperate climate, has a high degree of endemism in its flora. The degree of endemism is most powerfully expressed in the cusps of its triangular-crescentic area particularly in the high shrubland and heath formations found to the north of the Hill River and to the east of the Fitzgerald River. The shrubland and heath formations in the South-West Province, apart from certain communities dominated by *Eucalyptus* and *Acacia*, are known as Kwongan. Large areas of this province have been altered greatly by man and contain a high proportion of the naturalised alien species recorded in the State.

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

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

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

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

The Irwin Botanical District. The Irwin botanical district, for the most part, overlies sedimentary rocks from Silurian to Quaternary age, with smaller areas of Precambrian metamorphics. At the northern extremity, the Irwin district consists of red and yellow sands underlain by Mesozoic sediments. High shrubland formations are made up of mixed high shrubland with a heath understorey, with mainly Proteaceae and Myrtaceae 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 *Actinostrobus arenarius* occur on deep sands. Heath and low heath formations of Proteaceae, Myrtaceae, and Leguminosae occur in areas where the sand is shallow or where a lateritic crust is present.

The vegetation of the coastal dune system is an extension of the Darling district. The limestone hills in the Irwin district carry low woodlands of

E. erythrocorys. Poorly drained areas and small lakes carry or are fringed by *Casuarina obesa* and *E. rudis*-*Melaleuca* spp. alliances.

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

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

On the eastern edge of the Darling district, on the low hilly to hilly terrain, with hard acidic yellow mottled soils, the pediments of early erosional cycles, the woodland formation consists of *E. wandoo* alliance. *E. marginata*-*E. calophylla* alliance occurs on soils which tend more to ironstone gravels with a sandy matrix. *E. wandoo* alliance is associated with *E. accedens*, and with *E. astringens* which commonly occur on lateritic breakaways. In the southern portion *E. gardneri* (Blue Mallet) and *E. falcata* (Silver Mallet) are more commonly seen on the breakaways, while *E. cornuta* woodland alliance replaces the *E. wandoo* woodland alliance. *E. wandoo* woodland has a very open low shrub layer.

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

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

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

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

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

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

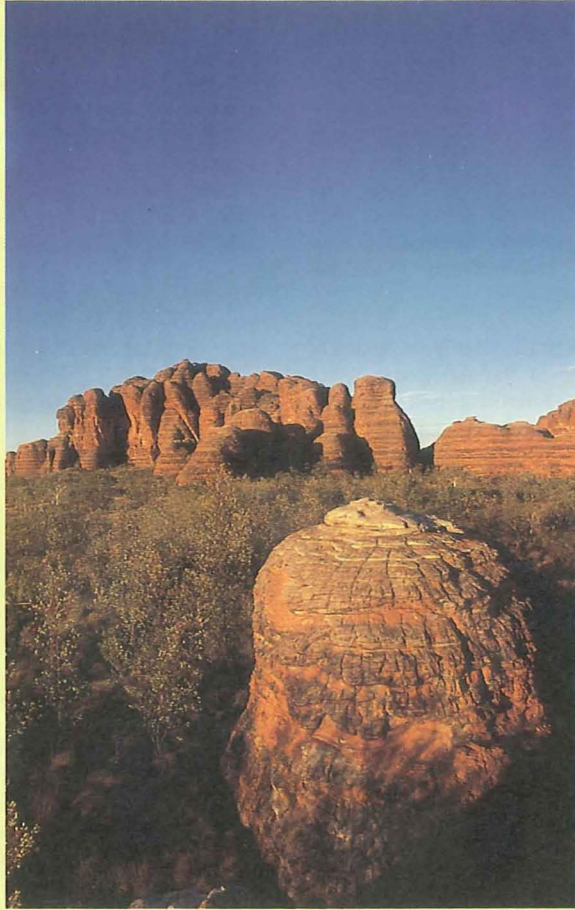
Woodland formations of *E. occidentalis*, *E. loxophleba* and *E. salmonophloia* alliances occur along drainage lines and loamy slopes and flats. Low forests of *E. platypus*-*E. gardneri*-*E. falcata* alliance occur locally on scarp slopes.

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

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

Northern Flora and Fauna

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Northern Flora and Fauna

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① The unusual shapes and colours of the Durnululu (or Bungle Bungle) Range. This spectacular region, now a national park, is found in the Kimberleys south of Lake Argyle.

② Thorny Devil or Moloch (*Moloch horridus*). A slow moving lizard found throughout much of the interior and coast of W.A., particularly in the sand and spinifex deserts and arid scrublands. It feeds only on ants.

③ Gouldian Finch. In W.A., this spectacular bird is found in the Kimberley Region. The finch lives in colonies in tropical woodlands.

④



④ Yellow Kapok. A common shrub of the Kimberley Region. The woolly hairs that surround the seeds are used by aborigines for decorative purposes. The Kapok usually flowers in the dry season.

⑤ Crabs Eye Bean. A twining vine found throughout the Kimberley. The seeds are highly toxic and are used by aborigines for decoration.



⑤

Southern Flora and Fauna

⑥

⑥ Christmas Tree. One of the few arborescent mistletoes in the world, this tree is a semi-parasite common in sandy soil from the Murchison River to Israelite Bay.



⑦ Winged Boronia. A common shrub found along the coast from Albany to Perth. It flowers in October to November.



⑦

⑧



⑧ Splendid Fairy Wren. The most beautiful of the blue wrens, it is found in the southern half of the State. Its song is characterized by loud, trilling notes. Breeding occurs between September to June.

⑨ Majestic Karri Forest. Found in the South West of Western Australia. Karri are amongst the tallest trees in the world, and grow in areas of high rainfall.

⑩ Numbat. For a detailed description of the Numbat, refer to the State Emblems section.

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 3, 6, 9: CALM
 5: W.A. Herbarium

Southern Flora and Fauna

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REFERENCES

- Aplin, T.E.H. *The Flora in Environment and Science* (Ed. Brian J. O'Brien). University of Western Australia Press, Nedlands, 1979.
- Aston, H.I. *Aquatic Plants of Australia*. Melbourne University Press, Carlton, 1973.
- Beard, J.S. (ed.). *West Australian Plants*. 2nd ed. Society for Growing Australian Plants, Sydney, 1970.
- Beard, J.S. *Phytogeographic Regions in Western Landscapes* (Ed. J. Gentilli). University of Western Australia Press, Nedlands, 1979.
- Beard, J.S. *Vegetation Survey of Western Australia 1 : 250,000 series*. Vegmap Publications, Sydney, 1969-1980.
- Beard, J.S. *Vegetation Survey of Western Australia 1 : 1,000,000 series*. University of Western Australia Press, Nedlands, 1974-1981.
- Bentham, G. *Flora Australiensis*. Reeve, London, 1863-78.
- Blackall, W.E. and Grieve, B.J. *How to Know Western Australian Wildflowers* Parts 1-4. University of Western Australia Press, Nedlands, 1956-75. 2nd ed. Parts 1, 3-4, 1980-88.
- Burbidge, N.T. *Dictionary of Australian Plant Genera*. Angus and Robertson P/L, Sydney, 1963.
- Chippendale, G.M. *Eucalypts of the Western Australian Goldfields (and the adjacent wheatbelt)*. Aust. Govt. Publishing Service, Canberra, 1973.
- Commonwealth Scientific and Industrial Research Organization. *Land Research Series*, Nos 4, 7, 9, 28, 1960-70.
- Erickson, R. *Orchids of the West*. 2nd ed. Paterson Brokensha, Perth, 1965.
- Erickson, R. *Plants of Prey in Australia*. Lamb Paterson, Perth, 1968.
- Erickson, R. *Triggerplants*. Paterson Brokensha, Perth, 1958.
- Erickson, R., George, A.S., Marchant, N.G. and Morcombe, M.K. *Flowers and Plants of Western Australia*. Reed, Sydney, 1973.
- Gardner, C.A. 'Gramineae'. *Flora of Western Australia*, Vol. 1, pt 1, Govt. Printer, Perth, 1952.
- Gardner, C.A. 'The Vegetation of Western Australia'. Presidential Address, 1942. J. Roy. Soc. W. Aust., Vol. 28, 1949, pp.11-87.
- Gardner, C.A. 'Trees of Western Australia'. Reprinted from J. Agric. W. Aust. 1952-66.
- Gardner, C.A. *Wildflowers of Western Australia*. 11th ed. West Australian Newspapers Ltd, Perth, 1973.
- George, A.S. (ed.). *Flora of Australia*. Vols 1-Australia Government Publishing Service, Canberra, 1981 - continuing.
- Green, J.W. *Census of the Vascular Plants of Western Australia*. 2nd ed. Western Australian Herbarium, South Perth, 1985.
- Jessop, J.P. and Toelken, H.R. *Flora of South Australia*. 4th ed. Government Printer, Adelaide, 1986.
- Lander, N.L. *Sources of information on the vegetation and flora of Western Australia*. Western Australian Herbarium, South Perth, 2nd ed. revised K.F. Kenneally, 1986.
- Leigh, J., Briggs, J. and Hartley, W. *Rare or Threatened Plants*. Australian National Parks and Wildlife Service, Canberra City, 1981.
- Marchant, N.G. and others. *Flora of the Perth Region*, Parts 1 and 2. Western Australian Herbarium, Western Australia, 1987.
- Morcombe, M.K. *Australia's Western Wildflowers*. Landfall, Perth, 1968.
- Nuytsia*. Bulletin of the Western Australian Herbarium, South Perth, 1970—continuing.
- Pate, J.S. and Beard, J.S. (ed.) *Kwongan, Plant Life of the Sandplain*. University of Western Australia Press, Nedlands, 1984.
- Ride, W.D.L. and others. *National Parks and Nature Reserves in Western Australia*. Government Printer, Perth, 1966.
- Seddon, G. *Sense of Place. A Response to an Environment: The Swan Coastal Plain, Western Australia*. University of Western Australia Press, Nedlands, 1972.
- Smith, G.G. *A Guide to the Coastal Flora of South-Western Australia*. Handbook No. 10 of the Western Australian Naturalists' Club. Perth, 1973.
- Specht, R.L. 'Vegetation' chapter in *The Australian Environment*. 4th ed. C.S.I.R.O. - Melbourne University Press, Melbourne, 1970.
- Specht, R.L., Roe, Ethel M. and Boughton, Valerie H. 'Conservation of Major Plant Communities in Australia and Papua New Guinea'. *Aust. J. Bot. Supp. Series*, Supp. No. 7, 1974.
- Vegetation Survey of Western Australia series*. Western Australian Department of Agriculture, South Perth, 1972.

The Fauna of Western Australia

(Contributed by the Western Australian Museum)

EXTINCT FAUNAS³

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

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

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

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

Seas of the Devonian (408-360 million years ago) abounded in early forms of fish. Limestones of this age in the West Kimberley have yielded exquisitely preserved fossils, including more than 34 species of primitive armoured fishes (placoderms), sea-living lungfish (dipnoans), rhipidistions and actinopterygians. Many of these show such fine anatomical details preserved that they have formed the basis for extensive revision of the classification and phylogeny of early vertebrates. Extensive shallow-water Devonian limestone reefs around the south-western part of the central Kimberley Block contain abundant marine faunas, including stromatoporoids (*Amphipora*, *Actinostroma*), corals, (*Hexagonaria*,

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

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

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

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

3 Contributed by K.J. McNamara and G.W. Kendrick.

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

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

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

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

Eocene (55-40 million years) marine deposits in the Carnarvon hinterland contain well-preserved faunas, notably corals and molluscs including the nautiloid *Aturia*. Plant remains include familiar modern genera, such as *Banksia*, *Casuarina* and forms related to *Araucaria*. *Banksia* cones from this area provide the earliest unequivocal record for the genus in Australia. Eocene deposits along the south coast contain a great diversity of fossil remains, both marine and non-marine. Marine groups present include many species of sponges, echinoids and molluscs, including the nautiloids *Aturia*, *Cimomia* and *Teichertia*. Rich assemblages of fossil leaves, wood, pollen, spores and occasional fruiting bodies are known from Eocene and other early Tertiary deposits in southern Western Australia. Most of this diverse flora remains to be identified; however, the presence of tree ferns and other ferns such as *Gleichenia*, the conifers *Araucaria*, *Agathis* and *Dacrydium*, palms such as *Livistona*, the Antarctic Beech, *Nothofagus*, mangroves including rhizophoraceans and genera of humid-tropical affinity, such as *Ficus*, *Terminalia*, *Bombax* and *Anacolosa* indicate vegetation consistent with a humid temperate rainforest environment.

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

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

During Quaternary time (the last 1.6 million years) many caves formed and have preserved the fossil remains of a vertebrate fauna of much greater diversity than that recorded today. Included are species of kangaroo (*Macropus*) larger than any

living kangaroo, as well as other large macropods including *Sthenurus* and *Protemnodon*; the large diprotodontid *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*. When these elements became extinct is unknown, but it appears to have been more than 40,000 years ago. The Thylacine (*Thylacinus*) and Tasmanian Devil (*Sarcophilus*) became totally extinct within Western Australia more recently, the Thylacine disappearing about 3,500 years ago. The Dingo appeared first in relatively recent times no more than 4,000 years ago, co-existing only for a brief period with its marsupial counterpart, the Thylacine.

CONTEMPORARY FAUNAS

Origins and Distributions ⁴

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

The present distribution of the modern Western Australian fauna reflects not only past geological and climatic events, particularly those of the Quaternary, but also short term climatic oscillations. The broad distribution patterns of most living terrestrial animals can generally be

related to today's major climatic zones which give rise to three major faunal divisions: a northern tropical fauna adapted to conditions of reliable monsoonal summer rain and dry winters characteristic of the Kimberley; a temperate fauna adapted to Mediterranean-type conditions with reliable winter rainfall and dry summers characteristic of the south-west and, between them, a fauna adapted to arid conditions with irregular and variable rainfall that prevail over the remainder of the State. These broad faunal divisions do not necessarily reflect origins and both Gondwanic and post-Gondwanic elements may be present in each. However, particularly in 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*).

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

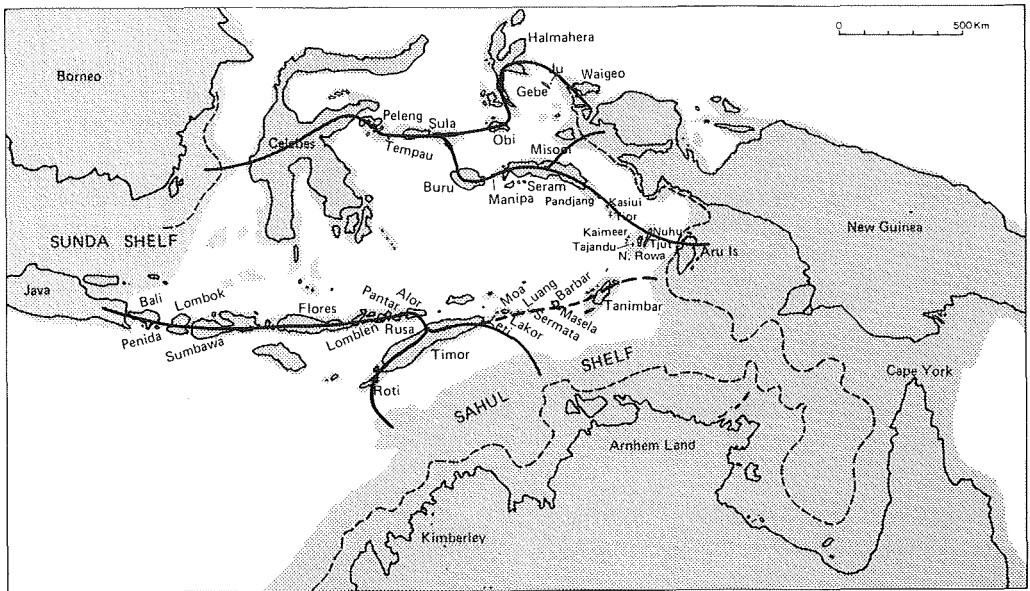
The distribution of some terrestrial species, particularly medium-sized marsupials, has been substantially modified by recent direct and indirect influence of European man (e.g. land clearing and introduction of alien animals), usually resulting in marked contraction of former distributional ranges,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

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

4 Contributed by P.F. Berry

DIAGRAM 4.2

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

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

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

Mammals⁵

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

Western Australia, with about one-third of the area of the continent, has 55 per cent of all Australian species of mammals. This fauna comprises 166 native and 19 introduced (including the Dingo) species, including representatives of all modern families except those of the Platypus, Tasmanian Tiger, Koala and rhinolophid bats. Excluding exotics and the single monotreme, the Echidna, the terrestrial assemblage comprises 53 per cent marsupials, 21 per cent rodents and 26 per cent bats. This is a close reflection of the proportion of these broad groups on the continent as a whole.

Because of the extensive coastline encompassing both tropical and temperate areas, Western

Australian waters have representatives of most of the Australian aquatic mammals, including four seal, seventeen whale and fifteen killer whale and dolphin species, as well as a particularly large population of Dugong (*Dugong dugon*) at Shark Bay.

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

The State's mammal fauna can be grouped into broad divisions related to climatic zones mentioned on page 54. The south-western zone is particularly rich in native terrestrial mammals, with sixty-three species recorded since European settlement. Endemics comprise the Dibbler, *Parantechinus apicalis*; White-tailed Dunnart, *Sminthopsis granulipes*; Western Ringtail Possum, *Pseudocheirus occidentalis*; Honey Possum, *Tarsipes rostratus*; Broad-faced Potoroo, *Potorous platyops*; Banded Hare-wallaby, *Lagostrophus fasciatus*; Quokka, *Setonix brachyurus*; Western Brush Wallaby, *Macropus irma*; the marsupial mice, *Sminthopsis gilberti* and *S. griseoventer*; *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 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.

5 Contributed by D.J. Kitchener

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

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

The arid zone includes the deserts, Pilbara, North West Cape, Murchison and Gascoyne areas. Over much of the region rain generally falls in summer, although the southern deserts and western part of the other areas receive most of their effective rain in winter. Mosaics of desert dune, sandplains and alluvial plain environments are found throughout the region.

The deserts, contrary to popular belief, are not markedly poor in species of mammals. Fifty-two species of native mammals are recorded from there. Although none is confined to the desert areas, a number are restricted to desert substrates (Hairy-footed Dunnart, *Sminthopsis hirtipes*;

Lesser Hairy-footed Dunnart, *S. youngsoni*; Long-tailed Dunnart, *S. longicaudata*; Spinifex Hopping Mouse, *Notomys alexis*; Desert Bandicoot, *Perameles eremiana* and Desert Mouse, *Pseudomys desertor*). Dasyurids, particularly the species *Sminthopsis* and native rodents of the genus *Pseudomys*, are well represented (both genera by six species). However, the other rodent genera are poorly represented there.

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

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

As in eastern Australia, the group that has suffered most since European settlement comprises the medium-sized species i.e. the Desert Bandicoot, *Perameles eremiana*; Pig-footed Bandicoot, *Chaeropus ecaudatus*; Long-nosed Potoroo, *Potorous tridactylus*; Broad-faced Potoroo, *P. platyops*; Crescent Nailtail Wallaby, *Onychogalea lunata* and stick-nest rats, *Leporillus* spp. Several of the Western Australian species that are now

extinct are however small rodents, namely *Notomys longicaudatus* and *N. macrotis*. The only group of mammals that has not apparently declined is the bats. In fact bats seem to have been favoured in some areas, such as the Pilbara and Murchison, by mining activity which has created new habitats in mine shafts.

Birds ⁶

For its size Western Australia has a small avifauna. Three hundred and eighty species breed here and another 130 visit the State.

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

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

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

With mean annual rainfall ranging from 250 millimetres at the mulga-eucalypt line to 1,500 millimetres in the karri forests of the deep south-west the winter-rainfall zone is much more

diverse 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.

Reptiles ⁷

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

In Western Australia there are 8 genera and 13 species of turtles; 42 genera and 313 species of lizards; 30 genera and 102 species of snakes; and 1 genus and 2 species of crocodiles.

The northern summer-rain zone has more in common with the far north of the Northern Territory and north Queensland than with the rest of Western Australia. It is the only part of the

6 Contributed by G.M. Storr.

7 Contributed by G.M. Storr.

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 *Eulamprus*; and among elapid snakes, *Demansia* and *Denisonia*.

The fauna of the arid zone is strongly demarcated from that of the northern zone but forms a continuum with that of the south-western zone. In other words the mulga-eucalypt line is irrelevant in reptile distribution. Reptiles are generally much less sensitive to changes in the vegetation than to changes in the soil. Among arid-zone geckos the dominant genera are *Diplodactylus*, *Gehyra* and *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 diverse part of the State. From the warm dry north to the cool humid south there is a gradual decline in the number of geckos, dragon lizards, monitors and blind snakes. The number of skinks and elapid snakes does not decline, but the composition of these families changes rapidly. For example, the dominant skink genera in the north are *Ctenotus* and *Lerista*; in the south, *Egernia*, *Morethia* and *Hemiergis*. Compared with other regions, the south-western zone is notable for its wealth of legless lizards; indeed no other part of Australia is as rich in these lizards as the coastal plains between Shark Bay and the Swan River.

Unlike the birds, the reptiles of the south-western zone have little in common with those of south-eastern Australia. The south-western zone is well represented by such northern and arid genera as *Diplodactylus*, *Ctenophorus*, *Tympanocryptis*, *Ctenotus*, *Lerista*, *Menetia*, *Morethia* and *Vermicella*. Genera shared with south-eastern Australia include *Phyllodactylus*, *Aprasia*,

Hemiergis, *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 with twelve in south-eastern Australia and Tasmania.

Amphibians⁸

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

The frogs of Western Australia comprise two families: the Hylidae (2 genera, 25 species) and Leptodactylidae (12 genera, 51 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.

Fishes⁹

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

Western Australia's temperate fish fauna consists of two major components, a cool temperate fauna inhabiting the south coast and lower west coast, and a warm temperate or subtropical fauna along the west coast. The first component is generally

8 Contributed by G.M. Storr.

9 Contributed by G.R. Allen and J.B. Hutchins.

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

The tropical fishes tend to be widespread, occurring throughout the vast Indo-West Pacific region. The northern tropical fauna is by far the largest comprising approximately 1,200 species. The majority are inhabitants of coral reefs, or their immediate vicinity, for example in adjacent sand flats or weed beds. The larger predators are the best known because of their edible qualities and the sport they provide for anglers. The most common fishes in this category include the gropers, coral cods, and coral trout (all members of the family Serranidae), the jacks or trevallies (Carangidae), tropical snappers or sea perches (Lutjanidae, unrelated to the popular southern snapper of the family Sparidae), sweetlips (Haemulidae), emperors (Lethrinidae) and barracuda (Sphyraenidae).

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

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

The Western Australian fauna can be conveniently divided into south-western (temperate) and northern (tropical) components with little intermixing of the two except in a few streams between the Murchison and Greenough Rivers.

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

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

Echinoderms ¹⁰

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

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

Molluscs ¹¹

The marine molluscs number over 2,000 species. The shallow water marine molluscs may be divided into a northern tropical Indo-West Pacific fauna, a temperate southern Australian fauna and a region of overlap, characterised by the presence of west coast endemic species. The North West

10 Contributed by L.M. Marsh.

11 Contributed by F.E. Wells.

Cape area is the major geographical limit for tropical molluscs, with nearly one-third of species having their southern limit in that area. Two subsidiary areas of southern limits occur on the west coast at Shark Bay and the Houtman Abrolhos. The Houtman Abrolhos is the southernmost area that can be considered to have a basically tropical fauna; 72 per cent of the molluscs are tropical forms. South of the Abrolhos the tropical species rapidly drop out; only about 3 per cent of the tropical species occur as far south as Cape Leeuwin. Most of the temperate molluscs occur along the entire south coast of Western Australia to Cape Leeuwin. About 20 per cent have their northern limit in the Cape Leeuwin-Cape Naturaliste region; only 3 per cent extend to the north coast, beyond North West Cape. Endemics comprise about 10 per cent of the west coast fauna. While some occur on the north or south coasts most endemics have at least part of their range on the west coast. Although the number of endemic species is only a small fraction of the total molluscan fauna, some species occur in large numbers and are thus ecologically important in coastal habitats.

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

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

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

Corals¹²

Approximately 318 species of corals in 70 genera have been recorded for the State. Coral growth is best developed off the tropical north with patch and platform reefs on the inner Sahul and North-West Shelves and a series of atolls along the shelf edge—Ashmore, Seringapatam and Scott Reefs and the Rowley Shoals. Along the mainland

coast of the Kimberley and Pilbara and adjacent islands are fringing reefs. Best developed is the Ningaloo Reef which extends 220 kilometres southward from North West Cape. The most southerly true coral reefs in the Indian Ocean occur at the Houtman Abrolhos off Geraldton. South of the Abrolhos the coral fauna diminishes sharply but extensive colonies of *Pocillopora damicornis* and *Montipora* grow at Rottneest Island from where 25 species have been recorded. Seven genera reach Geographe Bay and four extend to the Recherche Archipelago. The southward extension of corals along the west coast to the south coast is facilitated by the Leeuwin current which transports larvae and maintains slightly elevated water temperatures in winter.

Crustaceans¹³

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

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

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

12 Contributed by L.M. Marsh.

13 Contributed by P.F. Berry, D.S. Jones and G.J. Morgan.

Crustaceans of the inland waters fall into the ecological climate-dependent groupings mentioned on page 4-16. The Cherrabun (*Macrobrachium*), a large freshwater prawn, occurs in permanent pools of the Kimberley.

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

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

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

ARACHNIDS AND MYRIAPODS¹⁴

Arachnids

Six major groups of arachnids are known to occur in Australia: Spiders, scorpions, mites (and ticks), pseudoscorpions, harvestmen and schizomids.

Spiders are the most conspicuous group, with many different species occurring in or around houses. Orbweaving spiders (Araneidae) often spin large, sticky webs at night for prey capture, while others such as wolf spiders (Lycosidae) and huntsman spiders (Heteropodidae) are vagrant hunters, and usually do not construct aerial webs. Trapdoor spiders are common in Western Australia, but females are rarely seen due to their habit of seldom moving from their silk-lined burrow. However, upon maturity males leave their burrows to search for potential female mates. They then may wander into houses or fall into

swimming pools. Local trapdoor spiders are often confused with the dangerous Sydney Funnel-web Spider (*Atrax robustus*), but true funnel-web spiders have never been reported from Western Australia.

The only Western Australian spider that is capable of inflicting a dangerous bite is the Red-back Spider (*Latrodectus hasselti*). This widespread species is very common around dwellings and other buildings, and although not aggressive, should be treated with caution. An antivenene is available.

Scorpions occur in many different habitats in Western Australia, but the largest dig deep spiral burrows to avoid desiccation. Mites and ticks (Acarina) are ubiquitous. Of the former, several are known to sporadically feed on humans, but the association is normally short-lived. Ticks feed on the blood of a wide variety of vertebrates such as kangaroos, bandicoots, domestic stock, goannas and birds. Pseudoscorpions are rarely seen, due to their small size and cryptic habits; they resemble scorpions, but lack the characteristic scorpion tail and sting. Harvestmen are also seldom seen, and may be easily mistaken for spiders. However, they lack a medial constriction of the body which is present in all spiders.

Myriapods

Three main myriapod groups occur in Western Australia (centipedes, millipedes and symphylans) and all possess large numbers of legs (hence the name 'myriapod').

Most centipedes are fairly small and innocuous. However, several species are quite large, sometimes with colourful bands across the body, and capable of inflicting a painful bite. Millipedes are slow moving, rounded animals, often black in colour. The introduced Portuguese Millipede (*Ommatilius moreletti*) has been reported from several localities in Perth and other towns in the south-west. This species is a pest in South Australia where it occasionally reaches plague proportions, infesting houses and gardens. Symphylans are extremely small and agile, and rarely seen in Western Australia.

14 Contributed by M.S. Harvey.

REFERENCES

General

- Dakin, W.J. *Australian seashores*. Sydney 1976.
- Geological Survey of Western Australia*, 1975.
- Geology of West. Australia: West. Australia Geol. Survey, Memoirs. (2): 1-541.
- Keast, A. (ed) *Ecological Biogeography of Australia*. Vols 1-3 Junk, The Hague, 1981.

Vertebrates

- Allen, G.R. *Inland fishes of Western Australia*. Western Australian Museum, Perth, 1982.
- Hutchins, J.B. & Thompson, M. *The Marine and Estuarine Fishes of South-western Australia. A Field Guide for Anglers and Divers*. Western Australian Museum, Perth 1983.
- Serventy, D.L. & Whittell, H.M. *Birds of Western Australia*. 5th ed. University of Western Australia Press, Perth, 1976.
- Storr, G.M. & Johnstone, R.E. *Field Guide to the Birds of Western Australia*. 2nd ed. Western Australian Museum, Perth, 1985.
- Storr, G.M. & Johnstone, R.E. *Lizards of Western Australia. I. Skinks*. University of Western Australia Press with Western Australian Museum, Perth, 1981.
- Storr, G.M., Smith, L.A. & Johnstone, R.E. *Snakes of Western Australia*. Western Australian Museum, Perth 1986
- Strahan, R. (ed) *The Australian Museum Complete Book of Australian Mammals*. Angus and Robertson, 1983.
- Tyler, M.J. Smith, L.A. & Johnstone, R.E. *Frogs of Western Australia*. Western Australian Museum, Perth 1984.

Invertebrates

- Carlgren, O. 1954. Actiniaria and Zoantharia from South and West Australia. *Arkiv för Zoolog.* (2) 6 (34): 571-95.

Clark, H.L. *The Echinoderm Fauna of Australia*. Carnegie Institution of Washington, Publication 556. Washington D.C., 1946.

George, R.W., Morgan, G.R. & Phillips, B.F. 1979 The Western Rock Lobster. *J. Roy. Soc. W. Aust.* 62:45-51.

George, R.W. 1968. Tropical spiny lobsters, *Panulirus* spp., of Western Australia (and the Indo-West Pacific). *J. Roy. Soc. W. Aust.*, 51 (2): 33-8.

George, R.W. and Jones, D.S. 1982. A revision of the Fiddler Crabs of Australia (ocypodinae:Uca). *Rec. West. Aust. Mus.* Suppl.No.14: 99pp.

Harvey, M.S. & Yen, A.L. *Worms to Wasps*. Oxford University Press, Melbourne 1989.

Koch, L.E. 1977. The Taxonomy, Geographic Distribution and Evolutionary Radiation of Australo-Papuan Scorpions. *Rec. W. Aust. Mus.* 5(2): 82-367.

Koch, L.E. 1983. Morphological Characters of Australian Scolopendrid Centipedes, and the Taxonomy and Distribution of *Scolopendra morsitans* L. (Chilopoda: Scolopendridae: Scolopendrinae). *Aust. J. Zool.* 31 79-91.

Koch, L.E. 1985. Pincushion millipedes (Diplopoda: Polyxenidae): their aggregations and identity in Western Australia. *West. Aust. Nat.* 16 (2/3): 30-32.

Marsh, L.M. & Slack-Smith S.M. *Sea stingers and other venomous and poisonous marine invertebrates of Western Australia*. Western Australian Museum, Perth, 1986.

Marsh, L.M., 1976. Western Australian Asteroidea since H.L. Clark. *Thalassia Jugoslavica* vol. 12 (1): 213-25

Roberts, F.H.S. *Australian Ticks*. C.S.I.R.O., Melbourne, 1970.

Veron, J.E.N. and Marsh, L.M. 1988 hermatypic corals of Western Australia - records and annotated species list. *Rec. W. Aust. Museum.* Suppl. No 29. 136 pp.

Wells, F.E. & Bryce C.W. *Seashells of Western Australia*. Western Australian Museum, Perth, 1985.

Insects

*Contributed by T. Houston
(Western Australian Museum)*

This section deals with the six-legged arthropods (or hexapods) which are known loosely as 'insects' and which comprise four classes: Collembola (springtails), Protura, Diplura and Insecta (the true insects).

The hexapods occupy virtually all terrestrial and freshwater environments and are the most diverse group of organisms on Earth. Only in the marine environment have they not been particularly successful.

The four classes are subdivided into thirty two easily recognisable orders (e.g. Coleoptera — the beetles; Diptera — the flies; Orthoptera — grasshoppers and crickets). Most orders are cosmopolitan and only three very small, rather obscure ones (Grylloblattodea, Zoraptera and Raphidioptera) are absent from Australia. None is exclusive to this continent.

The proportion of species representing each order usually varies little from one continent or major region to another. So, in Western Australia as elsewhere, the largest orders by far (in descending order) are the Coleoptera, Lepidoptera (butterflies and moths), Hymenoptera (sawflies, wasps, bees and ants) and Diptera.

The orders are subdivided into families of which over 570 are represented in Australia and most of these also occur in Western Australia.

Recent estimates put the number of Australian insect species at over 100,000 and about half that number could reasonably be expected to occur in Western Australia. Doubtless a great many species remain to be discovered and described.

Comprehensive censuses of the insect faunae of individual Australian states have never been attempted so broad scale comparisons between states are difficult to make. The study of insect systematics has not been well supported in Western Australia and documentation of the State's insect fauna has been left largely to workers in eastern Australia and overseas. Consequently, the fauna is comparatively poorly studied.

A detailed synopsis of the insects of Western Australia is beyond the scope of this article and readers requiring a comprehensive coverage of the State's insects are referred to the CSIRO textbook *The Insects of Australia* (2nd edition).

The three main climatic regions of Western Australia (northern, arid and south-western) differ considerably in their insect faunae. The northern region has an insect assemblage fairly characteristic of the monsoonal (Torresian) belt of northern Australia (although it lacks many rainforest elements); the arid zone fauna is much the same as throughout the Eremaean Province of central Australia; and the south-western fauna has much in common with south-eastern Australia (Bassian fauna). Nevertheless, there is overlap between the regions and some insect species inhabit all three. Many other species occupy restricted habitats within these regions. The Hamersley Plateau, for example, is a centre of endemism within the arid zone.

Endemism in Western Australia is quite rare at the family level, moderately common at genus level and very common at species level. The family Carthaeidae represented by a single fine species, the dryandra moth (*Carthaea saturnioides*), is restricted to south-western Australia as are the bizarre spoon-winged lacewings (*Chasmoptera* spp.: Neuroptera).

Specialised habitat requirements restrict the distributions of many species. Insects may require particular kinds of soils, water bodies, plants or animals to complete their life cycles. For example, a large and diverse assemblage of insects lives in association with the prickly spinifex (*Triodia*) grasslands which dominate large areas of the arid zone and some native bees are known to specialise in certain flower species confined to the Swan Coastal Plain.

Probably because of the absence of extensive tracts of rainforest, certain groups of insects are less well represented in Western Australia than in some eastern states. Western Australia has, for example, only thirty three of 202 species of cicadas and 103 of 382 species of butterflies described from Australia. The aquatic orders Odonata (dragon-flies), Ephemeroptera (mayflies),

Plecoptera (stoneflies), Megaloptera (alderflies) and probably also the Trichoptera (caddisflies) are also poorly represented, particularly in southern Western Australia. However, some other groups such as the paracolletine and stenotritid bees which abound in semiarid or arid habitats are more diversified in Western Australia than elsewhere.

While the majority of the State's insects are indigenous, numbers of exotic species have also been introduced inadvertently. Most of the insects which infest city buildings, warehouses, grain stores and households are cosmopolitan pests introduced via goods and containers. Notable amongst the household pests are silverfish (*Thysanura*), the American Cockroach (*Periplaneta americana*), the booklouse (*Liposcelis* sp.), the clothes moths (*Tinea* and *Tineola* spp.), the carpet beetle (*Anthrenus verbascii*) and the biscuit beetle (*Stegobium paniceum*). The Indian house cricket (*Gryllobates sigillatus*), while a common nuisance because of its persistent nocturnal singing, is not known to cause damage.

Not all pest insects are introduced. Many native species are also economically important (e.g. certain grasshoppers which periodically behave as 'locusts' and various destructive termites). For a review of the economic insects of Western Australia see the 1990 and earlier editions of the *Western Australian Year Book*.

Undoubtedly the most popular and best studied insects on any continent are the butterflies but only 48 species inhabit the south-western region and only eight species are endemic to the State as a whole.

Given the paucity of the butterflies, many local collectors have turned to the jewel beetles, colourful members of the family Buprestidae. Australia has about 1,000 buprestid species and perhaps 400 of those occur in Western Australia. Many species are quite large, up to 7 cm in length, and adorned with various iridescent colours. Others do not rate as 'jewels', being very small and drab. This family now has legal protection in Western Australia so that specimens cannot be taken without a permit from the Department of Conservation and Land Management (the ant *Nothomyrmecia macrops* is the only other insect given such protection).

No insects in the State need be feared, except perhaps where allergic reactions are likely. Stings from the domesticated honeybee, *Apis mellifera*, are responsible for the greatest number of

insect-related casualties. This is the only insect which leaves its sting in a victim.

Other stinging insects in Western Australia include the papernest wasps (*Polistes* spp.), the bulldog or sergeant ants (*Myrmecia* spp.) and occasionally the introduced European Wasp (*Vespa germanica*), all of which may attack with little provocation.

Bites (delivered by the mouthparts) usually arise from insects' need for blood meals. Common culprits in Western Australia are the march flies (Tabanidae), mosquitoes (Culicidae), biting midges or 'sand flies' (Ceratopogonidae), stable flies (Muscidae), fleas (Siphonaptera), lice (Phthiraptera) and (rarely nowadays) bed bugs (Cimicidae). Some other insects may bite in self defence (e.g. assassin bugs, Reduviidae, and tree crickets, Gryllacrididae).

Some moth caterpillars have hairs or bristles which may cause stinging or irritation upon coming into contact with the skin or the eyes. Cup-moth (limacodid) larvae have eversible tufts of stinging bristles which are erected whenever the larvae are disturbed.

REFERENCES

- Literature covering the general aspects of Australian entomology is given below.
- Andersen, A.N. (due 1991). *Ants of Southern Australia. A Guide to the Bassian Fauna* (CSIRO Division of Wildlife and Ecology), c. 96 pp.
- Anon. (1970). *The Insects of Australia. A Textbook for Students and Research Workers* (CSIRO Division of Entomology/ Melbourne University Press), xiii + 1029 pp. (Revised 2nd edition due late 1991).
- Anon. (1974). *The Insects of Australia. A Textbook for Students and Research Workers Supplement 1974*. (CSIRO Division of Entomology/ Melbourne University Press), xiii + 146 pp.
- Common, I.F.B. (1990). *Moths of Australia* (Melbourne University Press), 535 pp.
- D'Abrera, B. (1971). *Butterflies of the Australian Region* (Landsdowne Press Pty Ltd), 415 pp.
- Hawkeswood, T. (1987). *Beetles of Australia* (Angus & Robertson Publishers), 248 pp.
- Watson, J.A.L., Theischiner, G. & Abbey, H.M. (due 1991). *Australian Dragonflies* (CSIRO Division of Entomology), c. 300 pp.

Chapter 5

GOVERNMENT

Outline of Constitutional Development	5-1
Vice-Regal Representation	5-2
The Federal Parliament	5-2
The State Parliament	5-4
Elections	5-6
Hon. Carmen Lawrence, MLA.	5-7
Legislation During 1991-92	5-8
Government Administration	5-10
The Judicature	5-10
State Representation Overseas and in Other States	5-10
The Local Government System	5-12
Statistical Divisions	5-14

Chapter 5

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 which took place in October of that year, consisted of twelve elected members, three nominees and three officials. The number of members of the Council was increased in 1874 to 21, of whom 14 were elected; in 1882 to 24, of whom 16 were elected; and in 1886 to 26, comprising 17 elected members, 5 nominees and 4 officials.

Following the passage by the Legislative Council of a Constitution Act in 1889 and subsequent representations made in London by delegates sent from the Colony, responsible government was granted to Western Australia by an Imperial Act assented to on 15 August 1890. Provision was made for the establishment of a Parliament of two Houses, to be known as the Legislative Council and the Legislative Assembly, to replace the old Council. Proclamation of responsible government was made in Perth on 21 October 1890 and election of the thirty members of the Legislative Assembly took place in November and December. The fifteen members of the Legislative Council were nominated by the Governor, as provided for in the Constitution Act, and the Parliament was officially opened on 30 December 1890. The *Constitution Act of 1889*, while prescribing a Council which was originally nominative, contained a provision that, after the expiration of six years or on the population of the Colony reaching 60,000, the Council should become fully elective. The required population was attained in 1893 and an amendment to the Act in that year enabled the election of twenty-one members to the Legislative Council, and at the same time increased the Legislative Assembly to thirty-three members. By an amendment of 1899, membership of the Legislative Council was raised to thirty and of the Legislative Assembly to fifty. Provision was made for the Legislative Assembly to be increased to fifty-one members by the *Constitution Acts*

Amendment Act (No. 2) 1965. The increase in numbers, however, did not become effective until the State general election in 1968.

On 1 January 1901, Western Australia and five other Australian Colonies were federated under the name of the 'Commonwealth of Australia', authority for the union having been given by the Commonwealth of Australia Constitution Act which was passed by the British Parliament in 1900. By a provision of the Constitution Act the constituent parts of the Commonwealth previously designated 'Colonies' became known as 'States'. Under the Constitution, powers are divided between the Parliaments of the Commonwealth and of the States, by conferring power 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 Honourable Bill Hayden, AC, who was sworn in on 16 February 1989. During the absence from

Australia of the Governor-General, it is usual for the senior among the State Governors to be appointed Administrator.

The Governor of Western Australia

The Governor of Western Australia is the personal representative of the Sovereign in the State and exercises the powers of the Crown in State matters. He is the titular head of the Government and performs the official and ceremonial functions pertaining to the Crown. 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 Governor of Western Australia, Sir Francis Burt, KCMG, was appointed on 27 February 1990. He had been Acting Governor since June 1989 and had served as Lieutenant-Governor since 1977. Chief Justice David Malcolm was sworn in as Lieutenant-Governor on the same date.

The last Governor of Western Australia as a Colony, was Lieutenant-Colonel Sir Gerard Smith, KCMG, whose term of office expired on 29 June 1900 and the first Governor of the State was Captain Sir Arthur Lawley, KCMG, who was sworn in on 1 May 1901.

THE FEDERAL PARLIAMENT

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

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

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

The Senate

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

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

Elections for the Senate were last held on 24 March 1990. Table 5.1 shows the Western Australian membership of the Senate at August 1991.

TABLE 5.1 – WESTERN AUSTRALIAN MEMBERS OF THE SENATE AT AUGUST 1991

Member	Political party	Year of retirement
M.E. Beahan	A.L.P.	1996
I.G. Campbell	Lib.	1993
Hon. P.F.S. Cook	A.L.P.	1993
W. Crane	Lib.	1996
N.A. Crichton-Browne	Lib.	1996
Hon. P.D. Durack, QC	Lib.	1993
P.J. Giles	A.L.P.	1993
S.C. Knowles	Lib.	1993
J.P. McKiernan	A.L.P.	1996
J.H. Panizza	Lib.	1996
J. Vallentine	Ind.	1996
Hon. P.A. Walsh	A.L.P.	1993

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

The House of Representatives

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

Subsequent redistributions have increased the number of members of the House of Representatives in line with population growth. At the last election in March 1990, the following numbers of members of the House were elected: New South Wales 51; Victoria 38; Queensland 24; Western Australia 14; 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 whom they represent. As provided by the *Commonwealth Electoral Act 1918*, enrolment for electors is the same as for the Senate. Voting is on the preferential system.

GOVERNMENT

Elections for the House of Representatives were last held on 24 March 1990. Table 5.2 shows the Western Australian membership of the House of Representatives at August 1991.

TABLE 5.2 - WESTERN AUSTRALIAN MEMBERS OF THE HOUSE OF REPRESENTATIVES

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

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

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'.

TABLE 5.3 - MINISTRIES FROM 1890

Name of Premier	Political party	Date of assumption			Duration		
		Year	Day	Month	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	5	—	—
Dowding	A.L.P.	1988	25	February	1	11	12
Lawrence	A.L.P.	1990	12	February			Still in office (b)

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

(a) No specific party designation. (b) At 30 April 1991. (c) The name of the Party was changed to the National Country Party of Australia (W.A.) Inc. on 5 May 1975. (d) The name of the Party was changed to The Liberal Party of Australia (Western Australian Division) Incorporated on 15 July 1968.

GOVERNMENT

TABLE 5.4 – THE MINISTRY AT SEPTEMBER 1991

<i>Minister</i>		<i>Title of office</i>
C.M. Lawrence, B Psych, PhD,	MLA	Premier; Treasurer; Minister for the Family; Women's Interests.
I.F. Taylor, B Econ (Hons), JP	MLA	Deputy Premier; Minister for State Development; Goldfields.
J.M. Berinson, QC	MLC	Attorney General, Minister for Corrective Services; Leader of the Government in the Legislative Council.
E.K. Hallahan, BSW, JP	MLC	Minister for Education; Employment and Training; The Arts; Deputy Leader of the Government in the Legislative Council.
R.J. Pearce, BA, Dip Ed, JP	MLA	Minister for Environment; Leader of the House in the Legislative Assembly.
K.J. Wilson	MLA	Minister for Health.
P.A. Beggs, JP	MLA	Minister for Transport; Racing and Gaming; Tourism.
E.F. Bridge, JP	MLA	Minister for Agriculture; Water Resources; North-West.
G.L. Hill, JP	MLA	Minister for Mines; Fisheries; Mid-West; Minister assisting the Minister for State Development.
G.J. Edwards	MLC	Minister for Police; Emergency Services; Sport and Recreation.
Y.D. Henderson, BA, Dip Ed, JP	MLA	Minister for Productivity and Labour Relations; Consumer Affairs.
D.L. Smith, LLB, JP	MLA	Minister for Lands; Planning; Justice; Local Government; South-West.
G.J. Gallop, B Econ, MA, M Phil, D Phil	MLA	Minister for Fuel and Energy; Microeconomic Reform; Parliamentary and Electoral Reform; Minister assisting the Treasurer.
J. Watson, Cert. of Nsg.Ed, B.Sc (Hons), PhD, JP, MLA		Minister for Aboriginal Affairs; Multicultural and Ethnic Affairs; Seniors; Minister assisting the Minister for Women's Interests.
E.S. Ripper, BA, Dip.Ed,	MLA	Minister for Community Services; Disability Services.
J.A. McGinty, BA, B.Juris (Hons), LL.B, JP,	MLA	Minister for Housing; Construction; Services; Heritage.
W.J. Thomas, BA	MLA	Parliamentary Secretary to the Cabinet.

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

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

The right to vote at parliamentary elections was extended to women by the *Constitution Acts Amendment Act 1899* and membership of either House was provided for by the *Parliament (Qualification of Women) Act 1920*. The first woman member of any Australian Parliament was Mrs Edith Dircksey Cowan, OBE, who was elected to the Legislative Assembly in March 1921 as member for West Perth. Mrs A.F.G. (later Dame Florence) Cardell-Oliver, MLA 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*.

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

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

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

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

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

ELECTIONS

The Federal Parliament

General elections for the Federal Parliament were held on 24 March 1990. The Australian Labor Party, led by R.J.L. Hawke, AC, was elected to office with seventy-eight seats in the House of Representatives.

After distribution of Senate seats the Australian Labor Party representation in the Senate remained at thirty-two.

The State Parliament

At the conjoint election for the Legislative Council and the Legislative Assembly held on 4 February 1989, the Australian Labor Party, led by Peter Dowding, MLA, was elected to office with a majority in the Legislative Assembly of five seats. Mr Dowding stood down from the Premiership on 24 February 1990; he was succeeded by Dr Carmen Lawrence MLA.

TABLE 5.5 – ELECTORAL REGIONS AND ELECTORAL DISTRICTS

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

Hon. Carmen Lawrence, MLA.

Dr Carmen Lawrence, Premier of Western Australia, has the distinction of being Australia's first woman Premier. Born in the small West Australian wheatbelt town of Morawa, Dr Lawrence graduated from the University of Western Australia in 1968 with first class honours in Psychology. During her undergraduate years, she won five prestigious prizes, mostly in the field of Psychology. Dr Lawrence then undertook post graduate research, and achieved her Doctorate of Philosophy in 1983.

Dr Lawrence has worked as a research assistant, tutor and lecturer at the University of Western Australia, Curtin University and the University of Melbourne. In 1986, while employed with the Health Department of WA, Dr

Lawrence was elected to Parliament. She currently holds the metropolitan seat of Glendalough.

In 1988, Dr Lawrence was appointed Minister for Education. One year later, the Aboriginal Affairs portfolio was added to her responsibilities. She demonstrated a strong commitment to the concerns of classroom teachers and students, and to improving opportunities for Aboriginal people.

In February 1990, Dr Lawrence became Premier of Western Australia; the first woman to do so in Australian history. Her achievement adds to that of another prominent West Australian, Edith Cowan, who became Australia's first woman parliamentarian in 1921.



Carmen Lawrence, Premier of Western Australia.
Photograph: Ministry of the Premier and Cabinet.

GOVERNMENT

LEGISLATION DURING 1991-92

During the third session of the thirty-third Parliament, which lasted from 14 March 1991 to 6 February 1992, the Western Australian legislature enacted sixty-five Public Statutes and dealt with ninety-eight Bills which were introduced but not passed.

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

TABLE 5.6 - MEMBERS OF THE LEGISLATIVE COUNCIL: MARCH 1992

<i>Name</i>	<i>Political party</i>	<i>Electoral region</i>
J.M. Berinson	A.L.P.	North Metropolitan
T.G. Butler	A.L.P.	East Metropolitan
J.N. Caldwell	N.P.A.	Agricultural
S.G.E. Cash	Lib.	North Metropolitan
K.M. Chance	A.L.P.	Agricultural
E.J. Charlton	N.P.A.	Agricultural
C.M. Davenport	A.L.P.	South Metropolitan
R.E. Davies	Ind.	North Metropolitan
G.J. Edwards	A.L.P.	North Metropolitan
G.M. Evans	Lib.	North Metropolitan
P.G. Foss	Lib.	East Metropolitan
C.E. Griffiths	Lib.	South Metropolitan
S.J. Halden	A.L.P.	South Metropolitan
E.K. Hallahan	A.L.P.	East Metropolitan
T.R. Helm	A.L.P.	Mining & Pastoral
B.J. House	Lib.	South-West
B.L. Jones	A.L.P.	South-West
G.K. Kelly	A.L.P.	South Metropolitan
P.H. Lockyer	Lib.	Mining & Pastoral
M. McAleer	Lib.	Agricultural
F.E. McKenzie	A.L.P.	East Metropolitan
M.S. Montgomery	N.P.A.	South-West
N.F. Moore	Lib.	Mining & Pastoral
M.W. Nevil	A.L.P.	Mining & Pastoral
M.G. Patterson	Lib.	South-West
P.G. Pendal	Lib.	South Metropolitan
S.M. Piantadosi	A.L.P.	North Metropolitan
R.G. Pike	Lib.	North Metropolitan
T.G. Stephens	A.L.P.	Mining & Pastoral
W.N. Stretch	Lib.	South-West
R.J. Thomas	A.L.P.	South-West
D.G. Tomlinson	Lib.	East Metropolitan
D.W. Wenn	A.L.P.	South-West
D.J. Wordsworth	Lib.	Agricultural

SUMMARY

Australian Labor Party (A.L.P.)	16
The Liberal Party of Australia (Western Australian Division) Incorporated (Lib.)	14
National Party of Australia (N.P.A.)	3
Independent (Ind.)	1

TABLE 5.7 - MEMBERS OF THE LEGISLATIVE ASSEMBLY: SEPTEMBER 1991

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

SUMMARY

Australian Labor Party (A.L.P.)	27
The Liberal Party of Australia (Western Australian Division) Incorporated (Lib.)	19
National Party of Australia (N.P.A.)	6
Independent (Ind.)	5

GOVERNMENT

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

<i>Department</i>	<i>Address</i>	<i>Department</i>	<i>Address</i>
Aboriginal Affairs Planning Authority	35 Havelock Street West Perth 6005	Mines Department	100 Plain Street East Perth 6004
Agriculture Department	Baron-Hay Court South Perth 6151	Department of Occupational Health Safety & Welfare	1260 Hay St West Perth 6005
Department for the Arts	Perth Cultural Centre Stirling Street Perth 6000	Department of Planning and Urban Development	469 Wellington St Perth 6000
Office of Auditor General	2 Havelock Street West Perth 6005	Police Department	2 Adelaide Terrace East Perth 6004
Authority for Intellectually Handicapped Persons	53 Ord Street West Perth 6005	Ministry of the Premier and Cabinet	197 St George's Terrace Perth 6000
Building Management Authority of Western Australia	2 Havelock Street West Perth 6005	Department of Productivity & Labour Relations	2 Havelock Street West Perth 6005
Department for Community Services	189 Royal Street East Perth 6004	Public Service Commission	469 Wellington Street Perth 6000
Department of Conservation and Land Management	Hackett Drive Crawley 6009	Office of Racing and Gaming	3 Plain Street East Perth 6004
Ministry of Consumer Affairs	251 Hay Street East Perth 6004	Department of the Registrar, Industrial Relations Commission	815 Hay St Perth 6000
Department of Corrective Services	441 Murray Street Perth 6000	Department of State Development	170 St George's Terrace Perth 6000
Crown Law Department	109 St George's Terrace. Perth 6000	Department of State Services	3 Havelock Street West Perth 6005
Ministry of Education	151 Royal Street East Perth 6004	Ministry of Sport and Recreation	Sir Thomas Meagher Pavilion Perry Lakes Stadium Floreat 6014
Department of Employment and Training	18-20 Howard Street Perth 6000	Office of Government Accommodation	2 Havelock St West Perth 6005
Environmental Protection Authority	1 Mount Street Perth 6000	State Taxation Department	20 Barrack Street Perth 6000
Fisheries Department	108 Adelaide Terrace. Perth 6000	Department of Technical and Further Education	151 Royal St East Perth 6004
Government Employees Superannuation Board	10 Kings Park Road Perth 6000	Department of Transport	136 Stirling Highway Nedlands 6009
Health Department of Western Australia	189 Royal Street East Perth 6004	Treasury Department of Western Australia	197 St George's Terrace Perth 6000
State Housing Commission (Homeswest)	99 Plain Street East Perth 6004	Water Authority of Western Australia	629 Newcastle Street Leederville 6007
Department of Land Administration	Cathedral Avenue Perth 6000	Worker's Compensation and Rehabilitation Commission	2 Bedbrook Place Shenton Park 6008
Local Government Department	32 St George's Terrace. Perth 6000	Western Australian Electoral Commission	480 Hay Street Perth 6000
Department of Marine and Harbours	1 Essex Street Fremantle 6160		

GOVERNMENT ADMINISTRATION

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.

State Government

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

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

THE JUDICATURE

The two major factors in the development of the Australian legal system have been its British origin and the Commonwealth Constitution of 1900. This Statute, an Act of the Imperial Parliament in London, limited the legislative power of State Parliaments in some respects and created a federal legislature. Since 1942, however, the Imperial Parliament can legislate for Australia only at Australia's request. The sources of Australian law of today are, therefore, found in Commonwealth and State legislation, in some Imperial legislation, and in the common law. Independence of the judiciary is an essential part of the Australian legal system.

Particulars of Western Australian courts and Commonwealth courts appear in Chapter 9 and Chapter 21.

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 D. Paxton Fischer, 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, Tokyo 107.

The Western Australian Tourism Commission has travel centres in the other States and Territories of Australia as well as overseas. Offices are located at:

- Cnr King William and Grenfell Streets, Adelaide, South Australia;
- 35 Elizabeth Street, Melbourne, Victoria;
- 243 Edward Street, Brisbane, Queensland;
- 33 Ainslie Avenue, Canberra A.C.T.;
- 79-81 Smith Street, Darwin, Nthn. Territory;
- Cnr Murray and Patrick Streets, Hobart, Tasmania;
- 92 Pitt Street, Sydney, New South Wales;
- Suite 702-3 Ocean Centre, Harbour City, Tsimshatsui, Kowloon, Hong Kong;

GOVERNMENT

Landic No. 2, Akasaka Building, 5th Floor
10-9 Akasaka 2-CHOME, Minato-Ku, Tokyo
107, Japan;

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

13th Floor 44-48 Emily Place, Auckland 1,
New Zealand;

Unit 03-03 Thong Sia Building, 30 Bideford
Road, Singapore 0922;

Western Australia House, 115 The Strand,
London WC2R OAJ, United Kingdom;
2121 Avenue of the Stars, Suite 1210, Los
Angeles 90067, California, U.S.A.

Whilst primarily concerned with promoting and
facilitating travel to Western Australia, travel
centre managers also provide liaison on behalf of

TABLE 5.9 - OVERSEAS REPRESENTATION IN WESTERN AUSTRALIA

<i>Country</i>	<i>Address of representative</i>	<i>Country</i>	<i>Address of representative</i>
Austria	T.A. Holmes, Hon. Consul, 95 St George's Terrace Perth 6000	Malta	A.V. Sciberras M.D., Hon. Consul, 1 Old Perth Rd. Bassendean 6054
Belgium	L. Bae, Hon. Consul, 16 St George's Terrace Perth 6000	Nepal	H.L. Roberts, Hon. Consul-General 2/16 Robinson Street Nedlands 6009
Canada	J. Lyall, Hon. Consul 11/111 St George's Terrace Perth 6000	Netherlands	T.C. Dercksen, Hon. Consul, 83 Mill Point Road. South Perth 6151
Chile	L. Gatica-Evans, Hon. Consul 33 Grant Street Cottesloe 6011	Norway	P.G. Lynn, Hon. Consul, 11 Cliff Street Fremantle 6160
Denmark	S.L. Jørgensen, Hon. Consul, 19 Philimore Street Fremantle 6160	Pakistan	M.A. Khan, Hon. Consul 26 Carnarvon Crescent Mt. Lawley 6050
Finland	P.K. Howard, Hon. Consul, 1/85 MacLeod Street Applecross 6153	Portugal	M. Zarcos Palma, Hon. Consul 242 South Terrace Fremantle 6160
France	Dr R. Pearce, Hon. Consul, 21/146 Mounts Bay Road Perth 6000	Seychelles	G.F. Robert, Hon. Consul, 23 Marri Crescent Lesmurdie 6076
Germany, Federal Republic of	A.E. Blanckensee, Hon. Consul, 16 St George's Terrace Perth 6000	Spain	A. Quintela, Hon. Consul, 181 St George's Terrace Perth 6000
Greece	I. Raptakis, Consul, 16 St George's Terrace Perth 6000	Sri Lanka	Major W. White, Hon. Consul, 2/66 Mill Point Road South Perth 6151
Honduras	E. de Newmann, Hon. Consul, 44 Troy Terrace Daglish 6008	Sweden	H. Morgan, Hon. Consul, 23 Walters Drive Herdsmen 6106
Indonesia	R.C.H. Manser, Hon. Consul, 2/85 Forrest Street Cottesloe 6011	Switzerland	R. Abplanalp, Hon. Consul, 5 Marie Way Kalamunda 6076
Ireland	G.M. Nolan, Hon. Consul-General, 10 Lilika Road City Beach 6015	Thailand	Brigadier W.D. Jamieson, Hon. Consul-General, 135 Victoria Avenue Dalkeith 6009
Italy	V. Schioppa, Consul, 31 Labouchere Road, South Perth 6151	United Kingdom	L. Boyes, Consul-General, 95 St George's Terrace Perth 6000
Japan	H. Sakuma, Consul-General, 221 St George's Terrace Perth 6000	United States of America	E. Skodon, Consul-General, 16 St George's Terrace Perth 6000
Malaysia	A.B. Junus, Consul, 195 Adelaide Terrace Perth 6000	Yugoslavia	D. Tomisic, Consul, 24 Colin Street West Perth 6005

Government Departments which have business in these cities.

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

THE LOCAL GOVERNMENT SYSTEM

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

Local government districts

On presentation of a petition signed by a prescribed minimum number of electors, the Governor may, by Order, constitute any part of the State as a Town; constitute as a new Shire any part of an existing Shire; divide a Shire into two or more Shires; sever a portion of a district and annex the portion to an adjoining district, or constitute the portion as a new Town or Shire; divide a district into wards; or abolish a district and dissolve the local governing authority. In some cases the electors of a district have the right to demand that a poll be held on the question of boundary changes.

On the petition of the local authority concerned, the Governor may, by Order, declare to be a City any district which satisfies certain specified requirements. These requirements are that during the three years immediately 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.

There are now nineteen cities, ten towns and 109 shires in Western Australia.

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

The boundaries of local government districts as they existed at 30 June 1991, are delineated on the maps of the State in the Appendix (pages A4 - A7) and the names and designations as at that date are on pages A8 - A9.

Constitution and electoral provisions

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

Provision is made for local government elections to be held on the first Saturday in May of each year but in specified circumstances the Governor may, by proclamation, appoint a Saturday in May, later than the first Saturday, to be the election date. Voting is not compulsory. Membership of a Council is elective in all cases, the qualified electors being adult Australian citizens, resident in the district and enrolled for the Legislative Assembly, or who own or occupy rateable land in the district. The preferential system of voting is used and representation is generally on the basis of wards into which the district may be divided. Each elector is entitled to one vote. Subject to disqualification on certain specified grounds, all electors, other than corporation nominees, are eligible for election to the Council of the district whether as Mayor, President or Councillor.

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

Functions of Local Authorities

The functions and powers of local authorities are extremely diverse in character. They are prescribed in detail in the Local Government Act and some

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

Financial Provisions

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

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

Valuations may be on the basis of either 'unimproved value' or 'gross rental value'. The unimproved value generally represents the price which the rated land might be expected to realise if sold on the open market and, as the term

implies, excludes any improvements. The gross rental value is an estimate of the gross rental value of the property including improvements. Generally, City Councils and Town Councils are required to assess the general rate on the basis of gross rental value, and Shire Councils on unimproved value. Councils may charge a penalty on unpaid rates or offer a discount for early payment. The prescribed maximum percentage for penalty or discount is 10 per cent.

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

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

Government grants. Government grants constitute an important source of revenue for local government authorities. These are mainly specific purpose payments for road works.

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

General. The financial transactions of local government authorities are subject to annual audit, either by an auditor (or auditors) appointed by the Council or by the Auditor-General or persons appointed by him. To qualify for the office of auditor, a person must be a member of a specified institute or society of accountants and be

GOVERNMENT

registered as an auditor under the Companies Act. Appointment is for a term not exceeding three 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 outlays of local authorities during the financial year 1989-90 are given in the section Local Government Finance in Chapter 23.

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.

Chapter 6

POPULATION AND VITAL STATISTICS

POPULATION	6-1
Estimates of Population	6-2
Mean Population	6-2
Population in Statistical Local Areas	6-3
Characteristics of the Population	6-4
VITAL STATISTICS	6-6
The 1991 Census of Population and Housing	6-7
Births	6-8
Deaths	6-10
Life Expectancy	6-12
Marriages	6-12
Divorces	6-14
Overseas Migration	6-14
References	6-15

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 tenth of the population.

At the end of 1829, the year of establishment of the Colony, there were 1,000 non-Aboriginal persons in Western Australia. Estimates of the number of Aborigines in the State at colonisation vary. Crawford¹, in the *Western Australian Year Book*, No. 24—1984, Chapter 1, notes that 'There has, therefore, been some consensus that the population prior to European settlement was in the 50,000 to 60,000 bracket.' Progress in the early years was slow, and in 1849 the non-Aboriginal population was still less than 5,000. Transportation of convicts, begun in the following year, resulted in some acceleration, but it was not until the discovery of gold in the Kimberley in 1885 and the rich finds at Coolgardie in 1892 and at Kalgoorlie in 1893 that any marked increase took place. This development was so rapid that, in the last decade of the century, the non-Aboriginal population was almost quadrupled, from 48,500 at the end of 1890 to 180,000 in 1900, representing an average annual rate of increase of 14.01 per cent. The rate of growth in those years has never been approached in the present century, but the average annual rate of increase of Western Australia's population from the Census of 1901 to June 1990, (2.48 per cent), has been higher than that of any other State and of Australia as a whole (1.71 per cent).

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

References: Catalogue Nos. 3101.0, 3201.0

Year ended 30 June	Western Australia	Australia	Proportion of Australia	Western Australia	
				Sex ratio (b)	Annual growth rate
	persons	persons	per cent		per cent
1971 (c)	1,053,834	13,067,265	8.06	104.83	6.30
1976 (c)	1,178,342	14,033,083	8.40	103.73	2.03
1981 (c)	1,300,056	14,923,260	8.71	102.25	2.44
1986 (c)	1,459,019	16,018,350	9.11	101.83	2.85
1989	1,594,745	16,833,085	9.47	102.05	3.23
1990	1,633,825	17,085,383	9.56	102.05	2.45
1991p	1,665,945	17,335,933	9.61	101.89	1.96

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

1 I.M. Crawford, *A History of the Aboriginal Population*.

In the decade from 30 June 1980 to 30 June 1990, the State's average annual rate of increase has been 2.56 per cent compared with a national figure of 1.52 per cent.

ESTIMATES OF POPULATION

The conceptual basis for population estimation in Australia changed in June 1981. Estimates since that date, together with revisions back to June 1971, have been made on the basis of the State of usual residence of persons. Census date estimates are derived by adjusting census count, place of usual residence data for under enumeration and adding residents who are temporarily overseas on census night.

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

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

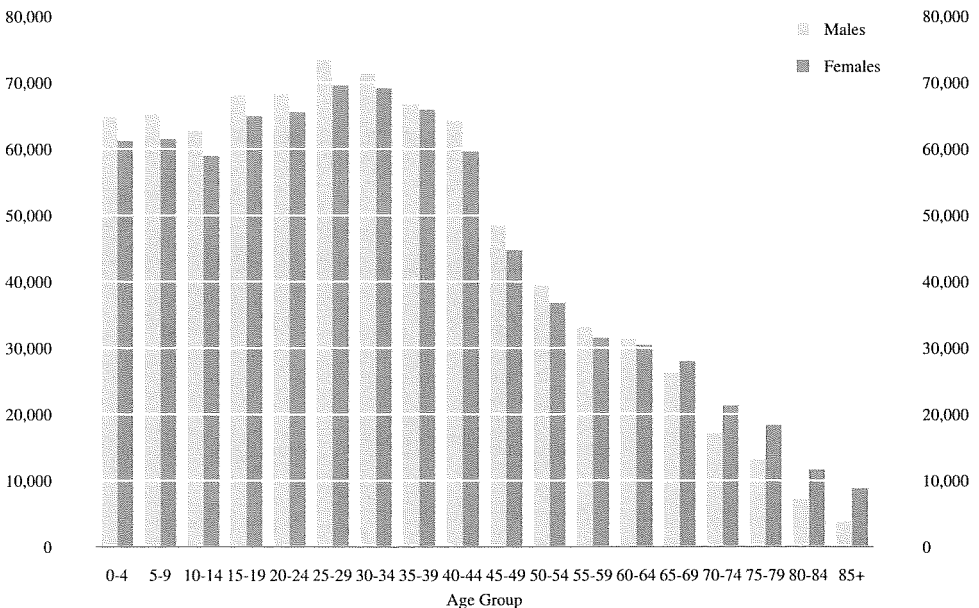
MEAN POPULATION

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

$$\frac{1}{12} (a + 4b + 2c + 4d + e)$$

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

**DIAGRAM 6.1
ESTIMATED RESIDENT POPULATION
AGE LAST BIRTHDAY, BY SEX: 30 JUNE 1990**



POPULATION AND VITAL STATISTICS

TABLE 6.2 – ESTIMATED RESIDENT POPULATION ('000)

Reference: Catalogue No. 3101.0

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									
1988	780.3	764.5	1,544.8	15.1	29.2	44.3	768.6	753.5	1,522.1
1989	805.5	789.3	1,594.7	15.4	34.6	50.0	793.6	777.7	1,571.3
1990	825.2	808.6	1,633.8	15.8	23.3	39.1	815.8	799.6	1,615.3
YEAR ENDED 31 DECEMBER									
1988	793.6	777.8	1,571.4	15.6	35.5	51.1	781.0	765.3	1,546.3
1989	815.4	799.4	1,614.8	15.5	27.9	43.4	805.3	789.2	1,594.5
1990p	832.9	817.0	1,649.9	15.9	19.2	35.1	825.1	808.8	1,633.8

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

POPULATION IN STATISTICAL LOCAL AREAS

Table 6.3 shows the estimated resident population in Statistical Local Areas. The names and designations are as they existed at 30 June 1990. The Cities of Fremantle, Perth and Stirling are comprised of a number of Statistical Local Areas. Statistical Local Areas are marked (C) for City, (T) for Town or (S) for Shire.

TABLE 6.3 – ESTIMATED RESIDENT POPULATION IN STATISTICAL LOCAL AREAS : AT 30 JUNE (a) (persons)

Reference : Catalogue No. 3203.5

Statistical Local Area	1988	1989	1990
Albany (S)	8,966	9,251	9,554
Albany (T)	14,791	14,998	15,270
Armada (C)	45,890	47,781	49,278
Ashburton (S)	8,754	8,904	8,489
Augusta-Margaret River (S)	5,508	5,720	5,929
Bassendean (T)	13,788	14,050	14,169
Bayswater (C)	45,524	46,539	46,936
Belmont (C)	29,623	29,777	29,725
Beverley (S)	1,477	1,464	1,516
Boddington (S)	1,219	1,219	1,298
Boyp Brook (S)	1,860	1,870	1,881
Bridgetown-Greenbushes (S)	3,679	3,765	3,836
Brookton (S)	1,054	1,026	1,044
Broome (S)	6,926	7,434	7,920
Broomehill (S)	587	573	562
Bruce Rock (S)	1,312	1,288	1,292
Bunbury (C)	25,838	26,469	27,000
Busselton (S)	12,963	13,458	14,133
Canning (C)	67,823	69,272	70,167
Capel (S)	4,366	4,539	4,800
Carnamah (S)	1,435	1,534	1,677

TABLE 6.3 – ESTIMATED RESIDENT POPULATION IN STATISTICAL LOCAL AREAS : AT 30 JUNE (a) – cont. (persons)

Reference : Catalogue No. 3203.5

Statistical Local Area	1988	1989	1990
Carnarvon (S)	7,676	7,707	7,736
Chapman Valley (S)	775	775	764
Chittering (S)	1,581	1,699	1,806
Claremont (T)	8,697	8,754	8,780
Cockburn (C)	47,388	49,923	51,947
Collie (S)	9,744	9,792	9,884
Coolgardie (S)	5,247	5,371	5,461
Coorow (S)	1,472	1,486	1,523
Corrigin (S)	1,439	1,407	1,414
Cottesloe (T)	7,286	7,318	7,348
Cranbrook (S)	1,252	1,240	1,233
Cuballing (S)	652	652	655
Cue (S)	688	927	918
Cunderdin (S)	1,457	1,432	1,437
Dalwallinu (S)	1,812	1,818	1,825
Dandaragan (S)	2,383	2,449	2,504
Dardanup (S)	4,592	4,681	4,772
Denmark (S)	2,973	3,034	3,108
Derby-West Kimberley (S)	7,301	7,352	7,488
Donnybrook-Balingup (S)	3,885	3,943	4,036
Dowerin (S)	967	945	938
Dumbleyung (S)	988	953	961
Dundas (S)	2,334	2,190	1,996
East Fremantle (T)	6,161	6,233	6,432
East Pilbara (S)	10,083	9,883	8,867
Esperance (S)	9,988	10,074	10,505
Exmouth (S)	2,543	2,599	2,614
Fremantle (C) (b)—			
Inner	691	671	676
Remainder	23,168	23,367	23,671
Total	23,859	24,038	24,347
Geraldton (C)	20,660	21,024	21,386
Gingin (S)	2,842	2,930	3,065
Gnowangerup (S)	2,083	1,979	1,911
Goomalling (S)	1,174	1,154	1,152
Gosnells (C)	69,157	72,037	73,733

POPULATION AND VITAL STATISTICS

TABLE 6.3 – ESTIMATED RESIDENT POPULATION IN STATISTICAL LOCAL AREAS : AT 30 JUNE (a) – cont.
(persons)
Reference : Catalogue No. 3203.5

Statistical Local Area	1988	1989	1990
Greenough (S)	6,204	6,492	6,880
Halls Creek (S)	2,931	2,946	2,991
Harvey (S)	10,901	11,421	11,850
Irwin (S)	1,984	2,073	2,149
Jerramungup (S)	1,348	1,354	1,358
Kalamunda (S)	47,340	48,868	49,265
Kalgoorlie-Boulder (C) (c)	26,103	26,885	27,405
Katanning (S)	4,846	4,822	4,823
Kellerberrin (S)	1,411	1,394	1,372
Kent (S)	972	954	942
Kojonup (S)	2,404	2,373	2,384
Kondinin (S)	1,148	1,138	1,146
Koorda (S)	678	645	636
Kulin (S)	1,181	1,152	1,150
Kwinana (T)	15,711	16,851	17,800
Lake Grace (S)	2,110	2,060	2,056
Laverton (S)	1,465	1,720	1,757
Leonora (S)	2,380	2,468	2,913
Mandurah (C) (d)	21,729	23,169	24,399
Manjimup (S)	9,670	9,766	9,790
Meekatharra (S)	1,947	2,204	2,250
Melville (C)	81,015	85,799	88,794
Menzies (S)	374	481	388
Merredin (S)	4,150	4,120	4,078
Mingenew (S)	690	674	662
Mooro (S)	2,802	2,757	2,783
Morawa (S)	1,168	1,160	1,146
Mosman Park (T)	7,488	7,488	7,498
Mount Magnet (S)	1,349	1,446	1,493
Mount Marshall (S)	857	840	831
Mukinbudin (S)	805	783	782
Mullewa (S)	1,403	1,381	1,368
Mundaring (S)	28,249	28,921	30,252
Murchison (S)	144	147	140
Murray (S)	7,215	7,535	7,821
Nannup (S)	1,186	1,195	1,193
Narembeen (S)	1,194	1,176	1,168
Narrogin (S)	661	639	653
Narrogin (T)	5,068	5,090	5,131
Nedlands (C)	20,050	20,133	20,332
Northam (S)	2,591	2,622	2,767
Northam (T)	6,928	6,985	7,059
Northampton (S)	3,127	3,150	3,184
Nungarin (S)	328	316	305
Peppermint Grove (S)	1,648	1,675	1,685
Perenjori (S)	787	852	865
Perth (C) (b)—			
Inner	929	919	911
North	21,560	21,653	21,672
Outer	14,612	14,612	14,641
South	24,787	24,968	25,046
Wembley-Coastal	20,277	20,425	20,502
Total	82,165	82,577	82,772
Pingelly (S)	1,364	1,333	1,339
Plantagenet (S)	4,150	4,138	4,154
Port Hedland (T)	13,757	13,857	13,707
Quairading (S)	1,264	1,249	1,257
Ravensthorpe (S)	1,424	1,422	1,382
Rockingham (C)	36,561	40,831	43,328

TABLE 6.3 – ESTIMATED RESIDENT POPULATION IN STATISTICAL LOCAL AREAS : AT 30 JUNE (a) – cont.
(persons)
Reference : Catalogue No. 3203.5

Statistical Local Area	1988	1989	1990
Roebourne (S)	17,787	16,537	16,707
Sandstone (S)	184	260	260
Serpentine-Jarrahdale (S)	7,198	7,565	7,965
Shark Bay (S)	1,125	1,130	1,129
South Perth (C)	34,674	34,895	35,293
Stirling (C) (b)—			
Central	102,255	103,582	105,275
West	55,937	56,574	57,346
South-Eastern	21,583	21,842	22,141
Total	179,775	181,998	184,762
Subiaco (C)	15,634	15,680	15,779
Swan (S)	44,138	48,425	51,422
Tambellup (S)	820	804	806
Tammin (S)	547	517	514
Three Springs (S)	992	969	957
Toodyay (S)	2,067	2,226	2,412
Trayning (S)	552	539	536
Upper Gascoyne (S)	257	253	250
Victoria Plains (S)	1,220	1,197	1,185
Wagin (S)	2,147	2,117	2,094
Wandering (S)	396	390	394
Wanneroo (C)	151,930	163,722	173,250
Waroona (S)	2,605	2,632	2,717
West Arthur (S)	1,079	1,056	1,044
Westonia (S)	528	527	468
Wickepin (S)	912	898	881
Williams (S)	1,126	1,111	1,118
Wiluna (S)	1,879	2,006	2,002
Wongan-Ballidu (S)	1,902	1,872	1,862
Woodanilling (S)	430	423	434
Wyalkatchem (S)	742	713	712
Wyndham-East Kimberley (S)	6,289	6,346	6,444
Yalgoo (S)	324	512	699
Yilgarn (S)	2,227	2,787	2,582
York (S)	2,373	2,381	2,492
Total	1,544,806	1,594,745	1,633,825

(a) Based on the 1986 Census of Population and Housing. (b) Cities of Fremantle, Perth and Stirling are comprised of a number of statistical local areas. (c) The Shire of Boulder and the Town of Kalgoorlie amalgamated on 1.2.89 to form the City of Kalgoorlie-Boulder. For ease of comparison the figures for 1988 have been combined. (d) The Town of Mandurah was declared a City on 14.4.90.

CHARACTERISTICS OF THE POPULATION

Age. Table 6.4 shows the numbers and proportions of the population of Western Australia in selected age groups at 30 June 1988, 1989 and 1990. The age groups represent, in a general sense, sectors such as the pre-school population, children of school age, minors, the economically active population and those beyond normal working age.

POPULATION AND VITAL STATISTICS

TABLE 6.4 - ESTIMATED RESIDENT POPULATION IN SELECTED AGE GROUPS : AT 30 JUNE
(persons)

Reference: Catalogue No. 3201.0

Age last birthday (years)	Number in each age group			Per cent of total		
	1988	1989	1990	1988	1989	1990
Under 6	146,141	149,573	151,708	9.53	9.38	9.28
6 - 12	165,344	169,965	173,921	10.70	10.66	10.64
6 - 15	239,366	243,787	247,867	15.49	15.29	15.17
Under 18	440,612	447,041	451,073	28.52	28.03	27.61
Under 21	517,330	528,424	534,627	33.49	33.14	32.72
15 - 44	763,162	788,666	807,111	49.40	49.45	49.40
15 - 64	1,039,663	1,075,377	1,103,186	67.30	67.43	67.52
65 and over	145,198	150,819	155,992	9.40	9.46	9.55

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

TABLE 6.5 - RELIGION OF THE POPULATION (a)
CENSUS 30 JUNE
(^{'000 persons})

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

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

TABLE 6.6 - BIRTHPLACE OF THE POPULATION (a)
CENSUS 30 JUNE
(^{'000 persons})

Birthplace	1976	1981	1986
Australia	832.4	911.0	997.8
Europe—			
United Kingdom and Eire	176.6	186.1	194.0
Italy	29.3	29.2	27.8
Netherlands	10.6	11.3	11.6
Yugoslavia	10.4	11.0	11.2
Germany	7.4	8.1	9.5
Poland	4.4	5.0	6.5
Greece	4.5	4.3	4.0
Other	15.3	15.8	17.3
Total Europe	258.6	270.9	281.8
Asia—			
India	9.9	10.1	10.6
Malaysia	4.0	5.4	8.7
Vietnam	—	2.8	5.9
Burma	4.0	4.4	4.5
Singapore	2.5	3.4	4.7
Other	8.9	11.4	16.0
Total Asia	29.3	37.6	50.5
Oceania—			
New Zealand	8.9	18.5	25.2
Other	1.1	1.6	3.4
Total Oceania	9.9	20.0	28.6
Africa—			
Republic of South Africa	2.3	4.2	6.3
Other	5.2	7.2	9.1
Total Africa	7.6	11.4	15.4
America—			
United States of America	3.6	4.1	5.1
Other	3.4	4.4	5.1
Total America	7.1	8.5	10.1
Total (b)	1,144.9	1,273.6	1,406.9

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

Aborigines and Torres Strait Islanders

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

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

TABLE 6.7 - ABORIGINES AND TORRES STRAIT ISLANDERS - AGE DISTRIBUTION CENSUS 30 JUNE (persons)

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

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

TABLE 6.8 - ABORIGINES AND TORRES STRAIT ISLANDERS - MAJOR POPULATION CENTRES CENSUS 30 JUNE 1986

<i>Locality</i>	<i>Persons</i>
URBAN CENTRES	
Albany	377
Broome	1,359
Bunbury	590
Carnarvon	878
Derby	946
Fitzroy Crossing	662
Geraldton	1,290
Halls Creek	719
Kalgoorlie-Boulder	929
Kununurra	748
Kwinana	354
Meekatharra	373
Mullewa	318
Northam	301
Perth	8,830
Port Hedland	1,407
Roebourne	597
Wyndham	539
REMOTE AREA COMMUNITIES	
Balgo	443
Beagle Bay	241
Billiluna/Lake Gregory	256
Central Reserves	629
Gogo	259
Jigalong	353
La Grange	410
Looma	207
One Arm Point/Lombardina	413
Turkey Creek	258
Warburton	361

Vital Statistics

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

Births are required to be registered within sixty days of the event, and a fetal death (stillbirth) must

be registered both as a birth and a death. Deaths are required to be registered within fourteen days. Marriage certificates must be lodged for registration within fourteen days of the date of marriage.

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

The 1991 Census of Population and Housing

In 1991, census day was Tuesday 6 August. A June date used in previous censuses was no longer suitable, with all mainland States having moved to a four-term school year incorporating school holidays at or near the end of June. An August census reduced the collection difficulties encountered in the previous (1986) Census when school holidays coincided with the end of June count.

Nationally, approximately 41,000 temporary field staff were involved in the distribution and collection of Census forms. More than 4,000 were employed in Western Australia. The total cost of the Census was about \$113 million.

Some of the many problems to be overcome in counting the Western Australian population were:

- Newly born babies. There were at least 10 babies born at King Edward Memorial Hospital on Census Day
- Flooding. In the Pilbara and South West areas, some collectors had to be dropped at houses by officers from the Department of Marine and Harbours.
- 650,000 Census forms. The logistics of delivering this huge number of forms in the space of 5 days, to all parts of Western Australia.
- Public Relations. The ABS had to undertake an advertising campaign aimed at informing every Australian household about the census and why they should participate. This involved a nationwide television advertising campaign, press releases over a 6 month period at both national and state level, talk back radio, television appearances and features in community newspapers.
- Outback Western Australia. Some parts of Western Australia can never be considered hospitable. Special Census Field Officers equipped for outback travel visited the many remote communities of WA both to train collectors and help with the collection of forms.

Other general tasks that formed part of the Census were form design and testing, telephone hotline system, telephone interpreter service and enumerating travellers (whether at sea, touring the outback, arriving from international flights, on board interstate trains and buses or driving trucks).

The processing of Census forms is being conducted by approximately one thousand staff in a Sydney data transcription centre. In an effort to reduce the cost of the census and to increase the speed of processing the information, respondent-marked optical mark recognition (OMR) technology and computer assisted coding have been adopted for the 1991 Census. As a result, preliminary Census counts for Western Australia were released on 4 March 1992 — less than seven months after Census day.

Some interesting statistics about the census itself are :

- 10 tonnes of paper stock was required, equivalent to the weight of two fully laden Jumbo Jets.
- If laid end-to-end, the Census forms would cover a distance of 25,600 kilometres.
- The amount of ink used outweighs three standard Falcon or Commodore sedans.
- To hold the census forms together the amount of glue required would fill over 10,000 soft drink cans.

BIRTHS

Table 6.9 shows that although there were more males than females born in each of the years included, the sex ratio (number of male live births per 100 female live births) tends to fluctuate and the movement shown does not necessarily indicate a trend. The average sex ratio for the last three years (105.2) is only marginally lower than for the last ten years (105.8). The crude birth rate, (number of live births registered during the calendar year per 1,000 of mean population), has declined over the three year period being higher in 1988 (16.3) than in 1989 (15.7) and 1990 (15.5). The trend has been for this rate to decline, the average for the last three years being 15.8 compared with 16.2 for the last ten years.

TABLE 6.9 – BIRTHS REGISTERED (a)
Reference: Catalogue No. 3301.0

	1988	1989	1990
Births (b)—			
Males	12,874	12,783	13,082
Females	12,269	12,268	12,274
Persons	25,143	25,051	25,356
Sex ratio (c)	104.9	104.2	106.6
Crude birth rate (d)	16.3	15.7	15.5

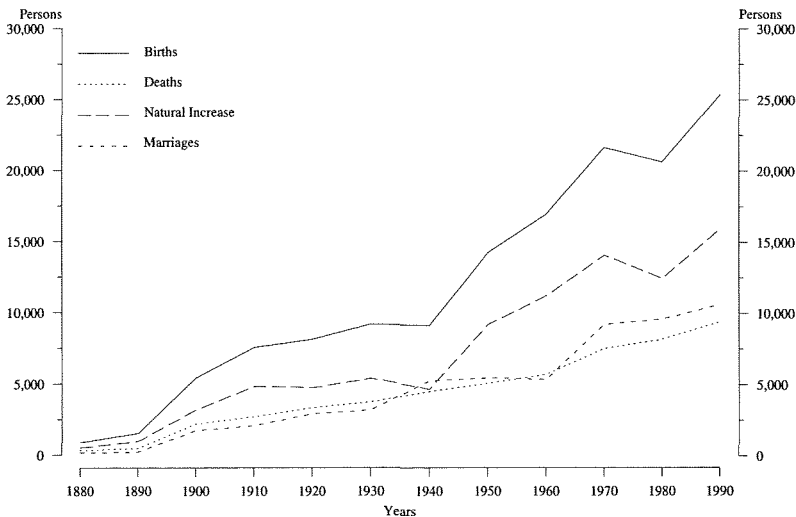
(a) Figures relate to state of usual residence of mother. (b) Includes ex-nuptial births. (c) Number of male live births per 100 female live births. (d) Number of live births registered during the calendar year per 1,000 of mean population.

The proportion of ex-nuptial births has increased between 1988 and 1990. Table 6.10 shows total and ex-nuptial births registered according to age of mother. The figures show an overall decrease in the proportion of both total and ex-nuptial births to mothers under the age of 25 years, and an increase in the proportion of births to mothers in the age groups from 25 to 39 years. The proportion of ex-nuptial births to mothers in the under 25 years age groups is consistently higher than the proportion of total births to mothers in the same age groups. In all other age groupings, the situation is reversed.

Ex-nuptial live births. A birth is registered as ex-nuptial if the parents are not married to each other at the time of the confinement. Ex-nuptial births in 1990 comprised 23.6 per cent of all live births registered.

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

DIAGRAM 6.2
BIRTHS, DEATHS, MARRIAGES AND NATURAL INCREASE
1880 to 1990(a)



(a) From 1 January 1966 includes particulars of persons of predominantly Aboriginal descent.

**TABLE 6.10 – BIRTHS REGISTERED (a)
BY AGE OF MOTHER**
Reference: Unpublished table: BTHR0007

Age of mother (years)	1988	1989	1990
TOTAL BIRTHS (b)			
Under 20	1,534	1,441	1,580
20 – 24	5,601	5,272	5,247
25 – 29	9,737	9,648	9,293
30 – 34	6,141	6,445	6,794
35 – 39	1,875	1,972	2,118
40 – 44	248	256	309
45 and over	4	11	12
Not stated	3	6	3
Total	25,143	25,051	25,356
EX-NUPTIAL BIRTHS			
Under 20	1,224	1,161	1,325
20 – 24	1,851	1,896	2,051
25 – 29	1,285	1,294	1,435
30 – 34	654	739	806
35 – 39	251	278	294
40 – 44	45	40	60
45 and over	1	1	3
Not stated	3	6	3
Total	5,314	5,415	5,977

(a) Figures relate to State of usual residence of mother. (b) Includes ex-nuptial births.

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 regions 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 live 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.

Gross and net reproduction rates. The gross reproduction rate is derived from female age-specific fertility rates which indicate 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 daughters who would be born, on the average, to every woman assuming that they live 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 daughters who would be born to women during their lifetime, if they were subject in each succeeding year of life to the fertility and mortality rates on which the calculation is based. The net reproduction rate is a measure of the number of women who, in the next generation, will replace the women of reproductive age in the current generation. It provides a useful indication of likely future population trends. A rate remaining stationary at unity indicates an ultimately static population. If a rate greater than unity is maintained, an ultimate increase of population will result, while a continuing rate less than unity will lead to an ultimate decline.

Table 6.11 provides comparative data for Western Australia and Australia on number of births, birth rates and reproduction rates for 1990. The figures show that the crude birth rate (the number of total births per thousand mean resident population) for Western Australia (15.5 per cent) is higher than for Australia as a whole (15.4 per cent). The percentage of ex-nuptial to total births in Western Australia is also higher (23.6 per cent) than the figure for Australia (21.9 per cent).

**TABLE 6.11 – BIRTHS, WESTERN AUSTRALIA IN
RELATION TO AUSTRALIA, 1990**
Reference: Catalogue No. 3301.0

	Western Australia	Australia
Number of births—		
Nuptial	19,379	205,241
Ex-nuptial	5,977	57,407
Total	25,356	262,648
Crude birth rate (a)	15.5	15.4
Age-specific birth rate (b)—		
15 – 19	24.3	22.0
20 – 24	80.0	79.6
25 – 29	133.6	139.0
30 – 34	98.2	101.6
35 – 39	32.1	34.7
40 – 44	5.2	5.5
45 – 49	0.3	0.2
Gross reproduction rate (c)	0.900	0.930
Net reproduction rate (d)	0.890	0.914

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

DEATHS

Causes of death. Statistics in Tables 6.12 and 6.14 are classified according to the Ninth (1975) Revision of the World Health Organisation's *International Classification of Diseases* which was adopted for world-wide use from 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'.

Western Australia accounted for 9.9 per cent of all suicides in Australia for the 1990 calendar year.

Figures indicate that there has been a slight rise in WA since 1988. However, as a rate of population, there has been a slight decrease from 3.39 to 3.16 suicides per 100,000 of the mean resident population. This rate follows a similar trend for Australia. As a percentage of the total causes of death, suicides have remained relatively steady since 1988 for both Western Australia and Australia. In 1990, the highest incidence of suicides was in the 25-44 year age group (42.3 per cent of all suicides in Australia) with males exceeding females by more than 4 to 1. Suicide was the principal cause of death in that age group, accounting for 14.7 per cent of all the deaths.

TABLE 6.12 - PRINCIPAL CAUSES OF DEATH, 1990 (a)
Reference: Catalogue No. 3303.0

Causes of death and International number (b)	Western Australia			Australia		
	Persons	Per cent of all deaths	Rate (c)	Persons	Per cent of all deaths	Rate (c)
Infectious and parasitic diseases (000-139)	57	0.6	3.49	803	0.7	4.70
Neoplasms (140-239)—						
Malignant (140-208)—						
Digestive organs and peritoneum (150-159)	667	7.1	40.82	8,634	7.2	50.53
Trachea, bronchus and lung (162)	518	5.5	31.70	6,053	5.0	35.43
Genito-urinary organs (179-189)	380	4.0	23.26	4,913	4.1	28.75
Other	875	9.3	53.56	10,864	9.0	63.58
Benign, other and unspecified (210-239)	28	0.3	1.71	280	0.2	1.64
Endocrine, nutritional and metabolic diseases (240-279)	242	2.6	14.81	3,167	2.6	18.54
Diseases of blood and blood-forming organs (280-289)	25	0.3	1.53	473	0.4	2.77
Mental disorders (290-319)	131	1.4	8.02	2,039	1.7	11.93
Diseases of the nervous system and sense organs (320-389)	232	2.5	14.20	2,268	1.9	13.27
Diseases of the circulatory system (390-459)—						
Ischaemic heart disease (410-414)	2,420	25.7	148.12	31,174	26.0	182.45
Cerebrovascular disease (430-438)	885	9.4	54.17	12,085	10.1	70.73
Other	782	8.3	47.86	11,026	9.2	64.53
Diseases of the respiratory system (460-519)—						
Chronic obstructive pulmonary disease (490-496)	445	4.7	27.24	6,121	5.1	35.82
Other	253	2.7	15.48	2,880	2.4	16.86
Diseases of the digestive system (520-579)	325	3.4	19.89	4,094	3.4	23.96
Diseases of the genito-urinary system (580-629)	135	1.4	8.26	1,888	1.6	11.05
Complications of pregnancy, childbirth and the puerperium (630-676)	1	(d)	0.06	16	(d)	0.09
Diseases of the skin and subcutaneous tissue (680-709)	9	0.1	0.55	137	0.1	0.80
Diseases of the musculoskeletal system and connective tissue (710-739)	25	0.3	2.51	658	0.5	3.85
Congenital anomalies (740-759)	94	1.0	1.53	840	0.7	4.92
Certain conditions originating in the perinatal period (760-779)	77	0.8	5.75	901	0.8	5.27
Symptoms, signs and ill-defined conditions (780-799)	84	0.9	5.14	813	0.7	4.76
Accidents, poisonings and violence (800-999)—						
Motor vehicle traffic accidents (810-819)	204	2.2	12.49	2,489	2.1	14.57
Suicide and self inflicted injury (950-959)	215	2.3	13.16	2,161	1.8	12.65
Other	298	3.2	18.24	3,285	2.7	19.22
All causes	9,407	100.0	575.76	120,062	100.0	702.68

(a) Based on State of usual residence. Fetal deaths are excluded. (b) Classified in accordance with the *International Classification of Diseases* (Ninth revision, 1975), operative from 1 January 1979. (c) Per 100,000 of mean resident population. (d) Less than 0.1.

POPULATION AND VITAL STATISTICS

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 deaths (stillbirths), special tabulations are prepared combining the two. These are termed 'perinatal deaths'. The statistical definition of perinatal deaths in Australia was amended in 1979 and now includes all fetuses and infants delivered weighing at least 500 grams or, when birthweight is unavailable, the corresponding gestational age (22 weeks) or body length (25cm crown-heel). The rates for fetal deaths and perinatal deaths are calculated per thousand live births only. The live births figure used to calculate these rates excludes those infants known to have weighed less than 500 grams at delivery.

TABLE 6.13 - PERINATAL DEATHS - NUMBER AND RATES, 1990
Reference: Unpublished tables used for preparation of catalogue No. 3304.0

	<i>Western Australia</i>		<i>Australia</i>	
	<i>Number</i>	<i>Rate</i>	<i>Number</i>	<i>Rate</i>
Fetal deaths	133	5.2	1,590	6.0
Neonatal deaths—				
Under 1 day	51	2.0	(a)576	2.2
1 day and under 7 days	36	1.4	311	1.2
7 days and under 28 days	18	0.7	235	0.9
<i>Total</i>	<i>105</i>	<i>4.1</i>	<i>(b)1,122</i>	<i>4.3</i>
Total perinatal deaths	238	9.3	2,712	10.3

(a) Includes 3 cases of 'hours not stated'. (b) Includes 3 cases of 'days not stated'.

TABLE 6.14 - INFANT DEATHS - CAUSES OF DEATH, 1990 (a)

<i>Causes of death and International number (b)</i>	<i>Western Australia</i>		<i>Australia</i>	
	<i>Number</i>	<i>Per cent of all infant deaths</i>	<i>Number</i>	<i>Per cent of all infant deaths</i>
<i>Causes mainly of prenatal and natal origin (740-779)—</i>				
Congenital anomalies (740-759)	54	24.9	537	25.0
Immaturity (765)	24	11.1	252	11.7
Birth trauma (767)	2	0.9	29	1.4
Hypoxia and birth asphyxia (768)	7	3.2	80	3.7
Respiratory distress syndrome (769)	32	14.7	134	6.2
Other respiratory conditions (770)	5	2.3	172	8.0
Infections specific to the perinatal period (771)	1	0.5	66	3.1
Fetal and neonatal haemorrhage (772)	3	1.4	85	4.0
Other	3	1.4	78	3.6
<i>Total</i>	<i>131</i>	<i>60.4</i>	<i>1,433</i>	<i>66.8</i>
<i>Causes mainly of postnatal origin—</i>				
Sudden death, cause unknown (798)	60	27.6	492	22.9
All other causes	26	12.0	220	10.2
<i>Total</i>	<i>86</i>	<i>39.6</i>	<i>712.0</i>	<i>33.2</i>
All causes	217	100.0	2,145	100.0

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

POPULATION AND VITAL STATISTICS

**TABLE 6.15 - DEATHS - WESTERN AUSTRALIA
IN RELATION TO AUSTRALIA, 1990**
Reference: Catalogue No. 3302.0

	Western Australia	Australia
Number of deaths	9,407	120,062
Crude death rate (a)	5.8	7.0
Infant death rate (b)	8.6	8.2
Age-specific death rate (years) (c)—		
Under 1 year	8.56	8.17
1 - 4	0.39	0.43
5 - 9	0.13	0.19
10 - 14	0.16	0.19
15 - 19	0.63	0.67
20 - 24	0.89	0.92
25 - 29	0.84	0.93
30 - 34	0.96	0.96
35 - 39	0.97	1.12
40 - 44	1.61	1.62
45 - 49	2.10	2.50
50 - 54	3.95	4.33
55 - 59	6.34	7.32
60 - 64	11.52	12.12
65 - 69	18.22	19.35
70 - 74	26.11	31.15
75 - 79	47.59	50.20
80 - 84	74.17	79.99
85 and over	141.92	156.43

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

Table 6.15 provides comparative data for deaths in Western Australia and Australia on number of deaths and death rates for 1990. The figures show that the crude death rate (the number of deaths per thousand of mean resident population) in Western Australia (5.8) is lower than the Australian figure of 7.0. With the exception of the under one and the 30-34 year age groups, the age-specific death rates for Western Australia are lower than for Australia.

LIFE EXPECTANCY

A life table is a life history of a hypothetical group, or cohort, of people, as it is diminished gradually by deaths. A key value in life tables is the expectation of life remaining at each age. ABS has produced life tables for Western Australia dating back to 1971. In that year, expectation of life at birth was 68.4 years for males, and 75.3 years for females. In 1990 it had risen to 74.9 and 80.6 years respectively. Life expectancy at birth for males has therefore increased slightly more than for females over this period, however female life expectancy is still nearly six years greater than that of males. In 1990 Western Australian life expectancy at birth was slightly higher than for

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

Age	Expectation of life (b)		
	1988	1989	1990
Birth—			
Males	73.75	74.27	74.93
Females	80.14	80.42	80.60
1 year—			
Males	73.48	73.91	74.61
Females	79.73	79.98	80.25
20 years—			
Males	55.05	55.54	56.12
Females	61.06	61.29	61.59
40 years—			
Males	36.24	36.79	37.29
Females	41.62	41.72	42.15
60 years—			
Males	18.66	19.06	19.50
Females	23.18	23.38	23.72
70 years—			
Males	11.63	12.08	12.50
Females	15.15	15.28	15.58
80 years—			
Males	6.57	6.90	7.15
Females	8.50	8.65	8.76

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

Australia as a whole for which figures were, males 73.86 years and females, 80.01 years.

MARRIAGES

Marriages may be celebrated either by ministers of religion registered for the purpose, by the Registrar-General, the Deputy Registrar-General, or other appointed State officers, or by other authorised fit and proper persons.

**TABLE 6.17 - MEDIAN (a) AGES OF BRIDEGROOMS
AND BRIDES**
(years)

Reference: Catalogue No. 3306.0

Marital status	1988	1989	1990
Bridegrooms—			
Never married	26.2	26.3	26.4
Widowed	62.7	61.6	61.0
Divorced	39.5	39.9	39.6
All bridegrooms	28.2	28.2	28.3
Brides—			
Never married	23.9	24.1	24.1
Widowed	53.2	54.2	53.6
Divorced	35.4	35.9	36.0
All brides	25.6	25.8	25.8

(a) The median age is that age which divides the reference population into two halves, one half being below the median age and one half above.

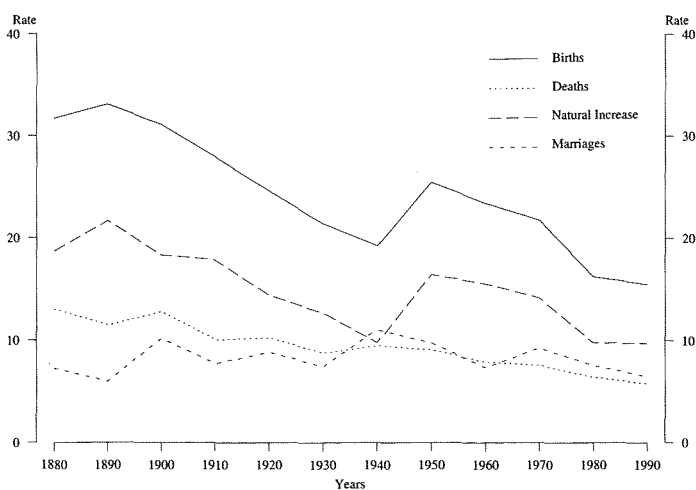
POPULATION AND VITAL STATISTICS

TABLE 6.18 – RELIGIOUS AND CIVIL MARRIAGES, 1990
Reference: Unpublished table: MARR0002

Category of authorised celebrant	Western Australia		Australia	
	Number	Per cent of total	Number	Per cent of total
Registered ministers of recognised religious denominations (a)—				
Christian denominations (a)—				
Anglican Church of Australia	1,251	11.8	15,497	13.2
Assemblies of God in Australia	66	0.6	905	0.8
Baptist Union of Australia	149	1.4	1,969	1.7
Christian Bretheren	16	0.2	232	0.2
Church of Jesus Christ of Latter Day Saints	23	0.2	343	0.3
Church of the Four Square Gospel in Australia	27	0.3	51	—
Churches of Christ in Australia	186	1.8	1,311	1.1
Jehovah's Witnesses	40	0.4	435	0.4
Lutheran Church of Australia Incorporated	45	0.4	1,307	1.1
Orthodox Churches (b)	64	0.6	2,955	2.6
Potter's House Christian Fellowship	13	0.1	33	—
Catholic Church	1,920	18.1	23,461	20.0
Salvation Army	98	0.9	823	0.7
Seventh-day Adventist Church	34	0.3	321	0.3
Uniting Church of Australia	817	7.7	11,916	10.2
Other	251	2.4	4,736	4.0
Total	5,000	47.1	66,295	56.7
Non Christian denominations—				
Hebrew, Jewish	9	0.1	253	0.2
Muslim, Islam	30	0.3	660	0.6
Other	16	0.2	496	0.4
Total	55	0.5	1,409	1.2
Total	5,055	47.6	67,704	57.9
Civil officers—				
Registrar-General, etc.	987	9.3	11,775	10.1
Civil celebrants	4,571	43.1	37,480	32.0
Total	5,558	52.4	49,255	42.1
TOTAL MARRIAGES	10,613	100.0	116,959	100.00

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

DIAGRAM 6.3
RATES OF BIRTHS, DEATHS, MARRIAGES AND NATURAL INCREASE
1880 to 1990(a)
Per Thousand of Mean Population



(a) From 1 January 1966 includes particulars of persons of predominantly Aboriginal descent.

DIVORCES

The Family Law Act 1975 (Commonwealth), which came into operation on 5 January 1976, repealed the Matrimonial Causes Act and made new provisions relating to divorce. It also established the Family Court of Australia.

In Western Australia, jurisdiction relating to the Family Law Act (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 grounds 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 also exercises jurisdiction in matters concerning the adoption of children, and the guardianship, custody or maintenance of children.

In both Western Australia and Australia, almost one half of marriage dissolutions occurred when the duration of the marriage was nine years or less. Dissolutions were highest in marriages with a duration of between five and nine years.

TABLE 6.19 - DISSOLUTIONS OF MARRIAGE, 1990
Reference: Catalogue No. 3307.0 and unpublished table DIVR0013

Duration (years)	Marriages dissolved			
	Western Australia		Australia	
	Number	Per cent of total	Number	Per cent of total
Under 5	669	17.4	8,918	20.9
5 - 9	1,068	27.8	12,155	28.5
10 - 14	725	18.8	7,369	17.3
15 - 19	543	14.1	5,576	13.1
20 - 24	448	11.7	4,329	10.2
25 - 29	206	5.4	2,323	5.4
30 and over	186	4.8	1,957	4.6
Total (a)	3,845	100.0	42,635	100.0

(a) Includes duration of marriage not stated.

OVERSEAS MIGRATION

Migration to Australia is regulated by the *Migration Act 1958* (Commonwealth) which came into force on 1 July 1959.

Permanent movement deals with arrivals of settlers (persons who hold migrant visas regardless of stated intended period of stay), New Zealand citizens who indicate an intention to settle and those who are otherwise eligible to settle, for example, the overseas born children of Australian citizens. Permanent movements also include the departures of Australian residents, including former settlers, who on departure state that they do not intend to return to Australia.

**TABLE 6.20 - PERMANENT (SETTLER) ARRIVALS
BY SELECTED COUNTRY OF BIRTH**
Reference: Unpublished table PMTR 0018

Country of birth	1988	1989	1990
<i>Africa</i>	1,390	1,030	940
South Africa	790	590	440
Zimbabwe	190	200	260
Other	410	230	240
<i>America</i>	630	780	660
Canada	120	130	120
Chile	90	50	30
El Salvador	120	290	210
USA	200	220	220
Other	90	90	80
<i>Asia</i>	6,710	5,570	5,380
Burma	130	100	40
China	200	190	140
Hong Kong	340	250	330
India	420	350	340
Indonesia	230	340	220
Iran	140	110	80
Malaysia	2,090	1,710	1,500
Philippines	610	380	270
Singapore	740	610	390
Sri Lanka	230	120	190
Taiwan	120	160	120
Thailand	150	100	140
Vietnam	500	640	1,220
Other	800	520	400
<i>Europe</i>	10,560	9,370	8,660
Germany	220	150	120
Poland	240	200	190
Portugal	140	100	90
Romania	130	90	100
UK & Ireland	8,790	8,140	7,560
Yugoslavia	340	200	160
Other	690	490	440
<i>Oceania</i>	3,770	2,530	1,130
New Zealand	3,620	2,440	1,060
Other	150	90	70
Total	23,050	19,290	16,780

POPULATION AND VITAL STATISTICS

TABLE 6.21 – PERMANENT ARRIVALS BY SEX AND AGE

Reference: Unpublished table No: PMTR0039

Age group (years)	1988	1989	1990
MALES			
0 – 4	1,330	1,110	1,020
5 – 14	2,300	1,860	1,610
15 – 24	1,550	1,350	1,100
25 – 44	4,990	4,010	3,820
45 – 64	1,070	950	680
65 and over	410	310	240
Total	11,640	9,580	8,470
FEMALES			
0 – 4	1,310	1,070	920
5 – 14	2,090	1,810	1,530
15 – 24	1,620	1,460	1,260
25 – 44	4,850	4,020	3,590
45 – 64	1,060	960	730
65 and over	480	390	280
Total	11,410	9,700	8,310
PERSONS			
0 – 4	2,640	2,180	1,940
5 – 14	4,390	3,660	3,140
15 – 24	3,170	2,810	2,360
25 – 44	9,840	8,030	7,410
45 – 64	2,140	1,910	1,420
65 and over	890	700	520
Total	23,050	19,290	16,780

REFERENCES

ABS publications

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

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

Births, Australia (3301.0).

Deaths, Australia (3302.0).

Causes of Death, Australia (3303.0).

Perinatal Deaths, Australia (3304.0).

Marriages, Australia (3306.0).

Divorces, Australia (3307.0).

Overseas Arrivals and Departures, Australia (3404.0).

Australian Demographic Statistics (3101.0).

Estimated Resident Population by Age and Sex, States and Territories of Australia (3201.0).

TABLE 6.22 – PERMANENT DEPARTURES BY CATEGORY

Reference: Catalogue No. 3404.0

Period	Former settlers	Other residents	Total
ANNUAL AVERAGES			
1971–1975	3,550	950	4,490
1976–1980	2,270	1,010	3,280
1981–1985	1,970	1,010	2,980
ANNUAL TOTALS			
1988	1,740	1,090	2,840
1989	2,140	1,520	3,650
1990	2,470	1,940	4,410

Chapter 7

SOCIAL WELFARE

Income Support through the Department of Social Security	7-1
Income Support through the Department of Veterans' Affairs	7-2
Department of Community Services and Health	7-3
Department for Community Services, Western Australia	7-4
Authority for Intellectually Handicapped Persons	7-5
The Western Australian Council of Social Service	7-5
References	7-6

Chapter 7

SOCIAL WELFARE

The Commonwealth and State Governments and a large number of voluntary agencies provide social welfare services for the population. The Commonwealth Government is concerned largely with providing fixed monetary pensions and benefits and repatriation services. It also provides, either directly or through State and local government authorities and voluntary agencies, a wide range of welfare services for people with special needs. State agencies operate in the field of child welfare and distribute emergency relief in circumstances where Commonwealth Government assistance is not available. The voluntary agencies, many of which receive government aid, provide a wide range of services in various fields of social welfare.

INCOME SUPPORT THROUGH THE DEPARTMENT OF SOCIAL SECURITY

The introduction of a pension for aged persons in 1909 began Australia's national provision of social security payments. Since then, a number of other regular income payments have been introduced to meet specific cases of perceived need. The Department of Social Security pays the following pensions and allowances subject to income and assets tests and certain residential requirements:

- age pension
- invalid pension
- wife's pension
- carer's pension
- widow's pension
- supporting parent's benefit and sheltered employment and rehabilitation allowances (under conditions similar to those applying to pensions)
- unemployment benefit
- sickness benefit
- special benefit (payable in circumstances of special need to persons not eligible for other pensions or benefits).

Eligible recipients may receive additional payments for dependent children, rent assistance

TABLE 7.1 - PENSIONS, BENEFITS AND ALLOWANCES: 30 JUNE 1991

<i>Pension or benefit</i>	<i>Number</i>	<i>Amount paid \$'000</i>
Aged pension (a)	109,592	723,721
Invalid pension (a)	42,352	299,108
Sheltered employment allowance (b)	851	7,542
Rehabilitation allowance (b)	640	4,646
Mobility allowance	741	462
Unemployment benefit (c)	55,756	478,412
Jobsearch allowance (c)	2,506	8,565
Sickness benefits (c)	5,086	40,994
Family allowance (d)	189,634	189,171
Family allowance supplement	18,912	56,537
Sole parent pension	26,646	267,446
Child disability allowance	4,375	7,938
Double orphans pension	182	162
Special benefit	3,011	24,584

(a) Includes wife's/carer's pension. (b) Amount paid includes pensions for wives, guardians etc. (c) Average number on benefit at end of each week. (d) Number of families

and remote area allowance. Pension and benefit rates are indexed to the Consumer Price Index.

In addition, the Department of Social Security pays the following allowances to assist families, subject to eligibility requirements:

family allowance (payable per dependent child, with additional payments for families with children from multiple births,

child disability allowance

double orphan's pension

family allowance supplement (for certain low income families)

job search allowance.

Fringe benefits

The majority of pension and allowance beneficiaries are entitled to a range of non-cash fringe benefits upon presentation of a concession card. The Department issues four types of health cards: pensioner health benefits card; health benefits card; health care card; and pharmaceutical benefits concession card (PHB Card). These cards are issued depending on the income and assets of the claimant and the type of social security payment being received. The cards may entitle the holder to a wide range of concessions including health, transport, household and recreation concessions which are provided by Government and semi-Government authorities and private organisations.

TABLE 7.2 - PENSIONERS ENTITLED TO PHB CARDS: 30 JUNE 1991

<i>Pension or allowance type</i>	<i>Number</i>
Age pensioner (inc wives/carers)	95,938
Invalid pensioner (inc wives/carers)	39,462
Sheltered Employment allowance (inc wives)	825
Rehabilitation allowees (inc wives/carers)	621
Widowed pension	5,504
Sole parents pension	23,987
Total	166,337

INCOME SUPPORT THROUGH THE DEPARTMENT OF VETERANS' AFFAIRS

The Department provides income support to compensate veterans and their dependants for the premature ageing and loss of earning power which could result from the intangible effects of qualifying (theatre of war) service and to allow veterans and their dependants to enjoy a living standard which is at least equal to that provided by other Government income support programs and, whenever practicable, consistent with veterans' special standing in the community.

Service pension. The Department of Veterans' Affairs provides service pensions to male veterans aged 60 years and over and female veterans aged 55 and over.

TABLE 7.3 - SERVICE PENSIONS: 30 JUNE 1990 (number)

<i>Type of service</i>	<i>Payable to veterans</i>	<i>Payable to wives/widows</i>	<i>Total</i>
World War 1	107	82	189
World War 2	15,528	10,985	26,513
Korea, Malaya and Far East Service Reserve	460	303	763
Special Overseas Service	279	195	472
British Commonwealth forces	3,650	2,863	6,513
Allied forces	416	333	749
Australian mariners	138	108	246
British Commonwealth and allied mariners	73	52	125
Total	20,651	14,919	35,570

Disability pension. The Department of Veterans' Affairs provides a disability pension to veterans as compensation for incapacity accepted as war service related.

TABLE 7.4 - DISABILITY PENSIONS: 30 JUNE 1990 (number)

<i>Type of service</i>	<i>Incapacitated veterans</i>	<i>Dependents(a)</i>	<i>Total</i>
World War 1	51	754	805
World War 2	10,858	13,040	23,898
Korea, Malaya and Far East Service Reserve	462	338	800
Special Overseas Service	939	1,081	2,020
Peacetime forces	1,712	1,036	2,748
World War 2 merchant navy	10	4	14
Total	14,032	16,253	30,285

(a) Number of pensions payable to dependents of incapacitated or deceased veterans.

Dependents pensions. War widow's pensions and orphan's pensions are paid to dependents of disability pensioners after the death of the veteran or member. Similarly, wives and widows of service pensioners may be entitled to a service pension.

Allowances. Several allowances are provided to supplement service and disability pensions. These allowances vary according to the severity of disablement and the special needs of the pensioner. They include attendant's allowance,

loss of earnings allowance, recreation transport allowance and domestic allowance. An education allowance is paid for children of special rate pensioners and children of veterans who died as a result of service.

DEPARTMENT OF COMMUNITY SERVICES AND HEALTH

The Department of Community Services and Health, administers programs which provide or subsidise services offering universal access to primary health care, illness prevention and promotion of better health, as well as services for the aged, children, people with disabilities and people who need accommodation. Reference to the activities of the Department primarily relating to Health are to be found in Chapter 8.

Housing and related assistance programs

A range of programs has been developed to assist households in the owner-occupied, public housing and private rental housing sectors. The Commonwealth Government provides funds for public housing, supported accommodation services, crisis accommodation, mortgage and rent relief, home purchase loans, and home purchase assistance to individuals and families. The bulk of the Commonwealth financial assistance for housing is provided through the First Home Owners Scheme and the Commonwealth State Housing Agreement (CSHA).

First Home Owners Scheme. This scheme is designed to assist low to moderate income earners acquire a first home of their own and is targeted particularly to households on low income and to families with dependent children.

TABLE 7.5 - FIRST HOME OWNERS SCHEME:
30 JUNE 1989

Applications received	No.	4,989
Amount paid (a)	\$'000	30,582

(a) Paid in 1988-89 to existing and new recipients.

Commonwealth-State Housing Agreement Assistance. Under the CSHA, the Commonwealth provides funding to the State Government for home purchase and rental housing assistance to people on low incomes who are unable to either achieve home ownership in the private market or afford the costs of private rental accommodation. Grants are made to the State for use either on specified programs or as untied grants in which the State Government has flexibility in managing

housing programs within the guidelines set out in the Agreement.

TABLE 7.6 - CSHA FEDERAL FUNDING: 30 JUNE 1990

Type	\$'000
Untied grants	66,266
Rental assistance for—	
pensioners	4,153
Aboriginals	15,862
Mortgage and rent relief	2,898
Crisis Accommodation program	3,717
Local government and community housing project	2,288
Total	95,184

Crisis Accommodation. The Supported Accommodation Assistance Program (SAAP) provides for a cost-shared arrangement between the Commonwealth and State Governments to assist organisations in providing a range of supported accommodation and related services to people who are either permanently or temporarily homeless as a result of crisis. The objective of the program is to enable individuals to move towards independent living where possible and appropriate. The CSHA Crisis Accommodation Program (CAP) allocates funds for the purchase, construction, renovation or leasing of dwellings for use as crisis accommodation.

TABLE 7.7 - CRISIS ACCOMMODATION PROGRAMME: 30 JUNE 1990

Type	\$'000
Expenditure—	
CAP	1,824
SAAP	6,031
Outlets: SAAP sub program—	
Youth	46
Women	32
General	75
Total	153

Assistance for families with children

The Commonwealth provides funds for services to families with children through the Children's Services Program. Grants are made directly to State Government or local government authorities and non-profit community organisations to provide child care services. The State Government also contributes towards the capital and recurrent costs of the program. The program aims to ensure that parents and children have access to quality, affordable child care services which meet their needs.

TABLE 7.8 - CHILDREN'S SERVICES: 30 JUNE 1989

Grants for childrens services	\$'000	18,395
Payments to States	\$'000	952
Approved services	Number	289
Approved places	Number	8,036

Home and Community Care

Home and Community Care services aim to enhance the independence, security and quality of life of frail aged and younger disabled people by avoiding their inappropriate admission to long term residential accommodation through cost-effective care in the community and to provide support to those who care for them. Assistance is provided in the form of grants paid to government and non-profit community organisations for community based support services.

Assistance for people with disabilities

As well as funding services and programs for people with disabilities, the Commonwealth provides direct rehabilitation services, hearing aids and other audiological services. Other community support services for people with disabilities are funded under the Home and Community Care Program.

TABLE 7.9 - DISABILITY PROGRAMME: 30 JUNE 1990

	<i>Number of services</i>	<i>Expenditure \$'000</i>
Rehabilitation	11	4,521
Hearing (a)	3	n.a.
Accommodation (b)	58	11,247
Employment	45	6,981
Community participation (c)	26	2,679
Project management	??	6

(a) Permanently staffed hearing centres only, expenditure for Australia was almost \$29 million in 1988-89. (b) Includes accommodation support services, respite care services and the attendant care scheme. (c) Includes advocacy services, print disability services, information services and recreation.

Residential care for older people.

Under the Residential Care Program, the Commonwealth funds a range of organisations to provide care in nursing homes and hostels for frail aged people. The main aims of the program are to ensure that the aged receive services best suited to their needs, facilities are developed where they are needed, care is of high quality, and facilities are

designed and services provided to allow the maximum level of independence. Home and Community Care services are also funded for the frail aged who wish to live at home.

DEPARTMENT FOR COMMUNITY SERVICES, WESTERN AUSTRALIA

The Department for Community Services deals with a wide range of issues and problems in working towards enhancing the welfare of individuals, families and groups, particularly those who are disadvantaged, throughout the community in Western Australia. Services are based on the principles of furthering independence, autonomy, social justice and access to opportunity.

The diverse range of welfare and community services fall broadly into seven programs with each one aimed at meeting particular policy objectives.

Family and individual services. This program embraces a wide range of services including counselling, family conflict resolution, crisis support, licensing of child care facilities, community based family support, parent support and education support. The Department's role varies from providing the service directly, to assisting community groups in developing their own support programs, or supervising the funding of community agencies which provide other services.

Financial and Material Assistance. The objectives of this program are to assist people on low incomes to alleviate or overcome short term financial emergencies and reduce the impact of poverty and/or personal financial management difficulties.

Substitute care. The substitute care program provides services for children up to the age of 18 years who are unable, for varying reasons and periods of time, to remain in their home environment.

The range of care categories include Respite, Emergency, Short-term and Permanent, incorporating adoption and guardianship. The Department provides Substitute Care directly to the community via Community Support Hostels, Country Hostels, Metropolitan Student Hostels, Group Homes and Departmental Foster Care. Additionally, the non-government sector is funded to provide Residential Care and Foster Care.

Youth. The Youth Program incorporates a range of services aimed at providing support services to disadvantaged young people. Primarily these are focused to the broad needs of young people between 12 and 18 who, because of their particular circumstances, might be considered at risk. Services aim to reduce this risk and are grouped into Youth Services, Parent/Young Person Conflict Services, Intensive Individual Youth Services and Supported Accommodation Assistance. The Department's role in the different services varies from direct service delivery to funding of non-government agencies.

Community Affairs. This program provides an avenue for the development and implementation of the Department's community focused work. The main strategy is to foster and support the efforts of non-government agencies and community groups to determine goals and establish services that meet community needs.

Child Protection. Through this program, the Department provides a range of services for children who have been harmed or not protected from harm by those caring for them. This may be done by providing services to the family to support them in their roles or by ensuring protective care for the child. The Department pursues preventative and educational strategies to support these services. In addition, this program aims to ensure that employment in entertainment and advertising is non-exploitative and provides safe and positive experiences for children.

Juvenile Justice. The objectives of this program are to ensure that the Department's dealing with young people who break the law has consequences which are justice oriented, is just and equitable, meets their rights, recognizes their special needs, does not disadvantage children in relation to adults and contributes to the protection of the community. Further information on Juvenile crime can be found in Chapter 9, Law, Order, Emergency Services and Public Safety.

This program also coordinates major initiatives which address the issue of high juvenile offending rates in specific locations.

AUTHORITY FOR INTELLECTUALLY HANDICAPPED PERSONS

The Authority is responsible for advancing the welfare of people with an intellectual disability by providing and coordinating appropriate services in cooperation with other government and non-government organisations. The Authority operates in two distinct ways. It provides services through its service arm known as Irrabeena Services and it funds services provided by government organisations.

THE WESTERN AUSTRALIAN COUNCIL OF SOCIAL SERVICE

The Western Australian Council of Social Service (WACOSS) is an independent organisation representing a wide range of interests in the field of social welfare, health and community services. The Council has individual members and organisational members, including voluntary agencies, self-help and community groups, professional associations and Commonwealth, State and local government bodies.

WACOSS has four principal roles:

- to contribute, through participation in various forums, to the development of social policy in Western Australia;

- to offer informed comment on, and to promote understanding of, social welfare and social development issues in the community;

- to facilitate coordination and cooperation amongst social welfare agencies in Western Australia; and

- to provide a range of services to member agencies.

The ABS, as part of its social project, conducts surveys of relevance to social welfare.

Survey of child care arrangements

A survey was conducted in June 1987 to obtain information on child care arrangements made by persons responsible for children under 12 years of age. The survey collected details on the social and economic characteristics of persons and families (marital status, labour force status, income etc); patterns of usage of child care (days, hours and time of day child care was used); location and preference of location of formal care; cost and main reason for using formal and informal child care services; and the amount of care by the partner or spouse of the person responsible.

Survey of Disabled and Aged Persons

The Survey of Disabled and Aged Persons was conducted to obtain information from disabled, handicapped and aged people about their need for, and receipt of, help. The survey also measured the

provision of help to handicapped people from the perspective of the handicapped person's principal carer.

The 1988 survey estimated that 2,543,000 people or 15.6 per cent of the Australian population were disabled. In Western Australia, 232,700 people or 15.4 per cent of the population were disabled.

Australia-wide there were over 320,000 carers of handicapped persons in 1988. For Western Australia, the figure was 24,000.

REFERENCES

Department of Social Security, *Annual Report 1990-91*

Department of Verteran's Affairs, *Annual Report 1990-91*

Chapter 8

HEALTH

Commonwealth Government Health Benefits and Services	8-1
The Health Department of Western Australia	8-3
Other Health Services	8-4
National Health Surveys	8-6
Health Insurance Surveys	8-9
References	8-10

Chapter 8

HEALTH

The Commonwealth and State Government health authorities, together with local government authorities, cooperate in maintaining health services and in the prevention and control of infectious diseases in Western Australia. Health services are also provided by other Commonwealth and State government bodies, religious or community based non-profit organisations, and by volunteer services.

COMMONWEALTH GOVERNMENT HEALTH BENEFITS AND SERVICES

Commonwealth activity in the health area is mainly concerned with the formulation of broad national policies, the provision of benefits and grants to individuals and organisations, and the regulation of health insurance. Services are primarily directed towards ensuring that all Australians have access to necessary health services at reasonable cost.

Medical and Hospital Services and Benefits

Medical Benefits. Medicare provides Australians and other eligible people with reimbursement for medical and optometrical services, free shared ward accommodation and treatment, and free outpatient treatment at public hospitals. Health insurance funds, which are regulated by the Commonwealth, provide medical cover for those electing to be treated privately by a 'doctor of choice' or have private ward accommodation in a public hospital. The Commonwealth provides substantial financial assistance to the States to support Medicare services.

The Health Insurance Commission pays medical benefits for medical and optometrical services and administers the daily operations of the Medicare program. It also undertakes measures to combat medical fraud and overservicing and provides services for processing of the Department of Veterans' Affairs treatment accounts.

TABLE 8.1 – MEDICARE: WESTERN AUSTRALIA,
1990-91

(Source: Health Insurance Commission, Annual report)

	<i>Unit</i>	
Persons enrolled (a)	'000	1,680
Services processed—		
General practitioner attendances	"	7,034
Specialist attendances	"	1,053
Pathology	"	2,141
Other	"	1,779
Total	"	12,007
Services processed (average number per enrolled person)		
Males		5.5
Females		8.8
Persons		7.1
Benefits paid	\$'000	338,559

(a) At 30 June 1991.

Veterans and Dependants. The Commonwealth meets the costs for eligible veterans and their dependants of specialist, local medical officer, paramedical, dental services, the supply and maintenance of surgical aids, and travelling and other expenses incurred in obtaining medical treatment. Repatriation hospitals and clinics are maintained in each State for the treatment of eligible veterans and their dependants. Community patients are admitted to Repatriation hospitals free of charge if spare beds are available and the facilities are suitable for the treatment required. Conversely, veterans and their dependants may, where appropriate, be admitted to private or State public hospitals, generally at Commonwealth expense.

HEALTH

TABLE 8.2 - HEALTH INSURANCE FUNDS MEMBERSHIP AND PERSONS COVERED, WESTERN AUSTRALIA, 31 MARCH 1990

(Source: Dept of Health, Housing and Community Services, Annual report)

Health Benefits funds operating (a)	No.	6
Basic hospital table (b)—		
Membership	'000	291
Persons covered	"	668
Proportion of population covered	per cent	41.1
Supplementary hospital table (c)—		
Membership	'000	272
Persons covered	"	624
Proportion of population covered	per cent	38.4
Ancillary table (d)—		
Membership	'000	333
Persons covered	"	768
Proportion of population covered	per cent	47.3

(a) State of registration of organisation. Number of funds offering health insurance. (b) Provides cover for hospital accommodation charges for inpatients of public, private and day hospital facilities. (c) Provides additional hospital accommodation benefits to those provided by the basic hospital table. (d) Provides benefits for services such as dental, optical, therapies and other non-accommodation services.

State Public Hospitals. Apart from Commonwealth outlays for free hospital care under Medicare, the Commonwealth also contributes to the upgrading of the infrastructure of State public hospitals through the Hospital Enhancement Program.

Nursing Home Subsidies and Domiciliary Care Services

Nursing home subsidies are provided to ensure that those people who are assessed as needing nursing home care, have access to residential support and care which is appropriate to their needs.

Domiciliary nursing home care benefits and services are provided to assist frail aged and young disabled people, who would otherwise require nursing home admission, to remain in the community. The Commonwealth meets the approved operating deficits of eligible non-profit nursing homes for persons with disabilities. In addition, nursing home benefits are paid to a small number of nursing homes for people with disabilities.

Pharmaceutical Benefits Scheme (PBS)

Through the payment of pharmaceutical benefits, the Commonwealth aims to ensure access by the Australian community, to necessary cost-effective, prescribed medications, at the lowest cost to Government and consumers, consistent with reliable supply.

Other Health Services

The Commonwealth provides financial assistance to support health research, to promote better health in conjunction with the prevention of disease, and to provide health services supplementary to the mainstream health care system.

Health research. Commonwealth support for health research activities, generally provided in the form of project, program, institute and research unit grants, covers medical and public health research. Support includes financial assistance through the Medical Research Endowment Fund (MREF) and the Public Health Research and Development Committee (PHRDC).

TABLE 8.3 - BENEFIT PRESCRIPTIONS: WESTERN AUSTRALIA, 1989-90

(Source: Dept of Health, Housing and Community Services, Annual report)

	Unit	General	Concess- ional	Pensioner	Total
Number	'000	1,337	748	5,856	(b)7,941
Benefit prescription cost—					
Payments	\$'000	14,238	6,370	(a)64,825	(b)85,433
Patients contributions on					
general benefit prescriptions	\$'000	14,311	1,875	..	16,186
Total benefit prescription cost	\$'000	28,549	8,245	64,825	101,619
Average total cost per prescription	\$	21.25	11.01	11.07	12.78

(a) Includes payments for holders of safety net cards. (b) Payments to approved persons.

Health promotion and disease prevention. The Commonwealth provides financial assistance for a wide range of health promotion and disease prevention activities that emphasise prevention in contrast to the dominant curative approach.

The National Health Promotion Program which supports community based initiatives to promote better health and to prevent illness is one such activity. AIDS control, where grants are provided for education and prevention; treatment and support services; the National Media Campaign; and Research activities is another.

Also included is The National Better Health Program, which funds projects in conjunction with the States to encourage reductions in the incidence of hypertension, accident, injury, poor nutrition, skin cancer and preventable health problems in the elderly.

Health services for Aborigines. The Government is committed to raising Aboriginal health standards. Strategies emphasise improvement of environmental conditions, domiciliary hygiene and preventative education programs coupled with the promotion of Aboriginal participation and decision making in health care delivery.

National Drug Programs. The National Campaign Against Drug Abuse activities include drug abuse treatment, rehabilitation and prevention programs, the 'Drug Offensive' public information campaign and the development of a national drug abuse data system together with research and evaluation.

Health Support Services. In addition to its commercial activities, the Commonwealth Serum Laboratories Commission (CSL) carries out functions determined by the Minister to be in the national interest, including research projects, blood fractionation and maintenance of reserve stocks. The Commonwealth reimburses CSL for the cost of carrying out these functions.

The Commonwealth subsidises the operating costs of the Royal Flying Doctor Service and also provides a substantial contribution to capital costs which together for the year ended June 30, 1991 totalled \$3,235,100.

Other. This category includes outlays on environmental, social and other public health activities including human quarantine and health advisory committees. Also included is provision for 'act of grace' payments, frequently to meet additional costs incurred in sending patients with

life threatening diseases overseas for treatment unavailable in Australia.

THE HEALTH DEPARTMENT OF WESTERN AUSTRALIA

The Health Department of Western Australia coordinates and manages health care functions and services throughout the State. The Department administers a wide range of legislation incorporating matters of individual and community health protection, treatment and regulation.

Health Promotion Program

The Department's Health Promotion Program informs the public about the causes and prevention of major preventable illnesses and injuries, and encourages the adoption of attitudes and behaviours that are conducive to better health.

Targeted areas include nutrition education, infectious disease control, alcohol, drug and smoking control, skin cancer prevention, hypertension control and Aboriginal health.

In 1990-91, campaigns such as 'Quit', 'Drinksafe', 'Eat Less Fat', 'Sunsmart' and the Nutrition Education Campaign, used advertising media - including press and electronic media, posters, pamphlets, brochures and leaflets, promotional material, competitions and help-lines - to promote their messages.

Research provides strong evidence that these health promotion messages are increasing public awareness of preventable illness and injury and reducing the incidence of health disorders, disability and premature death.

Planned achievements for 1991-92 include the general upgrading of the immunisation initiative, the enhancement of Aboriginal community based health promotions, continued 'Quit' and 'Drinksafe' campaigns and the Nutrition Education Campaign.

Health Surveillance and Protection Program

This program monitors the health of the community and the prevalence of environmental factors relevant to health, identifying any changes that may signify a danger.

Responsibilities in this area include waste management, food surveillance, meat hygiene, pesticides/pest control, pharmaceuticals and radiation health.

Community Health Program

The Community Health Program serves as a community based health delivery service in the form of health promotion, primary health care, immunisation, dental health, communicable disease control, and nursing care which are carried out by nursing staff, community health and allied health staff.

Community health services are targeted at broad groups within the community which have special needs, particularly children, youth, women, the elderly and Aboriginal people.

Hostels and Nursing Homes Program

Accommodation is provided for people with incurable chronic illness and persistent disability, in nursing homes, group and community homes and hostels.

Hospitals Program

The objectives of this program are to provide accessible and effective hospital care to those who are in need of it, to restore those who are ill or disabled to the maximum reasonably achievable level and to provide these services according to recognised standards of quality and in a way that is acceptable to clients. The philosophy behind this plan is to make hospital care more accessible to the community and free central hospitals to concentrate on their roles as specialist centres of excellence.

Activities involve the provision of services to hospitalised patients (in-patients) and to ambulatory and other patients (out-patients). Services are provided in teaching hospitals, non-teaching hospitals and psychiatric hospitals.

OTHER HEALTH SERVICES

Independent organisations provide a range of important health services for Western Australians. Many of these receive funds in the form of Commonwealth or State grants, but also rely heavily on support from individuals and private organisations. Some of the major independent organisations are detailed below.

Western Australian Alcohol & Drug Authority

The Authority provides treatment, management, care and rehabilitation to persons experiencing alcohol and other drug related problems and co-ordinates, promotes and subsidises research and education activities.

An Education and Research directorate provides drug-related education and training to people working or studying in the health and welfare fields and also formulates strategic advice on legislation, policy and services involving alcohol and other drug-related issues.

Information, confidential counselling and referral on alcohol, other drug problems and AIDS is available to the public by telephoning the Alcohol and Drug Information Service. A library containing a special collection of print and audiovisual material covering all aspects of addiction is also open for public use.

The Authority provides funding and professional support to non-government organisations engaged in providing services to people with alcohol and other drug problems. Grants made to non-government organisations totalled nearly \$3 million during 1989-90.

TABLE 8.4 - ALCOHOL AND DRUG INFORMATION SERVICE: CALLS BY TYPE, WESTERN AUSTRALIA, 1989

(Source: WA Alcohol and Drug Authority, Annual report)

Type of Drug	Number of calls
Alcohol	3,181
Cannabis	987
Heroin	745
Tranquilisers	737
Tobacco	358
Other drugs	2,663
Total drug related calls	8,671

The Perth Aboriginal Medical Service

The Perth Aboriginal Medical Service (PAMS) provides a health and medical service to the Aboriginal community of Perth. Funding is received from the Aboriginal and Torres Strait Island Commission, Aboriginal Hostels Ltd, Department of Health, Housing and Community Services, Health Department of Western Australia and the National Australian AIDS Council.

During the 1990-91 financial year, 11,478 people were seen through the medical clinic, at approximately 255 patients per week. There were 1,204 new patients in the 1990-91 period.

Service doctors give regular talks to health worker trainees and mental health nursing trainees at Graylands and the Aboriginal Health Unit at Curtin University of Technology.

PAMS community nurses make regular visits to clients in the community to see and understand the client within the context of their work and family situations; and to assess, educate and counsel as necessary. A prison visitor scheme is also in operation.

The Aboriginal Interpreter Service of PAMS maintains close liaison with major hospitals, doctors, social workers and government agencies. With more traditional Aboriginal people being sent to Perth for medical treatment, patients feel more comfortable when the Interpreter Service is present especially when discussing legal and medical problems in their own dialect.

The Interpreter Service also works in close contact with the Welfare section of PAMS. Donations of toiletries, personal items and warm clothing from welfare and religious groups are distributed to needy patients in hospitals.

The Welfare section of the Service liaises with other Aboriginal agencies and Government Departments on behalf of clients for food parcels, extension of time for bills payment and donations of clothing and household items.

The Transport section of the Service delivers patients to and from hospital appointments, picks up medical supplies, delivers specimens to hospitals and other general transport duties.

Family Planning Association of WA (Inc)

The Family Planning Association is a community based non-profit organisation financed by grants from both State and Commonwealth Government and with self generated funds. The Association strives to achieve excellence in sexual health care by providing services that affirm that all people are sexual throughout life and have a right to information and to personal choice, and that acceptance of sexuality is integral to health.

The clinical services are staffed by doctors and nurses who have developed their knowledge in the area of sexual health. This includes gynaecology, pregnancy counselling, sexually transmitted infection, cervical screening and sexual dysfunction.

Confidential counselling and information services in all areas of sexuality are available at all centres. The library in Northbridge has the most comprehensive collection of literature about human sexuality in the State and is open to members of the community.

TABLE 8.5 - FAMILY PLANNING ASSOCIATION OF WA (INC): 1990-91

(Source: Family Planning Association of WA, Annual report)

Funding -	(S)
Commonwealth Government	1,370,851
State Government	97,091
Project grants	97,092
Self generated funds	363,991
Total	1,929,025
Services -	(No.)
Clinical consultations	20,692
Counselling consultations	641
Telephone Information consultations	14,025
Community Education programs	81
Participants in Community Education programs	2,254
Professional Education programs	104
Participants in Professional Education programs	2,063
Library book loans	5,199

The Red Cross Society (WA Division)

As part of its broad community service activities, the Society operates the Blood Transfusion Service in WA. Blood collected by the blood transfusion service is processed by the Commonwealth Serum Laboratories and blood products are supplied to hospitals and pathologists for use in treatment and analysis.

Silver Chain Nursing Association

The Association provides domiciliary services, bush nursing and residential services throughout the State. The major source of funding is the Home and Community Care program, a Commonwealth/State cost sharing agreement which aims to provide an integrated range of services for frail aged and younger persons with disabilities.

NATIONAL HEALTH SURVEYS

The 1989-90 survey was the first of a new series of five-yearly health surveys conducted by the ABS which provides baseline and trend information on a range of health status indicators and health related behaviours of Australians. Surveys in this series will comprise a core data set, which will be repeated in successive surveys to provide comparative data over time and a supplementary component which can be varied from survey to survey to address key health issues of the day.

Information collected in the survey covered recent and long-term illness, health related actions such as doctor consultations, use of medications, episodes in hospital and aspects of lifestyle which may influence health such as smoking, alcohol consumption and exercise. In addition, the survey collected information on specific women's health issues. This survey is designed to enable information for all topics to be analysed in relation to other topics, and in relation to a range of demographic and socio-economic characteristics.

People experiencing long term conditions

Of the total Western Australian population, 71.2 per cent reported having one or more long term

conditions (conditions which lasted or were expected to last more than six months), with more females reporting such a condition than males (74.0 per cent and 68.5 per cent respectively). With the exception of the ACT (72.0 per cent), Western Australia had the highest rate of incidence of persons who reported long term conditions of any Australian State or Territory. However, differences in age and sex structure need to be borne in mind when interpreting such conditions.

Diseases of the nervous system and sense organs (eyesight disorders of refraction and accommodation, migraines, deafness, etc) were the most frequently reported long term conditions in Western Australia, affecting 42.6 per cent of the population or approximately 692,000 persons. Diseases of the musculoskeletal system and connective tissue (arthritis, back trouble, etc) - 30.2 per cent, and diseases of the respiratory system (hayfever, asthma, etc) - 25.1 per cent of the WA population were also prominent. Although the rate of incidence of disease for long term conditions is higher for Western Australia than for Australia as a whole, the prominence of condition types shows a similar trend at the national level with diseases of the nervous system and sense organs (38.2 per cent of the Australian population) being the most frequently reported.

TABLE 8.6 - PERSONS WHO EXPERIENCED LONG-TERM CONDITIONS: TYPE OF CONDITION(a), WESTERN AUSTRALIA AND AUSTRALIA, 1989-90
(Reference: National Health Survey, Summary of Results, State tables)

Type of condition	Western Australia		Australia	
	Rate(c)	Persons(d)	Rate(c)	Persons(d)
Infectious and parasitic diseases	8.9	14.4	7.7	131.3
Neoplasms	17.7	28.8	16.1	273.8
Endocrine, nutritional and metabolic diseases and immunity disorders	52.5	85.3	55.7	946.5
Diseases of the blood and blood forming organs	11.4	18.4	8.6	146.0
Mental disorders	17.9	29.1	21.8	370.0
Diseases of the nervous system and sense organs	426.2	692.0	382.3	6,495.1
Diseases of the circulatory system	129.8	210.8	131.0	2,225.2
Diseases of the respiratory system	250.8	407.2	219.8	3,733.5
Diseases of the digestive system	51.2	83.2	52.7	895.8
Diseases of the genitourinary system	31.3	50.9	26.8	456.1
Complications of pregnancy, childbirth and the puerperium	**	**	0.6	9.6
Diseases of the skin and subcutaneous tissue	66.5	108.0	56.5	960.6
Diseases of the musculoskeletal system and connective tissue	302.2	490.7	258.0	4,383.5
Congenital anomalies	**	**	0.4	6.4

For footnotes, see end of table.

HEALTH

TABLE 8.6 – PERSONS WHO EXPERIENCED LONG-TERM CONDITIONS: TYPE OF CONDITION(a), WESTERN AUSTRALIA AND AUSTRALIA, 1989-90 – continued
(Reference: National Health Survey, Summary of Results, State tables)

<i>Type of condition</i>	<i>Western Australia</i>		<i>Australia</i>	
	<i>Rate(c)</i>	<i>Persons(d)</i>	<i>Rate(c)</i>	<i>Persons(d)</i>
Symptoms, signs and ill-defined conditions	48.7	79.0	42.5	722.6
Injury and poisoning	9.6	15.6	13.8	234.9
Disability n.e.c.	6.8	11.1	6.8	115.2
Unspecified illness	**	**	*0.1	*1.6
Total persons who reported a long-term condition(b)	712.0	1,156.0	661.9	11,244.3

(a) Condition groups based on chapter headings of the International Classification of Diseases, Ninth Revision (ICD9). Details of the classification and associated coding procedures are contained in *1989-90 National Health Survey: Users' Guide* (Cat. No. 4363.0).
(b) Each person may have reported more than one type of illness therefore components do not add to totals. (c) Rate per 1,000 population of same age and sex. (d) Person unit represented in '000.

* relative standard error is between 25 and 50 per cent.

** nil or subject to sampling variability too high for most practical uses.

People taking health related actions

Over three quarters of the population surveyed in Western Australia (75.3 per cent) or Australia as a whole (75.5 per cent), reported taking a health-related action during the two weeks prior to interview. This ranged from using medication or taking vitamins/minerals to having been a hospital inpatient. In WA during the two weeks prior to interview, 17.5 per cent of those surveyed had consulted a doctor. Trends in WA tended to follow the national average.

Medications

Use of medications (including vitamins and mineral supplements) was the most frequently reported health-related action taken. In Western Australia, 69.8 per cent of the population reported using medication in that period. The proportion of persons using medications was higher for females (75.0 per cent) than males (64.7 per cent). Pain relievers (34.9 per cent), followed by vitamin/mineral supplements (22.4 per cent), were the most common types of medication used. The national average showed similar trends.

TABLE 8.7 – PERSONS WHO EXPERIENCED LONG-TERM CONDITIONS: TYPE OF CONDITION(a), BY SEX, (Rate per 1,000 population), WESTERN AUSTRALIA, 1989-90
(Reference: National Health Survey, Summary of Results, State tables)

<i>Type of condition</i>	<i>Males</i>	<i>Females</i>	<i>Persons</i>
Infectious and parasitic diseases	10.2	7.5	8.9
Neoplasms	18.7	16.7	17.7
Endocrine, nutritional and metabolic diseases and immunity disorders	47.7	57.4	52.5
Diseases of the blood and blood forming organs	*5.0	17.9	11.4
Mental disorders	14.4	21.5	17.9
Diseases of the nervous system and sense organs	393.0	460.0	426.2
Diseases of the circulatory system	99.2	161.1	129.8
Diseases of the respiratory system	230.3	271.7	250.8
Diseases of the digestive system	49.3	53.2	51.2
Diseases of the genitourinary system	9.5	53.6	31.3

For footnotes, see end of table

HEALTH

TABLE 8.7 – PERSONS WHO EXPERIENCED LONG-TERM CONDITIONS: TYPE OF CONDITION(a), BY SEX, (Rate per 1,000 population), WESTERN AUSTRALIA, 1989-90 – continued
(Reference: National Health Survey, Summary of Results, State tables)

Type of condition	Males	Females	Persons
Complications of pregnancy, childbirth and the puerperium	..	**	**
Diseases of the skin and subcutaneous tissue	57.0	76.3	66.5
Diseases of the musculoskeletal system and connective tissue	293.2	311.4	302.2
Congenital anomalies	**	**	**
Symptoms, signs and ill-defined conditions	42.5	54.9	48.7
Injury and poisoning	13.5	*5.7	9.6
Disability n.e.c.	8.7	*5.0	6.8
Unspecified illness	**	**	**
Total persons who reported a long-term condition(b)	685.1	739.5	712.0

(a) Condition groups based on chapter headings of the International Classification of Diseases, Ninth Revision (ICD9). Details of the classification and associated coding procedures are contained in *1989-90 National Health Survey: Users' Guide* (Cat. No. 4363.0). (b) Each person may have reported more than one type of illness therefore components do not add to totals.

* relative standard error is between 25 and 50 per cent.

** nil or subject to sampling variability too high for most practical uses.

TABLE 8.8 – PERSONS WHO TOOK HEALTH RELATED ACTIONS DURING THE TWO WEEKS PRIOR TO INTERVIEW: TYPE OF ACTION, WESTERN AUSTRALIA AND AUSTRALIA, 1989-90
(Reference: National Health Survey, Summary of Results, State tables)

Type of action	Western Australia		Australia	
	Rate (c)	Person (d)	Rate (c)	Person (d)
Took action—				
Hospital inpatient episode	7.5	12.2	9.2	156.7
Visit to casualty/outpatients	28.0	45.5	25.1	425.7
Doctor consultation	174.8	283.9	200.1	3,400.2
Dental consultation(a)	51.0	80.3	53.1	876.0
Consultation with other health professional	101.9	165.5	94.4	1,603.3
Taken vitamins/minerals	224.2	364.0	233.1	3,960.0
Used other medications	634.2	1,029.7	641.6	10,899.8
Days away from work/school	64.2	104.3	68.8	1,169.3
Other days of reduced activity	111.7	175.9	99.7	1,644.8
<i>Total persons taking action(b)</i>	<i>753.1</i>	<i>1,222.7</i>	<i>755.0</i>	<i>12,827.2</i>
Took no action	24.7	400.9	24.5	4,161.5
Total persons	..	1,623.6	..	16,988.8

(a) Persons aged two years and over. (b) Each person may have taken more than one type of action during the two weeks prior to interview and therefore components do not add to totals. (c) Rate per 1,000 population of same age and sex. (d) Person unit represented in '000.

HEALTH

TABLE 8.9 – PERSONS WHO USED MEDICATION DURING THE TWO WEEKS PRIOR TO INTERVIEW: TYPE OF MEDICATION, BY SEX, (Rate (a)), WESTERN AUSTRALIA, 1989-90

(Reference: National Health Survey, Summary of Results, State tables)

<i>Type of medication</i>	<i>Males</i>	<i>Females</i>	<i>Persons</i>
Vitamin and mineral supplements	175.7	273.6	224.2
Medication for cough or cold	120.8	137.2	128.9
Medication for allergy	56.8	69.1	62.9
Skin ointments	173.5	205.3	189.2
Stomach medicines or laxatives	58.1	93.4	75.6
Medications for fluid, heart, and blood pressure	69.1	97.2	83.0
Pain relievers	290.5	407.9	348.6
Sleeping medications	29.0	52.2	40.5
Tranquillisers or sedatives	10.6	19.4	15.0
Other medications	153.5	200.3	176.7
Total persons who used medication(b)	646.8	749.5	697.6

(a) Rate per 1,000 population of same age and sex. (b) Each person may have reported taking medication for more than one reason and therefore components do not add to totals.

HEALTH INSURANCE SURVEYS

In June 1990, a survey was conducted by the Australian Bureau of Statistics to obtain information about the health insurance arrangements of the Australian population, including details of the type and rate of private health insurance. Similar national health surveys were conducted annually from 1979 to 1983 and again in 1986 and 1988.

Information on health insurance arrangements was obtained for each person in the sampled population, except for dependent full-time students aged 15 to 25 years. The survey findings were organised into 'contributor units'. A 'contributor unit' consists of families and individual members or groups of members of families as defined by their health insurance arrangements.

In total, 8,916,700 persons in contributor units, representing 52 per cent of the Australian

population, were covered by private health insurance at June 1990. The proportion of persons with private health insurance cover varied between the States and Territories, ranging from 59 per cent in South Australia to 41 per cent in Queensland. Western Australia reported 53 per cent or 878,000 persons in contributor units with private health insurance. Overall, the proportion of persons with private health insurance cover was similar for residents of State Capital cities to residents of other areas of the State. The exceptions were Hobart and Darwin (61 and 52 per cent respectively), with Tasmania and Northern Territory showing 51 and 45 percent respectively. The proportion of persons with private health insurance for Perth and for the rest of WA was similar (53.5 and 52.5 per cent respectively).

The most frequently reported reasons for having private health insurance in Australia were security/peace of mind (40 per cent) and choice of doctor (37 per cent).

HEALTH

TABLE 8.10 - PERCENTAGE OF PERSONS IN CONTRIBUTOR UNITS: TYPE OF HEALTH INSURANCE BY CAPITAL CITY AND REGION, AUSTRALIA, JUNE 1990
(Reference: Catalogue No. 4335.0)

Type of health insurance	Perth	Rest of WA	Australia
With private health insurance—			
Hospital and ancillary	43.2	43.3	38.2
Hospital only	2.8	1.6	9.5
Ancillary only	6.9	7.1	3.7
Type of insurance not known	0.5	*0.5	0.6
Total	53.5	52.5	52.0
Without private health insurance	46.5	47.5	47.9
Total	100.0	100.0	100.0

* Relative standard error between 25 and 50 per cent.

REFERENCES

ABS Publications

Health Insurance Survey, Australia (4335.0)
National Health Survey, User Guide (4363.0)
National Health Survey, Summary of Results, State Tables

Other Publications

Department of Health, Housing and Community Services, *Annual Report*
Family planning Association of W.A., *Annual Report*

Health Department of Western Australia, *Annual Report*

Health Insurance Commission, *Annual Report*

Family Planning Association of W.A., *Annual Report*

Perth Aboriginal Medical Service, *Annual Report*

Red Cross Society (W.A. Division), *Annual Report*

Royal flying Doctor Service of Western Australia, *Annual Report*

Silver Chain Nursing Association, *Annual Report*

W.A. Alcohol and Drug Authority, *Annual Report*

Chapter 9

LAW, ORDER, EMERGENCY SERVICES AND PUBLIC SAFETY

The Law Courts	9-1
Legal Aid	9-3
Parliamentary Commissioner for Administrative Investigations	9-4
Prisons	9-4
Emergency Services	9-6
Public Safety	9-8
References	9-10

Chapter 9

LAW, ORDER, EMERGENCY SERVICES AND PUBLIC SAFETY

The issues of law, order, the provision of emergency services, and public safety are important concerns of the community today. These issues are primarily a State responsibility. The State Government has responsibility not only for enacting legislation in these areas, but also for providing a police force, judiciary and corrective service, as well as co-ordinating the provision of various emergency services, and arranging for the general safety of the public.

THE LAW COURTS

Courts

Courts administered by the Crown Law Department of Western Australia include the Supreme, District, Petty, Children's, Family, Local and Coroner's Courts, as well as the Western Australian Sheriff's Office.

Supreme Court of Western Australia

The Supreme Court of Western Australia is constituted under the *Supreme Court Act 1935* and exercises an original jurisdiction in both civil and criminal cases. It also has exclusive jurisdiction in regard to certain cases, including such serious indictable offences as murder and treason.

The jurisdiction of the Court in both civil and criminal matters is usually exercised by a single Judge, although some actions may be brought before a Full Court. Cases may be heard by a Judge either sitting alone or with a jury. All criminal cases involve a jury. The Supreme Court also hears appeals against judgements of the Supreme and District Courts, as well as against decisions of magistrates in the Courts of Petty Sessions. In some cases an appeal from a judgement of the Supreme Court of Western Australia may be made to the High Court of Australia.

The District Court of Western Australia

The District Court of Western Australia, constituted under the *District Court Act 1969*, is a court between that of the Supreme Court and the Courts of Petty Sessions. The District Court has the same jurisdiction as the Supreme Court for civil actions involving a claim for damage as a result of death or bodily injury. In other cases the limits of its civil jurisdiction is up to a maximum of \$80,000. In criminal cases it has the same jurisdiction and powers as the Supreme Court, except that it may not hear those cases for which the maximum penalty is either life, or strict security life imprisonment.

Courts of Petty Sessions

Courts of Petty Sessions are established under the *Justices Act 1902*. These Courts are held throughout the State and deal with minor criminal cases, as well as the hearing of committal proceedings in cases of more serious offences. Two or more Justices of the Peace sitting together may deal with cases which could be decided by a magistrate sitting alone.

Children's Courts

Children's Courts in Western Australia are now established under the *Children's Court of Western Australia Act 1988* which came into force on

1 December 1989. The Act provides for the appointment of a Judge, Magistrate, or not less than two members to deal with all summary offences (and certain other indictable offences) for offenders under the age of 18.

Family Court of Western Australia

The Family Court of Western Australia hears petitions for divorce and has jurisdiction in the welfare and custody of children and disputes about maintenance and property of marriage. (For further information refer to Chapter 6 - Divorces.)

Local Courts

Local Courts are held throughout the State to determine minor civil issues. Jurisdiction is limited in most cases to claims not exceeding \$10,000. A Small Disputes Division of the Local Court provides a quick and less expensive means of recovering debts of less than \$3,000. The Court also handles disputes between landlord and tenant under the provisions of the *Residential Tenancies Act 1987*.

TABLE 9.1 – LOCAL COURTS
(Source: Crown Law Department of Western Australia)

	1989-90	1990-91
Complaints lodged	62,160	63,912
Pre-trial conferences held	2,815	3,180
Residential Tenancy Applications (a)	890	3,399

(a) Commenced October 1989

Coroner's Courts

Coroner's Courts are responsible for inquiring into the circumstances of a person's death, where that person has suffered a violent or unexpected death, or where the nature of their death is uncertain. Coroner's Courts also inquire as to the cause and origin of fires.

Inquests, or public inquiries, are held in the following circumstances: where the death was the result of a mining or industrial accident, was a death in custody, or was the result of a police chase or other police action.

The family of the person concerned may request an inquest, which the coroner may decide to hold if it is felt to be in the public interest.

A coroner may charge a person with a major offence and commit that person for trial at a higher court.

TABLE 9.2 – CORONER'S COURTS
(Source: Crown Law Department of Western Australia)

	1989-90	1990-91
Deaths reported	1,777	1,743
Inquests completed (Deaths)	31	33

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.

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 State Parliament, 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 for persons who qualify as jurors. Certain persons are excluded from jury service and persons may be excused on the grounds of illness, undue hardship, circumstances of sufficient weight, importance or urgency; or recent jury service.

Criminal Convictions Recorded

Table 9.3 shows the number of convictions recorded in Western Australian criminal courts during 1986-87, and 1988-89. It is important to bear in mind that the number of convictions shown is not the same as the number of persons convicted, as a person may have been convicted on more than one offence.

LAW, ORDER, EMERGENCY SERVICES AND PUBLIC SAFETY

TABLE 9.3 – CRIMINAL COURT STATISTICS – NUMBER OF CONVICTIONS: 1986-87 AND 1988-89
References: Cat. Nos. 4501.5, 4502.5, 4503.5

Code (a)	Description of Offence	Supreme and District Courts	Courts of Petty Sessions	Children's Courts	Total
1986 -87					
100	Offences against the person	470	3,386	1,210	5,066
200	Robbery and extortion	135	2	31	168
300	Breaking and entering, fraud, and other offences involving theft	2,897	17,941	14,931	35,769
400	Property damage and environmental offences	50	2,550	1,584	4,184
500	Offences against good order	116	39,129	6,528	45,773
600	Drug offences	232	6,950	1,193	8,375
700	Motor vehicle, traffic and related offences	12	79,955	7,185	87,152
800	Other offences	–	7,491	104	7,595
..	Total	3,912	157,404	32,766	194,082
1988-89					
100	Offences against the person	848	3,566	1,207	5,621
200	Robbery and extortion	115	1	41	157
300	Breaking and entering, fraud, and other offences involving theft	2,132	20,849	13,540	36,521
400	Property damage and environmental offences	74	2,410	1,611	4,095
500	Offences against good order	141	36,863	7,415	44,419
600	Drug offences	246	6,915	1,118	8,279
700	Motor vehicle, traffic and related offences	–	79,628	7,133	86,761
800	Other offences	6	8,453	130	8,589
..	Total	3,562	158,685	32,195	194,442

(a) Related to Draft Australian National Classification of Offences, June 1980; and Australian National Classification of Offences, July 1987.

Law Reform Commission of Western Australia

The Law Reform Commission of Western Australia was established by the *Law Reform Commission Act 1972*. The Commission's function is to examine proposals for the review of various laws which have been referred to it by the Attorney-General. It may also submit suggestions to the Attorney-General for review.

The Commission usually issues a discussion paper dealing with the issue, and invites comments from interested persons. A report is then made to the Attorney-General.

LEGAL AID

Legal Aid Commission of Western Australia

The Legal Aid Commission is the principal supplier of Legal Aid Services for the State of Western Australia. It was established on 17 April 1978, and was the first Legal Aid Commission of its type in Australia. The Commission is an independent statutory body funded principally by grants from the Commonwealth and State Governments. For the financial year 1991-92 this will be in the ratio 60 percent Commonwealth and 40 percent State funds. The Commission provides

TABLE 9.4 – LEGAL AID: AT 30 JUNE
(Source: Legal Aid Commission of Western Australia)

	1988	1989	1990
Applications received	14,964	13,805	12,701
Number of persons assisted by —			
Duty counsel (incl. private legal practitioners)	20,898	25,224	24,891
Legal Advice Bureau staff (duty solicitors)	13,034	13,994	16,379
Amount paid to private legal practitioners for cases undertaken by them (\$ million)	8.6	11.2	9.2

legal assistance to eligible persons throughout the State. This assistance may cover all, part, or none of the legal costs involved in a case.

TABLE 9.5 – APPLICATIONS RECEIVED
(Source: Legal Aid Commission of Western Australia)

<i>Class of law</i>	<i>1988-89</i>	<i>1989-90</i>
Family	4,271	3,629
Criminal	6,457	6,621
Civil	3,077	2,451
Total	13,805	12,701

Aboriginal Legal Service of Western Australia Inc.

The Aboriginal Legal Service is the largest community based Aboriginal organisation in the State. Among its aims is the intention to provide direct relief to all Aboriginal people suffering poverty, distress, or helplessness as a result of their involvement with the laws of the Commonwealth or States of Australia.

Since opening its doors in 1973 with a staff of six, the Service has grown to the stage where it now employs seventy-one people working out of fourteen offices all over the State.

The Aboriginal Legal Service of Western Australia Inc. is funded by a grant from the Aboriginal and Torres Strait Islander Commission, which for the year 1990-91 was \$3,025,000 (including \$122,300 for Capital Expenditure).

PARLIAMENTARY COMMISSIONER FOR ADMINISTRATIVE INVESTIGATIONS

The Parliamentary Commissioner for Administrative Investigations (commonly known as the Ombudsman) is empowered under the *Parliamentary Commission Act 1971* to investigate complaints by a person or a body of persons (whether incorporated or not) affected by the administrative actions of government departments, specified statutory authorities, and local authorities.

The Act does not apply to Western Australian Courts of Law, the Auditor-General, the Parliamentary Privileges Act, or to any decision of the Cabinet or a Minister.

TABLE 9.6 – ALLEGATIONS RECEIVED(a)
YEAR ENDED 30 JUNE 1990
(Source: The Parliamentary Commissioner for Administrative Investigations)

	<i>Departments</i>	<i>Local Auth- orities</i>	<i>Statutory Auth- orities</i>
Number received	1,440	212	340
Uncompleted at 30/6/90	381	65	129
No jurisdiction	37	16	17
No action required	892	44	28
Not taken up formally, discontinued, or withdrawn	404	126	225
Rectified or settled	24	13	36
Sustained	18	8	18
Not sustained	6	—	3
Unable to be determined	14	5	5
Number processed	1,395	212	332

(a) A letter of complaint which concerns two organisations has been counted as two allegations. A letter of complaint signed by two or more complainants has been recorded as multiple allegations.

PRISONS

The Director of the Department of Corrective Services is responsible, subject to the control of the Minister, for the administration of prisons in Western Australia. Gaols administered jointly by the Department of Corrective Services and the Police Service, hold prisoners awaiting trial and some short-term prisoners. In addition, provision is made for holding some prisoners with very short sentences at police lock-ups throughout the State.

During 1991, prisoners at the old Fremantle Prison were progressively transferred to the new maximum security prison at Casuarina. The campus design of the new prison is intended to offer prisoners a more normalised environment where they will be able to assume greater responsibility for their actions. The design should also provide greater job satisfaction for staff.

TABLE 9.7 – NUMBER OF PRISONERS
DAILY AVERAGES 1989-90
(Source: Department of Corrective Services)

<i>Institution</i>	<i>Males</i>	<i>Females</i>	<i>Total</i>
Prisons	1,520.30	93.78	1,614.08
Police gaol— East Perth	9.73	—	9.73
Police lock-ups	n.a.	n.a.	146.39
Total	n.a.	n.a.	1, 770.20

LAW, ORDER, EMERGENCY SERVICES AND PUBLIC SAFETY

TABLE 9.9 - WESTERN AUSTRALIA POLICE SERVICE - CRIMES REPORTED AND OFFENDERS APPREHENDED: 1989-90

(Source: Western Australia Police Department)

Offence	Number of crimes		Offenders apprehended		
	Reported	Cleared	Male	Female	Total
Homicide	41	39	33	5	38
Indecent assault (excluding assault, sexual/agg)	1,398	1,178	258	1	259
Deprivation of liberty and abduction	153	110	113	3	116
Aggravated sexual assault	302	257	171	1	172
Sexual assault	166	126	68	-	68
Breaking and entering	49,603	6,227	6,309	619	6,928
Robbery	526	214	190	20	210
Serious assault	1,812	1,499	1,169	171	1,340
Assault police	841	800	595	115	710
Common assault	5,101	3,581	2,214	327	2,541
Stealing	63,872	13,000	7,523	3,555	11,078
Stolen motor vehicle	15,835	2,501	2,702	334	3,036
Fraud	9,776	5,003	1,205	424	1,629
Damage - over \$200	8,705	1,737	1,303	142	1,445
Damage - \$200 and less	14,758	3,013	2,114	529	2,643
Arson	121	40	41	1	42
Damage by fire	195	47	25	7	32
Unlawfully on curtilage/premises	3,705	1,020	926	111	1,037
Drugs	8,917	8,917	5,367	947	6,314
Bomb hoax	166	38	23	6	29
Other indictable offences	565	338	218	37	255
Total	186,558	49,685	32,567	7,355	39,922

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 trades training, including apprenticeships. Prison farms provide employment and some training in various aspects of agriculture. Full-time or part-time educational facilities are available at most prisons.

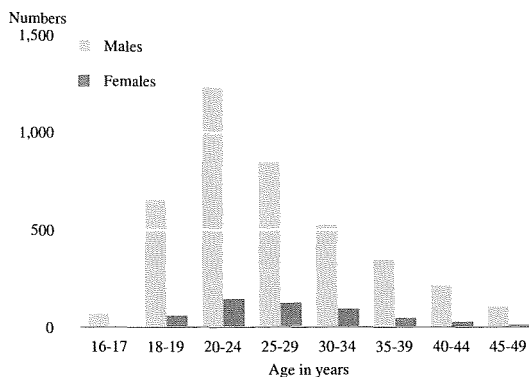
TABLE 9.8 - PRISON ACCOMMODATION AT 30 JUNE 1990

(Source: Department of Corrective Services)

Class of prison	Males	Females	Persons
Maximum or Remand	632	89	721
Medium	296	12	308
Low Medium	189	9	198
Minimum Open	581	27	608
Special purpose (a)	n.a	n.a	146
Total	1,698	137	1,981

(a) Includes inmates held in infirmary, maternity, observation, punishment, Section 43, special handling, and the Sexual Offenders Programme.

**DIAGRAM 9.1
PRISON RECEIVALS: DISTINCT PERSONS (a), BY AGE: 1989-90**



(a) Distinct persons refers to the individuals admitted during the year. A person received more than once during the period is counted only for the first time.
Source: Department of Corrective Services

EMERGENCY SERVICES

Western Australian Police Service

The Western Australia Police Service refers to the combined resources of the Western Australia Police Force (comprising sworn personnel) and the Western Australia Police Department (comprising Public Service staff).

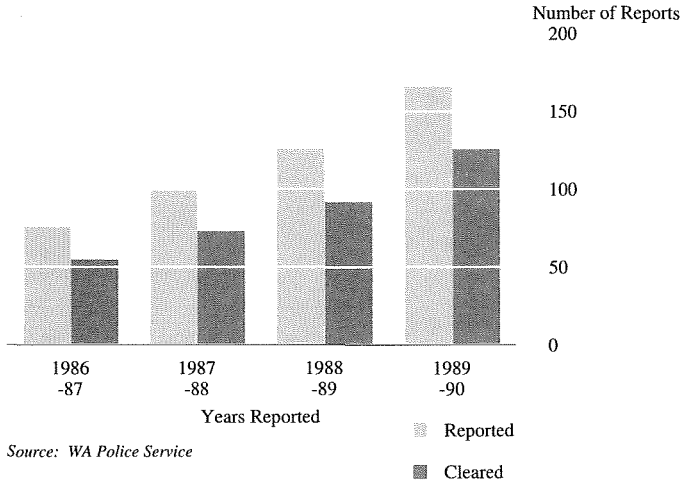
The objective of the Police Force is to be a major contributor to the safety and security of people in Western Australia by providing an effective and efficient service aimed at the maintenance of public peace and good order, and the detection and

prosecution of certain offenders. To meet that objective, the force is administratively supported by the Police Department.

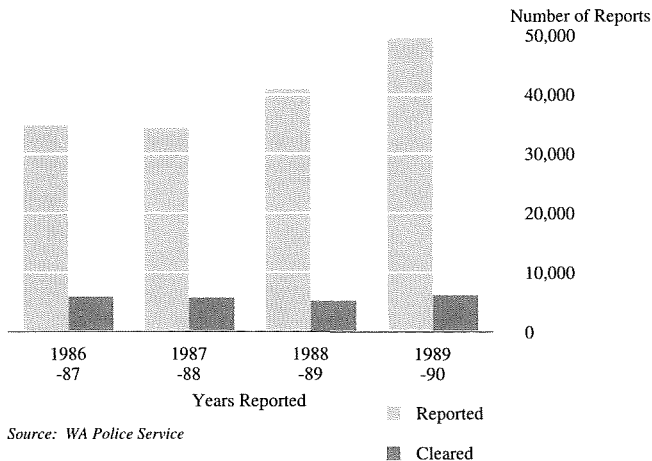
There were 3,905 officers in the Police Force at 30 June 1990 (including recruits in training) compared with 3,725 the previous year.

The increase in the number of reported sexual assault, and breaking and entering offences (as shown in graphs 9.2 and 9.3) indicate that schemes such as Neighbourhood Watch are vital in forging closer links between the police and the general public in an attempt to contain rising crime rates (see Public Safety).

**DIAGRAM 9.2
SEXUAL ASSAULTS REPORTED TO THE POLICE**



**DIAGRAM 9.3
BREAKING AND ENTERING CRIMES REPORTED TO THE POLICE**



Western Australian Fire Brigades Board

The Board is a Statutory Authority set up under the provisions of the *Fire Brigades Act 1942-1985*. Its mission is to: "Protect people and property within Western Australia from fire and the risk of fire, chemical and hazardous goods accidents, and to rescue people who are trapped". The Board exercises jurisdiction throughout the Metropolitan area, and in towns throughout Western Australia.

The Metropolitan Fire District has seventeen fire stations; fifteen are staffed by permanent brigade personnel only, one by permanent staff supported by volunteers and one wholly by volunteers. Permanent brigade personnel serve with volunteer brigade personnel in five large country centres and Armadale, and volunteer brigades provide town fire protection at eighty-two other centres. At 30 June 1989, the Board had 901 employees and there were 2,043 volunteer brigade officers and firefighters.

TABLE 9.10 - NUMBER OF INCIDENTS ATTENDED
(Source: Western Australian Fire Brigades Board)

Cause	1988-89		1989-90	
	No.	%	No.	%
False alarms	3,971		4,048	
Property and transport fires	2,358		2,462	
Rubbish, grass, or bush fires	4,971		5,278	
Special services (including rescue, assistance with hazardous conditions and salvage operations)	763		1,006	
Total incidents attended	12,063		12,794	

TABLE 9.11 - NUMBER OF INCIDENTS FOR TOP TEN CAUSES OF FIRE
(Source: Western Australian Fire Brigades Board)

Cause	1987-88		1988-89	
	No.	%	No.	%
Incendiary (a)	335		1,701	
Children misusing fire	879		849	
Carelessness with fire	448		489	
Inadequate control of open fire	315		443	
Short circuit	238		437	
Suspicious circumstances	1,307		393	
Rekindle/reignition of fires	246		216	
Unattended operation	100		215	
Part failure, leak, break	110		168	
Lack of maintenance	—		138	
Other electrical failure	112		—	

(a) With the introduction of training by the Fire Investigation Unit, resulting in more accurate reporting of incendiary, suspicious and undetermined causes the classifications have altered dramatically; in total this represents a 5.3% increase.

Bush Fires Board

The Bush Fires Board is constituted under the *Bush Fires Act 1954*. The Board's charter is to administer the provisions of the Bush Fire Legislation and to maintain a high standard of rural fire safety. The mission of the Bush Fires Board is to: 'Provide leadership to minimise the impact of fires on the rural community'.

The Bush Fires Board falls within the Emergency Services portfolio currently held by the Minister for Emergency Services, the Hon. Graham Edwards MLC.

The Bush Fires Board is responsible for the overall administration of the Bush Fires Act and Regulations, with day to day administration and the maintenance of Bush Fire Brigades being the responsibility of Local Government Authorities.

TABLE 9.12 - FIRES REPORTED
(Source: WA Bush Fires Board)

Cause	Rural		Outer Metropolitan	
	No.	%	No.	%
1989-90				
Escapes from burning off	33	11	61	18
Operation of plant and machinery	49	16	10	3
Children	13	4	31	9
Deliberate lighting	32	11	115	33
SEC lines	11	4	7	2
Camping and cooking fires	6	2	6	2
Railways	3	1	—	—
Rubbish tips	10	3	2	1
Lightning	54	18	3	1
Escapes from previous fires	5	2	11	3
Smokers	11	4	7	2
Household	3	1	9	3
Others	12	4	11	3
Unknown	62	20	71	21
Total	304	100	344	100
1990-91				
Escapes from burning off	12	2	8	1
Operation of plant and machinery	24	5	17	2
Children	7	1	31	4
Deliberate lighting	94	18	296	40
SEC lines	11	2	4	1
Camping and cooking fires	109	21	105	14
Railways	3	1	6	1
Rubbish tips	—	—	—	—
Lightning	68	13	—	—
Escapes from previous fires	9	2	32	4
Smokers	11	2	12	2
Household	2	0	6	1
Others	—	—	—	—
Unknown	179	34	223	30
Total	529	100	740	100

Volunteer Bush Fire Fighters are organized statewide into 813 Bush Fire Brigades with a membership in the order of 30,000 persons.

**St. John Ambulance Australia –
W.A. Ambulance Service Inc.**

The St. John Ambulance Australia - W.A. Ambulance Service Inc. is responsible for the road ambulance service and for teaching first aid throughout Western Australia. The Service also co-operates closely with the Royal Flying Doctor Service in transporting patients throughout the State.

The Service is a non-profit organisation whose 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. During 1990-91, the average response time to a Priority One (emergency) call was 8.8 minutes.

The Medic Alert Foundation, administered by St. John Ambulance in Western Australia, provides bracelets or necklets to persons who have hidden medical conditions which could be life threatening in emergency situations or where inappropriate drugs or medications are administered. Medic Alert membership, as at 30 June 1990, was 43,900.

**TABLE 9.13 – ST. JOHN AMBULANCE AUSTRALIA
W.A. AMBULANCE SERVICE INC. : 1990-91**

	<i>Number</i>
Patients transported by ambulance—	
Metropolitan area	67,800
Country areas	18,500
First aid classes—	
Students taught	29,750

**Royal Flying Doctor Service of Australia
(Western Australia Section) Incorporated**

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.

The radio network of the Royal Flying Doctor Service is regularly used in the work of Schools of the Air conducted by the Ministry of Education, and also for the transmission and receipt of telegrams and radio telephone calls. In addition, it may be used in connection with flood relief, in searching for lost parties and during cyclones or other emergencies.

State Emergency Service

The Western Australian State Emergency Service was established to assist the community in the event of emergencies and disasters. In 1985 it became part of the Western Australia Police Department where it remains as an identifiable entity. It is currently headed by a director who is a uniformed police officer at Chief Superintendent rank.

The state headquarters is located in the Perth suburb of Belmont with regional headquarters in Port Hedland, Carnarvon, Geraldton, Kalgoorlie, Northam, Bunbury, Albany and at two locations in the Perth Metropolitan area. The state and regional headquarters are staffed by permanent public service staff. Subsidiary units exist in most local government areas and are closely affiliated with their respective local government authorities. Staffing at this level, and to some extent at regional headquarters level, is by volunteers.

The volunteer staff of the organisation respond to calls from the police and public to assist in emergency situations of various types including searches for lost people, major vehicle accidents, floods, building collapses, cyclones, storm surges and a number of minor events. They also provide support for services in emergencies as and when required.

PUBLIC SAFETY

Neighbourhood Watch

Neighbourhood Watch is a scheme where people look after their neighbours' property by reporting suspicious activity to police, and increasing security awareness in their areas.

This program is organised on a suburb by suburb basis, each suburb having a separate scheme. It is managed by Area Co-ordinators who are assisted by Zone, Block and Group representatives. Selected Area Co-ordinators are regularly briefed at the Office of Crime Prevention.

Since the pilot scheme was launched in Bunbury in 1982, Neighbourhood Watch has gained sponsorship from State Government Insurance Office, and by June 1990 covered approximately 42 percent of the State's population

Rural Watch

Rural Watch is designed to look after people living on farms and other rural properties. The scheme has similiar aims to Neighbourhood Watch; to reduce or prevent crime by encouraging neighbours to report suspicious activity to police.

Rural Watch was tested in 1988 in Kojonup, and at June 1990 had 66 committees covering 30 percent of the non-metropolitan population.

Constable Care

Constable Care is a 'gentle giant with a cheery smile'. He is used to provide messages teaching as many children as possible about road and other safety guidelines. Constable Care is introduced in classrooms, at fetes, fairs and at shopping centre displays. Constable Care Safety Talks are given on water safety, safety in the home, and stranger danger amongst other topics.

The Royal Life Saving Society

The purposes of The Royal Life Saving Society are to prevent the loss of life and to promote safe participation in water related pursuits.

A modern interpretation of the aims of the Society is:

to promote safe participation in water activity through education in all aspects of water safety, personal survival, lifesaving and resuscitation.

to raise public awareness of the Society and its work and encourage participation in its formal educational programs.

to encourage participation in a wide range of water related activities which will be of benefit in the performance of lifesaving skills.

to promote educational classes, competitions and lifeguarding activities to help further the lifesaving work of the Society.

The WA Branch of The Royal Life Saving Society pursues these aims by actively promoting water safety through swimming, lifesaving and resuscitation classes.

The Society provides the infrastructure for the Ministry of Education, In-term and Vacation Swimming programs with all instructors for the higher awards being qualified with the Society.

TABLE 9.14 – ROYAL LIFE SAVING SOCIETY OF AUSTRALIA (WA BRANCH) AWARDS ISSUED: 1990-91

	<i>Number</i>
Lower awards (Water Discovery to Accompanied Rescue)	148,950
Higher awards (Bronze Star to Senior Resuscitation)	3,957
Pool life guard	68
Junior Instructor	81
Instructor	240
Total awards issued	153,296

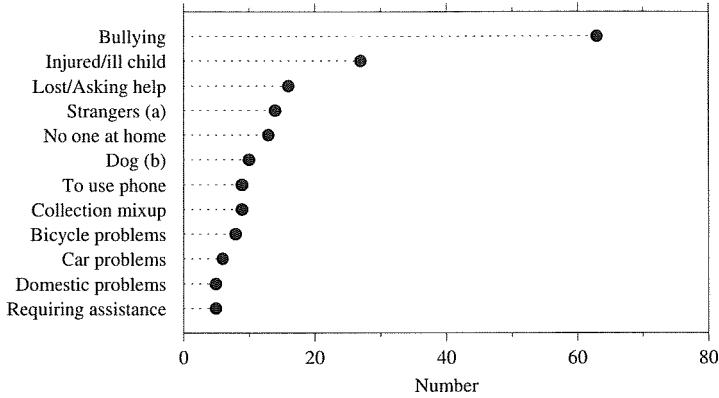
Safety House Association

The Safety House Association of Western Australia Incorporated operates the Safety House program which is a community program developed as a preventative measure to safeguard children.

It was introduced into Western Australia in 1983 and has expanded and developed to where it now offers protection for 100,000 primary school children.

Safety Houses are identifiable by a yellow and black triangular smiling house that is glued onto the letterbox.

DIAGRAM 9.4
MAJOR USES OF SAFETY HOUSES IN 1990



(a) includes being approached or followed by strangers (b) includes being frightened or attacked by dogs
Source: Safety House Association

REFERENCES

ABS Publications

Court Statistics: Higher Criminal Courts, Western Australia (4501.5)

Court Statistics: Courts of Petty Sessions, Western Australia (4502.5)

Court Statistics: Children's Court, Western Australia (4503.5)

Other Publications

Aboriginal Legal Service of Western Australia (Inc.) Annual Report 1990-91

Crown Law Department of Western Australia Annual Report for the year ended 30 June 1991

Legal Aid Commission of Western Australia Annual Report 1989-90

St. John Ambulance Australia (Western Australian Commandery) 99th Annual Report 1990/91

Report of the Parliamentary Commissioner for Administrative Investigations 1990

Royal Flying Doctor Service of Australia (Western Australian Section) Incorporated 56th Annual Report 1991

Western Australia Police Service Annual Report 1990

Western Australian Department of Corrective Services Statistical Report 1989

Western Australian Fire Brigades Board Annual Report 1989

Chapter 10

EDUCATION AND SCIENCE

EDUCATION	10-1
Pre-primary Education	10-1
Primary and Secondary Education	10-1
Post Secondary Education	10-3
Higher Education	10-5
Commonwealth Government Assistance for Education	10-8
Expenditure on Education by State and Local Authorities	10-9
SCIENCE	10-10
Perth Observatory	10-10
Chemistry Centre, Western Australia	10-10
Commonwealth Scientific and Industrial Research Organization	10-10
Botanic Garden	10-11
References	10-11

Chapter 10

EDUCATION AND SCIENCE

In Western Australia, education at pre-primary, primary and secondary levels is provided at government schools administered and staffed by the Education Ministry and at non-government schools, most of which are conducted by the principal religious bodies. Technical and further education is offered by the Department of Technical and Further Education, and by three independent regional colleges. The latter also provide higher education facilities. Additional higher education is available through four State universities and one private university.

Education

PRE-PRIMARY EDUCATION

Before commencing primary school, a child may receive pre-primary education at either a government or non-government school. A child may also attend a government staffed community pre-school or an independent pre-school. Attendance is optional at all centres. Children commence pre-primary education during the year in which they attain five years of age, although they may enrol during their fourth year where vacancies exist.

Every person conducting a pre-school centre is required to hold a permit issued by the Minister for Education and all authorised pre-school centres are subject to inspection by an officer of the Ministry.

PRIMARY AND SECONDARY EDUCATION

Children may commence school at the beginning of the year in which they attain the age of six years. Except in special circumstances, attendance is then compulsory to the end of the year in which the child attains the age of fifteen years. Instruction in primary school is provided over a seven-year period. A child who makes normal progress completes the course at the age of twelve years and may then enter secondary school.

Secondary education is provided over a period of five years — from Year 8 to Year 12. Generally, students may leave at the end of Year 10 or continue through to Year 12 to attain a Certificate of Secondary Education.

TABLE 10.1 – PRE-PRIMARY EDUCATION: JULY

	1988	1989	1990
NUMBER OF CENTRES			
Government—			
Pre-primary	506	511	526
Community pre-school	134	133	128
Non-government—			
Pre-primary	92	103	121
Independent pre-school	24	22	22
Total	756	769	797
NUMBER OF TEACHING STAFF(a)			
Government	594	602	573
NUMBER OF CHILDREN			
Government—			
Pre-primary	23,721	25,215	26,081
Community pre-school	6,859	6,835	6,281
Non-government—			
Pre-primary	2,810	3,078	3,869
Independent pre-school	1,312	1,251	1,126
Total	34,702	36,379	37,357

(a) Numbers shown are for full-time equivalents rounded to the nearest whole number.

EDUCATION AND SCIENCE

TABLE 10.2 – GOVERNMENT AND NON-GOVERNMENT SCHOOLS, FULL-TIME STUDENTS CLASSIFIED ACCORDING TO AGE (a) JULY 1990

Age last birthday (years)	Government schools (b)	Non-government schools (c)	Total
Under 6	9,752	2,291	12,043
6	20,669	5,173	25,842
7	20,334	5,188	25,522
8	20,436	5,223	25,659
9	19,619	5,039	24,658
10	19,210	5,071	24,281
11	19,061	5,365	24,426
12	18,125	6,438	24,563
13	17,013	7,141	24,154
14	17,260	6,907	24,167
15	15,058	6,506	21,564
16	11,036	5,591	16,627
17	5,599	2,883	8,382
18 and over	2,340	759	3,099
Total	215,412	69,575	284,987

(a) Excludes pre-primary and technical school students. (b) Includes students attending education support schools, centres and units. (c) Includes students attending special schools.

Western Australia also has a number of Senior Colleges run by the Ministry which provide 'second chance' secondary education for those people who left the school system before achieving their goals.

In Western Australia distance education operates as an adjunct to the general school system. The Distance Education Centre of the Education Ministry provides schooling to a wide variety of groups in the community who are unable to attend school. These groups include children living in remote areas, isolated Aboriginal communities, students (adults and children) who for various medical and social reasons are unable to attend normal schools, students at smaller schools who cannot have maximum choice of subjects because of the small size of the teaching staff, prisoners in gaols, students travelling interstate and overseas with their parents, and adults seeking a second chance.

A feature of the service offered by the Distance Education Centre is the field support given to students by visiting tutors and teaching staff as well as its links with the five Schools of the Air.

Schools of the Air are conducted through the radio network of the Royal Flying Doctor Service from bases at Carnarvon, Derby, Kalgoorlie, Meekatharra and Port Hedland. Materials provided

by the Distance Education Centre are used to supplement tuition.

TABLE 10.3 – GOVERNMENT SCHOOLS: JULY

	1988	1989	1990
NUMBER OF SCHOOLS			
Primary schools	534	539	548
Education support schools/centres	57	61	62
Secondary schools—			
District high schools	59	59	57
High schools	5	6	6
Senior high schools	83	83	85
Senior colleges	2	2	2
Distance Education Centre	1	1	1
Total	741	751	761
NUMBER OF TEACHING STAFF (a)			
Engaged in teaching duties—			
Primary	6,657	7,092	7,302
Secondary	5,869	5,939	6,117
Education support (b)	354	370	400
Total	12,880	13,401	13,819
NUMBER OF FULL-TIME STUDENTS			
Level of education—			
Primary (c)	134,181	137,669	140,175
Secondary—			
Years 8, 9 and 10 (c)	51,365	51,227	51,667
Years 11 and 12	22,003	20,965	20,983
Senior colleges	1,387	1,405	1,549
Other (d)	1,132	1,178	1,038
Total	210,068	212,444	215,412
Males	108,277	109,530	110,930
Females	101,791	102,914	104,482

(a) Numbers shown are for full-time equivalents rounded to the nearest whole number. (b) Excludes teachers working in education support units attached to primary and secondary schools. (c) Includes ungraded and education support students (students with intellectual disability) who attend primary or secondary schools. (d) Students attending education support schools and centres who cannot be assigned a level.

Primary school curricula

The curricula of both the primary and secondary schools are organised into seven study areas: English, Languages and Communication; Mathematics; Science and Technology; Social Studies; Practical and Creative Arts; Personal and Vocational Education; and Physical Education.

The curriculum in Years 1 to 3 of primary school focuses on the development of language abilities and functional literacy and numeracy. Middle and upper primary students study an integrated curriculum which covers the seven broad categories.

TABLE 10.4 – NON-GOVERNMENT SCHOOLS: JULY
(Source: National Schools Statistics Collection)

	1988	1989	1990
NUMBER OF SCHOOLS			
Primary	143	139	143
Secondary	39	38	39
Primary/secondary combined	56	60	60
Special	5	4	2
Total	243	241	244
NUMBER OF TEACHING STAFF (a)			
Primary	1,692	1,757	1,861
Secondary	2,352	2,444	2,515
Special	25	25	(b)—
Total	4,069	4,226	4,376
NUMBER OF FULL-TIME STUDENTS			
Level of education—			
Primary (c)	34,012	35,478	36,735
Secondary—			
Years 8, 9 and 10 (c)	20,346	20,888	21,466
Years 11 and 12	10,896	11,056	11,374
Special	76	81	(b)—
Total	65,330	67,503	69,575
Males	32,552	33,686	34,660
Females	32,778	33,817	34,915

(a) Numbers shown are for full-time equivalents rounded to the nearest whole number. (b) From 1990 students and the staff from special schools have not been identified separately. (c) Includes students in ungraded classes.

Secondary school curricula

The Secondary Education Authority (SEA) prepares syllabuses for subjects in which students will be assessed in both Government and Non-Government schools. It assesses student performance, accredits courses, issues certificates of student performance, and collaborates and consults with secondary and post-secondary institutions. The SEA is responsible to the Minister of Education for all of these functions.

Lower school students, years 8 to 10, who study under the Unit Curriculum system receive the Certificate of Lower Secondary Studies at the completion of Year 10. The Unit Curriculum is designed to ensure a general and balanced education whilst providing scope for a choice of units from those offered. Each unit is intended to take about forty hours. Generally, students are expected to study four units of English and Mathematics in each year and to complete at least one unit from each of the seven curriculum components.

The Certificate of Secondary Education is awarded to students who have completed at least one SEA approved Year 11 or Year 12 course. Students in these years study year-long courses selected from 150 accredited courses and a range of registered courses approved by the SEA. Assessment is school-based and grades in accredited courses are moderated by the SEA to ensure comparability across all schools in the State. Grades in registered courses are not moderated.

Agricultural education in the form of full-time residential courses is available at a number of centres. Day instruction is also provided at a number of secondary schools. Some private schools offer courses in agriculture.

In the twenty-eight Year 12 accredited courses which can contribute to a student's Tertiary Entrance Score (called TES subjects) an external examination is conducted. A numerical score (Scaled Mark) for TES subjects is reported on the Certificate of Secondary Education, as well as a grade. This numerical score is a 50:50 combination of the standardised moderated school assessment and the standardised examination mark. The combined mark is scaled using the Australian Scholastic Aptitude Test (ASAT).

Entrance to higher education institutions is based on TES, which is a weighted average of scores in a student's best three, four or five TES subjects. Ten per cent of the student's ASAT score is also included. The maximum TES is 510. The student must also have satisfied the requirements for Secondary Graduation, satisfactory performance and English Language competence. Most institutions also allow for some form of mature age assessment and entry.

POST SECONDARY EDUCATION

The Western Australian Higher Education Council (WAHEC)

WAHEC provides a forum for the discussion of matters relating to higher education in Western Australia and for advising the State Minister for Education. The Western Australian Office of Higher Education supports the operation of the Council through the provision of administrative, secretarial and research services and, as a government department, undertakes a range of activities which facilitate the provision of higher education in Western Australia.

Technical and Further Education

The Department of Technical and Further Education (TAFE) coordinates the provision of technical and further education in Western Australia, although three independent colleges also offer TAFE programs (details of their operations are shown later in this chapter).

The Department's mission is 'to meet client needs for skills formation with quality services which contribute to economic and social development'. The term 'skills formation' integrates individual and organisational learning, including initial formal education, induction, continuous on-the-job learning, recurrent off-the-job learning and continuous personal development.

TAFE is geared to provide skills formation programs which meet industry needs identified by the State Employment and Skills Development Authority.

Skills formation programs are provided for managers, supervisors, technicians, skilled tradespersons, semi-skilled personnel and other kindred support staff required by industry and commerce.

TABLE 10.5 - TECHNICAL AND FURTHER EDUCATION

	1988	1989	1990
NUMBER OF INSTITUTIONS			
Colleges	16	16	9
Evening technical schools	8	8	8
Technical centres	99	100	85
NUMBER OF TEACHING STAFF (a)			
Colleges	1,767	1,806	1,602
Evening technical schools	61	69	—
Technical centres	89	85	—
NUMBER OF STUDENT ENROLMENTS (b)			
Colleges	83,647	85,636	82,893
Evening technical schools	23,323	26,307	26,525
Technical centres	20,934	20,613	19,280

(a) Full-time equivalent. Following reorganisation of the Department, staff of Evening Technical Schools and Technical Centres are treated as part of the college responsible for the area. (b) Each student is counted only once, even though they may have enrolled in more than one course, or on more than one occasion during the year.

These programs also provide an alternative to those of the upper secondary schooling system. Included are vocationally related courses, bridging and link courses for young people aged fifteen to nineteen years of age. Increasingly, TAFE programs are becoming available as part of the upper secondary school curriculum. Further

services provided include specialist and mid-career training and retraining, and a range of cultural, recreational and leisure programs for the State's adult population.

Short intensive skills training and retraining courses are also provided to meet specific vocational needs, such as small business management. Since 1989, TAFE has expanded its user-pays capacity for meeting industry needs through the creation of the TAFE Customised Training Agency. Business managers and labour market training consultants are appointed to metropolitan colleges.

The TAFE Counselling Service provides educational, vocational and general guidance to students and prospective students of TAFE. A limited range of consultancy services are also available to industry and commerce, in areas such as staff selection, training and evaluation.

The Department of TAFE, in conjunction with a number of Commonwealth Government agencies, provides a range of courses to meet the particular needs of women, Aborigines, migrants, disabled persons and adults with literacy problems. The major objective of these programs is to enhance the students' prospects of gaining employment or pursuing further education and training.

The Department of Technical and Further Education has developed a variety of mechanisms to make its programs more accessible to students. It operates a network of four metropolitan colleges, five regional colleges (including the TAFE External Studies College located in West Perth) and centres in Broome and Kununurra, which offer a wide range of courses in the days and evenings.

The four metropolitan colleges are multi-campus institutions aligned to broad geographic and economic regions. They also include seven metropolitan evening technical schools which operate from local community and high school premises. Although some evening technical centres offer daytime classes, most cater for part-time evening students.

Non-metropolitan services are delivered by regional colleges located in Albany, Bunbury, Midland and Geraldton, and centres in Broome and Kununurra. Technical centres, including full-time TAFE centres in several major country towns, are distributed throughout the rural areas of the State and are controlled by the Regional College responsible for the area. These facilities

provide for the needs of the local communities whenever there is sufficient demand for classes. For those students who have difficulty in attending institutional based programs, the TAFE External Studies College provides a comprehensive range of courses.

The TAFE Rural Coordinator Scheme operates in several country centres, and serves the needs of the local populations for vocational programs by harnessing the resources and expertise in the regions.

The Colleges

Multi-level, post-secondary education colleges have been established by the Minister for Education, on the advice of the former Western Australian Post-Secondary Education Commission. Such colleges may, with the Minister's approval, provide advanced education, technical and further education, and education at other levels in specified circumstances.

Hedland College and Karratha College are situated in the Pilbara region in the north-west of the State and Kalgoorlie College is situated in the Eastern Goldfields region in the south-east of the State.

The Hedland, Karratha and Kalgoorlie Colleges provide courses mainly in the technical and further education sector. Currently the Colleges, together with regional colleges of TAFE, provide higher education courses under contract to Perth-based institutions. 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.

HIGHER EDUCATION

The Universities

Western Australia has four government universities. A private university, the University of Notre Dame Australia, commenced receiving students during the early part of 1992.

Western Australian university study programs offer graduate and postgraduate diplomas, bachelor, honours, masters and doctoral degrees. Bachelor degrees vary between three and six years duration, some requiring successful completion of the first year of another course, others the completion of that course. Honours degrees generally entail an additional year of study.

Study programs are designed to provide students with the degree of specialisation necessary for an increasingly demanding technological world. All courses are accredited and listed in the Register of Australian Tertiary Education.

All Universities seek to foster strong links with the community by providing research and consultancy services, implementing training programs for industry and offering a broad variety of community courses.

The attraction of full fee-paying overseas students has become increasingly important to Universities. Most of these students come from Malaysia, Singapore, Hong Kong, Indonesia, and the People's Republic of China, although a large number of other countries are represented.

Edith Cowan University

The University, (formerly the Western Australian College of Advanced Education), was established on 1st January 1991 as a multi-campus institution with over 15,000 students and 160 programs of study. It is one of Australia's largest degree awarding institutions. Academic courses are offered at the Churchlands, Mount Lawley, Joondalup and Bunbury Campuses. The University's Claremont Campus is used for a variety of non-teaching purposes, including conferences. The Western Australian Academy of Performing Arts is an academy of the University, and is located on the Mount Lawley Campus.

The University's name perpetuates the memory of an outstanding Western Australian citizen. As the first woman of an Australian parliament, Edith Cowan, OBE (1861-1932), was concerned with many social issues including the advancement of women, nursing, education and law.

TABLE 10.6 - EDITH COWAN UNIVERSITY - NUMBER OF STUDENTS

(Source: Department of Employment, Education and Training)

	1989	1990	Per cent Change
Field of study—			
Arts	2,730	2,948	8.0
Business	3,864	4,195	8.6
Education	4,692	4,634	-1.2
Health	1,373	1,572	14.5
Law	70	103	47.1
Science	1,052	1,167	10.9
Total	13,781	14,619	6.1

The University is vocationally orientated, providing multi-level courses to meet specific community needs for 30 per cent of the State's university students. The courses are flexible in approach to entry requirements, teaching methods, modes of study and design.

Women represent 62 per cent of the total student body, of which 40 per cent are enrolled in the School of Education.

Fifty-five per cent of students pursue full-time studies, while 33 per cent and 12 per cent study part-time and externally, respectively.

In 1989, Edith Cowan University attracted more mature age undergraduate students than any other tertiary institution in Australia. Over 3,000 mature age students entered the institution, nearly half of all mature age undergraduate students in Western Australia. This intake represented 60 per cent of the University's total undergraduate enrolment.

The Western Australian Academy of Performing Arts enjoys a semi-autonomous brief within the University. Administratively, it is treated as a school of the University having access to its resources and facilities. The purpose of the Academy is to prepare persons who seek full-time professional employment in the performing arts.

The Academy is organized in two major divisions: the Western Australian Conservatorium of Music providing courses in classical music and jazz; and, the School of Dramatic Arts providing courses in arts management, dance, musical theatre, media performance, production and design, and theatre.

The University of Western Australia (UWA)

The UWA was established in 1911 and teaching began in 1913. The University is located close to the city of Perth, adjacent to the Swan River.

The University has five residential colleges and a hall of residence for students, an art gallery, a museum of geology and a museum of anthropology. There are also five theatres, a music auditorium and Winthrop Hall which is used for arts attractions, mainly orchestral and choral works. These venues are used by arts practitioners from within and outside the University and are used particularly during the annual Festival of Perth.

University Extension is responsible for community education activities, of which the annual Summer

School, with its long tradition, is an important component.

TABLE 10.7 - THE UNIVERSITY OF WESTERN AUSTRALIA - NUMBER OF STUDENTS
(Source: Department of Employment, Education Training)

Field of study—	Per cent		
	1989	1990	Change
Agriculture	283	286	1.1
Architecture	200	209	4.5
Arts	2,691	2,770	2.9
Business	1,991	2,119	6.4
Education	388	452	16.5
Engineering	898	1,016	13.1
Health	899	938	4.3
Law	690	750	8.7
Science	2,150	2,261	5.2
Total	10,190	10,804	6.0

Murdoch University

Established in 1973, the University is situated some 13km from Perth, and comprises over 220 hectares.

Murdoch is one of the fastest growing of Western Australia's universities having doubled in size in the 5 years since 1985.

The gardens are a feature of the University and some 60,000 native trees, plants and wildflowers have been planted which attract many native birds. There is also a Chinese garden, the materials for which were donated by Chinese communities in Asia. Craftspeople from Taiwan visited Perth to assemble the garden.

On campus, accommodation is provided for 430 students. Student Village provides self-service accommodation with each student having a single study/bedroom. Groups of students share common kitchen, dining and lounge areas.

The University admitted full fee-paying overseas students for the first time in 1987, with an intake of ninety-eight students. In 1990, there were 644 full fee-paying overseas students enrolled in several areas of study, including commerce, computer science and communication studies. In addition, there were a number of exchange students from the USA studying under the Study Abroad Scheme. The University is an Australasian study centre for the New York based Centre for International Educational Exchange.

EDUCATION AND SCIENCE

Professional development programs are provided and the University has a very successful conference office.

TABLE 10.8 - MURDOCH UNIVERSITY - NUMBER OF STUDENTS

(Source: Department of Employment, Education and Training)

Field of study—	Per cent		
	1989	1990	Change
Agriculture	43	51	18.6
Arts	1,983	2,074	4.6
Business	1,345	1,528	13.6
Education	655	676	3.2
Engineering	63	75	19.0
Law, Legal Studies	—	115	—
Science	1,275	1,390	9.0
Veterinary Science	280	313	11.8
Total	5,644	6,222	10.2

Curtin University of Technology

The main campus of the University is set on 112 hectares of landscaped parkland in the Perth suburb of Bentley, 10 kilometres from the city centre. The Schools of Occupational Therapy, Physiotherapy and Podiatry are located in the Royal Perth (Rehabilitation) Hospital grounds at Shenton Park. Specialist campuses are located at the Muresk Institute of Agriculture in the Avon Valley near Northam and two campuses of the Western Australian School of Mines are at the gold mining centre of Kalgoorlie and at the coal mining town of Collie.

Curtin is concerned with technology and the range of ideas, operations and materials by which people apply knowledge to real situations. The University fosters close links with the local, national, and international community through its teaching programs and research and development activities.

Western Australian School of Mines. The Western Australian School of Mines comprises the Departments of Mineral Exploration and Mining Geology; Minerals Engineering and Extractive Metallurgy; and Mining Engineering and Mine Surveying. Associate diploma, bachelor degree, postgraduate diploma and masters degree courses are offered.

The increasing emphasis on applied research and consultancy within the School led to the establishment of the Brodie-Hall Mining Research and Consultancy Centre in Kalgoorlie.

TABLE 10.9 - CURTIN UNIVERSITY OF TECHNOLOGY - NUMBER OF STUDENTS
(Source: Department of Employment, Education and Training)

Field of study—	Per cent		
	1989	1990	Change
Agriculture	376	370	-1.6
Architecture	476	572	20.2
Arts	2,495	2,919	17.0
Business	4,014	4,701	17.1
Education	1,118	1,241	11.0
Engineering	1,673	1,792	7.1
Health	3,453	3,708	7.4
Science	1,259	1,526	21.2
Total	14,864	16,829	13.2

The Collie Federated School of Mines is also a campus of the Curtin University of Technology where the first year of the degree programs is being run as well as an Associate Diploma in Coal Mining Technology. The development of teaching and research facilities at Collie has consolidated the role of the School and expanded its base as a South-West Regional/Bentley Campus research centre.

Muresk Institute of Agriculture. Muresk Institute of Agriculture is situated near Northam. Muresk offers a range of courses which allows its graduates to fill almost any role in the rural industries.

The campus of some 1,800 hectares contains a cereal and sheep farm. Research facilities include laboratories, glass and tunnel houses and the Clyde Smith Rural Management Centre which houses the Rural Management Unit and its wide range of microcomputer hardware and software. Through this unit and with the establishment of the Farm Management Foundation of Australia (Inc.) on the campus, Muresk has expanded its applied research profile in the agricultural business field. This research concentrates on the development and application of new technologies in both broadacre and intensive farming systems and on assisting farmers to incorporate these developments into decision support systems.

Numerous short courses are held at Muresk, including in-service training schools for personnel of the Department of Agriculture and for field and service staff of agricultural firms.

EDUCATION AND SCIENCE

TABLE 10.10 – UNIVERSITY STAFF, APRIL 1990
(Source: Western Australian Office of Higher Education)

	<i>Edith Cowan (a)</i>	<i>UWA</i>	<i>Murdoch</i>	<i>Curtin</i>	<i>Total</i>
NUMBER OF STAFF					
Teaching—					
Full-time—					
Professor/Vice-chancellor (b)	1	66	23	32	122
Associate professor,	30	97	41	59	227
Senior lecturer	88	191	80	155	514
Lecturer	355	176	71	321	923
Assistant lecturer/tutor/demonstrator	45	83	58	96	282
Other	—	1	170	—	171
<i>Total</i>	<i>519</i>	<i>614</i>	<i>443</i>	<i>663</i>	<i>2,239</i>
Part-time—					
Professor	—	2	—	1	3
Associate professor	—	3	—	—	3
Senior lecturer	—	8	—	6	14
Lecturer	9	6	3	26	44
Assistant lecturer/tutor/demonstrator	3	10	12	13	38
Other	—	—	19	—	19
<i>Total</i>	<i>12</i>	<i>29</i>	<i>34</i>	<i>46</i>	<i>121</i>
Research staff—					
Full-time	4	310	80	35	429
Part-time	—	52	19	5	76
Other—					
Full-time	598	1,111	263	939	2,911
Part-time	103	152	26	97	378
Total staff	1,236	2,268	865	1,785	6,154

(a) Figures as shown relate to the Western Australian College of Advanced Education. (b) Includes Vice-chancellors, Deputy vice-chancellors, Principals and Professors.

The Tertiary Institutions Service Centre (Incorporated)

The Tertiary Institutions Service Centre (Incorporated) processes applications for admission to the higher education institutions and carries out such other functions as agreed by the institutions.

Applicants seeking admission to a first year undergraduate course (or later years in the case of Curtin University of Technology, Murdoch University and the University of Western Australia) or to a Diploma in Education course apply through a joint system operated by the Centre. Applicants list four preferences from all the higher education courses available and offers are then made by the institutions for each course on the basis of a ranked order.

In January 1991, 8,667 places were offered during the first round to 19,860 students who had applied to study at University. In 1990, 8,690 places were offered to 18,145 applicants.

The Higher Education Contribution Scheme

In 1989, the Commonwealth Government introduced the Higher Education Contribution Scheme for students enrolled at higher education institutions.

Students were liable for an annual course charge of \$1,882 in 1990. They are able to pay this charge through tax instalment deductions or as a payment in advance with a 15 per cent discount. No payment is required until personal annual income reaches \$23,583 at which time payment commences at the rate of 1 per cent of taxable income. For annual incomes of \$26,799 to \$37,518 the rate is 2 per cent and for those of \$37,519 and over, it is 3 per cent.

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 in Western Australia. The Commonwealth Government provides supplementary finance to the State and is responsible for the total funding of the four universities. The Commonwealth also has special responsibility for Aboriginal people and for migrants, as well as the power to provide assistance for students.

The National Board of Employment, Education and Training was established in 1988, one function being the provision of advice and information on education to the Commonwealth Government.

Financial assistance for students

Assistance for Isolated Children Scheme. This scheme assists families whose homes are too remote for normal daily access to government schools. It provides allowances for eligible students living away from home to attend school, for students studying by correspondence or when a second home is maintained for student occupation. The scheme also covers children regarded as isolated owing to medical disability.

AUSTUDY. In 1987, AUSTUDY replaced the Tertiary Education Assistance Scheme, Adult Secondary Education Allowance Scheme, and the Secondary Allowances Scheme as the main scheme for community-wide student assistance.

TABLE 10.11 - COMMONWEALTH GOVERNMENT ASSISTANCE FOR EDUCATION: WESTERN AUSTRALIA (\$'000)

(Source: Commonwealth Budget Paper Number 4)

Nature of assistance	1989-90	1990-91
Assistance of a revenue nature—		
Higher education	220,737	242,782
Technical and further education	11,858	12,219
Government schools	69,609	74,842
Non-government schools	94,316	99,437
Joint school programs	4,517	5,147
National Policy on Languages	690	771
Aboriginal advancement	2,782	14,085
Cost Escallation Allowance	—	16,533
Total	404,509	465,816
Assistance of a capital nature—		
Higher education	19,434	31,836
Technical and further education	15,414	18,007
Government schools	17,819	17,960
Non-government schools	4,132	4,813
Aboriginal education	1,103	—
Total	57,902	72,616
Total	462,411	538,432

Subject to eligibility criteria, AUSTUDY provides support for full-time students 16 years of age and older studying secondary, technical and further education, undergraduate and some postgraduate courses at universities and colleges of advanced education. Higher degree students, who are eligible for postgraduate awards do not qualify for AUSTUDY.

TABLE 10.12 - AUSTUDY: WEEKLY RATES OF BENEFIT: JANUARY 1991

	\$
Student living at home—	
Secondary and tertiary—	
16-17 years of age	62.05
18 years of age and over	74.55
Student not living at home or independent (a)—	
16-17 years of age	102.40
18 years of age and over	113.25

(a) Not available for secondary students under the age of 19.

Postgraduate Award Scheme. This scheme provides awards to selected higher degree students undertaking masters and doctor of philosophy programs at Australian universities and colleges of advanced education. They are made on academic merit, are taxable and, although not income-tested, are not available if a certain level of income is received from other awards.

EXPENDITURE ON EDUCATION BY STATE AND LOCAL AUTHORITIES

Financial Assistance for Schools and Students

The State Government provides financial aid to non-government schools by means of a direct annual grant for each student enrolled. The grant incorporates a needs component and separate rates are applicable to pre-primary, primary and secondary students.

Assistance is also given to non-government schools by way of low interest loans and interest subsidies on moneys borrowed to help meet expenditure on new residential accommodation, classrooms and associated facilities and school site acquisition. The scheme also applies to the provision of teacher accommodation north of the Twenty-Sixth Parallel.

The State Government provides an allowance to parents eligible for the family allowance, of \$50 for each primary pupil and \$100 for each secondary student, to assist in meeting education costs.

A 'boarding away from home' allowance, to supplement the isolated children's allowance paid by the Commonwealth Government, is also provided. An allowance of \$500 per annum is paid to an isolated child who is obliged to live away from home to attend school.

The State Government Additional Assistance and Clothing Assistance Schemes are also available to needy parents who have children in Years 8 to 12 aged under 16. These schemes aim to assist families on low incomes to meet the costs of books, materials and clothing.

Science

PERTH OBSERVATORY

The Perth Observatory, previously a research institution with limited public access, has now changed focus to more readily cater for the public. Emphasis is also being placed on the needs of schools.

The Education Program includes night tours, the demand for which has resulted in the tours being booked out at least six months in advance. A Sunday afternoon tour is also popular. Other daytime tours for school groups are usually booked for the week of the full moon, when Observatory staff are not engaged in observing programs. Participants see astronomical objects at first hand through Observatory telescopes.

In addition to 'on site' tours, the acquisition of two portable 20 cm telescopes has enabled Observatory staff to conduct field nights at remote locations. Typical interested groups include primary and high schools, as well as service organisations.

An annual *Astronomical Handbook* is produced, and a new Museum display gives an insight into past and present astronomy.

On the scientific side of astronomy, collaboration has continued with overseas organisations in cooperative observing programs.

A joint initiative with the local universities has seen the formation of the Perth Astronomical Research Group. The primary objective of this group has been the establishment of a fully automated telescope equipped with a Charge Coupled Device camera.

The Observatory has four telescopes operational on site. These include the 61 cm Lowell-Perth reflector, the 33 cm Astrographic Refractor, the University of Western Australia 45 cm reflector, and a 35 cm Celestron reflector. The Celestron has been used mainly as a 'visitors' telescope, and

several amateur astronomers have undertaken 'deep sky' photography programs.

CHEMISTRY CENTRE, WESTERN AUSTRALIA

The Chemistry Centre (WA), formerly the Government Chemical Laboratories, is a division of the Department of Mines and provides a wide range of scientific, analytical and consultancy services to government, industry and the general public. The Centre assists in mineral processing, soil and fertiliser analysis, agricultural trials, water quality assessment, food nutritional quality evaluation, forensic science, environmental monitoring, chemical aspects of occupational and physical environments, and materials testing. It undertakes research and development in all these areas.

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION

The Commonwealth Scientific and Industrial Research Organization (CSIRO), the largest scientific research organisation in Australia, is a statutory body employing some 7,000 staff in more than 100 laboratories and field stations throughout Australia. Several laboratories and field stations, employing around three hundred staff, operate in Western Australia.

The work of the CSIRO is carried out within six institutes: Information and Communications Technologies; Industrial Technologies; Minerals, Energy and Construction; Animal Production and Processing; Plant Production and Processing; and Natural Resources and Environment. Each institute consists of several divisions. Of these divisions, two, Water Resources and Exploration Geoscience, have their headquarters in Perth. Divisional groups from Forestry and Forest Products, Entomology, Animal Production, and Plant Industry and Soils, are represented in the Laboratory for Rural Research (Perth). Other divisions established in Western Australia include

Fisheries and Oceanography in the Marine Laboratories (Marmion), Food Processing, Geomechanics, Mathematics and Statistics, Mineral Products, Wildlife and Ecology, and Building, Construction and Engineering.

CSIRO maintains strong links with tertiary institutions, industry and the community to ensure that its research effort is targeted to national needs. Advisory committees make a significant contribution to divisional operations. Further industry input is obtained by the appointment of individuals to Sector Advisory Committees.

BOTANIC GARDEN

The Western Australian Botanic Garden is in Kings Park. It specialises in the display of the State's native flora, in particular, that of the South-West. Much of the indigenous flora occurs naturally only in this region. Many species are spectacularly beautiful and some are curiously adapted to the harsh environmental conditions. Seed and other materials have been collected from the wild and the propagation of these plants investigated to bring them into cultivation and maintain the garden collections of over 2,000 species native in this State. Nearly 1,000 more are in nursery, glasshouses and other living collections, or stages of introduction into cultivation.

Also growing in Kings Park and the Botanic Garden are about 1,500 species from other parts of the world, especially those which share with Perth a Mediterranean climate—cool, moist winters alternating with hot, dry summers.

The main Botanic Garden occupies more than twenty hectares, of which nearly seventeen hectares are devoted to Western Australian flora, and about one hectare each to plants from California, South Africa and the Mediterranean basin.

More than fourteen hectares are planted with native trees in an arboretum. There are other smaller collections embellishing particular features such as a bed planted with native species suitable for Perth suburban gardens at the Hale Recreation Area, where there is also a sensory trail of trees having contrasting scents, textures, colours and growth habits. Aromatic herbs and shrubs have been planted in a raised bed in the Ivey Watson Playground.

The display glasshouses extend the range of plants exhibited with species unsuited to growing in the open ground. These include some species from the drier inland parts of the Pilbara and Kimberley regions of the State, salt bushes and other succulents. Plants requiring humid conditions, such as carnivorous plants and ferns, are kept in separate sections of the display glasshouse complex. A collection of cycads surrounds a pool with aquatics in the central courtyard. Nearby there is a garden planted with rare and endangered species.

There is active scientific research by the botanical and horticultural staff into the biology, propagation and cultivation of the native flora, especially species threatened with extinction. Surplus seed and tissue cultures are distributed to botanical institutions throughout the world. Public interest in, and motivation towards, the conservation of the flora are fostered through advice on the growing of native plants, educational and interpretative programs. These and many other aspects are put on show during the annual Wildflower Festival in late September, which is a major tourist attraction, as are Kings Park and the Botanic Garden throughout the year.

REFERENCES

ABS Publications

Schools, Australia (4221.0)

Chapter 11

CULTURE, RECREATION AND TOURISM

CULTURE	11-1
Department for the Arts	11-1
The Western Australian Film Council	11-2
The Library Board of Western Australia	11-2
The Western Australian Museum	11-3
The Art Gallery of Western Australia	11-4
The Aboriginal Arts Committee	11-5
Participation in Leisure Arts and Crafts	11-5
The Festival of Perth	11-5
Dance Triennium 1990-92	11-6
RECREATION	11-7
Parks and Reserves	11-7
Local Government Reserves	11-9
Ministry of Sport and Recreation	11-9
TOURISM	11-10
References	11-11

Chapter 11

CULTURE, RECREATION AND TOURISM

This chapter reviews cultural activity supported by government organisations. Statistics on travel and tourism, complementing the monitoring and promoting role of government are also included.

Culture

The Perth Cultural Centre, located in Northbridge close to central Perth, provides a focus for arts and culture. Its heart is a large paved plaza with an amphitheatre for outdoor performances. Around the perimeter are housed the Library and Information Service of Western Australia in the Alexander Library, the Western Australian Museum, the Art Gallery of Western Australia and the Perth Institute of Contemporary Art.

Around the Perth Cultural Centre are a number of arts resource organisations, including the National Exhibitions Touring Structure, responsible for taking small exhibitions to Western Australian country centres; the Australian Association of Dance Education; The Dance Triennium Office; Evos Music, exponents of contemporary music; Artrage; The Festival Fringe Society; and the Australian and Regions Artists' Exchange, a body established to enable dialogue and exchange between artists from Australia and the Pacific region. Artists' studios are also located in and near the Centre. The Forrest Chase development links the Cultural Centre with the city.

The last few years have seen the development of regional arts facilities and there is a steady flow of country touring activity by professional companies. This will be enhanced by the establishment of the Performing Arts Touring Information Office and the new Arts Council of Western Australia.

DEPARTMENT FOR THE ARTS

The Western Australian Department for the Arts was established to advance the cultural development of Western Australia. The arts portfolio includes the Western Australian Film Council and the statutory authorities of the Western Australian Museum, the Art Gallery of Western Australia, the Library and Information Service of Western Australia (LISWA) and the Perth Theatre Trust. The Department for the Arts also includes the State Censorship Office.

Central to the role of the Department is support for the range of arts organisations and creative cultural practices that enrich the lives of Western Australians.

Major funded performing arts organisations include the State Theatre Company of WA, Deckchair and Swy Theatres, Black Swan Theatre, Spare Parts Theatre, the Western Australian Opera Company, Youth Orchestra and Ethnic Music Centre, the West Australian Ballet and 2 Dance Plus.

The Department also administers financial support to individuals and agencies as recommended by peer group assessment panels in each artform. Financial assistance is considered for projects of a developmental nature. Fremantle Arts Centre and Fremantle Arts Centre Press receive support as does the Perth Institute of Contemporary Art.

Artists are assisted and nurtured through a Creative Development Fund, arts traineeships and study exchanges.

Specific art forms are serviced by the Arts Development Officers in each field: literature; visual arts; music; dance; theatre; film; Aboriginal arts; community arts and multicultural arts. The potential of country areas is also of special concern and the Department has a comprehensive Regional Arts Plan.

Other areas currently receiving attention include cultural tourism, international cultural development, public art, corporate sponsorship for the Arts, housing the Arts, arts and education, arts marketing, and women and the Arts.

**TABLE 11.1 - DEPARTMENT FOR THE ARTS
GRANTS TO MAJOR ARTS AGENCIES (a)**
1990-91
(\$'000)

	<i>General purpose grants</i>	<i>Special purpose grants</i>	<i>Equipment grants</i>	<i>Total</i>
Aboriginal arts	267.5	-	-	267.5
Community arts	91.3	-	9.1	100.4
Dance	1,048.0	5.0	30.0	1083.0
Film and television	247.0	-	25.0	272.0
Literature	130.0	-	38.1	168.1
Multi-art forms	1,246.0	-	-	1,246.0
Music	1,096.2	39.5	20.0	1,965.7
Theatre	1,333.1	2.5	58.6	1,394.1
Visual arts and crafts	900.3	12.1	31.6	944.0
Total	7,169.2	59.1	212.3	7,440.6

(a) In 1990-91, additional financial assistance of \$3.5 million was provided for peer panels, the Creative Development Fund, the Regional Arts Panel, conferences and seminars, Discretionary Grants and minor capital works.

THE WESTERN AUSTRALIAN FILM COUNCIL

The Western Australian Film Council was established to encourage and assist in the development of a viable film industry in Western Australia.

Provision of industry assistance resulted in three major drama films being produced in Western Australia during the year.

The Council's Short Drama Fund funded five films made during the year. The aim of the fund is to lead short drama makers into mainstream drama production.

**TABLE 11.2 - THE WESTERN AUSTRALIAN FILM
COMMISSION PROVISION OF INDUSTRY
ASSISTANCE**
1989-90

	<i>\$'000</i>
Producers/Production Companies	423.2
Writers	95.5
Other	142.9
Short Drama Fund	132.2
Total	793.8

THE LIBRARY BOARD OF WESTERN AUSTRALIA

The Library Board of Western Australia is constituted to advise the Minister and local authorities on matters of general policy relating to libraries and to administer the funds made available by Parliament for The Library and Information Service of Western Australia (LISWA).

Funding is used to provide fully processed bookstock to all Western Australian public libraries and to resource the Reference and Information Service housed within the Alexander Library Building.

LISWA comprises five Directorates: Collection Management; Corporate Services; Public Libraries and Lending Services; Reference and Information Services and the State Archives. These directorates are coordinated by the Chief Executive Officer and State Librarian to provide an integrated and comprehensive library and information service throughout the State. Each directorate delivers a specific program to the people of Western Australia.

Collection Management

The Collection Management Directorate provides the program of services for supporting and maintaining all collections within the organisation. The Branches are Acquisitions, Cataloguing, Information Technology, and Preservation Services.

Corporate Services

The Corporate Services Directorate consists of four administration branches. These are Finance, Human Resources, Publishing and Promotions,

and Building Services. The main objective of the Directorate is to provide centralised administrative and support services to the organisation.

Reference and Information Services

The Reference and Information Services Program offers reference and information services from the Alexander Library Building through five branches. These are the Humanities and Social Sciences Branch; Infolink; Government and Community Information; J. S. Batty Library of Western Australian History; State Music Library and the Science, Technology and Commerce Branch. The objective of the Program is to provide responsive reference and information services to the people of the State. The J. S. Batty Library of Western Australian History has a mandate to seek out, acquire and make available, local materials for research covering printed records, film archives and oral history. Infolink has responsibility for providing community and State Government information services to the public. The State Music Library provides a cassette and musical scores lending service to the general public in addition to its reference and information services.

Public Libraries and Lending Services

Public libraries in Western Australia are managed as a cooperative venture between the Library Board of Western Australia and the 138 local government authorities throughout the State. The Public Libraries and Lending Service Program provides to public libraries fully processed bookstock and other resource materials and professional consultancy services. It also provides a centralised inter-library loans system available not only to public libraries but all government, private and academic library services within the State. The State Film and Video Library provides a free film and video lending service to groups and organisations throughout Western Australia.

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 of the State Government, local authorities and all other bodies established under statute. When records cease to be in current use, they become the responsibility of the Board and their destruction is prohibited without the approval of the Board.

In 1990, a new branch, the Records Management Branch, was created to enable the Archives to focus on the creation, maintenance and archiving of government records.

TABLE 11.3 – THE LIBRARY BOARD OF WESTERN AUSTRALIA : 1990-91

	<i>Unit</i>	
CRF Allocation	\$	21,589,000
Staff (a) (b)	Number	266
Associated public libraries	"	230
Books—		
Total circulation stock (a)	"	2,214,714
Received and dispatched in the exchange program—		
Public libraries	"	427,644
Reference libraries	"	322,833
Inter-library loan requests received	"	130,757
Enquiries in Reference Library	"	192,969
Visitors to Reference Library	"	829,854

(a) At 30 June. (b) Number of full-time staff plus full-time equivalent units of part-time staff.

THE WESTERN AUSTRALIAN MUSEUM

The Western Australian Museum has its headquarters and principal display galleries in Perth, in the heart of the Cultural Centre. It has branches in Fremantle (Fremantle Museum, Western Australian Maritime Museum, Samson House and Historic Boats Museum); Albany (Albany Residency Museum); Geraldton (Geraldton Museum); and Kalgoorlie (Museum of the Goldfields). The Museum has special responsibilities for Aboriginal material (including sites), historic shipwrecks and meteorites. The Director also has delegated powers for wrecks and material under Commonwealth control.

The Museum is a vital resource centre, its collections and displays reflecting the research and fieldwork constantly being undertaken by its curatorial staff. Emphasis in both display and research is on natural sciences and human studies, past and present, and on the State's rich culture and colourful maritime history.

The Trustees of the Museum are empowered to assist in establishing and maintaining local museums. The Museum is able to assist such museums with expertise, advice on the maintenance of collections, conservation and restoration, design and display, and by providing objects for display in recognised museums. At present, eighteen local museums are recognised under the Museum Act. The Museum plays an

important role in the sphere of education, from primary schools to tertiary institutions and the community in general. This is achieved through a variety of activities and endeavours including school visits, organised holiday activities (in the Museum and its branches) and lectures by scientific staff in tertiary institutions and public venues.

The Museum acts in an advisory capacity to government departments. Senior staff serve on government committees dedicated to the protection of 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, and by education volunteers.

TABLE 11.4 - THE WESTERN AUSTRALIAN MUSEUM: 1990-91

	<i>Unit</i>	
Expenditure(a)	\$	8,838,000
Staff (b)	Number	228
Days spent on field work	"	1,065
Public attendance—		
Western Australian Museum Perth	"	251,863
Fremantle Museum	"	48,603
Western Australian Maritime Museum	"	89,288
Samson House	"	1,993
Sails of the Century	"	28,866
Albany Residency Museum	"	92,080
Geraldton Museum	"	29,959
Museum of the Goldfields, Kalgoorlie	"	81,352
Total public attendance	"	624,004

(a) Excludes capital works. (b) At 30 June 1991.

THE ART GALLERY OF WESTERN AUSTRALIA

The Art Gallery of Western Australia incorporates eight major galleries, conservation laboratories, a prints and drawings study room, a restaurant, the Gallery Shop and the Art Gallery Society Room. The Gallery Administration Centre houses the library and theatre.

Together with exhibitions of art works from the permanent collection, the Gallery presents touring exhibitions initiated in Australia and from overseas.

The exhibition *Rover Thomas and Trevor Nickolls - Aboriginal Art at the 1990 Venice Biennale*, which was organised by the Art Gallery of Western Australia and premiered at the Biennale, was displayed in Perth and then toured to venues

in New South Wales and Victoria. Other major exhibitions organised by the Gallery in 1990-91 were *Keepers of the Secrets; Aboriginal Art from Arnhemland and Wildflowers in Art; Artists Impressions of Western Australian Wildflowers 1699-1991*.

The Gallery's collection of Australian and international art is divided into four curatorial departments: Aboriginal and Asian; craft, design and decorative arts; painting and sculpture; and works on paper.

The current acquisitions policy concentrates on contemporary and Aboriginal art. A highly selective international component, representing evolution in style since 1960, is included. The Australian component reviews outstanding artists and provides a view of artistic developments over the past three decades. A special focus is on the art of Western Australia.

Education programs relevant to the syllabus requirements of students from pre-primary to tertiary levels are emphasised. Group school visits can be arranged, with a guided tour by the Voluntary Gallery Guides and a hands-on activity session led by an Education Officer.

The Art Gallery has over fifty volunteer guides who maintain a regular program of guided tours to the public. Volunteer Information Officers assist the public from the information desk.

The Art Gallery of Western Australia Foundation was established in 1989 and continues to raise monies from the corporate and private sectors for the acquisition of art works.

The Art Gallery Society supports the Gallery with donations from their fund raising activities. These funds make possible the acquisition of important art works which otherwise may not have been obtained

Geraldton Regional Art Gallery

This important regional gallery continues an extensive program with a balance of multicultural, regional, State and national exhibitions. The Doug Moran National Portrait Prize and the Geraldton-Greenough Rotary Art Award exhibitions were highlights of the 1990-91 year, attracting many visitors. The Gallery has also presented a program of workshops ranging from kite making to photographic techniques, and a series of art appreciation lectures. Attendance for the year 1990-91 was 29,959.

Bunbury Regional Art Gallery

The Bunbury Regional Art Gallery maintains a comprehensive program of both touring exhibitions and displays from the permanent collection. The most important regional exhibition was the *South West Survey*, comprising art and craft production from 125 artists of the South-West region of Western Australia. An artist-in-residence program was initiated in 1991, with a four month residential term for the artist Julie Parsons followed by an exhibition of her work.

Attendance for the year 1990-91 was 22,058.

THE ABORIGINAL ARTS COMMITTEE

The existence and operation of the Aboriginal Arts Committee and its art form Panels, is based on indigenous people of Australia determining the future of their own cultural heritage. The Committee's responsibility is to provide support to promote and develop activities.

This involves traditional cultural practices and their associated art forms, the representations and preservation of Aboriginal and Torres Strait Islander culture generally, and the generation of new forms of artistic expression among Aboriginal and Torres Strait Islander peoples in urban and country areas.

The Committee aims to promote awareness of the dynamic culture of these indigenous peoples, within their own communities and amongst the wider community throughout Australia.

The Aboriginal Arts Committee awarded 57 grants totalling \$520,582 for arts programs in Western Australia during 1990-91. This compares with 44 grants totalling \$704,148 awarded for Western Australian Aboriginal arts projects in 1989-90.

PARTICIPATION IN LEISURE ARTS AND CRAFTS

In the period April to October 1990, over 38 per cent of adults in Western Australia participated in art or craft as a leisure activity. A further 15 per cent had not participated during the eligible period but were interested in doing so.

The most popular type of art/craft was handicrafts (52 per cent of those who participated), followed by photography (20 per cent), music making (19 per cent) and drawing/painting and sculpting (16 per cent). The level of participation in handicrafts increased with age.

THE FESTIVAL OF PERTH

As the oldest and largest annual international festival of the arts in the Southern Hemisphere, the Festival of Perth each year presents over 800 events covering all aspects of the arts. From theatre, music, dance, film and literature through to the visual arts, television and street theatre, annual attendances reach upwards of 500,000 for this *people's festival*.

Since its inception in 1953, the Festival of Perth has attracted the talents of over 16,000 artists from over 70 countries world-wide. 1992 will mark the Festival's 40th Anniversary.

Dance Triennium 1990-92

In 1989, dance professionals and administrators released the Dance Dialogue Report, which called for the promotion of dance in Western Australia. The Dance Triennium Committee was formed and in response to report recommendations, 1991 was declared the Year of Dance. Furthermore, it was decided that a three year period was required to allow sufficient time for the implementation of a promotional program. As a result, 1990-92 has been proclaimed the Dance Triennium.

With the aid of substantial grants, the Committee has been able to conduct research into the way dance is promoted by funded dance companies, organisations, schools, groups and individuals. The results of this survey enabled the design of an effective television campaign, to increase public awareness of the diversity of dance.

In addition, a Dance Information Line has been established, which allows people

to learn of dance activities in the metropolitan area and in regional centres. The direct Dance Information Line is 227 8343.

In November 1991, a celebration of dance was held in Perth's Forrest Place. This well publicised and patronised event involved the West Australian Ballet, the Chrissie Parrott Dance Collective, 2 Dance Plus, as well as other groups representing many other dance forms. A feature of the event was that the audience was invited to participate and enjoy dance as a social activity, and to learn more about the art of dance.

The creation of a Dance Centre for Western Australia is an ongoing project of the Committee. The establishment of such a Centre will ensure that dance continues to enjoy the greater awareness and public participation seen during the 1991 Year of Dance and the 1990-92 Dance Triennium.



Photograph: WA Academy of Performing Arts

Recreation

PARKS AND RESERVES

Land and water may be reserved for a variety of purposes servicing the public interest.

Some Crown land is reserved for public recreation and amusement, national parks, marine parks, other public parks and nature reserves specifically for the conservation of flora and fauna. Such reserves are often placed under the control of statutory bodies, some of which are dealt with in this section.

Department of Conservation and Land Management

The Department of Conservation and Land Management manages public lands, waters and wildlife for the benefit of present and future generations of Western Australians. National parks management encourages public enjoyment of the natural attributes of these lands, meeting the diverse needs of the community, but in a manner that does not compromise conservation objectives.

National parks and marine parks are vested with the National Parks and Nature Conservation Authority, a statutory body responsible to the Minister for Conservation and Land Management. A majority of the Authority's members represent community interests.

The State's 4.9 million hectares of national parks contain picturesque landscapes ideally suited to more passive nature-based activities such as sightseeing, photography, bushwalking, nature study, picnicking and camping in designated areas. This system of fifty-nine national parks is complemented by almost two million hectares of State forest, which offers opportunities for picnicking, camping, backpacking, canoeing, fishing, marroning, orienteering and other pursuits. In certain specified areas, other activities including horse and trail bike riding are permitted, subject to certain management controls.

Nature reserves are for the purposes of wildlife and landscape conservation, scientific study and protection of features of archaeological, historic or scientific interest. Wildlife may not be commercially exploited, and no recreation which damages natural ecosystems is allowed. At 30 June 1991, there were 10.4 million hectares of nature reserves.

Marine Parks are managed for marine conservation and recreation, with areas zoned for commercial fishing on a sustained yield basis. There are six marine parks in Western Australia: Hamelin Marine Reserve in Shark Bay has been set aside for environmental and scientific study; Marmion (off Perth); Ningaloo (off Exmouth); Rowley Shoals (north-west of Broome); Shoalwater Islands (south of Perth); and Swan Estuary (Perth). The area of marine parks and reserves at 30 June 1991 was some 1,114,220 hectares.

TABLE 11.5 – DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
TERRESTRIAL AND MARINE ESTATE : 30 JUNE 1991

	<i>Hectares</i>
Nature reserves	10,433,554
National parks	4,849,205
State forests	1,750,467
Marine parks and nature reserves	1,144,220
Conservation recreation reserves	188,928
Timber reserves	144,287
Freehold	32,478
Pastoral leases	475,445
Total	19,018,584

Extensive limestone caves are features at several places in the South-West part of the State as well as in the Kimberley and the Nullabor Plain. Some between Cape Naturaliste and Cape Leeuwin, and at Yanchep, have been developed for public inspection, and areas of the surrounding land have been reserved within Leeuwin-Naturaliste National Park, adjacent areas at Yallingup, Margaret River and Augusta, and within Yanchep National Park.

The total Department of Conservation and Land Management terrestrial estate constitutes 7.1 per cent of the land area of Western Australia.

Cape Range National Park on the Western Australian North West Cape and the adjacent Ningaloo Marine Park that extends for 260 kms along a barrier reef, exemplify the modern management of conservation reserves in Western Australia. Management plans involving public participation have been produced for both parks. Furthermore, a visitors guide, park notes and the park guide booklet 'Range to Reef' have been produced to assist visitor appreciation, understanding of park values and awareness of sites developed to facilitate recreational

opportunities. The Milyering Visitors Centre interprets the park and provides a plan for further learning about the natural environment and its management for wildlife and people.

Kings Park

The Kings Park Board administers an area of approximately 400 hectares close to the centre of Perth. There are several scenic vantage points on Mount Eliza overlooking the city and Swan River with views to the Darling Scarp. The original purpose when development began in 1895 was to provide for public recreation, health and enjoyment. This is still catered for by drives, dual use paths, grassed walks, formal gardens, picnic lawns, barbecue facilities, and playgrounds. Other roles have been added.

The State War Memorial, the Pioneer Women's Memorial, avenues of dedicated trees and many other features commemorating the service and sacrifice of Western Australians in peace and war, have been placed here, making Kings Park the State's principal shrine. There are also several historic sites in Kings Park, visited by early explorers or used by the pioneer settlers and the Aborigines before them.

The decision in 1959, implemented three years later, to create the Western Australian Botanic Garden in Kings Park, has led to the display in gardens and glasshouses of 2,000–3,000 species of native flora, and the undertaking of research into its biology, conservation and propagation, especially that of rare and endangered plants. About two-thirds of Kings Park is still native bushland, scarred in places by the extraction of timber, firewood and kindling by the early settlers, subsequent weed invasion and too frequent bushfires. Nevertheless, the resilience of the indigenous vegetation and active rehabilitation programs have combined to make Kings Park a remnant nature reserve unique in its proximity to a capital city.

The Kings Park Guides are volunteers who give their time to operate an information centre and to lead walks through Kings Park and the Botanic Garden to share its many interesting aspects with tourists and other visitors.

Perth Zoological Gardens

In South Perth, close to the Swan River, eighteen hectares are set aside for the Perth Zoo. Set in landscaped gardens, and boasting a most comprehensive display of rare palms, the Zoo is a popular tourist attraction having the highest visitation rate per capita of any zoo in Australia.

Perth Zoo cares for the State's largest and most complete collection of Australian animals, as well as an extensive collection of exotic species. Perth Zoo cares for nearly 1,500 animals; 503 specimens in 38 families of mammals; 759 specimens in 47 families of birds; 184 specimens in 11 families of reptiles and a further 43 specimens of amphibians, fish and molluscs.

The Zoo is administered by the Zoological Gardens Board and is recognised internationally as a successful haven for many endangered species. It has adopted the fundamental objective of 'contributing to the development of positive attitudes towards wildlife and the conservation of community life on earth'. Recent and future developments have all been designed with this in mind, and conservation education in Western Australia.

The rehousing of animals in naturalistic enclosures, the building of an educational complex, (the Bicentennial Education Centre), and the recent addition of two new attractions (the Conservation Discovery Centre and Microworld), all underline the Zoo's primary conservation role. These new attractions use electronic devices and 'state of the art' technology to provide learning experiences quite different from those traditionally associated with zoos.

During 1991, a new East African exhibit opened. Described as the best and most advanced of its kind in the world, this exhibit gives visitors the experience of walking through an African savannah surrounded by free ranging animals.

Also opened recently was Harmony Farm. A working Western Australian farm, it is designed as an example of sustainable living. Complementing the existing Australian wildlife park with its koala and kangaroo exhibits, Harmony Farm provides opportunities for animal contact and education on energy conservation.

Other principal attractions are the nocturnal house, otter and bear enclosures, lemur and gibbon islands, the water bird lakes, shady picnic areas and the new numbat enclosure which is the only place in the world where numbats, the Western Australian mammal emblem, can be seen on display.

Perth Zoo opens to the public every day of the year. During the year ended 30 June 1991, some 546,000 visitors took advantage of this opportunity. The Zoo has a permanent staff of 102. A further hundred and eighty trained volunteers, called Docents, liaise with the public and provide guided tours on request.

Rottnest Island

The Rottnest Island Authority administers, as a tourist and holiday resort, a reserve of 1,930 hectares comprising almost the whole of Rottnest Island, which is situated about eighteen kilometres west of Fremantle.

During the year ended 30 June 1991, 279,566 persons visited the Island by the daily commercial air and sea transport services. An additional 70,000 persons are estimated to visit the island by private craft.

LOCAL GOVERNMENT RESERVES

Many local authorities hold land for recreational purposes, the areas having been either Crown land vested in the Council, acquired by purchase, or received under private bequest. Included in these local government reserves are areas required to be surrendered to the Crown by private owners to provide recreation areas where land is divided into private residential lots. The reserves are frequently developed as public parks or to provide facilities for sports or camping.

MINISTRY OF SPORT AND RECREATION

The Ministry's main aim is to improve the well-being of all West Australians through sport and recreation.

Throughout the State, it works closely with sporting and community organisations and the three tiers of government to increase participation and performance in sport, community fitness and health.

The Ministry, which is responsible to the Minister for Sport and Recreation, has four specialist divisions.

Sport. The Ministry assists State sporting associations through funding, management support, research, information-sharing and consultancy, facility planning, coach education and talent identification/development.

Specialist programs have been established by the Ministry in the junior and Aboriginal sport areas.

Recreation. The Ministry provides a wide range of recreational opportunities and actively encourages community-based recreation groups.

The main objectives in this area are to improve community fitness and quality of life.

Many programs have been designed to attract those people for whom sporting activities are not always readily available, particularly older adults. Special attention is also given to the recreational needs of women.

Another key initiative in the recreation area is the development of the Ministry's 'wellness' program. This is an important program in achieving health enhancement.

Regional Services. This division is responsible for the delivery of all Ministry programs throughout the State and encourages and assists country people to take part in sport and recreation.

The Ministry has a comprehensive network of regional offices — Goldfields (based in Kalgoorlie), Great Southern (Albany), South-West (Bunbury), Central South and Midlands (both based in Northam), Mid-West (Geraldton), Gascoyne (Carnarvon), Pilbara (Karratha) and Kimberley (Kununurra).

Corporate Development and Services. This division provides support services and advice to assist in achieving corporate objectives.

The Ministry manages a chain of twelve camps which are available for hire by sport and recreation groups, schools, churches, community groups and families.

Tourism

Responsibility for the development of the tourism industry in Australia is exercised by government bodies at Commonwealth, State and regional levels. At the State level, the Western Australian Tourism Commission (WATC) is responsible for marketing Western Australia as a tourist destination for international, interstate and intrastate visitors.

TABLE 11.6 – TOURIST ACCOMMODATION (a)
31 December 1990
 Reference : Catalogue No. 8635.5

	<i>Perth Statistical Division</i>	<i>Rest of State</i>	<i>Western Australia</i>
HOTELS AND MOTELS, WITH FACILITIES (b)			
Establishments	93	229	322
Guest rooms	6,912	7,453	14,365
Bed spaces	17,397	19,278	36,675
HOTELS AND GUEST HOUSES, WITHOUT FACILITIES (b)			
Establishments	11	127	138
Guest rooms	428	2,832	3,260
Bed spaces	654	4,650	5,304
CARAVAN PARKS (c)			
Establishments	34	263	297
Sites	3,952	23,409	27,361
HOLIDAY FLATS, UNITS AND HOUSES (b)			
Letting entities	28	65	93
Units	931	832	1,763
Bed spaces	3,771	4,414	8,185

(a) Hotels, motels and guest houses must have breakfast available for guests. Caravan parks must provide powered sites and toilet, shower and laundry facilities. Holiday flats etc. are mainly self-contained and do not have breakfast available. (b) Establishments providing predominantly short term accommodation (i.e. periods less than two months). (c) Establishments providing short term or long term accommodation.

Information provided by the WATC shows that, during 1990-91, interstate and intrastate visitors, (persons aged 14 years and over), made 4.9 million trips to or within Western Australia. This represents 9.9 per cent of total domestic trips made within Australia. The main purpose of trips to or within the State was 'pleasure or holiday' (38.5 per cent) followed by 'visiting friends and relatives' (26 per cent). The main destination regions for domestic travel were Perth and the South-West.

Tourism is one of the largest growing industries in Western Australia. Response to that growth has seen a significant increase in the development and

refurbishment of luxury hotels and in the development of tourist attractions. As the State capital, Perth receives the majority of interstate and international visitors and, therefore has experienced a major share of the development in tourist accommodation. As at 30 June 1991, there were a total of 15, four and five star establishments in Western Australia, providing 3,101 guest rooms.

Development of tourism has not been restricted to Perth. Towns to the north and south of the State are also experiencing significant growth in tourist numbers.

The popularity of statistical local areas as tourist destinations can be indicated by the number of guests arriving to stay in commercial accommodation. A comparison of guest arrivals during 1989-90 and 1990-91 for areas attracting the most visitors is shown in Table. 11.7.

TABLE 11.7 – HOTELS, MOTELS, GUEST HOUSES AND CARAVAN PARKS

<i>Guest arrivals</i>	<i>Statistical Local Area (a)</i>	
	<i>1989-90</i>	<i>1990-91</i>
Over 200,000	1. Perth(C)	1. Perth(C)
150,001-200,000	2. Geraldton (C) and Greenough	2. Busselton
	3. Busselton	
100,001-150,000	4. Albany(T & S)	3. Albany(T & S)
	5. Augusta-Margaret River	4. Geraldton(C) Greenough(S)
	6. Bunbury(C)	5. Augusta-Margaret River
	7. Dundas	6. Bunbury(C)
	8. Belmont(C)	7. Camarvon
	9. Manjimup	8. Manjimup
	10. Kalgoorlie-Boulder(C)	9. Kalgoorlie-Boulder(C)
	11. Camarvon	
80,001-100,000	12. Mandurah(C)	10. Belmont
	13. Broome	11. Dundas
		12. Broome
		13. Shark Bay
60,001-80,000	14. Wyndham-East Kimberley	14. Mandurah(C)
	15. Stirling(C)	15. Wyndham-East Kimberley
	16. Gingin and Dandaragan	16. Stirling
	17. Esperance	17. Gingin and Dandaragan
	18. Northampton	18. Northampton
	19. Shark Bay	19. Esperance
		20. Roebourne

(a) Cities, Towns and Shires are marked (C), (T) and (S) respectively

CULTURE, RECREATION AND TOURISM

TABLE 11.8 – HOTELS, MOTELS AND GUEST HOUSES

Reference: Catalogue No. 8635.5

Year	Room occupancy rate		Guest arrivals '000	Takings '000
	Guest rooms (a)	Per cent		
1988	16,344	47	1,880	147,038
1989	17,080	48	1,980	169,802
1990	17,625	46	1,924	182,055

(a) At 31 December. (b) Takings only from accommodation.

TABLE 11.9 – CARAVAN PARKS

Reference: Catalogue No. 8635.5

Year	Site occupancy rate		Guest arrivals '000	Takings '000
	Sites (a)	Per cent		
1988	25,449	37	1,117	29,307
1989	26,315	37	1,193	34,565
1990	27,361	34	1,239	37,180

(a) At 31 December. (b) Takings only from accommodation.

During 1990, there were 194,166 short term overseas visitor arrivals to Western Australia. Travellers are considered as short term arrivals if their intended or actual period of stay is less than twelve months.

TABLE 11.10 – HOLIDAY FLATS, UNITS AND HOUSES

Reference: Catalogue No. 8635.5

Year	Unit occupancy rate		Unit lettings '000	Takings '000
	Units (a)	Per cent		
1988	1,667	58	65	12,258
1989	1,654	60	70	14,429
1990	1,688	56	79	15,931

(a) At 31 December. (b) Takings only from accommodation.

TABLE 11.11 – SHORT TERM VISITOR ARRIVALS COUNTRY OF RESIDENCE BY MAIN PURPOSE OF JOURNEY: 1990

(*000)

Reference : Unpublished data table PMTR0031

Country of residence	Visiting relatives	Holiday (a)	Business (b)	Total (c)
<i>Africa</i>	1.5	1.1	0.3	3.4
<i>America</i>	3.5	4.1	2.4	12.2
Canada	1.3	1.1	0.4	3.2
USA	2.1	2.9	1.9	8.5
Other	0.1	0.1	0.1	0.5
<i>Asia</i>	10.0	52.1	6.8	79.7
Hong Kong	0.9	1.4	0.4	3.6
Indonesia	0.9	3.6	0.5	6.4
Japan	0.3	14.6	1.9	18.4
Malaysia	2.6	7.9	0.7	13.1
Singapore	3.1	21.0	1.4	27.9
Other	2.2	3.6	1.9	10.3
<i>Europe</i>	30.0	31.5	6.0	72.8
Germany	0.8	4.0	0.7	5.8
Netherlands	1.2	0.7	0.3	2.4
Switzerland	0.4	2.2	0.1	3.0
U.K. and Ireland	25.2	20.7	3.1	51.9
Other	2.4	3.9	1.8	9.7
<i>Oceania</i>	11.3	8.8	2.4	26.0
New Zealand	11.1	8.6	2.4	25.5
Other	0.2	0.2	—	0.5
<i>Not stated</i>	0.1	0.1	—	0.2
Total	56.5	97.6	17.9	194.4

(a) Includes accompanying a business traveller. (b) Includes attending conventions. (c) Includes employment, education, other and not stated.

Short Term Overseas Visitors

The majority of short term overseas visitors came to the State to holiday (50 per cent) while 29 per cent visited relatives and 9 per cent visited for business and convention reasons.

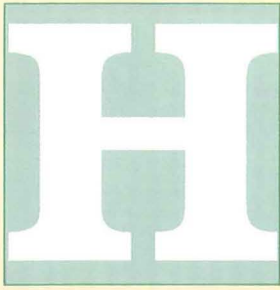
The largest group of visitors to Western Australia came from Asia (41 per cent), most of whom visited for holiday purposes. Travellers from the United Kingdom and Ireland (27 per cent) were the next largest group. The majority of visitors in this group were visiting relatives.

REFERENCES

ABS Publications

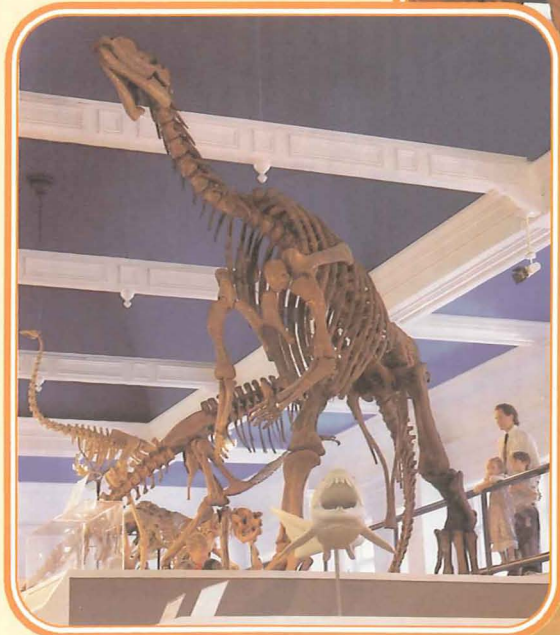
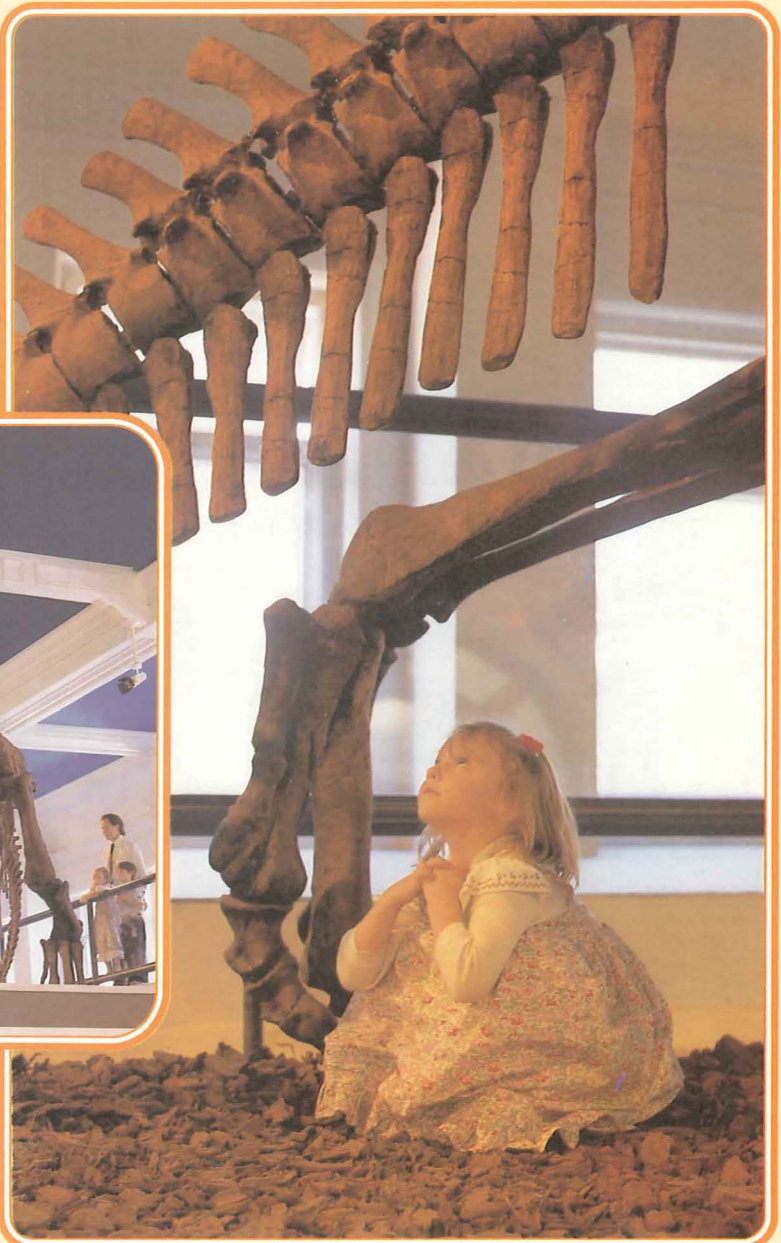
Tourist Accommodation, Western Australia (8635.5)

Arts and Crafts Purchasing and Participation, Western Australia (4111.5)



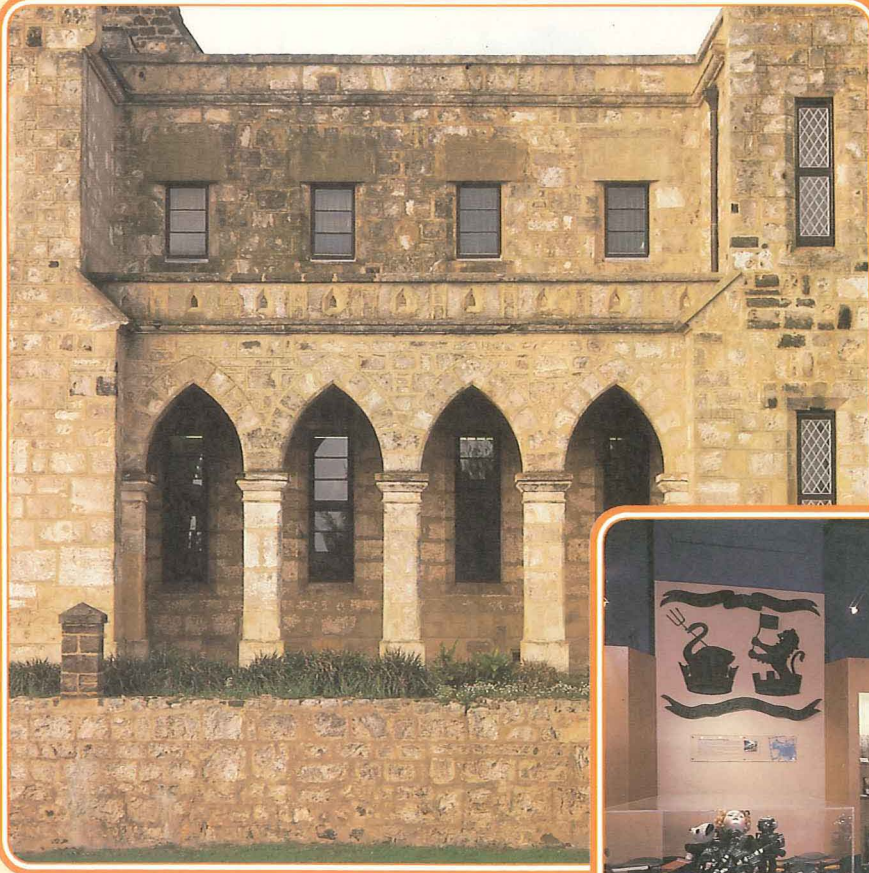
A CENTURY OF ISTORY AND HERITAGE

A century ago, the West Australian Museum first opened its doors to the public - in the Old Gaol - with a modest collection of mainly geological specimens. Today, the Museum boasts both classic and contemporary buildings, housing a collection comprising millions of priceless artifacts and specimens that distill for West Australians, the rich history, heritage and landscape of Australia's largest state.

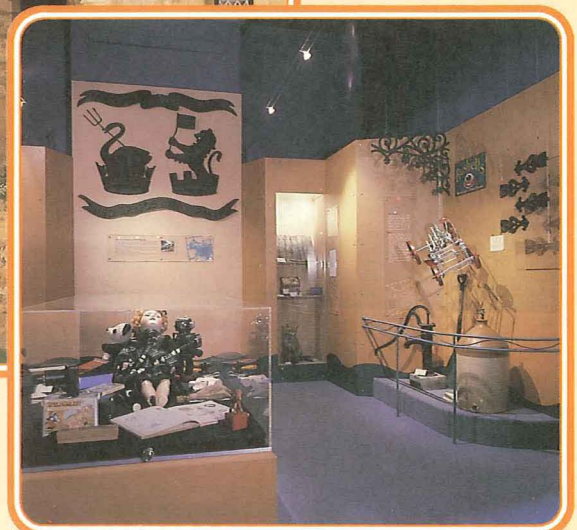


When visitors explore the treasures within the Museum, they discover that the buildings themselves are as fascinating as the collections they contain:

...the mellow limestone Old Gaol and its history collection...



...Fremantle Museum which highlights the history of the city port in a building exhibiting the classic architecture of the last century...



...The Western Australian Maritime Museum - which boasts one of the best maritime collections in the world...

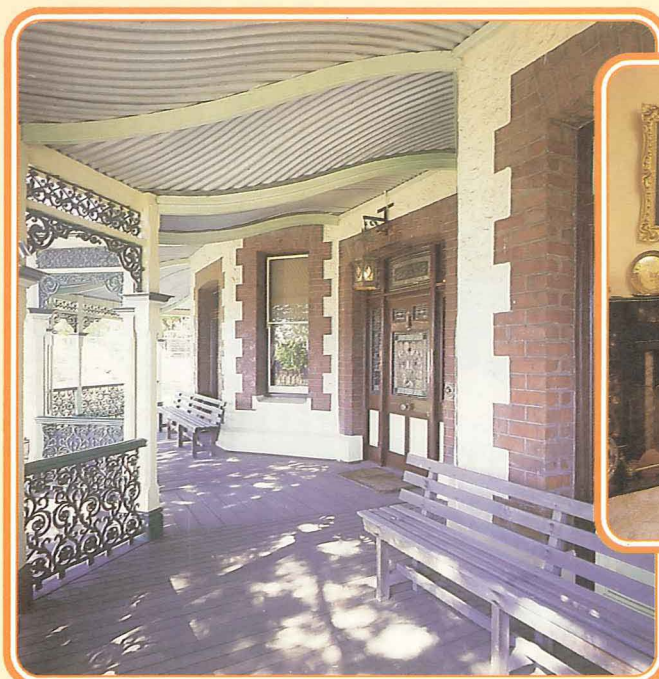


...including the timber and artifacts recovered from the Batavia, which sank in 1629...



...The Historic Boats Museum, displaying legendary craft in a restored cargo shed on Victoria Quay...

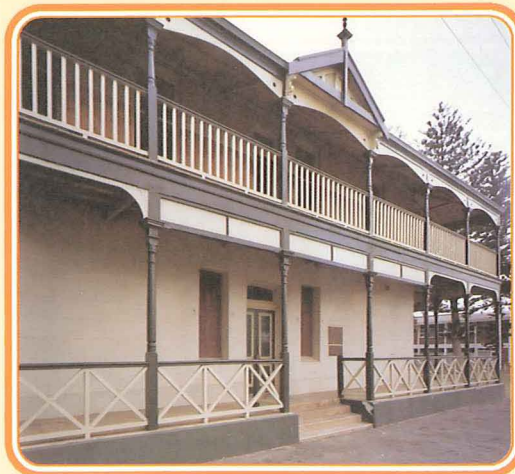
...and Samson House, with its deep-shaded verandahs



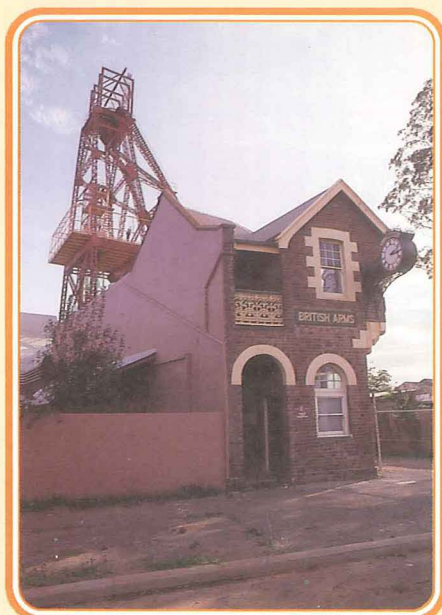
...and elegant interiors, illustrating the lifestyle of an earlier era.

Today, the Museum's tasks embody a range of natural science and human studies commitments; from painstaking scientific research, to educating and entertaining visitors who increasingly look upon museums as leisure-time destinations.

The fact that, in its Centenary Year, the Museum and its branches in Fremantle, Albany, Geraldton and Kalgoorlie attracted a record number of people, suggests that the need for accessing our history, heritage and the environment, is being felt as never before.



Geraldton Region Museum



Museum of the Goldfields



Albany Residency Museum

Chapter 12

WATER

Water Resources	12-1
Water Authority of Western Australia	12-1
Water Supply	12-4
Irrigation Schemes	12-7
Drainage	12-8
Sewerage Schemes	12-8
References	12-9

Chapter 12

WATER

Of the inhabited continents, Australia has the lowest average rainfall and the highest proportion of rainfall that is lost back to the atmosphere through evaporation and transpiration. Western Australia's average annual rainfall is 310mm compared with the Australian average of 420mm, and the average annual run-off from this western third of the continent is only eleven per cent of the nation's total.

WATER RESOURCES

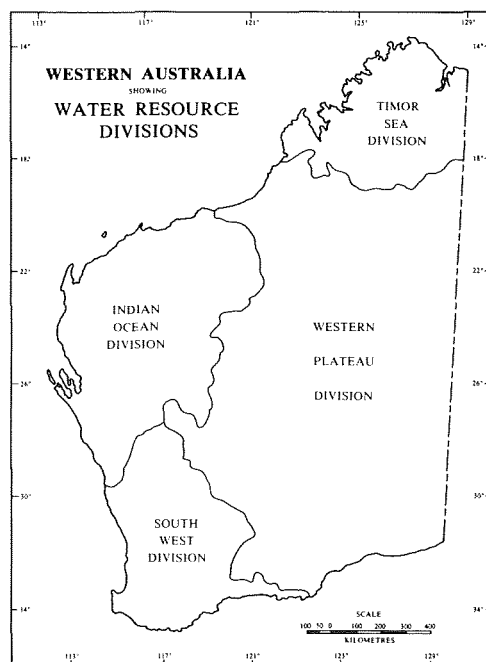
The amount of usable surface and groundwater resources available in each of the drainage divisions of Western Australia, is shown in Table 12.1. These divisions, which are based on surface water hydrological boundaries, are shown in Diagram 12.1.

Eighty-six per cent of the State's fresh/marginal water resources (on a sustainable yield basis) are surface water and fourteen per cent are groundwater. The majority of the resources, seventy-three per cent of the State's total, are in the Timor Sea Division. The next most abundantly endowed division is the South-West, with twenty-two per cent of the State's potable resources. The remaining five per cent of divertible potable resources are in the Indian Ocean Division and the Western Plateau Division.

TABLE 12.1 – DIVERTIBLE SURFACE AND GROUNDWATER RESOURCES
(million cubic metres per annum)

<i>Drainage division</i>	<i>Surface</i>	<i>Ground-water</i>	<i>Total</i>
South-West	1,860	876	2,736
Indian Ocean	285	262	547
Timor Sea	8,660	523	9,183
Western Plateau	1	155	156
Total	10,806	1,816	12,622

DIAGRAM 12.1



WATER AUTHORITY OF WESTERN AUSTRALIA

The Water Authority of Western Australia controls the majority of water-related services in Western Australia.

WATER

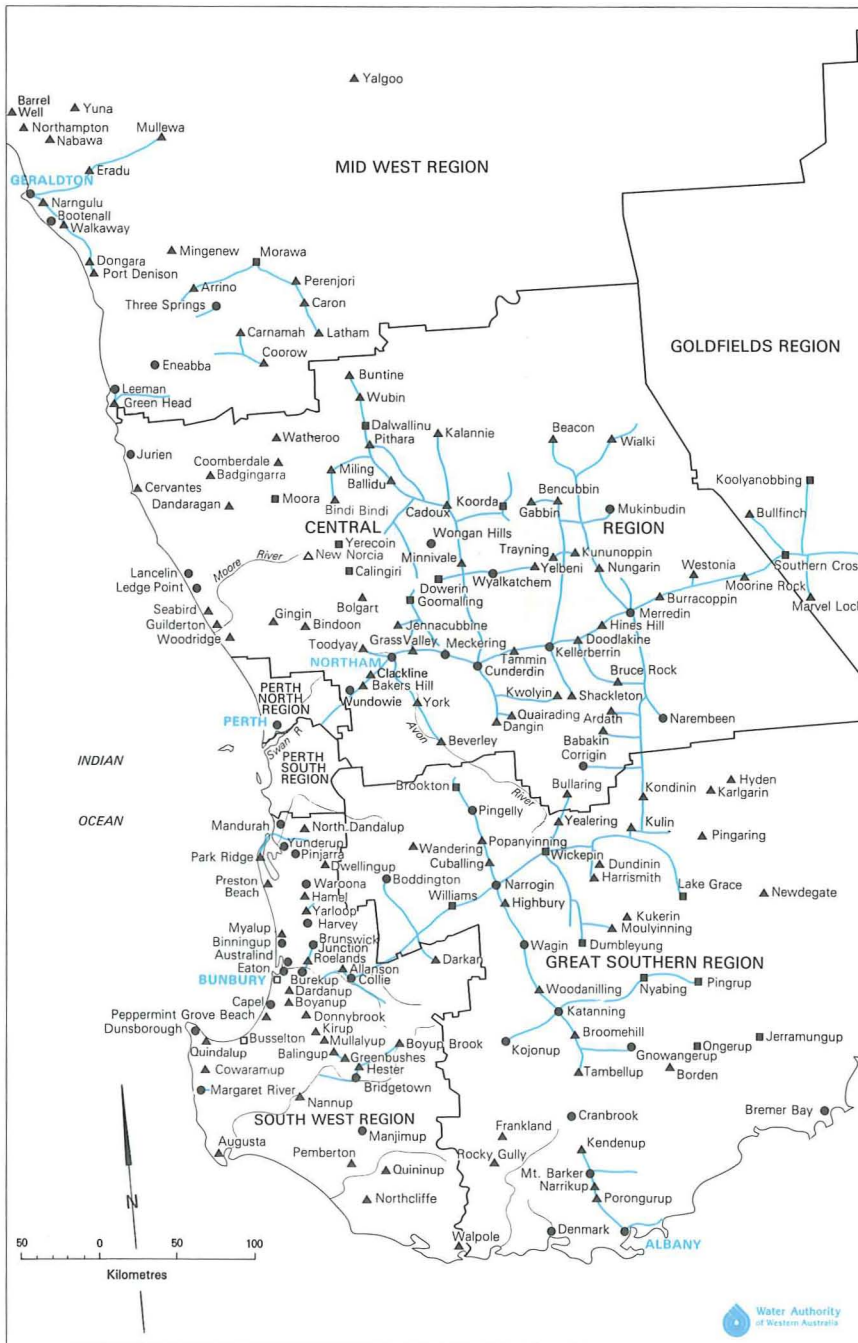
DIAGRAM 12.2
MAJOR WATER SUPPLY REGIONS, WESTERN AUSTRALIA
AT 30 JUNE 1991



- | | |
|---|--|
| ▲ Water Authority of W.A. Water Supply | ○ Other Authority Water Supply and Sewerage |
| ● Water Authority of W.A. Water Supply and Sewerage | ▽ Major Aboriginal Community Water Supply |
| ■ Water Authority of W.A. Water Supply, Other Authority Sewerage | ⊙ Major Aboriginal Community Water Supply and Sewerage |
| □ Water Authority of W.A. Sewerage, Other Authority Water Supply | |
| + Water Authority of W.A. and Other Authority Water Supply and Sewerage | |
| △ Other Authority Water Supply | |
-
- | | |
|-----------------------|--|
| PERTH Regional Centre | |
| — Main Water Pipeline | |
| — Region Boundary | |

WATER

DIAGRAM 12.3
 MAJOR WATER SUPPLY REGIONS, SOUTH WEST OF WESTERN AUSTRALIA
 AT 30 JUNE 1991



It is responsible for the following water-related services: water supply in the Perth metropolitan area and the majority of country towns; water resources assessment and management throughout the State; Government irrigation schemes; sewerage schemes in the Perth metropolitan area and many 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, ranging from town schemes serving fewer than one hundred people, to the Perth metropolitan scheme servicing a population of more than one million.

TABLE 12.2 - DAMS AND RESERVOIRS - STORAGE CAPACITY (a)
(*000 kilolitres)

<i>Dam or reservoir</i>	<i>Storage capacity</i>
Big Brook Dam	627
Canning Reservoir	90,500
Churchman Brook Reservoir	2,200
Drakes Brook Dam	2,290
Fitzroy Dam	4,650
Glen Mervyn Dam	1,142
Harding Dam	63,800
Harris Dam	71,000
Harvey Weir	9,126
Kununurra Diversion Dam (b)	97,900
Logue Brook Dam	24,592
Mundaring Weir	77,000
New Victoria Reservoir	9,463
North Dandalup Pipehead Dam	(c)
Ord River Dam (Lake Argyle)	6,109,000
Quickup Dam	1,189
Samson Brook Dam	7,993
Serpentine Pipehead Reservoir	3,140
Serpentine Reservoir	194,500
17-Mile Dam (d)	5,489
South Dandalup Reservoir	208,200
Stirling Dam	53,769
Waroona Dam	14,872
Wellington Dam	184,900
Wungong Reservoir	60,000

(a) At 30 June 1991. (b) Ord River Diversion Dam. (c) Diversion weir only. (d) On Uralia Creek, an anabranch of the Fitzroy River.

Considerable use is made of groundwater by individual farmers, pastoralists, market gardeners and others and it is estimated that over 92,000 bores are in use in the State. The quality of water is variable and much of it is too saline for irrigation or even for stock. Groundwater sources are used to supply or augment the supplies of numerous towns, including such major centres as Perth, Albany, Bunbury, Busselton, Carnarvon, Dampier, Esperance, Exmouth, Geraldton,

Karratha and Port Hedland. In a number of mining towns in the north-west and Goldfields, mining companies are responsible for the provision of their own water supplies.

Industries also use groundwater in substantial quantities, particularly in the processing of titanium, iron and alumina. Gold producers in the Eastern Goldfields use hypersaline groundwater extensively for gold ore processing. Recent mineral discoveries in several areas have given rise to very large demands for water, the search for which has had to be intensified. Marked advances in the knowledge of aquifers and quality of water in the main sedimentary basin have been made as a result of extensive geological surveys and exploratory drilling by the Geological Survey (a branch of the Department of Mines), several oil companies, and the Water Authority.

Perth Metropolitan Water Supplies

The sources of the metropolitan water supply are South Dandalup Reservoir, Serpentine Reservoir and Pipehead Reservoir, Canning Reservoir, Wungong Reservoir, Churchman Brook Reservoir, New 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.

TABLE 12.3 - METROPOLITAN WATER SUPPLY QUANTITIES OF WATER DRAWN
(*000 kilolitres)

<i>Source</i>	<i>1988-89</i>	<i>1989-90</i>	<i>1990-91</i>
Canning Reservoir	38,313	23,904	33,519
Churchman Brook Reservoir	5,166	2,043	2,862
Mundaring Weir	7,253	807	1,868
North Dandalup Pipehead Dam	15,567	11,903	12,708
Serpentine and Serpentine Pipehead Reservoirs	20,432	40,467	48,270
South Dandalup Reservoir	12,623	16,911	21,199
Victoria Reservoir	4,193	1,931	(a)
Wungong Reservoir	17,727	23,673	22,354
Total hills sources output	121,274	121,644	142,783
Total groundwater output	79,743	78,182	83,263
Gross output	201,017	199,827	226,046
Less output to Mandurah	4,602	4,717	6,086
Output to Metropolitan Area	196,415	191,315	215,664

(a) Replaced by New Victoria Reservoir.

Work began in early 1991 on a new Victoria Dam, to replace the original Victoria Dam which was decommissioned in May 1990. The new dam has been built 200 metres upstream from the existing

dam with an estimated cost of \$32.4 million. Its capacity is ten times greater than that of the old reservoir, and will contribute an additional 3,500 megalitres of water per year to the metropolitan supply system.

Water from storages in the Darling Range is conveyed to the metropolitan area by large trunk mains, including tunnels as part of the conveyancing system from Canning and Wungong Dams. 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 Reservoir and Wungong Reservoir respectively. In addition, groundwater is distributed, after treatment, into the supply system. The groundwater is treated at water treatment plants situated at Gwelup, Mirrabooka, Wanneroo and Jandakot. Groundwater from artesian wells is also fed into service reservoirs.

TABLE 12.4 – METROPOLITAN WATER SUPPLY

	1988-89	1989-90	1990-91
Number of services	368,435	379,903	389,825
Length of water mains (kilometres)	9,735	9,937	10,013
Water supplied ('000 kilolitres)	194,266	189,597	213,589

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 and Busselton 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 throughout most of the State, total control has been exercised on groundwater usage. The control of other areas has been tailored to specific problems which are known to exist.

Great Southern Towns Water Supply. This scheme provides water to the coal mining town of Collie, together with towns and farmlands in the Great Southern Area. Water has been drawn from Wellington Dam, and supplied to towns from Brookton and Kondinin in the north to Kojonup and Gnowangerup in the south. The new Harris Dam near Collie was completed in 1990. The dam supplies water to all towns, communities and farmlands within the Great Southern Scheme. Its reservoir capacity is almost 72,000 megalitres with a catchment area of 321 square kilometres.

Following commissioning of the Harris system, the Wellington Reservoir has been opened for controlled recreation activities. Reafforestation of the reservoir catchment is expected to reduce salinity to acceptable levels for future domestic supply in fifteen to twenty years.

TABLE 12.5 – GREAT SOUTHERN TOWNS WATER SUPPLY

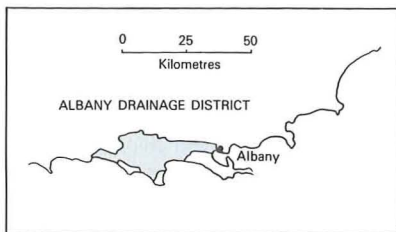
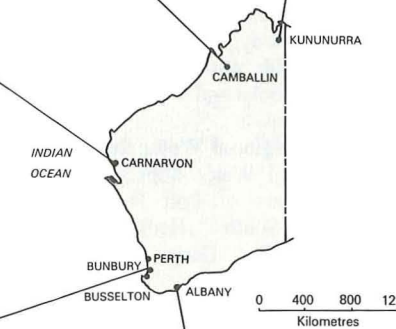
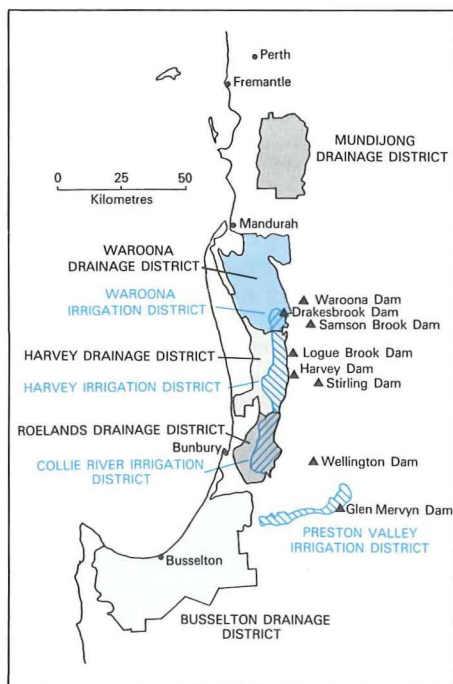
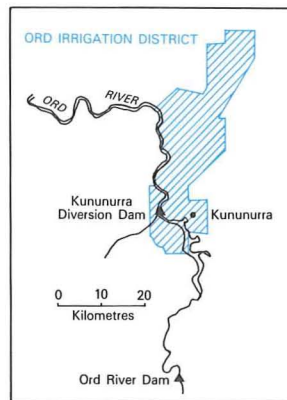
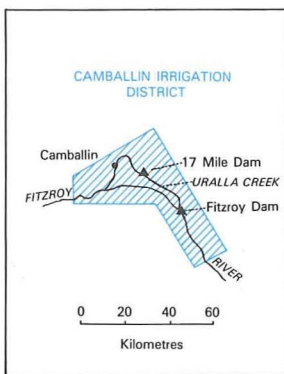
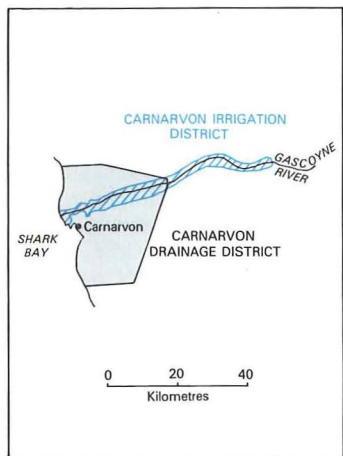
Item	1988-89	1989-90	1990-91
Number of services	13,914	14,030	14,035
Length of water mains (kilometres)	2,333	2,333	2,333
Water supplied ('000 kilolitres)	6,196	6,851	6,978

TABLE 12.6 – GOLDFIELDS AND AGRICULTURAL AREAS WATER SUPPLY

	1988-89	1989-90	1990-91
Number of services	31,175	30,888	29,496
Length of water mains (kilometres)	7,981	7,981	7,981
Water supplied ('000 kilolitres)	27,421	27,812	28,932

Goldfields and Agricultural Areas Water Supply. This scheme provides water to consumers in the Central agricultural areas and eastern Goldfields. Water is supplied to ninety-three towns and to 2,650,000 hectares of farmland in the central and north-eastern wheatbelt. Water is pumped from Mundaring Weir on the Helena River, augmented by the Lower Helena Pipehead Dam and supplemented by the metropolitan system when necessary. The main pipeline between Mundaring and Kalgoorlie is 554 kilometres long, with eighteen pumping stations and extensions to country towns and agricultural areas at several points.

DIAGRAM 12.4
IRRIGATION AND DRAINAGE DISTRICTS
AT 30 JUNE 1991



▲ Main Dams
▨ Irrigation Districts

Local and Regional Schemes

Lower Great Southern Towns Water Supply.

This scheme supplies the towns of Albany, Mount Barker and Kendenup. Water is drawn from three sources: Two Peoples Bay east of Albany (the water from which is treated for colour removal), Limeburners's Creek, and bores which are located west of Princess Royal Harbour.

Mandurah Regional Water 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 ninety per cent of the water consumed is supplied by gravity from the South Dandalup Reservoir with the remainder being injected into the supply main from metropolitan hills storages and bores at Ravenswood. At present the scheme supplies some 15,880 services and is the most rapidly growing scheme in the State.

Geraldton Regional Water Supply. The Geraldton Regional Water Supply serves consumers in the towns of Geraldton, Dongara, Port Denison, Mullewa, Walkaway, Drummonds Cove, Eradu and Narngulu with water being drawn from the Wicherina, Allanooka and Wye Springs borefields.

Port Hedland Regional Water Supply. The Port Hedland Regional Water Supply provides water for the consumers of Port Hedland, Finucane Island and South Hedland from the complementary De Grey and Yule River borefields.

West Pilbara Water Supply. The West Pilbara Water Supply serves the towns of Dampier, Karratha, Roebourne, Wickham and Point Samson, and also the industrial complexes at Dampier, the Burrup Peninsula and Cape Lambert in the north of the State. Water is drawn from the Harding Dam in conjunction with the Millstream aquifer.

Supplies to other Country Towns. One hundred and eight towns are supplied with water from stream flow, dams, tanks, wells and bores, the schemes being administered under the provisions of the Country Areas Water Supply Act 1947.

The Water Authority is also responsible for the provision and maintenance of tanks and wells as a source of cartage water for a number of small communities in gold mining and agricultural areas.

TABLE 12.7 - OTHER REGIONAL SCHEMES

	1988-89	r/1989-90	1990-91
Number of services	80,299	83,065	89,255
Length of water mains (kilometres)	3,993	4,072	4,365
Water supplied ('000 kilolitres)	57,867	58,320	60,567

Aboriginal Communities. The Water Authority's involvement with Aboriginal communities throughout the State continues at a high level on a consultancy/contractual basis. Four coordinators at Kununurra, Port Hedland, Kalgoorlie and Geraldton operate in conjunction, with overall coordination by officers in Karratha.

During 1990-91, Aboriginal and Torres Strait Islanders Commission (ATSIC) and Aboriginal Affairs Planning Authority (AAPA) together provided \$4 million for upgrading and construction of water supply and sewerage facilities for eighty-eight town based, remote and newly emerging communities throughout the State. In addition, AAPA provided \$1.4 million for maintenance to be carried out at forty-eight remote communities and a small amount of money for maintenance of internal infrastructure work at town based communities.

Water Resources Assessment and Management

The Water Authority, in conjunction with the Western Australian Water Resources Council, is responsible for the assessment and management of water resources in Western Australia.

Supply and Development. The Authority is responsible for the evaluation, measurement and general management of surface and groundwater resources, including research, investigation and hydrological studies.

Water Quality. The Authority monitors and controls salinity and contamination of water supplies by an extensive sampling and treatment program. It also monitors land use management in catchment areas, particularly in relation to bauxite mining and forest management.

IRRIGATION SCHEMES

Irrigation activities conducted by the Water Authority are restricted to designated schemes

within the North-West, Mid-West and South-West Regions.

Water entitlements vary between schemes. The Ord River Scheme at Kununurra in the North-West Region, provides virtually an open water entitlement owing to the small scope of the existing irrigation area in relation to the potential capacity of the scheme. Water is used throughout the year from surface storage.

All other schemes limit water entitlement in relation to the rated irrigable land of each irrigation area. Water entitlements vary according to seasonal factors and water availability.

Schemes in the South-West Region, at Waroona, Harvey, Collie River and Preston Valley, provide water only during the summer months from surface storages replenished over the preceding winter. Entitlements vary between schemes and between sub-areas of schemes depending on available storages.

The Carnarvon scheme in the Mid-West Region provides water throughout the year from underground sources beneath the Gascoyne riverbed. The Authority's scheme supplements the irrigated supply from their own underground sources. Use of water from all sources is limited by individual entitlements which vary from year to year. Entitlements are affected by the length of time since underground aquifers were last replenished by a river flow.

TABLE 12.8 - IRRIGATION

	1988-89	1989-90	1990-91
Length of channels and drains (kilometres)	911	903	903
Assessments (number)	1,556	1,536	1,535
Area irrigated (hectares)	18,050	19,131	19,152
Water consumed ('000 kilolitres)	215,816	200,083	235,044

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 metropolitan area, whereby it receives surplus

water from local drainage systems into controlled main drains and disposes of it through outlets to the sea or rivers, or by groundwater recharge where practicable. This scheme provides a means of coordinating the Water Authority's drainage planning activities with those of local authorities, particularly for potential areas of new land development.

The Water Authority operates and maintains proclaimed Drainage Districts, which are mainly located on the coastal plain south of Perth between Wungong/Serpentine and Busselton. Other declared Drainage Districts are between Denmark and Albany, and at Carnarvon. Many of these drainage districts are an inseparable adjunct to irrigation schemes on the coastal plain. Local authorities are responsible for drainage activities in other areas.

Advice on flood plain management and river improvement matters is provided by the Water Authority. This involves performing flood studies in order to identify and assess flood-prone areas of the State. This service has received increased attention in recent years.

SEWERAGE SCHEMES

The Water Authority aims to ensure the effective collection, conveyance, treatment and disposal of waste-water and industrial waste so as to safeguard community health and protect the environment.

Metropolitan Sewerage

The Water Authority operates five major waste-water treatment plants throughout the metropolitan area.

Over ninety-eight per cent of the treated effluent from these plants is discharged to the ocean where it is diluted and dispersed by currents and wave action. The remainder is discharged to effluent soakage basins for land disposal.

TABLE 12.9 - METROPOLITAN SEWERAGE SYSTEMS

	1988-89	1989-90	1990-91
Number of sewered assessments	320,113	334,767	346,868
Length of sewers (kilometres)	5,352	5,532	5,638

Country Towns Sewerage

At 30 June 1991, the Water Authority operated sixty-nine town sewerage schemes throughout the country areas of Western Australia. In addition, a further seventeen sewerage schemes were in operation by local government authorities under provisions of the Health Act, and a number by major mining companies in towns established to service mining operations. Several other local government authorities have reached an advanced stage of planning to commence schemes in future years.

REFERENCES

Water Authority of Western Australia, *Annual Report 1991*.

Western Australian Water Resources Council, *Water Resource Perspectives Western Australia; Report No. 2 — Water Resources and Water Use*.

TABLE 12.10 - COUNTRY SEWERAGE SYSTEMS

	1988-89	1989-90	1990-91
Number of towns sewered	65	68	69
Length of sewers (kilometres)	1,514	1,613	1,682
Number of services	62,525	67,566	72,558

Chapter 13

AGRICULTURE, FORESTRY AND FISHING

AGRICULTURE	13-1
Integrated Agricultural Statistics	13-1
Value of Agricultural Commodities Produced	13-2
Land Use on Agricultural Establishments	13-3
Agriculture	13-4
Pastoral Production	13-10
Other Livestock	13-13
The Department of Agriculture	13-15
Agriculture Protection Board	13-16
Advisory Committees	13-16
Herd Improvement Service of Western Australia	13-16
Farm Management Service Laboratory	13-16
FORESTRY	13-16
Forests for Wood, Water and Wildlife	13-16
The Prime Indigenous Forests	13-17
The Inland Forests	13-17
Forestry Administration	13-17
Forest Production	13-17
FISHERIES	13-18
General Fisheries	13-18
Fisheries Administration	13-19
Aquaculture and Inland Fishing	13-20
Pearl-Shell Fishing and Pearl Culture	13-20
Australian Fishing Zone	13-20
References	13-20

Chapter 13

AGRICULTURE, FORESTRY AND FISHING

Agriculture

INTEGRATED AGRICULTURAL STATISTICS

The principal source of statistics relating to the agricultural sector is the Integrated Agricultural Commodity Census, which is conducted annually by the ABS. Units (establishments) included in the census are defined and classified in accordance with the Australian Standard Industrial Classification (ASIC).

While no financial data are collected in the census, an 'estimated value of agricultural operations' (EVAO) is calculated for each establishment by applying unit values to reported production and/or stock data. This procedure enables establishments in the census to be classified according to industry (ASIC) and also according to size of operations.

TABLE 13.1 - NUMBER OF ESTABLISHMENTS WITH AGRICULTURAL ACTIVITY
INDUSTRY AND ESTIMATED VALUE OF AGRICULTURAL OPERATIONS: 1990-91

Reference: Catalogue No. 7102.0

Industry of establishment ASIC code	Description	Estimated value of agricultural operations (\$'000)					Total	
		Less than 20	20- 49	50- 99	100- 199	200- 499		500 and over
0124	Poultry for meat	1	1	1	16	26	6	51
0125	Poultry for eggs	5	6	12	12	35	30	100
0134	Grapes	9	68	30	10	6	—	123
0135	Plantation fruit	3	6	20	62	14	2	107
0136	Orchard and other fruit	56	111	96	79	38	11	391
0143	Potatoes	—	11	23	45	52	18	149
0144	Vegetables (except potatoes)	20	88	94	91	62	36	391
0181	Cereal grain (incl. oil seeds)	15	26	68	103	411	316	939
0182	Sheep - cereal grains	10	90	360	1,372	2,351	712	4,895
0183	Meat cattle - cereal grains	—	1	3	7	3	1	15
0184	Sheep - meat cattle	33	159	177	149	101	27	646
0185	Sheep	118	371	655	955	841	148	3,088
0186	Meat cattle	155	421	242	117	92	51	1,078
0187	Milk cattle	2	13	55	249	160	14	493
0188	Pigs	1	17	18	33	41	22	132
0192	Peanuts	—	—	1	—	—	—	1
0195	Nurseries	10	26	45	39	40	23	183
0196	Agriculture n.e.c.	26	87	52	23	14	4	206
01	Total agriculture	464	1,502	1,952	3,362	4,287	1,421	12,988
..	Other industries	13	43	34	19	20	4	133
..	Total all industries	477	1,545	1,986	3,381	4,307	1,425	13,121

AGRICULTURE, FORESTRY AND FISHING

TABLE 13.2 – NUMBER OF ESTABLISHMENTS WITH AGRICULTURAL ACTIVITY
INDUSTRY AND AREA OF ESTABLISHMENT: 1990-91
Reference: Catalogue No. 7102.0

Industry of establishment ASIC code	Description	Area of establishment (hectares)					Total
		0-49	50- 499	500- 2,999	3,000- 9,999	10,000 and over	
0124	Poultry for meat	48	3	—	—	—	51
0125	Poultry for eggs	87	12	1	—	—	100
0134	Grapes	95	27	1	—	—	123
0135	Plantation fruit	101	4	2	—	—	107
0136	Orchard and other fruit	269	116	6	—	—	391
0143	Potatoes	24	112	13	—	—	149
0144	Vegetables (except potatoes)	300	84	6	1	—	391
0181	Cereal grains (incl. oilseeds n.e.c.)	1	57	541	327	13	939
0182	Sheep – cereal grains	—	208	3,627	1,012	48	4,895
0183	Meat cattle – cereal grains	—	2	12	1	—	15
0184	Sheep – meat cattle	9	333	258	22	24	646
0185	Sheep	25	817	1,861	145	240	3,088
0186	Meat cattle	41	714	162	12	149	1,078
0187	Milk cattle	10	415	68	—	—	493
0188	Pigs	22	67	41	1	1	132
0192	Peanuts	—	1	—	—	—	1
0195	Nurseries	149	21	12	1	—	183
0196	Agriculture n.e.c.	97	95	12	2	—	206
01	Total agriculture	1,278	3,088	6,623	1,524	475	12,988
..	Other industries	43	50	30	3	7	133
..	Total all industries	1,321	6,226	6,653	1,527	482	13,121

TABLE 13.3 – FINANCIAL STATISTICS,
AGRICULTURAL ENTERPRISES
(\$ million)

Reference: Catalogue No. 7507.0

	r1988-89	1989-90p
Sales of crops	1,140.5	1,167.8
Sales of livestock	504.9	485.8
Sales of livestock products	1,237.4	1,299.3
Turnover	3,043.9	3,099.4
Purchases and selected expenses	1,603.5	1,682.2
Value added	1,609.7	1,198.7
Adjusted value added	1,442.4	1,016.7
Gross operating surplus	1,252.0	804.3
Total interest paid	202.4	278.5
Cash operating surplus	959.7	846.8
Total net capital expenditure	293.6	331.5
Gross indebtedness	1,630.8	2,144.6
Number of enterprises	11,614	12,003

The effect of the pre-1986-87 cut-offs on statistics, other than counts of establishments, is minimal. The \$20,000 cut-off applying from 1986-87 does have a significant effect on some items, and estimates of the under coverage are available from the ABS.

Statistics on the financial performance of the agricultural sector are obtained from the Agricultural Finance Survey which has been conducted periodically by the ABS. This survey, which provides estimates of turnover, expenditure, cash operating surplus, capital expenditure and indebtedness, was recommenced on an annual basis from 1986-87. Detailed definitions and explanatory notes about the survey were published in the bulletin *Agricultural Industries, Financial Statistics, Australia 1986-87* (Catalogue No. 7507.0).

VALUE OF AGRICULTURAL
COMMODITIES PRODUCED

Since 1976-77, small establishments have been excluded from the census, to reduce ABS processing costs and minimise respondent burden. From 1976-77 to 1980-81, an EVAO cut-off of \$1,500 was used. The cut-off was raised to \$2,500 in 1981-82, and further raised to \$20,000 in 1986-87.

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.

AGRICULTURE, FORESTRY AND FISHING

The local value is the value at the place of production and is obtained by deducting marketing costs from the gross value. Marketing costs comprise freight, cost of containers, commission, and other charges incurred in marketing. Gross values provide a reliable measure of the value of production of any particular commodity or group but when comparing or combining values for agricultural industries with those for secondary industries, the value added series of financial statistics from the Agricultural Finance Survey should be used.

Wool (including fellmongered and exported on skins) was the most important item in 1990-91 with a gross value of \$891 million, followed by wheat with \$727 million.

LAND USE ON AGRICULTURAL ESTABLISHMENTS

In 1990-91, there were 13,202 agricultural establishments with an estimated value of agricultural operations over \$20,000. They comprised 111 million hectares of land, or about 44 per cent of the total area of Western Australia.

Of the total area of these establishments, 5.5 million hectares were used for crops and 6.8 million hectares were under sown pasture. The balance consisted mainly of uncleared land (most of which is pastoral leases held by sheep and cattle stations) but it also included cleared land which was used for grazing or which was resting during the season, fallowed areas and newly cleared land.

Table 13.6 gives details of rural land use according to statistical division for 1990-91. Maps showing the boundaries of the statistical divisions and their component statistical local areas are located in the Appendix.

TABLE 13.4 - GROSS VALUES, MARKETING COSTS AND LOCAL VALUES OF AGRICULTURAL COMMODITIES
(\$ million)

Reference: Catalogue No. 7503.5

	1988-89	1989-90r	1990-91p
Crops and pastures—			
Gross value of production	1,799.7	1,545.0	1,361.1
Marketing costs	239.5	225.3	247.3
Local value of production	1,560.2	1,319.7	1,113.8
Livestock slaughtering and other disposals—			
Gross value of production	424.9	454.0	379.8
Marketing costs	39.0	47.4	47.5
Local value of production	385.9	406.7	332.3
Livestock products—			
Gross value of production	1,495.0	1,370.0	1,017.8
Marketing costs	39.0	42.6	32.9
Local value of production	1,455.9	1,327.4	984.9
Total agriculture—			
Gross value of production	3,719.6	3,369.1	2,758.7
Marketing costs	317.5	315.3	327.7
Local value of production	3,402.1	3,054.0	2,431.0

TABLE 13.5 - SUMMARY OF AUSTRALIAN STATISTICS: 1989-90
References: Catalogue Nos. 7330.0, 7503.0

	Unit	NSW	Vic	Qld	SA	WA	Tas	Australia (a)
Agricultural establishments—								
Number	..	37,540	33,306	26,619	14,636	13,410	3,699	129,539
Area	'000 ha	61,984	13,062	152,340	57,480	110,881	1,933	466,560
Area of crops	"	4,080	1,989	2,580	3,042	5,174	83	16,956
Sown pasture	"	6,992	6,504	4,822	3,786	7,724	856	30,781
Gross value of—								
Crops	\$m	2,552	1,821	2,362	1,437	1,545	222	9,961
Livestock slaughtering and disposals	"	1,734	1,247	1,671	403	454	134	5,719
Livestock products	"	2,556	2,142	748	720	1,370	261	7,810

(a) Excludes Northern Territory and Australian Capital Territory.

AGRICULTURE, FORESTRY AND FISHING

TABLE 13.6 - LAND USE IN EACH STATISTICAL DIVISION 1990-91

Reference: Catalogue No. 7411.5

Statistical division	Agricultural establishments (number)	Land use during the season ('000 hectares)			Total area of establishments ('000 hectares)
		Used for crops	Under sown pastures	Lucerne (all purposes)	
Perth	1,051	7.7	32.8	0.1	78.5
South-West	2,273	30.2	507.9	0.5	786.5
Lower Great Southern	2,332	505.1	1,657.9	1.6	2,833.8
Upper Great Southern	1,954	1,029.3	1,490.7	—	3,423.2
Midlands	3,189	2,436.6	1,455.9	0.6	7,058.4
South-Eastern	767	345	999.4	1.5	16,705.1
Central	1,440	1,004.1	645.3	2.4	42,413.2
Pilbara	59	—	—	—	14,469.9
Kimberley	137	4.6	6.3	0.1	23,101.9
Total	13,202	5,362.7	6,796.3	6.9	110,870.5

TABLE 13.7 - LAND USE
Reference: Catalogue No. 7411.5

Unit	1988-89	1989-90	1990-91
Agricultural establishments	No. 13,461	13,410	13,202
Land use during the season—			
Used for crops	'000 ha 5,082	5,174	5,359
Under sown pasture	" 7,781	7,718	6,796
Lucerne (all purposes)	" 6	6	7
Other	" 99,762	97,983	98,709
Total area of establishments	" 112,631	110,881	110,871

TABLE 13.8 - WHEAT FOR GRAIN
AREA AND PRODUCTION

Reference: Catalogue No. 7321.5

Unit	1988-89	1989-90	1990-91
Area	'000 ha 3,297	3,476	3,632
Production—			
Total	'000 t 5,225	4,800	5,449
Per hectare	tonnes 1.58	1.38	1.50
Gross value	\$'000 1,122,328	954,292	727,482p

AGRICULTURE

Wheat

Although wheat has been grown from the earliest years of settlement, cultivation was confined to limited areas as late as 1890 when an area of approximately 14,000 hectares was grown. In 1990-91, 3.63 million hectares were sown. This was well below the 1982-83 figure of 4.87 million hectares, which was the largest area ever sown to wheat in the State.

A summary of the history of the wheat industry in Western Australia, which covers the development of new areas, the effects of such factors as the decline in the goldmining industry, government land settlement policies and the introduction of new marketing practices, is contained on pages 365-7 of the *Western Australian Year Book*, No. 20 — 1982.

TABLE 13.9 - ESTABLISHMENTS GROWING WHEAT FOR GRAIN CLASSIFIED ACCORDING TO AREA SOWN SEASON 1990-91

Reference: Catalogue No. 7321.5

Area of wheat for grain	Establishments	Total area sown to wheat for grain
Hectares	No.	'000 hectares
1 - 9	66	0.3
10 - 49	293	8.3
50 - 99	354	25.5
100 - 249	1,135	192.3
250 - 499	1,399	511.7
500 - 999	1,387	970.8
1,000 - 1,499	652	778.9
1,500 and over	524	1,144.5
Total	5,810	3,632.2

Size Classification of Farms with Wheat. Of the 13,202 agricultural establishments in the State in 1990-91, wheat for grain was grown on 5,810 or 44 per cent of the total. The median wheat crop was between 500 and 750 hectares.

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 cooperative company, Co-operative Bulk Handling Limited, was set up in 1933 to operate the system. A detailed account of the history of Co-operative Bulk Handling Limited's method of operation and the techniques developed for handling the State's grain production is given on pages 369-70 of the *Western Australian Year Book*, No. 20 — 1982.

Marketing of wheat. Until 30 June 1989, the Australian Wheat Board was the sole marketing authority for wheat, operating under the authority of the *Wheat Marketing Act 1984*. From 1 July 1989, marketing of wheat for use within Australia was deregulated, and producers are now free to make their own marketing arrangements for wheat for domestic use. The Australian Wheat Board retains sole authority for export of wheat.

Exports of wheat. Most of the State's wheat is exported as grain. Flour exports, which had been as high as 160,000 tonnes in the mid 1950s, now account for a minimal proportion of the State's wheat crop.

TABLE 13.10 – OVERSEAS EXPORTS OF WHEAT
(^{'000 tonnes})

	1988-89	1989-90	1990-91
Wheat	4,870	4,252	5,013

Oats

Although oats have been grown in Western Australia since the early development of wheat farming, cultivation was somewhat limited until stimulated by the introduction of large-scale sheep raising in the agricultural areas, when their high nutritional worth as stock feed made them a very valuable crop. In addition to their importance as local stockfeed, significant quantities of oats are also exported. The area sown to oats for grain increased from 78,000 hectares in 1920 to a peak of 538,000 in 1960. More recently, area sown has been subject to considerable fluctuations.

TABLE 13.11 – OATS FOR GRAIN
AREA AND PRODUCTION
Reference: Catalogue No. 7321.5

	Unit	1988-89	1989-90	1990-91
Area	'000 ha	389	340	324
Production—				
Total	'000 t	618	529	497
Per hectare	tonnes	1.59	1.56	1.53
Gross value	\$'000	83,697	50,714	41,915p

Barley

Barley grows well over a wide range of climatic and soil conditions and generally yields better than other cereals. It is more successful on saline soils where other crops may not do well, and as a first crop on newly-developed land. Both 'two-row' and 'six-row' barley are grown. Part of the crop is retained on farms for stockfeed, while the balance is sold locally and overseas for malting or stockfeed manufacture.

TABLE 13.12 – BARLEY FOR GRAIN
AREA AND PRODUCTION
Reference: Catalogue No. 7321.5

	Unit	1988-89	1989-90	1990-91
Area	'000 ha	383	421	498
Production—				
Total	'000 t	552	628	742
Per hectare	tonnes	1.44	1.49	1.49
Gross value	\$'000	88,691	108,740	104,488p

In terms of area sown, barley was for some years the second most important crop in the State, after wheat. The 623,000 hectares sown in 1970-71 moved barley ahead of oats for the first time. Since that year, although barley plantings fluctuated from a low of 387,000 hectares in 1974-75 to a high of 965,000 hectares in 1984-85, they exceeded oat plantings each year. In 1988-89, barley became the second most valuable crop in the State, after wheat.

Lupins

The large-scale growing of lupins has been undertaken in Western Australia since the early 1970s. Apart from the drought-affected 1985-86 season, area sown has increased significantly each year from 1980-81 to 1987-88. Since 1988-89 lupins area fell as sheep numbers remained high. Farmers continued to expand their sheep flocks at the expense of cropping.

**TABLE 13.13 - LUPINS FOR GRAIN
AREA AND PRODUCTION**
Reference: Catalogue No. 7321.5

	Unit	1988-89	1989-90	1990-91
Area	'000 ha	720	676	665
Production—				
Total	'000 t	790	619	624
Per hectare	tonnes	1.10	0.92	0.94
Gross value	\$'000	156,423	104,031	99,662

Other grains and oilseeds.

There was considerable interest in the production of rapeseed (canola) in the early 1970s, and plantings reached 42,000 hectares in 1972-73. Subsequent problems with disease saw plantings reach a low of 200 hectares in 1982-83. Since then, area sown has expanded and reached 4,800 hectares in 1986-87. Plantings fell back to 576 hectares in 1989-90. However, in 1990-91 the area planted rose to 2,002 hectares.

Triticale, a wheat/rye cross, was first recorded in the Agricultural Census in 1978-79, and since then plantings increased each year to 1984-85 when 39,000 hectares were sown. Area planted in the 1990-91 season was 15,550 hectares.

Field peas is another crop with significant increases in planting over the past decade. Recorded area reached 1,000 hectares in the 1982-83 season, was 4,100 hectares in 1985-86, and had expanded to 47,100 hectares by 1988-89.

However, plantings have been decreasing since then and in the 1990-91 season, fell to 23,000 hectares.

Grain sorghum, linseed, rye, 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 1990-91 being 399,700 tonnes from 111,000 hectares. The principal cereal hay crop is oats and 497,000 tonnes of oaten hay were cut in 1990-91 from 94,000 hectares.

TABLE 13.14 - HAY - AREA AND PRODUCTION
Reference: Catalogue No. 7321.5

	Unit	1988-89	1989-90	1990-91
Pasture (a)—				
Area	'000 ha	119	107	111
Production	'000 t	402	380	400
Crop (b)—				
Area	'000 ha	129	122	111
Production	'000 t	471	430	383

(a) Includes lucerne. (b) Principally from oats and wheat.

Pastures

Of the 6.8 million hectares of improved pastures in the south-west region, the majority are sown to the legume subterranean clover. Other species used include medic, rose clover, serradella, lucerne and a variety of grasses, principally Wimmera ryegrass. The use of perennial grasses such as perennial ryegrass, kikuyu, phalaris and cocksfoot is restricted to a small area having a long growing season along the south coast.

Dominant legume pastures are initially easily established, following the clearing of the native vegetation. As most of the soils are infertile, a range of fertilisers must be used. Phosphorus, as superphosphate, is usually applied annually while minor elements such as copper, zinc and sometimes molybdenum, have to be applied at least once. Over time, other elements may also need to be applied for good pasture growth to be maintained. Potassium in particular can become deficient on the sandy soils of high rainfall areas.

While pastures are green for only four to nine 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 program, 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 to 1,200 millimetres 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.

TABLE 13.15 - PASTURE SEED HARVESTED
Reference: Catalogue No. 7321.5

	Unit	1988-89	1989-90	1990-91
Area harvested	'000 ha	23.8	12.5	15.7
Production	tonnes	4,916	2,272	2,705

Vegetables

The State's vegetable production is aimed principally at providing for the local fresh market. Market gardens for fresh produce are concentrated in the outer suburbs of the Perth Statistical Division, although some of these areas are now becoming urbanised. Growing of vegetables for processing was restricted to peas and beans for a long time. More recently, there has been a significant increase in both the volume and variety of vegetables grown for processing, with potatoes forming a major proportion of this market. Exports of vegetables have also assumed greater importance in recent years, with some growing operations being set up either wholly or principally for supplying the export market.

Potatoes are the major and most valuable vegetable crop, accounting for over a quarter of the State's vegetable area. Production is concentrated in the higher rainfall areas of the south-west, principal growing centres being Manjimup, Busselton, Donnybrook and Albany. Compared with the total State crop, the Perth Statistical Division is relatively unimportant as a potato producer.

Apart from potatoes, a wide variety of other vegetables are grown in the State. Among these, carrots rank as the second most valuable crop, with cauliflowers the third most valuable.

Over half the State's carrot production is grown in the Perth Statistical Division, while the main cauliflower growing area is the Manjimup district in the far south-west of the State.

A significant proportion of the State's tomato production is grown at Carnarvon, on the State's upper west coast. Because of the warmer winter climate, Carnarvon growers are able to produce 'out of season' crops of tomatoes and other vegetables for the Perth market. Similar factors are assisting the development of vegetable production at Kununurra in the far north of the State, where significant quantities of melons and pumpkins are being grown.

TABLE 13.16 - PRINCIPAL VEGETABLES
AREA, PRODUCTION AND GROSS VALUE
Reference: Catalogue No. 7321.5

	Unit	1988-89	1989-90	1990-91
Carrots—				
Area	hectares	852	790	685
Production	tonnes	30,988	30,942	29,925
Gross value	\$'000	15,409	r12,814	p12,426
Cauliflowers—				
Area	hectares	754	724	802
Production	tonnes	17,866	17,438	17,156
Gross value	\$'000	12,288	r13,530	p10,703
Lettuce—				
Area	hectares	437	403	420
Production	tonnes	14,505	13,898	14,414
Gross value	\$'000	7,206	r5,463	p6,244
Onions—				
Area	hectares	412	471	492
Production	tonnes	21,622	25,399	27,584
Gross value	\$'000	7,922	r7,594	p8,553
Potatoes—				
Area	hectares	2,188	2,497	2,877
Production	tonnes	78,464	98,705	110,095
Gross value	\$'000	31,070	r31,865	p37,105
Tomatoes—				
Area	hectares	246	250	238
Production	tonnes	7,910	7,070	8,243
Gross value	\$'000	9,090	r7,448	p7,304
All vegetables—				
Area	hectares	8,141	9,127	10,102
Gross value	\$'000	113,072	r109,706	p124,275

Fruit

Fruit production is largely confined to the temperate regions between Gingin to the north of Perth and Albany on the south coast. The cool, wet winters and warm, dry summers of this area permit the successful cultivation of a wide variety of fruits. In the southern and south-western sections, apples, pears and stone fruits are grown extensively, and grapes are of increasing importance, while in the districts around Perth the principal crops are apples, stone fruits, citrus fruits and grapes. Outside this main fruit-growing area, banana plantations have been established at Carnarvon in the north-west and at Kununurra in the north.

TABLE 13.17 - FRUIT - AREA AND GROSS VALUE OF PRODUCTION
Reference: Catalogue No. 7322.5

	Unit	1988-89	1989-90	1990-91
Area—				
Orchard fruit	ha	5,287	5,150	5,114
Plantation and berry fruit	"	524	529	540
Grapes	"	1,930	2,039	2,032
Total	"	7,742	7,718	7,685
Gross value of production—				
Orchard fruit	\$'000	41,910	r34,603	32,089
Plantation and berry fruit	"	13,493	17,113	24,839
Grapes	"	12,839	r10,926	10,843
Total	"	68,241	r62,643	67,771

Apples and pears

Apples, which are the principal fruit crop, account for more than half of the total orchard area. Donnybrook, Manjimup and the hills area near Perth are the most important centres but other districts in the south-west still produce significant quantities. In 1990-91, the number of apple trees recorded in the Census was 738,000. Granny Smiths accounted for 61 per cent of the 36,348 tonnes produced. Pears are usually grown in conjunction with apples, and although apples are still considerably more important, pear tree numbers have increased by over 50 per cent in the last ten years. Exports of both apples and pears are significant, mainly to South East Asian countries.

Citrus fruit

The Shire of Chittering, north of Perth, is a major citrus fruit producer, while other important areas are the Shires of Kalamunda and Swan and the City of Armadale, all near Perth, and the Shires of Harvey and Capel in the south-west. Although oranges are by far the most important crop, substantial quantities of lemons and mandarins, and lesser quantities of grapefruit are also produced. Production is largely for local consumption but there is some export trade, especially in lemons.

Stone fruits

Stone fruits are grown mainly in the hills districts in the Darling Ranges near Perth, and in the Shires of Manjimup and Donnybrook-Balingup in the south-west of the State; however some stone fruits are grown in many other districts of the south-west.

TABLE 13.18 - ORCHARD FRUIT - TREES, PRODUCTION AND GROSS VALUE
References: Catalogue Nos. 7322.5, 7503.5

	Unit	1988-89	1989-90	1990-91
Apples—				
Trees	'000	667	687	738
Production	tonnes	46,695	44,835	36,348
Gross value	\$'000	24,041	18,671	p13,218
Pears—				
Trees	'000	143	169	184
Production	tonnes	6,974	7,192	7,308
Gross value	\$'000	3,797	3,015	p3,894
Lemons and limes—				
Trees	'000	18	18	20
Production	tonnes	1,322	1,105	1,126
Gross value	\$'000	1,223	701	p965
Mandarins—				
Trees	'000	43	48	59
Production	tonnes	867	1,004	1,279
Gross value	\$'000	978	r907	p1,091
Oranges—				
Trees	'000	198	187	186
Production	tonnes	5,087	4,503	5,368
Gross value	\$'000	2,396	1,616	p1,609
Nectarines—				
Trees	'000	99	116	118
Production	tonnes	1,112	1,425	1,768
Gross value	\$'000	1,529	r1,554	p1,823
Peaches—				
Trees	'000	112	114	123
Production	tonnes	1,819	2,157	2,440
Gross value	\$'000	2,724	r2,200	p2,976
Plums and prunes—				
Trees	'000	138	146	197
Production	tonnes	2,072	2,712	3,106
Gross value	\$'000	2,588	3,276	p3,269

Vineyards

Historically, the 'Swan Valley' region in the Shire of Swan has dominated the State's viticulture industry. In the early 1970s, this region accounted for some 70 per cent of the State's vineyard area. Since then, pressures of urban growth in the Swan Valley have reduced the area under vines there, and new vineyards have been developed elsewhere in the State; principally at Margaret River/Busselton, Mount Barker/Frankland and Bindoon/Gingin. As a result, the Swan Valley now accounts for just over 30 per cent of the State's vineyard area. The Margaret River/Busselton, and Mount Barker/Frankland grape production is almost entirely used for winemaking; in other areas table and drying grapes are also significant.

TABLE 13.19 – GRAPES – AREA AND PRODUCTION
Reference: Catalogue No. 7322.5

	Unit	1988-89	1989-90	1990-91
Area of vines—				
Bearing	ha	1,684	1,701	1,763
Not yet bearing	"	246	338	269
Grapes for wine making and table use—				
Quantity	tonnes	9,299	10,769	9,954
Gross value	\$'000	11,666	r10,303	9,888
Dried vine fruits—				
Quantity	tonnes	480	359	382
Gross value	\$'000	1,171	624	956

Other fruit

Production of bananas is mainly confined to a narrow strip of land along the Gascoyne River at Carnarvon, with small, but increasing areas at 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 cropped and in production, as occurred in the 1988-89 season. Apart from such weather-caused interruptions, production has consistently increased over the last twenty years. The crop is transported by road to Perth and sold locally in competition with bananas imported from other Australian States.

Strawberry production has increased significantly in recent years. Nearly 90 per cent of the area planted is within the Perth Statistical Division.

TABLE 13.20 – BANANAS – AREA AND PRODUCTION
Reference: Catalogue No. 7322.5

	Unit	1988-89	1989-90	1990-91
Area of plants—				
Bearing	ha	346	366	359
Not yet bearing	"	97	66	91
Production—				
Total quantity	tonnes	9,908	11,268	12,516
Gross value	\$'000	9,426	12,684	p19,890

Nurseries

The main concentration of commercial nurseries is in the Perth Statistical Division in the areas of Wanneroo, Armadale and Cockburn. Most nurseries produce ornamental shrubs and trees; some specialise in the production of bedding plants while others concentrate on cut-flower production. Fruit trees, mainly citrus, are produced by specialist nurseries in the Perth Statistical Division while pome and stone fruit trees are mostly produced in the South-West Statistical Division at Manjimup and Donnybrook. The value of cultivated turf has declined during the last two years and accounts for nine per cent of the total gross value of nurseries and turf. The cultivation of native plants, generally on a less extensive scale than is the case with exotic plants, is also now of increasing importance.

TABLE 13.21 – NURSERIES (a)
AREA AND GROSS VALUE
Reference: Catalogue Nos. 7321.5, 7503.5

	Unit	1988-89	1989-90	1990-91
Area	hectares	1,972	1,871	1,748
Gross value	\$'000	50,751	r46,969	71,594

(a) Including cultivated turf.

Artificial fertiliser

Soils in Western Australia are acutely deficient in phosphate and regular applications of phosphatic fertiliser are required for crop and pasture growth. Newly cleared land in particular requires heavy applications of superphosphate for satisfactory yields. Nitrogen deficiencies are also common. Legume pastures and lupins have assisted greatly

in increasing nitrogen supplies. Potassium deficiency is primarily a problem on sandy soils in high rainfall areas.

Many Western Australian soils and particularly sandy soils, are also deficient in trace elements. The use of fertilisers is therefore a significant factor in the State's farming activity.

TABLE 13.22 - ARTIFICIAL FERTILISER USED ON RURAL HOLDINGS

Reference: Catalogue No. 7411.5

	Unit	1988-89	1989-90	1990-91
Area fertilised	'000 ha	10,074	10,426	9,156
Quantity used	'000 t	1,244	1,274	1,014

PASTORAL PRODUCTION

Throughout this section, where mention is made of the 'pastoral areas', the portion of the State referred to comprises the Kimberley and Pilbara Statistical Divisions and the Sub-divisions of Lefroy, Gascoyne and Carnegie. The balance of the State, referred to as the 'agricultural areas', comprises the Perth, South-West, Upper Great Southern, Lower Great Southern and Midlands Statistical Divisions and the Sub-divisions of Johnston and Greenough River.

In the early days of settlement, pastoral activities in Western Australia were confined largely to what are now the agricultural areas and were usually associated with the cultivation of crops. However, beginning with Captain George Grey's visit in 1838 to the area known as the West Kimberley, explorers increasingly drew attention to the pastoral possibilities of large sections of the present Kimberley, Pilbara and Central Statistical Divisions.

In 1857 and 1858, F.T. Gregory noted the existence of good pastoral country in the Murchison and the Gascoyne districts and in the course of a journey further to the north in 1861 he discovered the Ashburton, Fortescue, De Grey and 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.

Sheep

From the end of the Second World War, the State's sheep numbers increased almost continuously until the mid 1970s, to peak at 34.8 million in 1976. Since then, numbers have fluctuated, reflecting variations in seasonal conditions and in the prices for wool and meat relative to grain prices. Since 1984, sheep numbers have risen significantly, owing to a strong wool market and relatively low wheat prices. The previous peak sheep population of 1976 was exceeded for the first time in 1989 and subsequently in 1990 when the flock numbered 38.4 million. However, with the collapse of prices for medium to coarse grade wool and removal of the floor prices in February 1991, sheep numbers decreased to 36.5 million. The national flock reduction scheme also contributed to this decrease.

TABLE 13.23 - SHEEP NUMBERS AND DISTRIBUTION AT 31 MARCH

Reference: Catalogue No. 7221.5

	In agricultural areas		In pastoral areas		State total
	Number	Proportion of State total	Number	Proportion of State total	
	'000	per cent	'000	per cent	'000
1960	13,396	81.6	3,016	18.4	16,412
1970	29,844	88.7	3,790	11.3	33,634
1980	28,730	94.4	1,701	5.6	30,431
1989	34,760	93.7	2,330	6.3	37,090
1990	35,924	93.5	2,498	6.5	38,422
1991	34,005	93.2	2,460	6.7	36,465

In the agricultural areas, sheep farming is usually carried out in conjunction with grain growing, while in the pastoral areas, sheep are generally grazed on large specialist 'sheep stations'. As a result, large flocks predominate in the pastoral areas. In 1991, the average flock size in agricultural areas was 2,465; in pastoral areas 12,041.

**TABLE 13.24 - SHEEP FLOCKS AT 31 MARCH 1991
CLASSIFIED ACCORDING TO SIZE OF FLOCK**
Reference: Catalogue No. 7221.5

Size of flock	Flocks	Sheep
		'000
1 - 99	239	11
100 - 999	1,355	759
1,000 - 1,999	2,003	3,012
2,000 - 4,999	4,157	13,502
5,000 - 9,999	1,693	11,449
10,000 - 19,999	414	5,544
20,000 and over	76	2,189
Total	9,937	36,465

Marketing of lamb

Lamb Marketing Board. All lamb produced for slaughter south of the twenty-sixth parallel in Western Australia is marketed through the Western Australian Lamb Marketing Board. The Board was established by the *Marketing of Lamb Act 1971* and began operations in December 1972. It came into being mainly as a result of pressure from, and following a referendum of, the State's lamb producers, who looked to the Board to improve the stability of their industry and increase returns.

The major aims of the Board are to administer an orderly method of marketing and encourage producer participation in lamb marketing, to operate an advance price schedule and a weight and grade system, and to rationalise procedures throughout the industry.

Apart from promoting lamb on the local market, the Board is also responsible for lamb exports. During the period of the Board's operations, there has been a marked change in the pattern of export sales of Western Australian lamb with reliance on the traditional United Kingdom market being replaced by other markets to the extent that the Board now exports to a range of overseas countries.

Wool

The decrease in sheep numbers and the abolition of the minimum floor price scheme for wool, led to the first major decrease in wool production for several years; however the 1990-91 clip of 214,567 tonnes is still the second highest on record. A further 7,684 tonnes was accounted for by dead and fellmongered wool and 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 steadying influence on market prices. A summary of this government action is contained on page 386 of the *Western Australian Year Book*, No. 20 — 1982.

TABLE 13.25 - SHEEP SHORN AND WOOL PRODUCTION

Reference: Catalogue No. 7221.5

	Unit	1988-89	1989-90	1990-91
Sheep shorn	'000	33,899	r36,471	35,530
Lambs shorn	"	8,880	r10,111	7,636
Total	"	42,779	r46,583	43,165
Average weight of wool shorn	kg	4.69	4.97	4.97
Wool production (greasy)—				
Shorn	'000 t	201	232	215
Dead, fellmongered, exported on skins	"	3	4	8
Total	"	203	236	222

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.

**DIAGRAM 13.1
SHEEP NUMBERS AND WOOL PRODUCTION 1970 TO 1991
(Excludes wool exported on skins)**

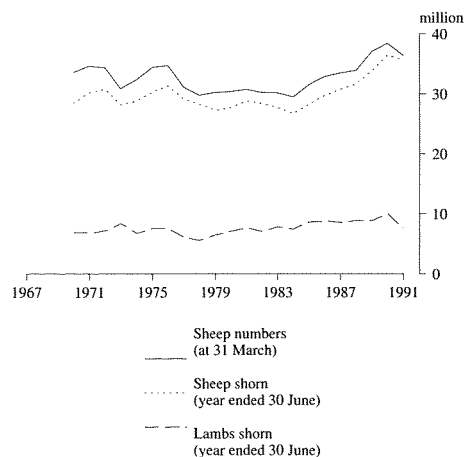


TABLE 13.26 – GROSS VALUE OF WOOL PRODUCTION
(\$'000)

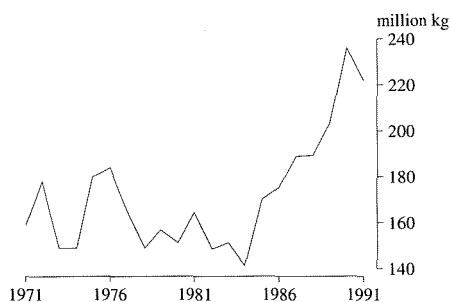
Reference: Catalogue No. 7503.5

	1988-89	1989-90	1990-91p
Shorn wool	1,388,361	1,244,908	881,974
Dead wool and fellmongered wool	813	817	351
Wool exported on skins	5,942	7,912	8,707
Total	1,395,116	1,253,637	891,033

1991, meat cattle comprised over 93 per cent of the State's cattle herd. More than 50 per cent of the State's meat cattle are located in the pastoral areas of the State, where extensive grazing on very large cattle stations is carried out. In 1991, the average meat cattle herd size in the pastoral areas, was 3,043 compared to 122 in the agricultural areas. These calculated averages exclude small semi-commercial operations, of which there are significant numbers in the south west of the state.

DIAGRAM 13.2

AVERAGE WEIGHT OF WOOL PER SHEEP SHORN



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.

Slaughtering

Beef from cattle slaughtered at Broome in the Kimberley Division is principally for export. The local market for meat is supplied mainly from abattoirs at Fremantle, Waroona, Harvey, Bunbury, Albany, Woorooloo, Geraldton and Katanning. Most of these establishments also slaughter for the export trade. Small establishments operating in country towns also contribute to total production, and most stations and many farms slaughter sufficient for all or part of their own requirements. Over half of all exports are destined for the United States of America.

Cattle

Cattle statistics are classified according to the two broad categories of 'meat production' and 'milk production', regardless of breed. At 31 March

TABLE 13.27 – CATTLE FOR MEAT PRODUCTION AT 31 MARCH CLASSIFIED ACCORDING TO SIZE OF HERD AND LOCATION

Reference: Catalogue No. 7221.5

Size of herd	In agricultural areas		In pastoral areas		Whole state	
	Number of		Number of		Number of	
	Herds	Cattle	Herds	Cattle	Herds	Cattle
		'000		'000		'000
1991—						
1 – 29	780	10.5	11	0.2	791	10.7
30 – 99	1,168	71.4	16	0.8	1,184	72.3
100 – 299	1,375	241.1	28	5.6	1,403	246.9
300 – 499	323	122.8	18	6.8	341	129.6
500 – 999	213	143.3	27	18.1	240	161.4
1,000 – 1,999	52	66.8	43	62.6	95	129.4
2,000 – 4,999	16	43.6	47	143.0	63	186.5
5,000 – 9,999	4	25.5	27	178.5	31	204.0
10,000 and over	—	—	20	334.4	20	334.4
Total herds	1991	3,931	237	750.0	4,168	1,475.0
	1990	3,957	227	862.9	4,184	1,554.0
	1989	4,037	234	901.8	4,271	1,590.7

While the agricultural areas account for just under 50 per cent of the State's cattle numbers, higher productivity and turnoff than in the pastoral areas enables the agricultural areas to account for about 75 per cent of the State's beef production.

TABLE 13.28 – LIVESTOCK SLAUGHTERED AND MEAT PRODUCED

Reference: Catalogue Nos. 7221.5, 7503.5

Unit	1988-89	1989-90	1990-91
Livestock slaughtered (a)—			
Sheep '000	2,234	3,815	4,188
Gross value (b) \$'000	36,557	19,607	19,682
Lambs '000	972	1,469	1,582
Gross value (b) \$'000	23,533	131,918	27,822
Cattle and calves '000	458	506	449
Gross value (b) \$'000	183,641	216,813	171,016
Meat produced (c)—			
Mutton and lamb tonnes	61,109	95,651	107,880
Beef and veal "	94,312	106,542	95,637

(a) Mainly slaughtering for human consumption but also includes quantities condemned and small numbers of livestock slaughtered for boiling down. (b) Value on hoof at principal market. (c) Dressed carcass weight; excludes condemned carcasses and offal.

OTHER LIVESTOCK

Dairying

Compared with the wheat, wool and meat producing industries, dairying as a major well-organised rural activity is of fairly recent origin. Its growth was retarded initially by the difficulty of clearing heavily-timbered country in the south-west and the need for special methods of pasture establishment. As these problems were progressively overcome, dairying became a significant feature of primary production. After a period of intense rationalisation in the 1970s, the industry has been concentrated on the production of milk for the local liquid milk and fresh dairy products markets.

TABLE 13.29 – CATTLE FOR MILK PRODUCTION AT 31 MARCH ('000)

Reference: Catalogue No. 7221.5

	1989	1990	1991
Bulls and Bull calves (a)	1	1	1
Commercial dairy—			
Cows	63	64	65
Heifers and Heifer calves (a)	45	45	42
Total	111	111	109

(a) Under one year.

A summary of the history of the dairying industry in Western Australia, with specific reference to legislative and marketing arrangements, price instability and subsidy schemes, is contained on pages 391-2 of the *Western Australian Year Book*, No. 20 — 1982.

TABLE 13.30 – CATTLE FOR MILK PRODUCTION CLASSIFIED ACCORDING TO SIZE OF HERD AT 31 MARCH 1991

Reference: Catalogue No. 7221.5

Size of herd	Number of herds	Total cattle '000
1 – 9	120	0.4
10 – 49	46	1.0
50 – 99	44	3.4
100 – 149	95	11.9
150 – 199	98	17.0
200 – 249	107	23.7
250 and over	143	51.4
Total	653	108.8

TABLE 13.31 – WHOLE MILK PRODUCTION (a)

Reference: Catalogue No. 7221.5

Unit	1988-89	1989-90	1990-91
Quantity million L	245	267	283
Gross value \$'000	66,686	80,321	93,801

(a) Includes milk used for processing.

The bulk of the State's dairy cattle are concentrated in the high rainfall, near-coastal strip from Pinjarra to Augusta, with lesser numbers being found further east to Albany. Irrigation of pastures during the drier summer months plays an important role in the industry.

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 1991, 66 per cent of pigs were within these divisions. Although the greater proportion of production is consumed locally, there is some export trade.

Intensive piggeries have assumed greater importance in recent years, and there has been a reduction in the number of pigs being raised in small or 'mixed farm' operations. While there has been little change in pig numbers since the mid

1970s, the number of herds at 31 March 1991 was less than half the number in 1976. Over the same period the proportion of pigs which were in herds of 500 or more has increased from 20 per cent to 71 per cent.

TABLE 13.32 – PIG NUMBERS AT 31 MARCH
(*000)

Reference: Catalogue No. 7221.5

	1988-89	1989-90	1990-91
Boars	3.4	2.7	3.1
Breeding sows and gilts for breeding	36.2	36.1	34.7
Other pigs	245.6	233.8	233.0
Total	307.0	272.5	270.7

TABLE 13.33 – PIGS SLAUGHTERED AND MEAT PRODUCED

Reference: Catalogue No. 7221.5

	Unit	1988-89	1989-90	1990-91
Pigs slaughtered	'000	503	461	466
Gross value (a)	\$'000	62,924	63,293	58,780
Pigmeat produced (b)	tonnes	29,228	26,883	26,993
Bacon and ham produced	"	9,384	9,937	10,674

(a) Value 'on hoof' at principal market or at factory door. (b) Dressed carcass weight; excludes condemned carcasses and offal but includes quantities used to produce ham.

TABLE 13.34 – PIG HERDS AT 31 MARCH 1991 CLASSIFIED ACCORDING TO SIZE OF HERD

Reference: Catalogue No. 7221.5

Size of herd	Number of herds	Total pigs
		'000
1 – 9	110	0.5
10 – 49	244	6.7
50 – 99	146	10.4
100 – 199	134	18.8
200 – 499	155	48.7
500 – 999	69	49.0
1,000 and over	48	136.5
Total	906	270.7

Livestock in Australia

TABLE 13.35 – LIVESTOCK NUMBERS AT 31 MARCH 1990, AUSTRALIA
(*000)

Reference: Catalogue No. 7221.0

State or Territory	Sheep	Cattle		Pigs
		Milk	Meat	
New South Wales	62,109	380	5,125	865
Victoria	29,268	1,445	2,200	428
Queensland	16,675	309	9,180	600
South Australia	18,363	139	830	437
Western Australia	38,422	111	1,562	272
Tasmania	5,337	136	433	42
Northern Territory	1	2	1,326	2
Australian Capital Territory	122	—	12	—
AUSTRALIA	170,297	2,523	20,668	2,648

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 eggs or poultry meat. A few laying birds are kept for commercial production on orchards, dairy farms and wheat farms throughout the agricultural areas.

TABLE 13.36 – POULTRY NUMBERS AT 31 MARCH
(*000)

Reference: Catalogue No. 7221.5

	1989	1990	1991
Fowls	5,210	5,398	5,348
Ducks	2	3	4
Turkeys	29	13	8

The Western Australian Egg Marketing Board, constituted under the *Marketing of Eggs Act 1945*, is the statutory authority controlling the commercial production of eggs. Two other Acts, the *Poultry Industry Levy Act 1965* and the *Chicken Meat Industry Act 1977*, are used to regulate and control poultry farming.

Details of how these Acts control and regulate poultry farming is contained on page 311 of the *Western Australian Year Book*, No. 24 — 1986.

**TABLE 13.37 – EGG PRODUCTION AND POULTRY SLAUGHTERED FOR TABLE PURPOSES
YEAR ENDED 30 JUNE**
Reference : Catalogue No. 7221.5

	Unit	1989	1990	1991
Egg production—				
Quantity (a)	'000 dozen	17,859	18,768	18,578
Gross value	\$'000	29,651	32,690	30,591
Poultry slaughtered for table purposes—				
Dressed weight	tonnes	33,623	36,950	35,299
Gross value	\$'000	55,288	60,345	57,724

(a) 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.

**TABLE 13.38 – BEEKEEPERS, BEEHIVES AND HONEY PRODUCTION
1990-91**
Reference: Catalogue No. 7221.5

	Numbers of hives					
	Less than 200	200-299	300-399	400-499	500-799	800 and over
Beekeepers—						
Number	3	8	15	13	14	4
Productive beehives ('000)	0.3	1.6	3.6	4.8	7.1	3.3
Honey production (tonnes)	14	64	253	239	753	192

TABLE 13.39 – BEEHIVES AND PRODUCTION OF HONEY AND BEESWAX
Reference: Catalogue No. 7221.5

	Unit	1988-89	1989-90	1990-91
Beehives—				
Productive	'000	26	27	21
Unproductive	"	7	7	2
Honey production	tonnes	2,182	2,330	1,514
Beeswax production	"	39	41	29

THE DEPARTMENT OF AGRICULTURE

A Bureau of Agriculture was formed in 1894 and became the Department of Agriculture in 1898. At that time cleared, arable land in Western Australia was less than one per cent of present farm land.

The Department of Agriculture, which has expanded progressively, has a broad role to foster the State's agriculture and to advise on marketing of its products. By representation on the Australian Agriculture Council, it helps establish nationally acceptable policies.

It is the branch of the State Government service which communicates scientific advice to farmers, pastoralists and allied industries, conducts a wide range of research and administers relevant Acts of Parliament. It maintains services to assist farmers and its regulatory work consists of carrying out the provisions of some of the laws relating to agriculture.

The Head Office at South Perth houses the main administrative, research, specialist and diagnostic staff and there are twenty-five district offices and nineteen research stations. Most research stations are for the wheat and sheep, beef, and dairying industries but specific stations cater for fruit, vegetables, poultry, pigs, viticulture and tropical agriculture.

The greater part of the Department's extension activities are carried out by the advisers and veterinary officers stationed at its Regional and District Offices. Research is carried out at head office, and at four outer metropolitan and fifteen country research stations.

A detailed description of the Department of Agriculture, including its history, structure and the services it provides to the agricultural sector is contained in pages 313-318 of the *Western Australian Year Book*, No. 24 — 1986.

AGRICULTURE PROTECTION BOARD

The Agriculture Protection Board is the body responsible for ensuring that the State's agriculture resources are protected from the sometimes devastating effects of plant and animal pests.

The Board administers the Agriculture and Related Resources Protection Act which replaced the Noxious Weed Act and the Vermin Act in 1976. Plants and animals can be declared by the Board to be 'declared animals' for the purposes of the Act.

The Agriculture Protection Board's role is to coordinate the control effort and see that declared plants and declared animals are dealt with according to its policies. In addition to coordinating overall agriculture protection policies, the Board advises on methods of control, maintains services to prevent pest animals and plants entering the State, and conducts research into the biology and control of vertebrate pests.

ADVISORY COMMITTEES

Responsibility for advising the Minister for Agriculture on various aspects of agricultural activity, is vested in a number of advisory committees, whose members are drawn from government departments and authorities, industry organisations and marketing and storage organisations.

These committees include the State Wheat Advisory Committee, the State Coarse Grains and Seeds Advisory Committee, the State Soil Conservation Advisory Committee, Drought Consultative Committee and the Ord Project Co-ordinating Committee.

HERD IMPROVEMENT SERVICE OF WESTERN AUSTRALIA

The Herd Improvement Service of Western Australia (HIS) was established in November 1984 under the provisions of the *Herd Improvement Service Act 1984*. HIS is an independent corporate body based in Bunbury. It was created to amalgamate the services previously provided by the Artificial Breeding Board and the Department of Agriculture's Dairy Herd Recording Scheme. Accordingly, the purpose of HIS is to promote improvements in the quality and productive genetics of Western Australia's livestock through extensive use of advanced artificial breeding practices and scientific measurement of production as with the Dairy Herd Recording Service.

FARM MANAGEMENT SERVICE LABORATORY

The University of Western Australia, by resolution of the Senate, approved the establishment of the Farm Management Service Laboratory within the University in 1966. The aims of the Laboratory are to develop concepts and services in management accounting, computer planning and animal breeding which are specially suited to the needs of farmers; to make these developments available to farmers; and to use information processed by the Laboratory for teaching and research at the University of Western Australia.

Forestry

FORESTS FOR WOOD, WATER AND WILDLIFE

Most of Western Australia's native hardwood forests grow in the south-west of the State, between Walpole and Perth. From these forests are drawn a wide variety of essential resources, both tangible and intangible: the beauty and durability of their timbers is renowned world-wide, and generates a considerable income for Western Australia each year; the forests also provide an increasingly popular environment for recreation, within easy reach of major cities and towns.

Catchment areas, which supply high quality water for domestic and agricultural use to the most populated areas of the State, occur throughout the forests; and conservation areas for native wildlife and plants ensure the long-term survival of many species, as well as providing an invaluable scientific and educational resource.

At present 1,750,357 hectares have been permanently dedicated as State forest, 144,399 hectares are held as timber reserves, and 32,518 hectares of freehold land is vested mainly for pine production.

THE PRIME INDIGENOUS FORESTS

Jarrah (*Eucalyptus marginata*) is the State's principal timber and the prime forest covers almost 1.4 million hectares. Karri (*E. diversicolor*) is next in importance and is distributed over some 126,000 hectares. Wandoo (*E. wandoo*) accounts for a smaller portion of the dedicated area (106,000 hectares) and Tuart (*E. gomphocephala*), another valuable timber, has a restricted area of about 1,000 hectares. Blackbutt (*E. patens*) occurs in patches throughout the jarrah and karri forests and is an important milling timber with properties and uses similar to jarrah. Marri (*E. calophylla*), the most widespread of the commercial eucalypts, is used to a limited extent as building scantling, pole timber and as the principal material for an export woodchip industry based in the Manjimup region.

Other eucalypts and many trees of different genera occur within the prime forest belt but they are not of major economic importance. The main distribution of the prime forests, is practically confined to the south-western portion of the State.

THE INLAND FORESTS

East of the area of prime forest is an inland woodland, within which are a number of eucalypts (both tree and mallee form), as well as several types of Acacia, such as the wattles and mulgas, tea tree (*Melaleuca spp.*) and casuarinas. Sandalwood (*Santalum spicatum*), indigenous to the wheat belt and semi-arid areas of the State, is exported to Asian countries for use in the manufacture of incense.

The major emphasis of forestry activities in the goldfields area is the conservation of woodlands. During recent years, soil conservation in the regions of low rainfall has received increasing attention and the importance of controlling clearing, grazing and firewood cutting has been recognised. The Department of Conservation and Land Management maintains a staff to exercise these controls and to advise on tree planting. Work is proceeding with demarcation of areas representing important inland ecotypes for which long-term conservation proposals have been prepared.

FORESTRY ADMINISTRATION

Forests in Western Australia are managed by the Department of Conservation and Land Management, within a General Working Plan of multiple use management and regulation of an

allowable hardwood sawlog cut. Major uses include wood production, water production, forest and catchment protection, recreation, flora, fauna and landscape conservation, scientific study and education, public utility and mining.

Timber harvesting in both natural forests and plantations is tightly controlled and closely monitored to meet environmental protection and disease management requirements, and to achieve the most efficient use of the resource.

To supplement native forest production, pine forests have been established throughout the south-west. There are over 68,000 hectares of State owned plantations and an increasing amount of forests planted on private land. *Pinus radiata* and *Pinus pinaster* are the principal species.

Other major forest-related roles of the department include reduction of forest diseases, particularly jarrah dieback (*Phytophthora cinnamomi*), fire surveillance and control measures and the granting of sawmilling permits and forest produce licences.

FOREST PRODUCTION

Sawn timber from jarrah and karri is the principal form of forest wood production, but there will be a gradual increase in the use of pine in the future.

TABLE 13.40 – LOG PRODUCTION FROM CROWN LAND AND PRIVATE PROPERTY 1990-91 (cubic metres)

Source: CALM Annual Report 1990/91

Type	Crown Land	Private Property	Total
Sawlog Timber (a)—			
Hardwood—			
Jarrah	378,331	14,986	393,317
Karri	154,026	7,279	161,305
Marri	122,703	3,748	126,451
Blackbutt	1,318	404	1,722
Wandoo	125	1,453	1,578
Sheoak	626	—	626
Other	565	2,920	3,485
Total Hardwood	657,694	30,790	688,484
Pine	93,195	10,539	103,734
Total Sawlogs	750,889	41,329	792,218
Other log material (b)—			
Hardwood	512,533	85,789	598,322
Softwood	208,056	75,101	283,157
TOTAL LOG TIMBER	1,471,478	202,219	1,673,697

(a) Sawlog timber from all sources, including veneer, but excluding chiplogs, firewood, piles and poles. Includes sawlogs and logs used in the production of plywood veneer. (b) Includes chiplogs, pine particle board material, pine rounds and pine industrial (MDF) material.

Karri and locally grown pine logs together with imported logs, are used for plywood. During recent years, there has been a greater use of local logs for plywood manufacture. Small sized logs, from thinning pine plantations and manufacturing residues, are used for the production of particleboard. Hardwood mill wastes and bush residues of marri and karri, form the basis of an important export woodchip industry located in the southern forests.

In addition to these major wood products, the State's forest wealth includes sandalwood for

export, firewood for general purposes, and various seeds and plants for propagation both in Australia and abroad. The karri, wandoo, marri and some inland scrub species are important nectar producers for apiarists, who move their bees to various forest sites to follow the nectar flow.

Of the hardwood chiplogs supplied from State forest in 1990-91, 27 per cent were karri and 73 per cent were marri.

Sawmilling and production are also referred to under Manufacturing in Chapter 16.

Fisheries

GENERAL FISHERIES

Rock lobsters are the most important item of production of the Western Australian fishing industry. The value of the 1989-90 catch was \$166.9 million, which was 72 per cent of the total value of the State's fish catch. The most important commercial species of rock lobster in Western Australian waters is the Western Rock Lobster, which is fished off the south-west coast between Murchison River and Bunbury. The principal localities around which rock lobsters are caught are the Abrolhos Islands, Geraldton, Dongara, Green Head, Jurien Bay, Cervantes, Lancelin, Ledge Point and Fremantle. The industry is protected from overfishing by numerous measures and the catch is processed at shore stations licensed under the *Fisheries Act 1905* as processing establishments.

The catches of Australian salmon, which school in the bays on the south and lower south-western coasts, yield a significant proportion of the production of inshore and beach fishing and are used almost exclusively for canning. The remainder of the catch from this type of fishing comprises chiefly Australian herring, western sand whiting and sea mullet sold mainly as wet fish on the local market, and pilchard and scaly mackerel, sold as bait and for pet food. There is an important fishery for southern bluefin tuna on the south coast of the State and investigations are being conducted on the commercial potential of tuna stocks in northern waters.

The coastal waters northward from the mouth of the Murchison River to North West Cape and Exmouth Gulf, are the source of several species of commercial importance. Snapper are caught between the Murchison River and North West

Cape during the northern schooling season from May to August. Cod and Spanish mackerel, though in smaller quantities, are also caught between the Murchison River and North West Cape.

Prawn fisheries have been established at Shark Bay and Exmouth Gulf, with the catch processed at Carnarvon and Learmonth respectively. The major species caught are western king prawns and brown tiger prawns, as well as quantities of banana and endeavour prawns. In these areas and the smaller fisheries at Nickol Bay and Onslow, the number of boats licensed to fish for prawns is restricted as a conservation measure.

Important catches of scallops are taken in Shark Bay with smaller catches occurring at the Abrolhos Islands. In 1989-90, the value of the scallop fisheries was over \$7.4 million.

Shark fishing is an important activity on the lower west and south coasts. The other major species caught offshore in this region is the Westralian Jewfish.

Abalone are taken by licensed divers in the southern half of the State, with most production coming from the south coast. Species taken are greenlip, blacklip, brownlip and Roe's abalone. The 1989-90 value of the catch was almost \$6.5 million.

The first fishing grounds to be exploited were the estuaries and rivers and, although they are not now as important as other grounds, they still provide substantial quantities of fish of a fairly wide variety. The principal species are cobbler and yellow-eye mullet, sea mullet and Perth herring most of which are caught in the Swan and Harvey

AGRICULTURE, FORESTRY AND FISHING

TABLE 13.41 – FISH, CRUSTACEANS AND MOLLUSCS – CATCH AND VALUE
Reference: Catalogue No. 7601.5

Species—Common name	Quantity (a) (tonnes)			Value (b) (\$'000)		
	1987-88	1988-89	1989-90	1987-88	1988-89	1989-90
Fish—						
Barramundi (Giant perch)	101	69	57	574.2	390.9	330.8
Cobbler	162	171	92	843.9	930.4	305.8
Emperor (North-west snapper)	442	496	433	1,159.0	1,284.9	1060.1
Herring, Australian	1,266	1,346	206	1,211.3	1,341.8	1236.1
Jewfish, Westralian	218	216	229	1,894.7	1,846.1	1941.8
Mackerel, Spanish	270	196	212	823.3	657.6	710.2
Mullet, sea	639	511	473	785.2	613.6	532.3
Mullet, yellow-eye	454	452	221	411.6	345.5	115.0
Pilchard	7,392	7,527	8,138	3,735.4	3,273.1	4,522.4
Salmon, Australian	1,315	1,433	1,711	747.5	839.6	642.1
Scaly mackerel	224	183	418	209.7	174.2	375.9
Shark, bronze whaler	463	456	486	1,878.0	1,885.3	1,338.9
Shark, whiskery	341	310	332	1,182.8	1,089.6	767.1
Shark, other	1,344	844	1,104	3,051.4	1,753.8	1,973.6
Snapper	919	914	948	3,131.6	3,095.4	3,059.1
Tuna, southern bluefin	1,278	699	289	2,241.6	975.0	369.9
Whiting, western sand	181	159	164	533.6	571.0	538.6
Other species	1,980	2,146	2,457	4,911.6	4,648.2	5654.6
Total fish	18,989	18,128	18,969	29,326.4	25,716.0	25,474.3
Crustaceans—						
Crabs	197	241	290	575.8	945.5	1,094.0
Prawns—						
Banana	211	230	338	2,466.0	2,644.2	1,536.6
Brown tiger	672	564	766	9,052.3	7,421.1	7,480.5
Endeavour	300	354	274	2,116.8	2,458.1	1,501.3
Western king	1,872	1,556	1,308	22,108.1	14,460.0	11,770.6
Other species	259	455	302	752.3	2,078.4	1020.6
<i>Total prawns</i>	<i>3,314</i>	<i>3,160</i>	<i>2,988</i>	<i>36,495.5</i>	<i>29,061.8</i>	<i>23,309.6</i>
Rock lobsters	10,873	11,776	9,949	174,260.2	177,910.3	116,908.2
Total crustaceans	14,384	15,177	13,227	211,331.4	207,917.6	191,311.8
Molluscs—						
Abalone	262	250	300	3,378.9	4,075.9	6,499.9
Scallops	2,814	1,346	1,869	9,291.2	3,635.3	7,390.2
Other molluscs	616	491	486	1,070.8	1,067.2	1,001.1
Total molluscs	3,692	2,087	2,654	13,740.9	8,778.4	14,891.1
TOTAL WESTERN AUSTRALIA	37,064	35,392	34,850	254,398.8	242,412.0	231,677.1

(a) Live (whole) weight. (b) Gross value paid to fishermen.

Estuaries and the Peel and Leschenault Inlets. Other species taken include sand whiting, King George whiting, tailor, garfish and pilchard. Crabs, school prawns and Western King Prawns are also caught commercially in these waters.

FISHERIES ADMINISTRATION

The Western Australian Fisheries Department conducts research on a wide range of commercially important fish species such as rock lobsters, prawns, snapper, Australian salmon, pearl oysters and tuna. The Department is also involved in research on recreational fisheries, estuaries, freshwaters and environmental matters relating to

fisheries. Much of this research is carried out in association with the Commonwealth Scientific and Industrial Research Organization, other State and Commonwealth bodies and tertiary education institutions.

Research is carried out chiefly at two centres. The marine research centre at Waterman, was built for the Fisheries Department and incorporates several separate laboratories and a large aquarium with circulating water, for experiments and studies on a wide range of species. A second centre, the Commonwealth Scientific and Industrial Research Organization marine research centre at Marmion was opened in 1976.

AQUACULTURE AND INLAND FISHING

Limited commercial production of marron began in 1977 following the passing of legislation which established fish farming guidelines, including licensing of marron farms. A number of other aquaculture ventures are proposed and some in place, including the commercial rearing of prawns, Atlantic salmon, brine shrimp and abalone.

Brown trout, rainbow trout and English perch have been introduced into the streams of the south-west, and rainbow trout are also reared commercially on a number of fish farms. These species together with indigenous stocks of freshwater cobbler, marron, barramundi and cherabin, provide sport for amateur inland fishermen.

PEARL-SHELL FISHING AND PEARL CULTURE

Pearl and pearl-shell fishing has been a valuable industry for many years, the main centre being Broome. The natural pearls obtained were once an important feature of production but the success of the industry now depends almost entirely on the shell produced and the price obtainable for it, and cultured pearl production from licensed farms.

AUSTRALIAN FISHING ZONE

The Australian Fishing Zone (A.F.Z.) covering waters within 200 nautical miles of Australia, was declared on 1 November 1979. Under licence from the Commonwealth Government, foreign fishing vessels are permitted to fish within the Zone. A number of joint-venture feasibility studies and test fishing programs have been conducted in the Zone since its declaration.

REFERENCES

ABS Publications

Agricultural Industries, Financial Statistics, Australia (7507.0)

Agricultural Industries, Structure of Operating Units, Australia (7102.0)

Agricultural Land Use and Selected Inputs, Western Australia (7411.5)

Agriculture, Western Australia (7113.5)

Crops and Pastures, Western Australia (7321.5)

Fisheries, Western Australia (7601.5)

Fruit, Western Australia (7322.5)

Livestock and Livestock Products, Australia (7221.0)

Livestock and Livestock Products, Western Australia (7221.5)

Recreational Fishing, Western Australia (7602.5)

Summary of Crops, Australia (7330.0)

Summary of Crops, Western Australia (7330.5)

Value of Agricultural Commodities Produced, Australia (7503.0)

Value of Agricultural Commodities Produced, Western Australia (7503.5)

Value of Selected Agricultural Commodities Produced, Australia, Preliminary (7502.0)

Western Australia Agriculture in Brief (7106.5)

Other Publications

Department of Conservation and Land Management, *Annual Report*.

Western Australian Department of Agriculture, *Annual Report*

Western Australian Department of Fisheries, *Annual Report*.

Chapter 14

MINING

Mining in Western Australia	14-1
Mining Statistics	14-2
Private Mineral Exploration (other than for petroleum)	14-5
Petroleum Exploration	14-5
References	14-6

Chapter 14

MINING

Western Australia is a world-scale producer of a range of minerals. The export-orientated mining industry is one of the most significant contributors to the State economy.

MINING IN WESTERN AUSTRALIA

Gold mining was the mainstay of the State's mining industry from the 1890s through to the 1960s, when iron ore, nickel, bauxite and oil assumed prominence. Since the late 1970s, however, high gold prices and technological advances in processing methods have led to renewed growth in the industry. Production has increased significantly every year since 1981-82, and in 1987-88 gold again became the single most valuable mineral produced. Major gold mine developments and expansions have occurred, not only in the traditional areas around Kalgoorlie and other Eastern Goldfields centres, but also in the Pilbara and at Boddington in the South-West.

Other significant mineral projects in Western Australia are the giant iron ore mines in the Pilbara, nickel in the Eastern Goldfields, bauxite on the Darling Scarp, mineral sands principally at Capel and Eneabba, and diamonds in the Kimberley. Coal and solar salt production are also commercially important. Copper and zinc mining recommenced in 1988 and production of both is expected to reach significant levels.

The North-West Shelf Project, which supplies liquefied natural gas (LNG) for export, gas for industrial and domestic purposes and condensate, is the most important project in the State's oil and

gas sector. Over \$12 billion is expected to be spent on the development of this project, which will generate annual exports worth over \$2 billion. (Further information on this project is contained in Chapter 15, Energy). Several significant oil projects have also been developed in shallow waters near the existing Barrow Island field.

Apart from the 1989 commissioning of the LNG plant, other 'value-added' developments in the mining industry include synthetic rutile production from ilmenite, and the extraction of liquefied petroleum gas (LPG) at Kwinana from gas piped from the north-west. Other significant recent developments relate to the further processing of minerals, and are covered in Chapter 16, Manufacturing.

A more comprehensive picture of the history of mining and mineral exploration can be found in the *Western Australian Year Book—No. 24, 1986*.

In Western Australia the development of minerals occurs under a variety of statutes, notably the Mining Act administered by the Department of Mines. The Department of State Development has the responsibility for coordinating major resource development projects in recognition of the special approach required to effectively support projects of the magnitude undertaken in this State.

The Western Australian Department Of Mines

The primary role of the Department is to facilitate the orderly exploration and development of minerals and petroleum in Western Australia for the benefit of the community, now and in the future. It also provides scientific and technical advice to Government agencies and the public on geo-technical and mining related matters, provides chemical consultancy services, regulates and records the ownership of mining tenements and regulates for public safety in matters concerning explosives and dangerous goods.

The Department is responsible for the collection of royalties for minerals owned by the Crown. Royalties for the State Government in 1989-90 amounted to \$264 million.

The Western Australian Department of State Development

By presenting a single point of contact with the Government, the Department of State Development facilitates development projects by coordinating the activities of government agencies in relation to a particular project and resolves issues between agencies and the developer or between agencies themselves.

MINING STATISTICS

Australian Standard Industrial Classification (ASIC)

Information presented in this and the following three chapters comes mainly from a system of integrated economic censuses based on the Australian Standard Industrial Classification (ASIC). ASIC classifies all economic activities into four hierarchic levels. At the broadest level of the classification, economic activities are grouped into 'industry divisions'. Each industry division is further divided into industry sub-divisions, groups and classes.

For a detailed explanation of ASIC refer to *Australian Standard Industrial Classification, Volume 1—1983 edition* (Catalogue No. 1201.0)

Census of Mining Establishments

The 1988-89 census differed from previous mining censuses in that the construction materials and other non-metallic minerals industries were excluded. Complete mining censuses, including these industries, are conducted on a triennial basis with the next one scheduled for the 1989-90 financial year. As a consequence, figures in the following tables and graphs show data for only those industries surveyed in 1988-89.

TABLE 14.1 – MINING ESTABLISHMENTS – SUMMARY OF OPERATIONS BY INDUSTRY SUB-DIVISION
Reference : Catalogue No. 8404.5

Industry sub-division	Number of establishments (a)	Persons	Wages and	Turnover	Value	Capital	
		employed (a)(b)	salaries (c)		added	expenditure	
		1988-89					
			\$m	\$m	\$m	\$m	
Metallic minerals	113	17,690	665.4	5,605.4	3,343.7	1,318.4	
Coal, oil and gas	15	2,923	126.9	886.3	740.2	990.5	
Total mining (d)	1988-89	128	792.4	6,491.7	4,083.8	2,308.9	
	1987-88	157	19,151	680.7	5,790.8	3,904.0	2,173.1
	1986-87	144	18,246	619.2	4,734.5	3,146.7	n.a

(a) At 30 June. (b) Includes working proprietors. (c) Excludes drawings of working proprietors. (d) Excludes Construction materials and Other non-metallic minerals.

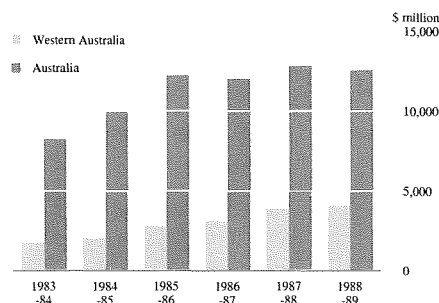
MINING

**TABLE 14.2 – MINING ESTABLISHMENTS – PERSONS EMPLOYED, VALUE ADDED AND CAPITAL EXPENDITURE BY INDUSTRY SUB-DIVISION
WESTERN AUSTRALIA AND AUSTRALIA: 1988-89**
Reference : Catalogue No. 8404.5

Industry sub-division	Persons employed (a)			Value added			Capital expenditure		
	Western Australia	Western Australia as a percentage of Australia		Western Australia	Western Australia as a percentage of Australia		Western Australia	Western Australia as a percentage of Australia	
		'000	'000		%	\$m		\$m	%
Metallic minerals	17.7	32.6	54	3,343.7	5,948.5	56	1,318.4	1,913.0	69
Coal, oil and gas	2.9	32.9	9	740.2	6,618.4	11	990.5	1,834.3	54
Total mining (b)	20.6	65.5	31	4,083.8	12,566.8	32	2,308.9	3,747.3	62

(a) At 30 June. Includes working proprietors. (b) Excludes Construction materials and Other non-metallic minerals.

**DIAGRAM 14.1
MINING ESTABLISHMENTS (a); VALUE ADDED
WESTERN AUSTRALIA AND AUSTRALIA**

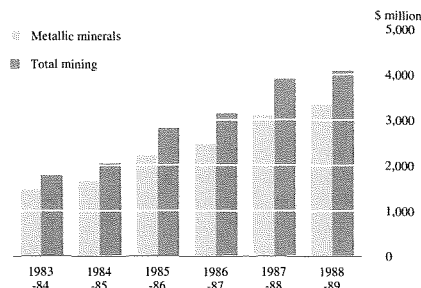


(a) Excludes those establishments in the Construction materials and Other non-metallic minerals sub-divisions.

In 1988-89, Western Australia remained as the most significant state of the Commonwealth in terms of turnover and value added for mining. Major new projects in iron ore, gold and nickel, and the LNG phase of the North West Shelf Project were the main contributors.

Employment in the mining industry continued to improve with an increase of more than seven per cent in the industries surveyed. This resulted in Western Australia's share of employment in the Australian mining industry rising from twenty-eight per cent to thirty-one per cent. The industries showing significant increases were gold mining and iron ore mining.

**DIAGRAM 14.2
MINING ESTABLISHMENTS; VALUE ADDED
METALLIC MINERALS AND TOTAL MINING (a)**



(a) Excludes those establishments in the Construction materials and Other non-metallic minerals sub-divisions.

Mineral Production

Gold continues to be the most valuable mineral produced in Western Australia with production of 121 tonnes of contained metal in 1988-89; an increase of thirty-three per cent over production in 1987-88.

Iron ore, which has been at the forefront in Western Australia since the first commercial shipments to overseas destinations commenced in 1966, declined by a further eleven per cent from the 1987-88 level of \$1.7 billion.

Other minerals which provide strong contributions to the State's value of mineral production and have shown increases over their 1987-88 levels are bauxite, coal, diamonds, mineral sands and nickel concentrate.

MINING

TABLE 14.3 – MINERAL PRODUCTION
Reference: Catalogue No. 8404.5

Mineral	Unit	1986-87		1987-88		1988-89	
		Quantity	Value (a)	Quantity	Value (a)	Quantity	Value (a)
			\$'000		\$'000		\$'000
Metallic minerals—							
Bauxite (b)	'000 tonnes	20,438	n.p.	20,957	n.p.	22,134	n.p.
Copper concentrate	"	—	—	(c)10	n.p.	(c)34	n.p.
Copper ore	tonnes	—	—	8,892	n.p.	(c)59,266	n.p.
Gold bullion	kilograms	75,450	1,295,854	106,764	1,839,478	137,079	1,923,156
Iron ore	'000 tonnes	92,468	1,801,585	97,967	1,669,762	92,977	1,479,716
Mineral sands concentrates—							
Ilmenite (incl. synthetic rutile)	"	1,070	78,840	1,265	141,914	1,428	179,068
Leucoxene	"	26	10,437	23	5,704	20	6,111
Monazite	"	11	7,135	(b)10	(b)6,961	(b)10	(b)7,446
Rutile	"	(d)88	n.p.	(b)85	(b)51,169	(b)100	(b)62,491
Xenotime	tonnes	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
Zircon	'000 tonnes	291	51,672	(d)340	n.p.	(d)340	(d)151,609
<i>Total value mineral sands</i>	..	..	196,851	..	n.p.	..	n.p.
Nickel concentrate	'000 tonnes	(b)406	n.p.	(b)389	n.p.	(b)354	n.p.
Tin concentrate	tonnes	(b)731	n.p.	(b)434	(b)2,856	n.p.	n.p.
Other (e)	..	..	511,011	..	834,737	..	1,056,231
Total value metallic minerals	..	..	3,756,524	..	4,552,580	..	4,865,830
Coal, oil and gas—							
Coal	'000 tonnes	(f)3,782	n.p.	(b)3,702	(b)150,965	(b)3,800	(b)161,241
Crude oil (including condensate) (d)	megalitres	2,174	n.p.	(d)3,100	n.p.	3,205	n.p.
L.P.G. (d)	"	—	n.p.	1	n.p.	—	n.p.
Natural gas (d)	gigalitres	3,377	n.p.	3,887	n.p.	4,072	n.p.
Total value coal, oil and gas	..	..	n.p.	..	n.p.	..	888,290
Construction materials—							
Building and monumental stone	'000 tonnes	79	n.p.	78	n.p.	n.a.	n.a.
Crushed and broken stone—							
Limestone	"	2,124	n.p.	1,613	n.p.	n.a.	n.a.
Other	"	4,605	39,915	4,089	42,419	n.a.	n.a.
Total value construction materials	..	..	n.p.	..	n.p.	..	n.a.
Other non-metallic minerals—							
Clays (g)	'000 tonnes	1,756	11,729	n.p.	11,183	n.a.	n.a.
Diamonds (b)	'000 carats	32,165	284,095	30,218	248,203	36,470	354,746
Gypsum	'000 tonnes	201	1,331	107	694	(b)166	(b)1,326
Limestone	"	1,507	6,134	n.p.	n.p.	n.a.	n.a.
Salt (b)	"	5,051	107,382	5,534	107,165	6,023	106,706
Silica	"	332	2,349	461	3,137	(b)364	(b)3,052
Spodumene	tonnes	(c)9,150	n.p.	(c)27,466	n.p.	(b)32,812	(b)5,742
Talc	'000 tonnes	(c)181	n.p.	n.p.	n.p.	(b)195	(b)14,992
Other (h)	..	..	14,679	..	26,658	..	3,047
Total value other non-metallic minerals	..	..	427,698	..	397,040	..	(i)489,610
TOTAL VALUE ALL MINERALS	..	..	5,009,887	..	5,935,544	..	(i)6,243,729

(a) Ex-mine value. (b) Source: Department of Mines. (c) Source: Production from published producers' reports. (d) Source: Department of Primary Industries and Energy. (e) Includes gold concentrate, gold ore, lead concentrate, tantalite-columbite concentrate and those metallic minerals for which values are not publishable. (f) Source: Joint Coal Board. (g) Includes attapulgit. (h) Includes barite, diatomite, dolomite, felspar, garnet concentrates, mica, peat, semi-precious stones, sillimanite, vermiculite and those minerals for which values are not available separately for publication. (i) Not comparable with values for earlier years as production of some non-metallic minerals was not collected in 1988-89 and no other source of the data was available.

MINING

PRIVATE MINERAL EXPLORATION (Other than for petroleum)

Mineral exploration (other than for petroleum) is carried out over a large portion of the State. In recent years the search has largely concentrated on gold, as indicated in the accompanying table and diagram.

Expenditure in 1990-91 increased overall by 3.2 per cent compared to 1989-90, to \$325.5 million. Expenditure on base metals exploration increased by fifty-eight per cent. However, the impact of the Gold Tax (introduced in January 1991) has resulted in a continuing decrease in exploration expenditure for gold.

**TABLE 14.4 – PRIVATE MINERAL EXPLORATION
(OTHER THAN FOR PETROLEUM)
EXPENDITURE BY TYPE OF MINERAL SOUGHT
(\$m)**

Reference: Catalogue No. 8412.0

Type of mineral sought	Total private exploration		
	1988-89	1989-90	1990-91
Base Metals (a)	41.4	36.8	63.7
Coal	n.p	2.4	1.1
Construction materials	n.p	1.6	n.p
Diamonds	22.4	25.0	26.7
Gold	271.3	214.4	200.9
Iron ore	6.2	10.7	12.5
Mineral sands	8.3	7.1	8.3
Tin/tungsten	n.p	0.1	n.p
Uranium	n.p	7.0	7.4
Other	18.0	10.3	3.8
Total	387.2	315.4	325.5

(a) Copper, lead, zinc, silver, cobalt and nickel.

**TABLE 14.5 – PRIVATE MINERAL EXPLORATION
WESTERN AUSTRALIA IN RELATION
TO AUSTRALIA : 1990-91
(\$m)**

Reference: Catalogue No. 8412.0

Mineral	Western Australia	Australia	Western Australia as a percentage of Australia
Gold	200.9	299.9	67
Base metals (a)	63.7	171.8	37
Diamonds	26.7	39.0	68
Other minerals	34.2	91.5	37
Total	325.5	602.2	54

(a) Copper, lead, zinc, silver, cobalt and nickel.

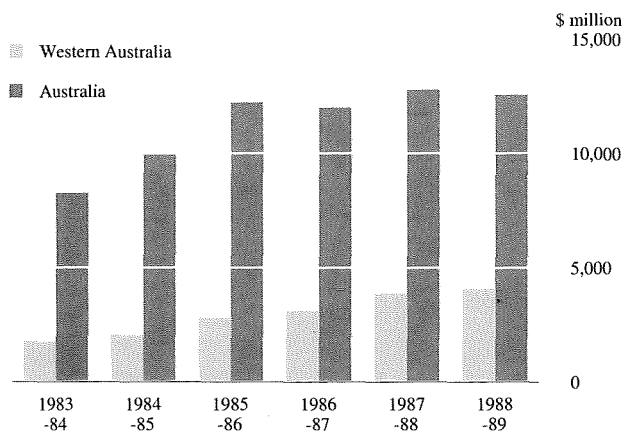
Despite this, Western Australia continued to be the dominant state for exploration, in total and for most individual minerals.

PETROLEUM EXPLORATION

In the past few years petroleum exploration in Western Australia has been centred on the Carnarvon Basin, with lesser activity taking place in the onshore Canning and Perth basins and the offshore Bonaparte Basin.

As at 30 June 1991, there were 139 current petroleum titles in Western Australia - ninety-six exploration permits, twenty-two production licenses and twenty-one pipeline licenses.

**DIAGRAM 14.3
PRIVATE MINERAL EXPLORATION
GOLD AND TOTAL**



The ninety-six exploration permits cover an area of about 400,000 square kilometres out of a total of 2.1 million kilometres of Phanerozoic sedimentary rocks on land and continental shelf areas. The average size of permits is less than 4,000 square kilometres.

During 1990-91, thirty-two exploration wells (twenty-one offshore and eleven onshore) were commenced compared to thirty in 1989-90 and forty-three development wells were drilled (thirty-one onshore and twelve offshore) compared to thirteen in 1989-90.

Total penetration was 135,301 metres, including 76,405 metres in exploration wells and 58,896 metres in development wells.

Most of the drilling was concentrated in the northern part of the offshore Canning basin where nineteen out of the total of twenty-one exploration wells were drilled. Two onshore wells were commenced in the basin.

Activity in other basins consisted of six onshore wells in Perth, four onshore wells in Canning and one each offshore in Bonaparte and Browse.

REFERENCES

ABS Publications

Actual and Expected Private Mineral Exploration, Australia (8412.0)

Census of Mining Establishments: Details of Operations by Industry Class, Australia (8402.0)

Mineral Production, Australia (8405.0)

Mining, Western Australia (8404.5)

Principal Mining Statistics, Western Australia (8405.5)

Other Publications

Statistical Digest of Mineral Production 1988-89, Department of Mines, Western Australia

Petroleum in Western Australia, Petroleum Division, Department of Mines, Western Australian

Chapter 15

ENERGY

Energy Resources	15-1
Energy Production, Conversion and Utilisation	15-2
Perth Landfill Gas Project	15-5
Energy And The Environment	15-6
National Energy Survey of Households	15-7
References	15-8

Chapter 15

ENERGY

The availability of energy is an important factor in the economic and social development of any country, and this is no less so in Australia, which ranks amongst the highest per capita energy users in the world. In Western Australia, the per capita energy consumption is approximately 10 per cent higher than that for the rest of Australia, primarily because of two factors:

the vast area of the State in relation to its population and the resultant high demand for transport energy; and,

the development and expansion of large scale mining and mineral processing industries since the mid 1960s which has added considerably to energy demand.

For many years, Western Australia's only major indigenous source of primary energy (other than firewood and wind power) was black coal, which has been mined in the Collie region since the 1890s. Production of crude oil at Barrow Island (1967) and natural gas at Dongara (1971) further broadened the State's energy resource base. More recently, large deposits of natural gas in the North West Shelf area off Western Australia have been developed. Production from this source commenced in 1984.

Several deposits of energy minerals are at various stages of exploration, evaluation or development. In addition, research and development work continues on the various alternative sources of energy including solar and wind energy.

While Western Australia is still dependent on imports of some petroleum products, it is considerably more energy self-sufficient than it was in the early 1960s. One of the factors influencing previous economic development of this State has been the limited availability of local energy supplies. With the development of the North West Shelf natural gas project, a substantial energy surplus was created for the first time in the history of the State.

ENERGY RESOURCES

Western Australia's resources of energy minerals are shown in Table 15.1. To put these resources data into perspective, recent State production data have also been shown.

TABLE 15.1 — FUEL MINERALS
RESOURCES AND PRODUCTION, 1989-90
(Sources: Joint Coal Board;
Western Australian Department of Mines)

Type	Unit	Resources (a)	Pro- duction
Hydrocarbon liquids—			
Crude oil	mil. cu m	(b)18.1	4.0
Condensate	mil. cu m	(b)87.4	1.6
Natural Gas	mil. cu m	(b)847,220	3,847
Black coal	mil. tonnes	(c)4,220	4.2

(a) At 30 June 1990. (b) Probability greater than 90 per cent that resources shown are recoverable. (c) Represents open cut and underground resources, both demonstrated and inferred.

The resources data, except for black coal, represent amounts which are expected to be profitably extractable, given existing knowledge of mineral deposits, current prices and technology. Resources data are therefore subject to considerable revision if any of these factors change.

While it is not possible to quantify such resources, Western Australia's geographical and climatic characteristics are such that it has considerable potential to take advantage of advances in the use of solar, wind and biomass energy, as well as tidal and wave power.

ENERGY PRODUCTION, CONVERSION AND UTILISATION

Electricity

Most of the electricity production in the State is generated by the State Energy Commission of Western Australia (SECWA) whose responsibilities include ensuring the effective and efficient use of the State's energy resources and the provision of economical and reliable supplies of electricity and gas. Significant amounts of electricity are also generated by private enterprise, particularly large-scale mining companies in the Pilbara region.

TABLE 15.2 - PRODUCTION OF ELECTRICITY
(million kWh)

Generated by	1987-88	1988-89	1989-90
Government	8,179	9,123	9,990
Private	r2,935	r2,827	3,548
Total	r11,114	r11,950	13,538

SECWA operates two power grid systems which supply the electricity needs of 98 per cent of the State's population. The two systems are:

The *South-West interconnected system* servicing an area from Kalbarri in the north to Bremer Bay in the south and from Perth east to Kalgoorlie. Three major thermal power stations provide the bulk of electricity for the system. They are located at Muja (1,040MW capacity) and Bunbury (120MW), both are coal fired and generated around 64 per cent of electricity supplied through the system during 1989-90; and at Kwinana (880MW), fuelled by coal and North West Shelf natural gas. Gas turbines are located at Pinjar (north of Wanneroo), Mungarra (south east of Geraldton), Kwinana, Geraldton and Kalgoorlie to provide peak and emergency power. At 30 June 1990, the installed capacity of generating plants within this system was 2,280MW. Additional gas turbines are being installed at Pinjar, Mungarra and Kalgoorlie.

The *Pilbara interconnected system* linking Karratha, Dampier, Cape Lambert, Wickham, Roebourne, Port Hedland and Goldsworthy. Electricity is supplied from Cliffs Robe River Iron Associates' gas-fired power station at Cape Lambert. Additional power can be drawn from the SECWA stand-by diesel generating facility at Port Hedland, from Hamersley Iron Proprietary Limited's power station at Dampier and from a SECWA gas turbine generating unit also located in Dampier.

Outside the electricity grid systems, SECWA operates another twenty-eight smaller diesel power stations with a total capacity at 30 June 1990 of 184MW. It also provides support services for the Aboriginal and Torres Strait Islanders Commission to help run thirty-four Aboriginal village power stations in remote areas of the State.

At 30 June 1990, SECWA had 623,000 customer accounts for electricity throughout Western Australia.

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.

TABLE 15.3 - FUELS USED FOR ELECTRICITY GENERATION

(Source : State Energy Commission Of Western Australia)

Fuel	Unit	1987-88	1988-89	1989-90
Coal	'000 tonnes	2,363	3,233	3,633
Fuel oil	'000 tonnes	15	16	19
Distillate	'000 tonnes	56	70	68
Natural gas	Terajoules	42,128	33,973	35,056

The first commercial deposits of oil were found on Barrow Island, off the north-west coast of the State, in 1964 and shipments commenced in 1967. This oil is refined at several Australian refineries, including Kwinana.

The North West Shelf provides most of the natural gas to SECWA with a small amount of gas being received by SECWA from the onshore Woodada gas field (near Dongara).

In addition to reticulating (principally) North West Shelf natural gas to customers linked to the Dampier to Bunbury pipeline, SECWA also reticulates tempered liquefied petroleum (TLP) gas to customers in Albany on the south coast, and Simulated Natural Gas (SNG) to customers in Mandurah, south of Perth.

At 30 June 1990, there were 243,731 customer accounts for natural gas and 2,537 customer accounts for TLP gas.

The North West shelf project is based on the use of the North Rankin and Goodwyn gasfields which contain expected recoverable hydrocarbons currently estimated at 297,500 million cubic metres of gas and 52 million cubic metres of condensate (with a 90 per cent probability that these volumes are recoverable). In North Rankin, the first field to be developed, the natural gas reservoir is trapped in layers of porous sandstone, more than three kilometres below the sea floor. The gas-saturated sandstone beds have a cumulative thickness of approximately 300 metres and extend over an area of more than 50 square kilometres.

Construction of the offshore and onshore facilities for the project involved two phases; the first (the Domestic Gas Phase) to supply gas to Western Australia, while the second (the Liquefied Natural Gas (LNG) phase) is to supply LNG to Japan.

The Domestic Gas Phase is complete. The LNG phase began in 1985. It involved the construction of three LNG processing 'trains', four 65,000 cubic metre capacity LNG storage tanks to store the refrigerated LNG ready for export, and seven 125,000 cubic metre capacity LNG tankers to ship the LNG to Japan.

By October 1990, two of the three processing trains, all storage tanks and four of the seven tankers were in service with the total plant and fleet due to be fully operational by 1993. LNG exports to Japan commenced at the end of July 1989, nearly two months ahead of the contract schedule. From commencement to beginning of November 1990, 54 export shipments have been made, totalling 3,105,635 tonnes of LNG.

When both phases are fully operational at planned plateau production levels, output from the project will include:

10.5 million cubic metres (414 Terajoules) of gas per day for the domestic market in Western Australia;

6 million tonnes of LNG per year to eight Japanese electricity and gas utilities which service areas embracing 90 million people;

1.9 megalitres of condensate per year (33,000 barrels per day). Production could treble once the Goodwyn Platform is in operation

During the year ended 30 June 1990, the North 3 Rankin field produced 7,357 million cubic metres of gas and 1.63 million cubic metres of condensate. The field currently produces about 33 million cubic metres of gas per day of which 10 million cubic metres is re-injected into the reservoir, resulting in increased condensate production. The peak daily flow rate of gas supplied to SECWA during 1989-90 was 443 terajoules (11.6 million cubic metres), but averaged 370 terajoules during 1990 due to the Kwinana Power Station firing on coal.

Development of the condensate-rich Goodwyn field is now underway. Contracts have been let for construction of the \$1.7 billion Goodwyn A platform due for completion in 1993. It will be connected to the North Rankin A platform 23 kilometres to the south-east by undersea pipeline. The Goodwyn development will have the capacity to process 25.5 million cubic metres of gas per day and up to 12,700 kilolitres per day of condensate.

In 1984 SECWA constructed a 660 millimetre capacity pipeline, 1,500 kilometres long, from Dampier to Wagerup, at a cost of approximately \$1,000 million, to carry gas to its Perth distribution network, and to major industrial customers in the south-west of the State. The pipeline has been extended to serve major industrial customers in the Pilbara and smaller gas supply systems at Carnarvon, Geraldton, Pinjarra, Bunbury and Harvey.

Petroleum exploration has continued at a high level in recent years. Statistics relating to this activity and to the production of crude oil and natural gas are contained in tables in Chapter 14.

An LPG extraction plant based at Kwinana and using North West Shelf gas to produce propane and butane became fully operational in October 1988. About 100,000 of the 150,000 tonnes produced each year is being exported to Japan.

Table 15.4 shows sales of petroleum products in Western Australia. The data relate only to sales of refinery products (whether produced in this State or imported), and hence exclude products such as

natural gas, which do not go through a refining process; or crude oil, which is a refinery input.

TABLE 15.4 – SALES (a) OF PETROLEUM PRODUCTS
(Source: Australian Bureau of Agricultural
and Resource Economics)
(megalitres)

	1988-89	1989-90	p1990-91
LPG	67	92	87
Automotive gasoline—			
Leaded	1,323	r1,268	1,120
Unleaded	337	r456	525
<i>Total</i>	<i>1,661</i>	<i>r1,724</i>	<i>1,645</i>
Aviation gasoline	16	19	16
Aviation turbine fuel	283	280	313
Automotive diesel	1,840	2,030	2,002
Industrial and marine diesel fuel	44	40	31
Fuel oil	330	286	373
Lubricating oils and greases	66	69	65
Bitumen	67	65	57
Other products (b)	36	r33	31
Total products	4,409	r4,638	4,619

(a) Includes reporting companies' own use, but excludes refinery fuel. (b) Includes lighting kerosene and heating oil.

Coal

Commercial production of coal commenced in the 1890s at Collie. For many years, coal was the major source of energy in the State, being used to generate electricity, to manufacture 'town' gas and to provide fuel for steam locomotives and industry generally. Today, the major user of coal mined in the Collie basin is SECWA. Coal is the main fuel for electricity generation for SECWA's South-West interconnected system.

Substantial deposits of black steaming coal suitable for power generation have been demonstrated at Hill River, 250 kilometres north of Perth near the coastal town of Jurien. The deposit, at 600 megatonnes (demonstrated and inferred), has the potential to be a major long term supplier of energy to the State.

Apart from the Collie and Hill River deposits, several other deposits of both black and brown coal have been identified and are at present being evaluated. Chapter 14 contains statistics relating to exploration and production of coal.

Data showing trends in coal production since 1900 are contained in the Statistical Summary, Chapter 26.

Solar energy

The use of solar radiation for the production of domestic hot water is well established in Western Australia, and is the most common application of solar energy. Such systems are accepted as being competitive with other forms of domestic water heating.

Photovoltaic cells, which convert light directly into electrical energy, are used for the refrigeration of food, and basic lighting and radio communications equipment in remote and outback localities. Solar energy is also used for water and space heating in commercial applications and in agriculture, where solar power can be used to pump water from reservoirs and to electrify fencing.

At present, economical application of solar energy is largely restricted to relatively small scale heating purposes, with some more sophisticated applications in remote localities where factors such as the transport costs of conventional fuels are significant.

Biomass

Biomass refers 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.

Uranium

No uranium has been mined on a commercial basis in Western Australia to date, though small amounts of ore have been extracted and processed for test purposes. A number of uranium ore bodies have been identified in the State, and exploration for this mineral is continuing. Further details of uranium exploration are contained in Chapter 14.

Wind energy

Wind power was of some significance as an energy source in the early days of settlement and is still used extensively in agricultural and pastoral areas for pumping water for stock.

Development of the use of wind power to generate electricity has intensified in recent years. In 1986, wind turbines were installed at a test site near South Fremantle. In March 1987, SECWA commissioned six 60 kilowatt wind turbines at Salmon Beach, a few kilometres west of the south coastal town of Esperance, to augment the local electricity supply. A wind power generator is also being used to augment the electricity supply on Rottneest Island.

Wind energy is now considered close to becoming cost effective for power production in areas with reliable wind and there are prospects for extending the use of wind beyond its present major application in the pumping of water. SECWA is currently studying the use of wind energy generators on the interconnected grid and have identified sites near Geraldton and Albany as being suitable for a wind farm of up to 20MW capacity.

PERTH LANDFILL GAS PROJECT

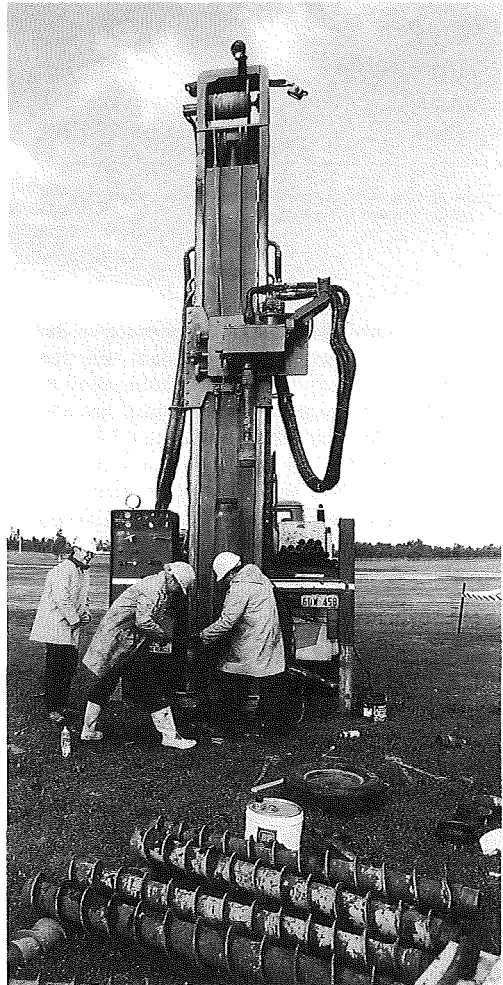
Landfill gas (LFG) is primarily composed of methane and carbon dioxide. It is produced by the action of bacteria during the decomposition of organic materials in landfills, and is released into the atmosphere.

To determine if LFG has the potential for industrial applications, the Minerals and Energy Research Institute of WA (MERIWA), SECWA, and the CSIRO have funded a \$280,000 study.

Eleven extraction bores and 66 monitoring boxes have been drilled in seven metropolitan landfill pits. SECWA has used a mobile test rig to measure the gas flow and to flare the gas.

The results of the project will help organisations such as the Health Department of WA and the Environmental Protection Authority prepare management policies for existing and future landfills. The project may also lead to private companies and local authorities collecting the gas for use in local industry and electricity generation.

The harnessing of LFG has environmental implications, as methane - a principal Greenhouse gas - can be burned and converted to less harmful carbon dioxide.



Evaluation drilling at suburban rubbish tips has identified commercial quantities of landfill gas.

Photograph: SECWA.

Other energy sources

There are several other energy sources which have potential use in Western Australia. Sites have been identified 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, while wave power is proposed to be harnessed in waters near Esperance. Some small deposits of oil shale have been identified in the south-east of the State.

Research

The Renewable Energy Advisory Council was recently established to advise the Western Australian Government on all aspects of research, development, demonstration and general promotion of renewable energy technologies.

The principal energy research organisations in Western Australia are SECWA, the Minerals and Energy Research Institute of Western Australia (MERIWA) and Murdoch University's Energy Research Institute (MUERI).

SECWA is primarily responsible for the efficient and effective use of energy resources available to the State of Western Australia. Consistent with this responsibility, it is engaged in an active program of investigation and evaluation of renewable energy sources and applications of energy which may become significant in the future.

SECWA has undertaken studies into the use of alternative fuels for power generation and for use in motor vehicles. Vegetable oils have been tested with some success as alternative liquid fuels for generating electricity and tests are continuing into the use of LPG and compressed natural gas (CNG) in light vehicles. The Metropolitan (Perth) Passenger Transport Trust is involved in a project to convert thirty buses to operate exclusively on CNG.

SECWA are currently looking at a number of opportunities to achieve energy savings. One area is the establishment of co-generation facilities, i.e. facilities enabling the combined generation of electricity and useful heat (usually as steam or hot air). Industry and commercial organisations requiring heat can arrange to install plant that will generate electricity at the same time, either for

their own use or for on-selling. Where economic, SECWA will purchase power from such facilities.

SECWA and MERIWA are jointly funding a research program to assess the Landfill Gas (LFG) resource in the Perth metropolitan area. This information will be useful to organisations responsible for managing waste, the environment and energy utilisation.

MUERI is principally involved in research and development of renewable energy sources, especially solar energy (solar radiation) systems. In addition, MUERI carries out a range of tests for manufacturers and research workers on a confidential basis.

Since 1984, staff at MUERI have undertaken field trials in remote areas on photovoltaic systems for producing electricity. Staff are now developing systems suitable for remote Aboriginal communities, with funding from the Federal Departments of Aboriginal Affairs and Primary Industries and Energy.

There are also a number of other testing facilities in the State, some operating under contract. These facilities, and the institutions responsible for operating them include:

Corrosion Testing Facility
— Curtin University of Technology;

Materials Performance Testing Facility
— Curtin University of Technology;

Materials Standards Laboratory
— University of Western Australia.

At the national level, CSIRO and the Commonwealth Department of Primary Industries and Energy, and the Energy Research and Development Corporation (ERDC) are involved in a number of energy research programs. ERDC is a grant scheme established to encourage energy research.

ENERGY AND THE ENVIRONMENT

There is an increasing awareness in the community about the possible impact on the environment of energy generation emissions, particularly from the combustion of fossil fuels.

In response to community environment awareness, the Western Australian Government has outlined policies on energy conservation and emission controls.

For its part, SECWA is seeking to enhance the management of energy demand by improving the efficiency of energy utilisation. It has also established a Renewable Energy Branch to investigate alternatives to the use of traditional non-renewable energy sources. Other environment related SECWA activities include the preparation of an environmental policy, revision of its tree maintenance procedures and seeking to ensure that underground water reserves in the vicinity of power stations are protected.

NATIONAL ENERGY SURVEY OF HOUSEHOLDS

National Energy Surveys were conducted by the ABS in November 1980, June 1983 and over the twelve months commencing 17 June 1985.

The 1985-86 Survey sought information about the types of domestic appliances and water heating facilities, room heating, air-conditioning, insulation and swimming pools installed. Additional data obtained were: the number of adults and children and gross income of the household; consumption of electricity and reticulated gas by households over a twelve-month period; and the number of rooms in the dwelling.

TABLE 15.5 — HOUSEHOLDS BY MAJOR APPLIANCES AND FACILITIES: JUNE 1983 AND 1985-86
WESTERN AUSTRALIA AND AUSTRALIA
Reference: Catalogue No. 8212.0

	Western Australia			Australia		
	June 1983 Per cent (a)	1985-86 '000 Per cent (a)		June 1983 Per cent (a)	1985-86 '000 Per cent (a)	
Refrigerator	99.7	460.7	99.6	99.6	5,023.5	99.6
Freezer	46.4	210.3	45.5	46.0	2,342.4	46.4
Hot plates	97.5	455.7	98.5	97.7	4,953.1	98.2
Oven	99.1	456.0	98.6	99.0	4,980.4	98.7
Microwave oven (b)	12.9	154.8	33.5	10.0	1,509.5	29.9
Electric frypan/skillet (b)	35.9	301.1	65.1	38.0	3,521.2	69.8
Vertical grill (b)	5.7	53.7	11.6	6.9	777.7	15.4
Dishwasher	13.1	68.5	14.8	17.1	995.2	19.7
Washing machine	92.1	425.8	92.0	91.8	4,684.6	92.9
Clothes dryer	30.1	159.1	34.4	45.2	2,428.3	48.1
Ceiling fan (c)	(d)	113.0	24.4	(d)	852.7	16.9
Air conditioning	37.1	186.4	40.3	32.3	1,783.0	35.3
Main heating, non-shared—						
Electric	30.4	130.3	28.2	44.2	2,103.1	41.7
Gas	15.3	82.8	17.9	21.9	1,232.1	24.4
Oil	12.9	42.3	9.2	7.6	281.3	*5.6
Wood/solid fuel	21.3	120.1	26.0	12.4	794.6	15.8
Total	92.5	421.9	91.2	92.5	4,646.8	92.1
Hot water system (e)	99.0	459.6	99.2	98.7	5,001.8	98.9
Wall insulation (f)	4.6	21.3	4.9	*12.1	672.8	*15.0
Roof insulation (f)	39.2	201.5	46.2	43.7	2,239.4	49.8
Swimming pool (f)	12.7	56.6	13.0	10.1	518.3	11.5
Bore/well pump (f)	(d)	96.4	22.1	(d)	279.5	6.2
Total households	100.0	462.6	100.0	100.0	5,044.1	100.0

(a) Percentage of total households. (b) For June 1983, included only if used more than once a week. For 1985-86, included if the household had any of the appliances as distinct from actually using them. (c) Permanently fixed large bladed fans only. (d) Not asked. (e) Includes shared systems. (f) Not asked at flats, mobile, and improvised dwellings. * Care should be exercised when using this figure — subject to sampling variability too high for most practical purposes.

REFERENCES

ABS Publications

National Energy Survey: Household Appliances, Facilities and Insulation, Australia, 1985-86 (8212.0).

National Energy Survey: Household Energy Consumption, Australia, 1985-86 (8213.0).

Other Publications

State Energy Commission of Western Australia, *Annual Report 1989*.

Australian Bureau of Agricultural and Resource Economics, *Quarterly Mineral Statistics*.

Western Australian Department of Mines, *Petroleum in Western Australia, July 1989*.

Western Australian Department of Mines, *Annual Report 1988-89*.

Joint Coal Board, *Black Coal in Australia 1988-89*.

Western Australian Government, Energy Policy and Planning Bureau, *Energy in Western Australia*.

Chapter 16

MANUFACTURING

Manufacturing in Western Australia	16-1
Department of State Development	16-1
Manufacturing Statistics	16-2
References	16-5

Chapter 16

MANUFACTURING

The manufacturing industry in Western Australia is heavily concentrated in the south-west of the State. The production of food and beverages and the processing of mineral products are the most valuable industries.

MANUFACTURING IN WESTERN AUSTRALIA

Historically, manufacturing in Western Australia was centred around processing of local raw materials to produce meat, milk, seafood, wood, clay and cement products for both local consumption and export.

While these industries still remain important, the development in recent decades of the State's enormous mineral wealth and the availability of cheap, plentiful energy in the form of natural gas have seen the emphasis switch to value-added processing of minerals such as alumina and nickel for export. More recent mineral-related developments include expansion of gold and alumina refining capacities, the establishment of a silicon smelter and several projects related to downstream processing of mineral sands.

Concurrent with these developments and the strong growth in the mining industry (particularly in the gold and oil and gas sectors) has been the growth of manufacturing industries involved in the construction and servicing of new resource projects, especially in the fabrication and machinery and equipment sectors. Industrial chemicals for the resource industry, such as sodium cyanide, caustic soda, chlorine and ammonium nitrate are also now being produced locally.

Manufacturing activity is largely centred in the Perth metropolitan area. Heavy industry is chiefly located at Kwinana, with other important industrial areas in Canning Vale, Osborne Park-Balcatta,

Kewdale-Welshpool and O'Connor. Increased decentralisation of industry to areas like Kemerton, near Bunbury, is being encouraged.

A more comprehensive picture of the history of manufacturing in Western Australia can be found in the *Western Australian Year Book*, No. 24 — 1986.

The Western Australian Government body now responsible for encouraging the establishment of new industries, is the Department of State Development.

DEPARTMENT OF STATE DEVELOPMENT

The Department of State Development was established early in 1991. As a single agency, it is the responsibility of the Minister for State Development. It brings together the work of five former departments which covered the areas of economic, trade, resource, regional and small business development.

The Department aims to foster an environment for sustainable development within the State by providing policy advice to Government and by strategic planning of economic progress.

The Department of State Development assists Western Australian industry to improve its competitiveness and productivity at enterprise level and at the broader sector level.

A major objective of the Department is to secure development projects of economic significance to

MANUFACTURING

the State through negotiations with developers. It coordinates the public decision-making processes and prepares and monitors agreements.

The Department also coordinates the provision of government services to regions.

MANUFACTURING STATISTICS

The 1988-89 Census of Manufacturing Establishments shows that the Perth Statistical Division had about eighty-two per cent of all manufacturing establishments, eighty-five per cent of manufacturing employment and eighty-two per cent of turnover. The South-West Statistical Division, where several of the State's larger mineral and timber processing establishments are located, was the only other region with a significant proportion of manufacturing activity.

Factories employing fewer than twenty persons accounted for over seventy-eight per cent of establishments. However, the large establishments employing more than 100 persons, which comprised only three per cent of establishments, contributed forty-two per cent of employment, forty-nine per cent of wages and salaries and fifty-one per cent of turnover.

**TABLE 16.1 – MANUFACTURING ESTABLISHMENTS
SUMMARY OF OPERATIONS BY
STATISTICAL DIVISION: 1988-89**

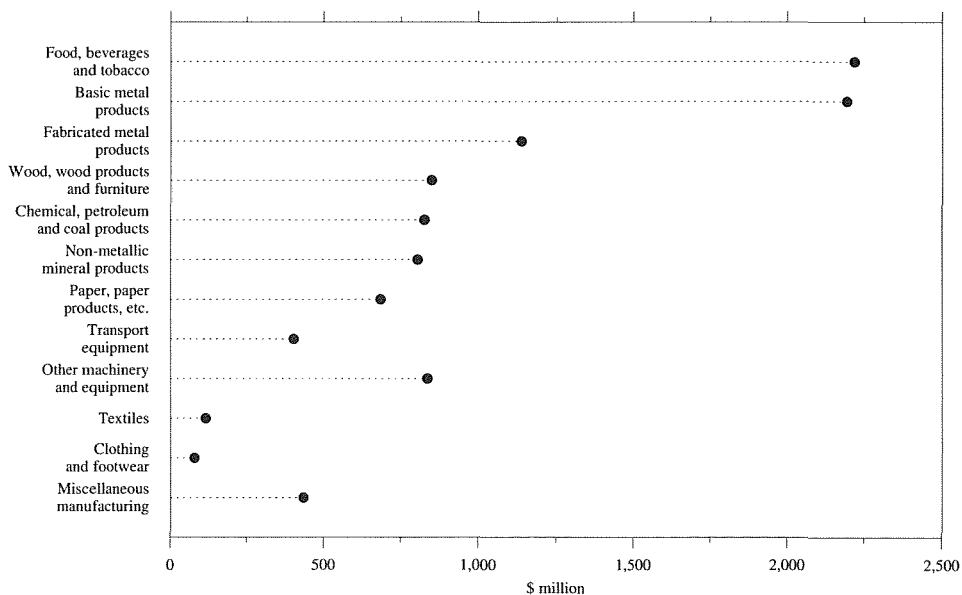
Reference: Catalogue No. 8202.5

Statistical division	Estab- lishments operating (a)	Persons employed (a)(b)	Wages and salaries (c)	Turnover
	No.	No.	\$m	\$m
Perth Statistical Division	2,172	62,357	1,459.6	8,681.2
Other divisions—				
South-West	184	5,464	136.4	971.7
Lower Great Southern	66	1,103	25.4	144.7
Upper Great Southern	24	245	3.6	19.9
Midlands	49	727	14.0	83.0
South-Eastern	48	983	27.0	382.2
Central	64	948	20.0	211.2
Pilbara	27	559	17.6	52.3
Kimberley	17	336	7.0	33.0
<i>Total other divisions</i>	<i>479</i>	<i>10,365</i>	<i>251.0</i>	<i>1,898.0</i>
Western Australia	2,651	72,722	1,710.5	10,579.0

(a) At 30 June. (b) Includes working proprietors. (c) Excludes amounts drawn by working proprietors.

(Note: Data in this table exclude operations by single establishment manufacturing enterprises employing fewer than four persons.)

**DIAGRAM 16.1
MANUFACTURING ESTABLISHMENTS: TURNOVER BY INDUSTRY AND SUB-DIVISION
1988-89**



MANUFACTURING

TABLE 16.2 - MANUFACTURING ESTABLISHMENTS OPERATING AT 30 JUNE 1989 (a) : SELECTED VARIABLES BY EMPLOYMENT SIZE - WESTERN AUSTRALIA AND AUSTRALIA
Reference: Catalogue Nos. 8203.0, 8207.5

	<i>Fewer than 4 persons</i>	<i>4-19 persons</i>	<i>20-49 persons</i>	<i>50-99 persons</i>	<i>100 or more persons</i>	<i>Total</i>
WESTERN AUSTRALIA						
No. of establishments	788	1,892	489	152	118	3,439
Employment ('000)	1.8	15.8	14.9	10.6	31.4	74.5
Wages and salaries (\$m)	21.0	281.2	315.3	260.3	837.6	1,715.4
Turnover (\$m)	106.0	1,516.3	1,650.4	1,826.6	5,508.3	10,607.6
AUSTRALIA						
No. of establishments	11,024	22,227	5,031	1,872	2,119	42,273
Employment ('000)	24.2	182.6	151.9	129.9	608.2	1,096.8
Wages and salaries (\$m)	257.4	3,227.3	3,244.4	3,042.0	15,968.7	25,739.8
Turnover (\$m)	1,290.5	16,386.6	17,941.5	19,112.7	97,843.5	152,574.8
WESTERN AUSTRALIA AS A PERCENTAGE OF AUSTRALIA						
No. of establishments	7.1	8.5	9.7	8.1	5.5	8.1
Employment	7.4	8.7	9.8	8.1	5.2	6.8
Wages and salaries	8.2	8.7	9.7	8.6	5.2	6.7
Turnover	8.2	9.2	9.1	9.6	5.6	7.0

(a) Excludes manufacturing establishments with no employees.

TABLE 16.3 - MANUFACTURING ESTABLISHMENTS SUMMARY OF OPERATIONS BY INDUSTRY SUB-DIVISION (a)
Reference: Catalogue No. 8207.5

<i>Industry sub-division</i>		<i>Establishments operating (c)</i>	<i>Persons employed (c)</i>	<i>Wages and salaries (d)</i>	<i>Turnover</i>	
<i>ASIC code (b)</i>	<i>Description</i>					
		No.	No.	\$m	\$m	
1988-89						
21	Food, beverages and tobacco	364	12,135	273.9	2,216.9	
23	Textiles	41	1,277	23.4	116.7	
24	Clothing and footwear	69	1,850	29.5	80.6	
25	Wood, wood products and furniture	451	8,998	182.2	847.0	
26	Paper, paper products, printing and publishing	255	7,932	161.2	684.1	
27	Chemical, petroleum and coal products	75	3,168	94.0	826.4	
28	Non-metallic mineral products	144	5,070	130.1	804.3	
29	Basic metal products	43	5,688	193.1	2,193.6	
31	Fabricated metal products	466	9,888	230.41	1,138.4	
32	Transport equipment	179	5,001	116.0	402.1	
33	Other machinery and equipment	378	8,473	206.2	834.9	
34	Miscellaneous manufacturing	186	3,242	70.4	434.2	
	Total Manufacturing	1988-89	2,651	72,722	1,710.5	10,579.0
		1987-88	2,675	72,069	1,604.8	9,416.9
		1986-87	2,660	69,452	1,407.0	8,215.1

(a) Includes establishments operating part year and ancillary locations. (b) Australian Standard Industrial Classification. (c) At 30 June. Includes working proprietors. (d) Excludes amounts drawn by working proprietors.

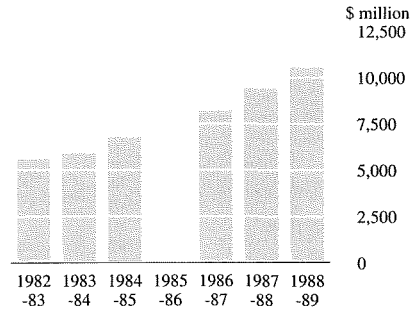
(Note: Data in this table exclude operations by single establishment manufacturing enterprises employing fewer than four persons.)

MANUFACTURING

DIAGRAM 16.2
MANUFACTURING ESTABLISHMENTS
EMPLOYMENT AT 30 JUNE



DIAGRAM 16.3
MANUFACTURING ESTABLISHMENTS
TURNOVER



(Note: A census was not conducted for the year 1985-86. Data in these diagrams exclude operations by single establishment manufacturing enterprises employing fewer than four persons.)

TABLE 16.5 – PRODUCTION OF SELECTED COMMODITIES (a)
(Includes quantities produced and used in own establishment)
Reference: Catalogue No. 1305.5

Commodity	Unit	1986-87	1987-88	1988-89	1989-90
Aerated and carbonated waters	'000 L	107,010	n.p.	n.p.	140,679
Alumina (b)	'000 t	5,727	6,063	6,172	6,651
Bacon and ham	tonnes	8,502	8,377	9,384	9,937
Butter (c)	"	1,400	1,505	1,139	1,339
Cheese (c)	"	3,727	3,772	3,586	4,129
Footwear	pairs	287,816	288,843	304,384	363,089
Ice cream	'000 L	19,045	17,136	n.p.	n.p.
Inedible tallow	tonnes	31,251	34,464	30,647	38,400
Paints	'000 L	5,875	5,942	7,425	8,773
Ready-mixed concrete	'000 cu m	1,261	1,342	1,642	1,400
Rock lobster tails	tonnes	2,642	4,259	3,545	1,626
Scoured wool from greasy shorn wool	"	29,109	25,820	22,921	19,475
Stock and poultry foods—					
Meat and bone meal	"	37,844	39,471	35,621	45,673
Prepared stock and poultry food	"	351,388	333,617	439,763	341,583
Solar collectors	sq m	92,627	104,566	91,787	86,244
Terracotta and concrete tiles	'000 sq m	2,967	3,369	4,541	4,127
Timber (d)—					
Local logs sawn	cu m	941,794	919,848	990,346	955,193
Sawn timber produced	"	316,658	318,652	342,905	324,083

(a) Data from ABS sources exclude production by single establishment manufacturing enterprises employing fewer than four persons and establishments predominantly engaged in non-manufacturing activities. (b) Source: Department of Mines. (c) Source: Australian Dairy Corporation. (d) Derived from data supplied by the Department of Conservation and Land Management.

Despite the recent growth in Western Australia's manufacturing sector, the State's contribution to Australian manufacturing statistics was relatively small. The Non-metallic mineral products industry and the Fabricated metal products industry achieved the highest growth in turnover,

increasing by 18.7 per cent and 16.5 per cent respectively, compared with the previous year. The Western Australian industries that made the smallest contribution at the national level, were the Clothing and footwear, Textiles and Transport equipment industries.

MANUFACTURING

At the ASIC sub-division level, Food, beverages and tobacco and Basic metal products made the largest contributions to turnover in 1988-89. Industries with the largest turnover per person employed in 1988-89 were recorded in the Basic metal products and Chemical, petroleum and coal products divisions.

In 1988-89, persons employed in Western Australia's manufacturing industry accounted for twelve per cent of the employed labour force.

A wide range of manufactured commodities is produced in Western Australia, as indicated in Table 16.5. It should be noted that details of quantities produced for many other significant commodities are confidential or not collected, and therefore are not available for release. However, they are included in total Australian production.

REFERENCES

ABS Publications

Census of Manufacturing Establishments: Industry and Area Data, Western Australia (8202.5)

Census of Manufacturing Establishments: Selected Items of Data Classified by Industry and Employment Size, Western Australia (8203.5)

Manufacturing Industry, Details of Operations by Industry Class, Australia (8203.0)

Manufacturing Industry, Selected Items of Data Classified by Industry and Employment Size, Australia (8204.0)

Manufacturing Commodities: Principal Articles Produced, Australia (8303.0)

Chapter 17

INTERNAL TRADE AND SERVICES

Wholesale Trade	17-1
Retail Trade	17-1
Service Industries	17-3
Consumer Affairs	17-3
References	17-5

Chapter 17

INTERNAL TRADE AND SERVICES

WHOLESALE TRADE

Wholesale trade is described as the resale of new or used goods to retailers and other business users (including farmers, builders, government and professional bodies).

A sample survey of wholesale establishments was conducted for the year ended 30 June 1982 and provides the latest information available about the wholesale sector. Estimates were produced at the national level and are contained in *Wholesale Establishments, Details of Operations by Industry Class, Australia* (Catalogue No. 8638.0).

RETAIL TRADE

Retail trade is described as the resale of new or used goods to final consumers for personal or household consumption. Detailed information about the retail sector has been collected using Censuses of Retail Establishments, the first of which was taken for the year 1947-48. Eight censuses have been taken since then as part of the ABS program of rotating economic censuses. Results from each census are published for each State and Territory and for Australia as a whole. Surveys of retail trade, which were introduced from 1956, have enabled the production of estimates of retail trade on a less detailed but more frequent basis.

Census of Retail Establishments

The most recent census was taken for the year ended 30 June 1986 and included all establishments classified to the Retail Trade subdivision of the Australian Standard Industrial Classification (ASIC), excluding bread and milk vendors, shoe repairers and electrical appliance repairers n.e.c.. Builders hardware dealers were

included for the first time. The next retail census will be conducted in 1992-93 and will relate to the year ending 30 June 1992.

Survey of Retail Establishments

Since 1956, intercensal estimates of the value of retail sales have been produced by means of sample surveys. Surveys were initially conducted quarterly but are now conducted on a monthly basis. The surveys are reviewed periodically, generally to account for changes reflected in the results of each retail census. The survey conducted since June 1988 is based on the results of the 1985-86 Retail Census and produces

TABLE 17.1 - RETAIL TURNOVER - ANNUAL ESTIMATES AT CURRENT PRICES, BY INDUSTRY GROUPS(a) : 1988-89 TO 1990-91
(\$ million)

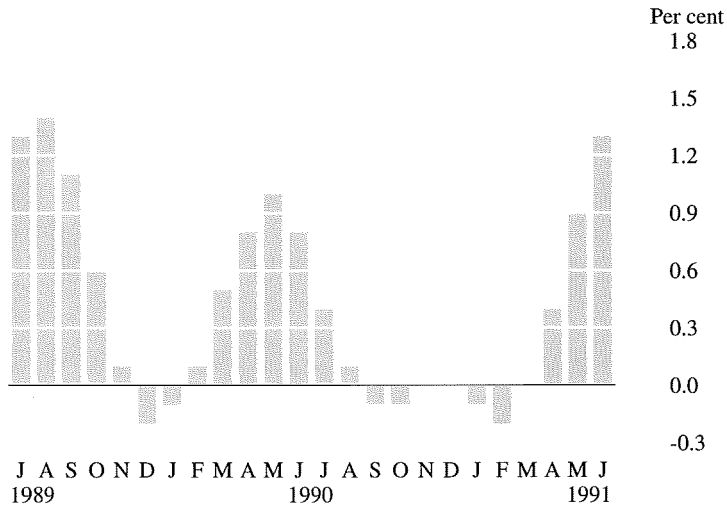
Reference : Catalogue No. 8501.0

Industry group	1988-89	1989-90	1990-91
Grocers, confectioners, tobacconists	2,244.4	2,430.0	2,643.4
Butchers	72.7	84.8	64.7
Other food stores	412.2	516.7	650.6
Hotels, liquor stores, licensed clubs	862.7	962.8	896.6
Cafes and restaurants	249.2	386.6	441.4
Clothing and fabric stores	449.7	458.3	414.8
Department and general stores	872.5	917.5	916.7
Footwear stores	94.8	89.6	84.3
Domestic hardware stores, jewellers	158.0	202.3	201.2
Electrical goods stores	494.2	521.9	470.3
Furniture stores	166.0	121.6	130.8
Floor coverings stores	89.8	91.7	71.1
Pharmacies	293.4	330.4	345.2
Newsagents	204.4	233.2	229.6
Other	390.5	397.0	412.4
Total	7,054.1	7,745.0	7,972.6

(a) Excludes motor vehicle dealers, petrol and tyre retailers.

INTERNAL TRADE AND SERVICES

DIAGRAM 17.1
MONTHLY CHANGE IN RETAIL TURNOVER
 Trend Estimates Data

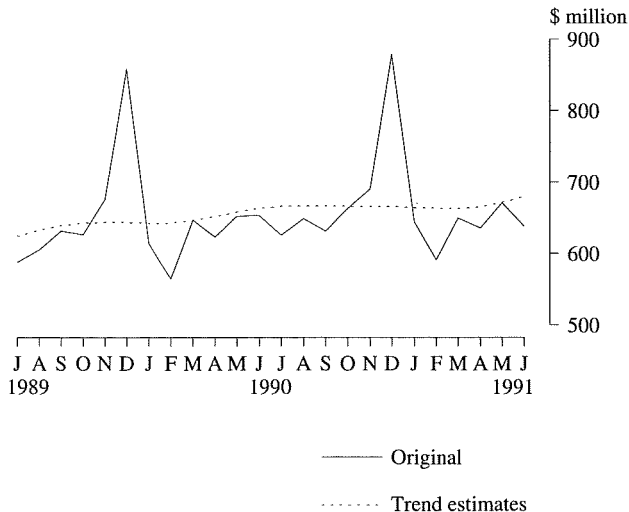


estimates of 'turnover' by retail establishments rather than the narrower estimates of 'retail sales'. The surveys are conducted monthly, (quarterly prior to April 1982), and estimates are published in *Retail Trade, Australia* (Catalogue No. 8501.0).

Diagrams 17.1 and 17.2, which relate to the 24 month period July 1989 to June 1991, illustrate the seasonal nature of retail turnover, the long term upward trend in retail turnover and the monthly variations that can occur. Data are presented as trend estimates in current price terms.

Estimates of turnover, (in original current price terms), by industry group for 1988-89 to 1990-91 are provided in Table 17.1.

DIAGRAM 17.2
MONTHLY ESTIMATES OF RETAIL TURNOVER



INTERNAL TRADE AND SERVICES

**TABLE 17.2 – SELECTED SERVICES INDUSTRIES
PERSONAL AND TRAVEL RELATED INDUSTRIES
SUMMARY OF OPERATIONS**

Reference : Catalogue Nos. 8652.0 to 8660.0 and 8662.0 to 8673.0

Industry	Enterprises operating (a)	Persons employed (a)	Turnover	Net operating surplus (b)
	No.	No.	\$m	\$m
1986-87				
Hotels, etc (mainly drinking places)	418	8,210	469.3	40
Licensed clubs	346	2,516	109.6	8
Cafes and restaurants	636	7,267	226.4	19
Accommodation	351	4,829	171.6	19
Travel agency services	209	1,057	34.7	n.a.
Motor vehicle hire	41	324	(c)34.0	n.a.
Hairdressers and beauty salons	839	3,756	70.0	11
Laundries and dry cleaners	128	1,151	36.8	5
Photography services	126	321	13.7	2
Motion picture theatres	17	542	25.8	3
1987-88				
Legal services	262	3,394	202	53
Accounting services	538	4,791	228	51
Real estate agents (d)	678	3,427	231	35
Architectural services	495	1,867	120	22
Surveying services	113	978	61	*11
Engineering and technical services	696	4,548	266	36
Computing services (e)	241	1,262	76	*4
Advertising services	126	786	287	*8
Debt collecting and credit reporting services	16	220	11	1
Pest control services	66	549	23	4
Cleaning services	405	3,020	*55	9
Security/protection and other business services	54	1,404	44	5

(a) At 30 June. (b) This item is a measure of turnover less business expenses except for non-operating expenses (e.g. interest) and can be considered a basic measure of profit for an industry. (c) State turnover figures are not available for this industry; \$34 million relates to takings from rental cars which accounts for the major portion of total turnover. (d) Persons working solely on commission are excluded from the summary employment statistics for this industry. (e) Royalties and licence fees have not been included in these summary statistics.
* Subject to sampling variability greater than 25 per cent.

SERVICE INDUSTRIES

The 1986-87 Service Industries Survey covered ten personal and travel related industries. Seven of these were also part of the 1979-80 Census of Retail and Selected Services Industries allowing for some comparisons between the two periods. These industries were motion picture theatres, cafes and restaurants, hotels (mainly drinking places), accommodation, licensed clubs, laundries and dry cleaners, and hairdressers and beauty salons. Data for motor vehicle hire, travel agency services, and photography services were collected for the first time.

The 1987-88 Service Industries Survey covered twelve professional and business related industries. These industries were Legal services, Accounting services, Real estate agents, Architectural services, Surveying services, Engineering and technical

services, Computing services, Advertising services, Pest control services, Cleaning services, Debt collection and credit reporting services, and Security/Protection and other business services. The industries included for the first time in the 1986-87 survey and the industries surveyed in 1987-88 have not previously been studied in this detail by the ABS, so comparisons with earlier statistics are not possible. Detailed statistics for each of the industries covered, plus a number of 'sub-industries', are available from the publications listed at the end of this chapter.

CONSUMER AFFAIRS

The Ministry of Consumer Affairs is the successor to the Bureau of Consumer Affairs which was established under the *Consumer Affairs Act 1981* and became the Department of Consumer Affairs in 1983.

INTERNAL TRADE AND SERVICES

The Ministry has as its corporate mission, the promotion and maintenance of fair trading. The earlier emphasis on consumer protection has developed into a concern for the trading environment as a whole, with services provided for both traders and consumers.

The Ministry structure reflects its changing role. In addition to Executive and Legal services, the Ministry comprises three Divisions:

- Policy and Corporate Services,
- Education and Consumer Services, and
- Industry Standards.

The Policy and Corporate Services Division provides the internal support functions essential for program delivery. It also provides administrative support to the Commercial and Small Claims Tribunals.

A Register of Encumbered Vehicles (REVS) maintains details of financial interests in motor vehicles and unlicensed farm machinery to assist prospective purchasers and financiers.

A policy unit within this Division assesses the need for legislative review and other policy measures such as the development of Codes of Practices designed to promote fair trading.

The Education and Consumer Services Division is responsible for informing and educating both traders and consumers about their respective rights and responsibilities. Emphasis is placed on providing consumers with skills to negotiate satisfactory resolutions to problems encountered in the marketplace. Advice and conciliation assistance is offered to individuals unable to resolve particular issues.

The Prices Monitoring Unit located in this Division, researches and publishes information about the prices of various goods and services.

The Division also investigates product safety complaints and imposes bans on potentially unsafe goods.

The Industry Standards Division provides support to the Occupational Licensing Boards and the Commercial Tribunal in occupational licensing matters.

**TABLE 17.3 – MINISTRY OF CONSUMER AFFAIRS
SUMMARY OF PRODUCT COMPLAINTS RECEIVED
1988-89 TO 1990-91**

(Source: Ministry of Consumer Affairs)

Product classification	Number of product complaints		
	1988-89	1989-90	1990-91
Food, beverages, tobacco	128	151	139
Clothing, footwear, drapery	212	221	221
Appliances and furnishings	932	1,018	944
Motor vehicles and transport equipment	1,627	1,976	1,760
Building and construction	1,327	1,064	822
Miscellaneous products	434	498	492
Transport and energy services	416	405	313
Insurance and finance	724	954	1,002
Real estate and accommodation	628	916	992
Miscellaneous services	992	981	1,083
Not specified	88	75	126
Total	7,508	8,259	7,894

**TABLE 17.4 – MINISTRY OF CONSUMER AFFAIRS:
COMPLAINTS FINALISED: 1988-89 TO 1990-91**

(Source: Ministry of Consumer Affairs)

	1988-89	1989-90	1990-91
Full redress obtained for consumer	2,089	1,954	1,939
Partial redress obtained for consumer	442	375	450
Situation clarified between consumer and trader	149	1,003	912
Complaint justified – trader warned	267	173	190
Proceedings initiated under State or Federal law	70	36	30
Insufficient evidence to resolve complaint	197	312	211
Incapable of resolution owing to conflict of evidence	200	257	244
Trader bankrupt or in liquidation	122	166	174
Trader unable to be located	69	58	66
Complaint referred to Small Claims Tribunal	913	972	1,003
Complaint referred to Commercial Tribunal	80	33	36
Complaint outside Ministry's jurisdiction (includes referrals to other organisations)	470	550	348
Complaint withdrawn or lapsed	551	676	543
Complaint not justified	767	714	744
Complaint lodged for information purposes only	338	305	328
Other reason	881	613	1,014
Total	7,605	8,197	8,232

INTERNAL TRADE AND SERVICES

REFERENCES

ABS Publications

Accounting Services Industry, Australia, 1987-88 (8668.0)

Advertising Services Industry, Australia, 1987-88 (8670.0)

Architectural Services Industry, Australia, 1987-88 (8664.0)

Cafes and Restaurants Industry, Australia, 1986-87 (8655.0)

Cleaning Services Industry, Australia, 1987-88 (8672.0)

Computing Services Industry, Australia, 1987-88 (8669.0)

Engineering and Technical Services Industry, Australia, 1987-88 (8666.0)

Hairdressers and Beauty Salons Industry, Australia, 1986-87 (8659.0)

Hotels & Bars and Accommodation Industries, Australia, 1986-87 (8656.0)

Laundries and Dry Cleaners Industry, Australia, 1986-87 (8658.0)

Legal Services Industry, Australia, 1987-88 (8667.0)

Licensed Clubs Industry, Australia, 1986-87 (8657.0)

Motion Picture Theatre Industry, Australia, 1986-87 (8654.0)

Motor Vehicle Hire Industry, Australia, (8652.0)

Pest Control Services Industry, Australia, 1987-88 (8671.0)

Photography Services Industry, Australia, 1986-87 (8660.0)

Professional and Business Services, Summary Statistics, Australia, (8662.0)

Real Estate Agents Industry, Australia, (8663.0)

Retail Trade, Australia (8501.0)

Security/Protection and Other Business Services Industries, Australia, (8673.0)

Selected Tourism and Personal Service Industries, Summary of Operations, Australia, 1986-87, Preliminary (8650.0)

Surveying Services Industry, Australia, (8665.0)

Travel Agency Services Industry, Australia, (8653.0)

Other Publications

Ministry of Consumer Affairs, *Annual Report*

Chapter 18

HOUSING AND CONSTRUCTION

Housing and the Census	18-1
Control of Building	18-2
Building Statistics	18-2
Engineering Construction Survey	18-5
References	18-5

Chapter 18

HOUSING AND CONSTRUCTION

The typical dwelling in Western Australia is single, detached, of double brick construction and on its own block of land. It has three bedrooms and is owned or being purchased by the occupier. Information from the 1986 Census of Population and Housing indicates that throughout the State, 80.1 per cent of the 456,515 private households lived in single detached houses. Only 7,016 (1.5 per cent) private households occupied multi-storey high rise flats (3 or more storeys). The remainder were accommodated in duplexes, row or terrace houses or similar medium density housing.

HOUSING AND THE CENSUS

The definitions below relate to data derived from the Census of Population and Housing.

Occupied dwellings. For the purpose of the census an occupied dwelling is any habitation occupied on census night by a household group living together as a domestic unit, and may comprise the whole of a building or only part of it. This means the total number of occupied dwellings, as measured by the census, may be greater than the known number of structures.

Unoccupied private dwellings. An unoccupied private dwelling is defined as a structure built specifically for private living purposes and capable of being lived in, though unoccupied at the time of the census.

Private dwellings comprise houses, including self-contained flats, and other dwellings such as sheds, tents, garages, caravans, houseboats, etc., occupied on a permanent or semi-permanent basis.

Non-private dwellings are dwellings which provide communal eating facilities and include hospitals, homes for the aged, motels, hotels, boarding houses, gaols, religious and charitable institutions, defence establishments etc.

Between the censuses of 1981 and 1986, the number of private occupied dwellings in the State increased by 13.1 per cent. The number of persons enumerated in private dwellings showed an increase of 9.7 per cent.

**TABLE 18.1 - DWELLINGS AND PERSONS
ENUMERATED: CENSUSES, 1981 AND 1986**
Reference: Catalogue No. 2465.0

	1981	1986
DWELLINGS ('000)		
Occupied dwellings—		
Private (a)	403.6	456.5
Non-private	2.4	2.2
Caravans, etc in parks (b)	n.a.	10.7
Total occupied dwellings (b)	406.0	469.5
Unoccupied private dwellings	42.1	53.9
PERSONS ('000)		
Persons enumerated in—		
Private dwellings	1,205.8	1,322.6
Caravans, etc in parks (b)	n.a.	26.4
Other structures	67.8	58.0
Total persons	1,273.6	1,406.9

(a) Excludes caravans in caravan parks. (b) In 1981, caravan parks were treated as non-private dwellings. The number of caravans in caravan parks was not recorded and the figures for total occupied dwellings in 1981 and 1986 are not comparable.

CONTROL OF BUILDING

Each of the local government authorities as constituted under the provisions of the *Local Government Act 1960* has the power to exercise general control over the erection of buildings in its own district. The powers of local government authorities to control building, derive from the Town Planning and Development Act and the Local Government Act.

A more detailed description of these Acts appears on page 374 of the *Western Australian Year Book No.24 — 1986*.

BUILDING STATISTICS

Scope

The statistics in this section relate to the construction of new buildings and the alterations and additions to existing buildings.

Non-building construction of railways, roads, bridges, earthworks, etc. is excluded. Also excluded are particulars of repairs and maintenance to buildings.

Sources 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 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 predominantly consist of one or more dwelling units. Residential buildings can be either 'houses', (a detached building predominately used for long term residential purposes and consisting of only one dwelling unit), or 'other residential buildings'.

Non-residential building: Relates to construction work on buildings other than residential buildings. Additions and alterations to 'non-residential building' are also included.

Commenced: A building job is regarded as commenced when the first physical building activity has been performed on site.

Completed: A building job is regarded as completed when building activity has progressed to the stage where the building can fulfil its intended function.

Value of building completed: Represents the actual completion value based on the market or contract price of building jobs.

Value of building work done: Represents the estimated value of building work actually carried out during the period on building jobs which have commenced.

Building Approvals

The number of houses and other residential buildings approved during 1990-91 decreased by 6.0 and 37.7 per cent respectively compared with the previous year. This resulted in a decrease of 15.9 per cent in total dwelling units approved.

TABLE 18.2 – NEW RESIDENTIAL BUILDING
APPROVED BY SECTOR
(Number of dwelling units)
Reference : Catalogue No. 8731.5

<i>Class of building</i>	<i>1988-89</i>	<i>1989-90</i>	<i>1990-91</i>
PRIVATE SECTOR			
Houses	19,229	11,300	10,776
Other residential buildings	6,769	4,464	2,733
Total	25,998	15,764	13,509
PUBLIC SECTOR			
Houses	738	495	317
Other residential buildings	861	914	620
Total	1,599	1,409	937
TOTAL			
Houses	19,967	11,795	11,093
Other residential buildings	7,630	5,378	3,353
Total	27,597	17,173	14,446

HOUSING AND CONSTRUCTION

The value of new residential building approved during 1990-91, at current prices, decreased by 13.1 per cent over the previous year. The value of non-residential building approved during 1990-91 decreased by 12.7 per cent when compared with 1989-90.

The total value of building approved during 1990-91 decreased by 12.8 per cent when compared with the previous year.

Building Activity Survey

The value of new residential building commenced during 1990-91 fell by 15.7 per cent compared with the previous year. This decrease comprised a fall of 8.6 per cent in the value of new houses commenced and a decrease of 34.8 per cent in the value of other residential building commenced.

TABLE 18.3 – VALUE OF BUILDING APPROVED BY SECTOR
(\$ million)

Reference: Catalogue No. 8731.5

<i>Class of building</i>	1988-89	1989-90	1990-91
PRIVATE SECTOR			
New residential building (a)—			
Houses	1,307.2	862.7	804.7
Other	313.1	242.7	174.2
Total	1,620.3	1,105.4	979.0
Alterations and additions to residential buildings (b)	132.5	140.0	125.3
Non-residential building (c)	766.8	766.7	505.9
Total building	2,519.7	2,012.1	1,610.1
PUBLIC SECTOR			
New residential building (a)—			
Houses	53.9	33.7	21.4
Other	41.2	51.2	34.1
Total	95.1	84.8	55.5
Alterations and additions to residential buildings (b)	1.8	2.3	0.9
Non-residential building (c)	218.3	257.3	388.5
Total building	315.2	344.4	445.0
TOTAL			
New residential building (a)—			
Houses	1,361.1	896.4	826.2
Other	354.4	293.9	208.3
Total	1,715.5	1,190.2	1,034.4
Alterations and additions to residential buildings (b)	134.3	142.3	126.2
Non-residential building (c)	985.1	1,024.0	894.4
Total building	2,834.8	2,356.5	2,055.0

(a) From 1 July 1990 valued at \$10,000 and over. From 1 July 1988 to 30 June 1990 valued at \$5,000 and over. (b) Valued at \$10,000 and over. (c) From 1 July 1990 valued at \$50,000 and over. From 1 July 1988 to 30 June 1990 valued at \$30,000 and over.

TABLE 18.4 – VALUE OF BUILDING COMMENCED BY CLASS OF BUILDING
(\$ million)

Reference: Catalogue No. 8752.5

<i>Class of building</i>	1988-89	1989-90	1990-91 ^p
New residential building—			
Houses	1,343.6	857.9	784.2
Other	311.6	316.4	206.3
Total new residential building	1,655.2	1,174.3	990.5
Alterations and additions to residential buildings (a)	121.4	138.6	131.8
Non-residential building (b)—			
Hotels, etc	34.3	16.4	23.9
Shops	137.0	141.2	77.4
Factories	74.9	96.4	36.5
Offices	739.2	381.4	159.7
Other business premises	199.7	112.6	58.9
Educational	133.9	112.0	88.3
Religious	4.3	7.3	7.0
Health	27.6	41.0	22.7
Entertainment and recreational	42.4	39.1	34.6
Miscellaneous	56.7	86.9	65.9
Total non-residential building	1,450.0	1,034.0	574.9
Total building	3,226.6	2,346.9	1,697.2

(a) Valued at \$10,000 and over. (b) From 1 July 1990 valued at \$50,000 and over. From 1 July 1988 to 30 June 1990 valued at \$30,000 and over.

TABLE 18.5 – VALUE OF BUILDING COMPLETED BY CLASS OF BUILDING
(\$ million)

Reference: Catalogue No. 8752.5

<i>Class of building</i>	1988-89	1989-90	1990-91 ^p
New residential building—			
Houses	906.9	1,296.1	904.3
Other	193.6	367.9	240.6
Total new residential building	1,100.5	1,664.0	1,144.9
Alterations and additions to residential buildings (a)	99.5	142.0	143.5
Non-residential building (b)—			
Hotels, etc	20.1	51.3	13.8
Shops	186.3	163.1	98.9
Factories	81.3	97.4	59.3
Offices	263.6	343.5	203.1
Other business premises	123.9	174.0	112.5
Educational	65.1	161.9	117.5
Religious	4.8	8.0	5.6
Health	112.9	58.5	24.7
Entertainment and recreational	37.6	63.9	48.5
Miscellaneous	63.8	72.5	77.5
Total non-residential building	959.5	1,194.0	761.4
Total building	2,159.5	3,000.0	2,049.8

(a) Valued at \$10,000 and over. (b) From 1 July 1990 valued at \$50,000 and over. From 1 July 1988 to 30 June 1990 valued at \$30,000 and over.

HOUSING AND CONSTRUCTION

TABLE 18.6 – HOUSES AND OTHER RESIDENTIAL BUILDINGS COMMENCED CLASSIFIED BY OWNERSHIP

Reference: Catalogue No.8752.5

<i>Class of building</i>	<i>1988-89</i>	<i>1989-90</i>	<i>1990-91p</i>
Private sector—			
Houses (a)	18,980	10,780	9,970
Other residential buildings (b)	6,216	4,595	2,453
Public sector—			
Houses	698	524	348
Other residential buildings (b)	726	1,049	606
Total—			
Houses (a)	19,680	11,300	10,320
Other residential buildings (b)	6,942	5,644	3,059

(a) Figures are rounded to nearest ten units. (b) Number of dwelling units.

The value of alterations and additions to residential buildings commenced during 1990-91 decreased by 4.9 per cent when compared with 1989-90.

The value of non-residential building commenced during 1990-91 fell by 44.4 per cent compared with 1989-90.

The total value of building commenced, at current prices, during 1990-91 decreased by 27.7 per cent when compared with 1989-90.

The value of new residential building and non-residential building completed during 1990-91 decreased by 31.2 and 36.2 per cent respectively when compared with the previous year.

The total value of building work completed during 1990-91, at current prices, decreased by 31.7 per cent compared with 1989-90.

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.

TABLE 18.7 – HOUSES COMMENCED, BY MATERIAL OF OUTER WALLS

Reference: Catalogue No. 8741.5

<i>Type of material</i>	<i>1988-89</i>	<i>1989-90</i>	<i>1990-91</i>
Double brick (a)	16,639	8,906	8,326
Brick veneer	925	691	431
Fibre cement	896	820	485
Other	603	630	578
Total new houses	19,063	11,047	9,820

(a) Includes houses built with outer walls of stone or concrete.

TABLE 18.8 – DWELLING UNITS COMMENCED IN STATISTICAL DIVISIONS BY OWNERSHIP : 1990-91

Reference : Catalogue No. 8741.5

<i>Statistical division</i>	<i>Private sector</i>			<i>Public sector</i>			<i>Total</i>		
	<i>Houses</i>	<i>Other residential buildings</i>	<i>Total</i>	<i>Houses</i>	<i>Other residential buildings</i>	<i>Total</i>	<i>Houses</i>	<i>Other residential buildings</i>	<i>Total</i>
Perth Statistical Division	6,511	2,133	8,644	158	357	515	6,669	2,490	9,159
Other divisions—									
South-West	1,688	244	1,932	54	90	144	1,742	334	2,076
Lower Great Southern	322	21	343	8	29	37	330	50	380
Upper Great Southern	60	7	67	3	—	3	63	7	70
Midlands	356	11	367	19	5	24	375	16	391
South-Eastern	147	21	168	18	34	52	165	55	220
Central	345	63	408	37	65	102	382	128	510
Pilbara	24	—	24	10	2	12	34	2	36
Kimberley	51	18	69	9	15	24	60	33	93
Total	2,993	385	3,378	158	240	398	3,151	625	3,776
Total Western Australia	9,504	2,518	12,022	316	597	913	9,820	3,115	12,935

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.

ENGINEERING CONSTRUCTION SURVEY

This survey measures engineering construction activity in Australia by both public and private sector organisations. The data are compiled from the Engineering Construction Survey (ECS).

**TABLE 18.9 - ENGINEERING CONSTRUCTION
ACTIVITY BY STAGE OF CONSTRUCTION**
(\$ million)

Reference: Catalogue No. 8762.0

<i>Stage of construction</i>	<i>1988-89</i>	<i>1989-90</i>	<i>1990-91</i>
Commenced during period	1,441.1	1,309.7	1,640.1
Work done during period	1,599.3	1,432.0	1,420.1
Work yet to be done	429.0	313.9	647.1

The ECS measures the value of all engineering construction work undertaken in Australia. For the ECS, all enterprises recorded on the ABS central register of economic units and classified to the construction industry are included in the survey

framework together with all other units known to be undertaking engineering work (from trade journals, newspapers, etc.). Table 18.9 provides details of engineering construction work undertaken in Western Australia.

The value of engineering construction work commenced during 1990-91 increased by 25.2 per cent when compared with the previous year.

REFERENCES

ABS publications:

Estimated Stocks of Dwellings in Census Collection Districts and Statistical Local Areas, Western Australia (8705.5).

Building Approvals, Western Australia (8731.5).

Dwelling Unit Commencements Reported by Approving Authorities, Western Australia (8741.5).

Building Activity, Western Australia (8752.5).

Construction Industry Survey: Private Sector Construction Establishment, Details of Operations, Australia (8772.0).

Engineering Construction Survey, Australia (8762.0).

Chapter 19

TRANSPORT AND COMMUNICATION

TRANSPORT	19-1
Road Transport	19-1
Rail Services	19-4
Air Services	19-5
Shipping	19-6
COMMUNICATIONS	19-9
Telecommunications	19-9
Postal Services	19-10
References	19-10

Chapter 19

TRANSPORT AND COMMUNICATION

Transport

Western Australia's main transport systems are centred on Perth, the capital, and on Fremantle, the principal port. Subsidiary systems are centred on a number of outports north and south of Fremantle and on some inland towns. International flights operate through the airports at Perth and the north-west town of Port Hedland.

ROAD TRANSPORT

Roads

The Main Roads Department is the principal road authority in Western Australia. In conjunction with local government authorities, it is responsible for the planning, design, construction and maintenance of the State road network.

The basis of the Western Australian road system is a series of declared highways and main roads which are the responsibility of the Department. These highways and roads carry traffic to major internal centres and interstate. Other connecting or local roads, declared as secondary or unclassified, are controlled by individual local councils.

Road statistics at 30 June 1991 were:

Highways	8,215 km
Main Roads	7,495 km
Secondary Roads	8,398 km
Unclassified Roads	118,821 km

State sealed road length totalled 43,031 kilometres.

Excluded from these statistics are forestry roads, which are the responsibility of the Department of Conservation and Land Management and total 25,300 kilometres.

A comprehensive route numbering system for roads was established in Western Australia during 1986. The system consists of forty-eight State routes in the metropolitan area and twenty-five in the country.

Perth now has 41.8 kilometres of freeway from Forrest Road, Jandakot to Ocean Reef Road, Edgewater. A reserved bus lane was opened on the Kwinana Freeway in December 1989 to improve access for public transport to Perth.

Upgrading of the Eyre, Great Northern and North-West Coastal Highways is continuing. Other road developments include the construction of bypass and arterial or perimeter routes in major metropolitan and country areas.

Motor vehicles

The responsibility for the registration and licensing of vehicles and the licensing of motor vehicle drivers has been delegated to the Commissioner of

TRANSPORT AND COMMUNICATION

TABLE 19.1 – MOTOR VEHICLE REGISTRATIONS
References: Catalogue Nos. 9304.5, 9305.5

	1989	1990	1991
New motor vehicle registrations—			
Year ended 30 June—			
Motor cars and station wagons	44,100	42,728	36,926
Utilities and panel vans	7,376	7,625	6,507
Trucks and buses	6,773	6,110	4,367
Motor cycles	2,522	2,875	2,784
Total	60,771	59,338	50,584
Vehicles on register—			
At 30 June—			
Motor cars and station wagons	708,253	746,194	764,157
Utilities and panel vans	140,893	146,677	149,095
Trucks and buses	100,805	107,332	110,151
Motor cycles	36,294	37,452	38,240
Total	986,245	1,037,655	1,061,643

Police by the Traffic Board of Western Australia. The Traffic Board is responsible for the collection and analysis of road traffic accident statistics, and research into the causes and prevention of road traffic accidents.

A survey of motor vehicle use is undertaken by the ABS every three years. The latest survey results relate to the twelve months ended 30 September 1988. The survey was based on a sample of approximately 67,000 vehicles across Australia (7,000 vehicles in Western Australia) of which 75 per cent were trucks and other commercial vehicle types.

TABLE 19.2 – CURRENT DRIVERS LICENCES AT 30 JUNE 1990

(Source: Western Australian Police Service)

Age group	Male	Female	Total
Under 17	422	66	488
17 – 20	42,458	37,098	79,556
21 – 24	47,717	44,317	92,034
25 – 29	65,273	61,354	126,627
30 – 39	127,205	123,110	250,315
40 – 49	105,720	93,194	198,914
50 – 59	67,168	53,371	120,539
60 and over	79,037	50,209	129,246
Total	535,000	462,719	997,719

TABLE 19.3 – DRIVERS LICENCES DISQUALIFICATIONS AND CANCELLATIONS (a) 1989-90

(Source: Western Australian Police Service)

Nature of offence	Number
Alcohol related—	
Driving under the influence	4,798
Driving with 0.08% or more	6,616
Refusing test	356
Other	460
Dangerous, reckless or careless driving	1,783
Speeding	991
Driving under disqualification	3,079
Driving without a licence	3,131
Demerit points suspension	4,823
Other	4,420
Total	30,457

(a) Includes some cases carried forward from the previous year.

TABLE 19.4 – ANNUAL KILOMETRES TRAVELLED (a) YEAR ENDED 30 SEPTEMBER 1988
(Million kilometres)

Reference: Catalogue No. 9208.0

Vehicle type	Area of travel			Total
	Perth Statistical Division	Rest of State	Inter-state	
Cars and station wagons	7,972.4	2,964.1	178.0	11,114.5
Utilities and panel vans	1,430.0	1,212.5	22.3	2,664.8
Rigid trucks	446.5	391.2	6.3	843.9
Articulated trucks	79.1	240.0	27.2	346.4
Other truck types	14.0	9.7	—	23.8
Buses	89.1	88.7	23.7	201.5
Motor cycles	146.0	57.3	2.7	206.0
Total	10,177.1	4,963.6	260.2	15,400.9

(a) Vehicles registered in Western Australia

TRANSPORT AND COMMUNICATION

TABLE 19.5 – FUEL CONSUMPTION AND TONNES CARRIED (a)
YEAR ENDED 30 SEPTEMBER 1988
 Reference: Catalogue No. 9208.0

Vehicle type	Fuel consumption (million litres)				Tonnes carried (million)
	Petrol	Diesel	Other (b)	Total	
Cars and station wagons	1,247.4	33.3	18.2	1,298.9	—
Utilities and panel vans	287.4	69.9	2.1	359.4	11.0
Rigid trucks	57.1	167.4	4.3	228.7	67.3
Articulated trucks	0.9	186.9	2.9	190.7	42.8
Other truck types	2.6	2.4	0.7	5.6	—
Buses	4.7	46.9	0.4	52.1	—
Motor cycles	12.6	—	—	12.6	—
Total	1,612.7	506.8	28.5	2,148.0	121.0

(a) Vehicles registered in Western Australia. (b) Including LPG and dual fuelled.

Bicycle services

In the metropolitan area and regional centres of Western Australia, a range of bicycle facilities have been developed to cater for the growing number of pedal cyclists. Bikewest (comprising the State Bicycle Committee and a Bicycle Management team) was established by the government to develop and implement bike plans with assistance from local groups. It was originally part of the Department of Local Government, however, in recognition of the role of the bicycle as a legitimate and increasingly popular means of transport, Bikewest was transferred to the Department of Transport in September 1990.

Bikewest has sought to service the rapid growth in bicycle use by improving the standard of existing bicycle facilities and by assisting in, and funding, the construction of new facilities.

Bikewest also conducts encouragement and education programs and produces and/or distributes a range of cycling related brochures, maps and reports.

Bikewest also administers a school based rebate scheme which enables cycle helmets to be purchased at about one third of the normal retail cost. From July 1 1992, it will be compulsory for all bicycle riders to wear an Australian Standards approved helmet.

Bus and ferry services

The Metropolitan (Perth) Passenger Transport Trust (Transperth), bears overall responsibility for all of Perth's metropolitan public transport (bus, ferry and train) services. The metropolitan area is designated as being within a fifty kilometre radius

of the Perth Town Hall, as well as the area west of the South-West Highway between Perth and Pinjarra. The ferry service operates on the Swan River between Perth and South Perth. Buses and ferries are also available for charter from Transperth.

The new Busport in the City of Perth was opened in November 1991. It services Perth's southern suburbs and connects directly with the bus lane on the Kwinana Freeway. It complements the existing Bus Station in Wellington Street, Perth, which services Perth's northern suburbs.

A number of privately owned ferry companies operate tours to the wine growing regions of the Swan River as well as river and harbour cruises around Perth and Fremantle, and trips to Rottnest Island.

TABLE 19.6 – TRANSPERTH BUS AND FERRY SERVICES (a)

(Source: Metropolitan (Perth) Passenger Transport Trust)

	1988-89	1989-90	1990-91
Buses—			
Number (b)	898	906	917
Route kilometres	1,836	1,867	1,876
Bus kilometres (millions)	46.8	47.3	48.2
Passenger boardings (millions)	r55.6	r54.4	53.7
Ferries—			
Number (b)	4	4	3
Route kilometres	2.5	1.3	1.3
Kilometres run (thousands)	51	46	44
Passenger boardings (millions)	0.6	0.6	0.5
Passenger Journeys (millions)—			
Bus	r44.9	r44.1	43.5
Ferry	0.5	0.4	0.4

(a) Includes private charter and tourist services and, in the case of buses, clipper and school specials. (b) At 30 June.

Road transport of passengers outside the metropolitan area is provided by railway road services (see the section 'Rail Services') and privately operated bus services. Railway coach services operate in the southern part of the State (a private company competes with Westrail on the Perth-Augusta and Perth-Pemberton routes) and privately operated bus services cater predominantly for those areas north of Geraldton. Privately operated express bus services operate a restricted service between Perth and Kalgoorlie.

Intratown bus services are provided in a number of the larger country towns by private operators, although in the Kalgoorlie-Kambalda-Boulder region services are undertaken by the Eastern Goldfields Transport Board.

In certain country areas, private operators run school bus services under Government contract, taking country children to and from school.

Taxi services

The Taxi Control Board controls the operations of taxis in the Perth Metropolitan Traffic Area and any other designated areas. The Department of Transport is responsible for taxi operations in country areas.

In addition to unrestricted taxis, private taxi-cars (luxury type vehicles used mainly for VIP work and tours where a chauffeur driven limousine is required) are licensed to cater for demand for this type of vehicle. To provide for peak demand and 'special event' situations, Temporary and Restricted Hour taxi licences are issued. Restricted Areas licences are issued for areas that would otherwise be poorly serviced. Multi-purpose taxis, for use primarily by disabled people, may also be licensed.

TABLE 19.7 - LICENSED TAXI CARS; 30 JUNE 1990
(Source: Taxi Control Board, (State) Department of Transport)

	Number
Metropolitan area—	
Metered taxis—	
Unrestricted	855
Premium restricted	40
Temporary restricted	79
Multi-purpose	6
Area restricted	7
Private	25
Total	1,012
Country areas	280

RAIL SERVICES

Westrail is the trading name of the Western Australian Government Railway Commission, a statutory authority which competes in the freight, passenger and related transport markets in southern Western Australia. The system is linked with railways in other States at Kalgoorlie where it joins Australian National Railways. In addition to the Westrail services, there are private railways for the handling of iron ore in the north of the State.

At 30 June 1991, there were 5,554 kilometres of railway owned and operated by Westrail, with a further 655 kilometres of rail in Western Australia owned by the Commonwealth Government and operated by Australian National Railways.

Westrail's passenger services are operated with interstate and country trains and country road services. The Perth metropolitan rail service is owned by Westrail and operated under contract to Transperth.

TABLE 19.11 - WESTRAIL SERVICES
(Source: Westrail)

	1988-89	1989-90	1990-91
Kilometres of railway (a)—			
Route kilometres	5,553	5,554	5,554
Track kilometres	6,982	6,962	6,961
Kilometres run ('000)—			
Train	9,472	8,212	7,731
Road bus (b)	2,773	2,745	2,926
Passenger journeys ('000)—			
Rail	323	336	309
Road (b)	177	186	193
Tonnes carried ('000) (c)	24,294	24,906	24,410

(a) Excludes suburban rail, charter and tourist services. (b) In addition to its rail services, Westrail operates a system of road services for passengers and freight. (c) Paying goods only.

TABLE 19.12 - SUBURBAN RAIL SERVICES
(Source: Metropolitan (Perth) Passenger Transport Trust)

	1988-89	1989-90	1990-91
Rail cars and carriages (number)	102	97	81
Route kilometres	63	63	63
Train kilometres (millions)	2.4	2.7	2.5
Passenger boardings (millions)	r9.9	r8.9	8.0
Passenger journeys (millions)	r7.5	r6.7	6.0

TRANSPORT AND COMMUNICATION

Electrification of the suburban rail network is currently underway. The first electric service commenced between the city and Armadale in mid 1991, with the Midland and Fremantle routes following in late 1991. A new line extending northward from Perth to Joondalup will be completed in late 1992 to cater for the rapidly expanding northern suburbs, with completion to North Joondalup scheduled for mid 1993.



Westrail workers laying sleepers for the new Northern Suburbs Railway.
Photograph: Westrail.

The exploitation of extensive inland deposits of iron ore in Western Australia has necessitated the construction of private railways for the transport of ore from the mines to the coast. Conditions applying to the construction and operation of these railways are incorporated in agreements made between the State Government and mining companies. At 30 June 1989, private railways operated from Newman to Port Hedland (426 kilometres), Paraburdoo to Dampier (400 kilometres), Shay Gap to Port Hedland (185 kilometres) and Pannawonica to Cape Lambert (187 kilometres).

A number of private organisations operate tourist railways in the south-west of the State, principally on lines owned and maintained by Westrail. The tourist railways own the steam locomotives used

on the tourist services. A tourist tramway operates in the south-west of the State between Pemberton and Northcliffe.

TABLE 19.13 - IRON ORE RAILWAYS

	1986-87	r/1987-88	1988-89
Kilometres	1,185	1,191	1,198
Locomotives in service	124	127	129
Ore wagons	5,514	5,458	5,462
Tonnes carried ('000)	88,037	90,128	84,655

AIR SERVICES

An extensive system of regular air services operates in Western Australia for the transport of passengers, freight and mail. Perth has frequent and direct links with major Western Australian regional centres, other Australian capital cities and Alice Springs. It also has direct overseas links which include Europe, Asia, Africa and New Zealand. Pacific and American connections are made via the Eastern States. Port Hedland, the second international airport in Western Australia, has direct international links with Indonesia.

The Civil Aviation Authority has responsibility for setting safety standards and day to day regulatory control of air services throughout Australia as well as operational responsibility for air traffic control, flight advisory services, communication, navigation and surveillance systems and rescue and fire fighting services at airports.

TABLE 19.14 - PASSENGER TRAFFIC BETWEEN PERTH AND PRINCIPAL AIRPORTS (a)

(Source: Department of Transport and Communications)

	<i>Passengers</i>		
	1988	1989	1990
Domestic—			
Adelaide	249,470	180,676	235,864
Alice Springs	41,313	23,891	38,518
Brisbane	4,678	168	229
Cairns	10,954	7,979	10,851
Melbourne	395,514	328,228	429,928
Sydney	290,222	237,944	278,403
International—			
Auckland	72,730	75,498	73,830
Bangkok	36,666	55,751	63,079
Denpasar	79,982	91,685	97,451
Hong Kong	54,057	55,267	59,807
Kuala Lumpur	73,060	72,135	77,425
London	68,646	72,732	76,839
Singapore	251,296	282,337	294,189

(a) Total of embarkations and disembarkations.

TRANSPORT AND COMMUNICATION

TABLE 19.15 – PASSENGER AND AIRCRAFT MOVEMENTS AT PRINCIPAL AIRPORTS

Airport	Passengers (a)			Aircraft movements (b)		
	1988	1989	1990	1988	1989	1990
Broome	47,262	48,258	63,402	2,306	2,148	2,617
Carnarvon	18,680	13,077	15,097	967	683	879
Derby	32,845	23,890	27,732	2,323	1,621	2,014
Geraldton	38,591	30,031	32,378	1,521	1,102	1,436
Kalgoorlie	100,752	67,069	74,346	2,080	1,386	1,587
Karratha	140,492	100,450	107,830	4,386	3,089	3,283
Kununurra	39,769	35,390	43,772	1,981	1,681	2,048
Learmonth	13,357	12,654	17,214	702	544	710
Newman	30,809	18,900	24,496	1,650	1,138	1,651
Paraburdoo	26,954	26,803	28,665	1,516	1,111	1,318
Perth—						
Internal (c)	1,471,116	1,140,513	1,399,311	18,724	13,965	17,636
International	714,111	811,754	860,816	3,338	4,228	4,849
Port Hedland—						
Internal	87,397	68,330	81,618	3,774	2,761	3,344
International	5,899	4,766	4,949	106	102	104

(a) Total of embarkations and disembarkations. (b) Total of arrivals and departures. (c) Interstate and intrastate.

The Bureau of Air Safety Investigations investigates aircraft accidents and incidents involving civil aircraft in Australia.

The Federal Airports Corporation is responsible for the operations at Perth and Jandakot airports, including the Perth International Terminal which is located twelve kilometres from the domestic terminal.

The domestic and international airports at Perth are currently used by:

- 10 international operators
- 2 interstate operators
- 1 intrastate operator
- 4 commuter operators connecting Perth with 15 country centres.

Other commuter services connect townships and stations with ports on jet routes.

Excluding Jandakot and Perth, there were forty-one aerodromes used for civil aviation in Western Australia at 31 December 1991, including the Department of Defence aerodromes at Learmonth and Curtin (WA) and thirteen aerodromes operated under the Aerodrome Local Ownership Plan (ALOP).

At 31 December 1991, there were 1,062 aircraft undertaking general aviation work, (charter, private, aerial agriculture and other), based in Western Australia.

The operation of regular passenger air services over the main domestic routes, has been deregulated since 31 October 1990 and is no longer restricted to the two major domestic carriers.

SHIPPING

Western Australia's sea-borne trade is conducted through the Port of Fremantle and a number of outports. Of these, Geraldton, Bunbury, Albany and Esperance are situated in the more highly developed south-western and southern parts of the State. The less closely settled areas of the north-west and the north, are served by ports and other landing points at Useless Loop (Shark Bay), Carnarvon, Cape Cuvier, Exmouth, Barrow Island, Dampier, Port Walcott (Cape Lambert), Port Hedland, Broome, Derby, Yampi and Wyndham.

Table 19.16 shows the number of arrivals into and departures from various ports by vessels coming direct from or going direct to overseas ports during 1989-90. The figures exclude particulars of: ships in ballast; naval vessels; yachts and other craft used for pleasure; foreign fishing vessels that neither load nor discharge cargo; geophysical and oceanographic research vessels; oil-drilling rigs and vessels servicing them; and vessels of 200 registered net tonnes and under.

The importance of mineral developments in the north-west of the State is evident from the amount of cargo loaded at the ports of Dampier, Port

Hedland and Port Walcott. They are surpassed only by the Port of Fremantle, the principal port of Western Australia.

TABLE 19.16 – OVERSEAS SHIP ARRIVALS AND DEPARTURES AT MAJOR PORTS (a)
1989-90

Reference: Catalogue No. 9206.0

	<i>Arrivals</i>		<i>Departures</i>	
	<i>Ship calls</i>	<i>Dead weight tonnage</i>	<i>Ship calls</i>	<i>Dead weight tonnage</i>
	No.	'000	No.	'000
Fremantle	1,519	33,756	1,076	27,614
Port Hedland	33	392	332	28,321
Albany	14	508	29	825
Kwinana	104	5,621	2	70
Other	158	4,488	1,204	86,414
Total	1,828	44,765	2,643	143,244

(a) Excludes ships in ballast.

Cargo statistics are recorded according to value and gross weight tonnes. Gross weight is the total weight of cargo excluding the weight of containers, irrespective of the basis on which freight is charged.

Apart from general cargo, overseas consignments discharged were principally petroleum and petroleum products, rock phosphate, caustic soda, iron, steel and sulphur. Outward cargoes from Fremantle consisted largely of alumina, cereal grains, wool, refined petroleum and sheep. Cargo loaded at Esperance and Albany comprised mainly cereal grains. At Bunbury, the principal cargoes loaded were alumina, mineral sands and woodchips. Cereal grains and mineral sands were the main items loaded at Geraldton. Principal cargoes loaded in the northern part of the State were iron ore from Dampier, Port Hedland and Port Walcott. Salt was loaded at Carnarvon, Dampier and Port Hedland.

The Western Australian Coastal Shipping Commission was established in 1965 to carry on the services formerly maintained by the State Shipping Service. The Commission's ships operate along the north-west and northern coasts, calling regularly at ports between Fremantle and Darwin (Northern Territory). Besides general cargo, the freight discharged at north-west and northern ports consists mainly of refined petroleum products, bulk cement and other building and construction materials, refrigerated cargo, vehicles and drilling equipment. Cargoes carried south to Fremantle are mainly primary products (such as meat, grains and prawns) and vehicles.

The Commission also maintains a regular link between Fremantle and Bunbury and the Eastern States.

In 1986, the Commission extended its operations to include Papua New Guinea; and in 1988, after a break of fifty years, the shipping service with South East Asia recommenced.

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 an 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 1989, 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 and having an abundance of natural deep water, it affords excellent protection to shipping and shore works.

Access to Princess Royal Harbour from King George Sound is by means of a channel of 12.2 metres minimum depth and 145 metres wide.

Bunbury. The port of Bunbury (33°S latitude) is situated in Koombana Bay, 104 nautical miles south of Fremantle, and comprises an inner and outer harbour. It is an all-weather port with a tidal rise and fall of 0.8 metres influenced by weather conditions.

Access to the inner harbour is by means of a dredged channel approximately 24 kilometres in length, 12.2 metres in depth and 121 metres wide.

Esperance. The port of Esperance (33°S latitude) is situated in Esperance Bay on the south coast of Western Australia.

TRANSPORT AND COMMUNICATION

The port has two land-backed berths of concrete and steel construction. The approach channel to the berths is 244 metres wide and is dredged to a depth of 13.0 metres. The deepest permissible loading draft is 11.5 metres.

Fremantle. The port of Fremantle (32°S latitude) is the principal port of Western Australia. It is an all-weather port, virtually tideless and little troubled by storm or fog. The port provides modern facilities for the handling of ships, passengers and cargo and is connected to the road and rail systems of Western Australia and Australia generally. It has an area of 87,600 hectares and comprises an Inner Harbour and an Outer Harbour.

The Inner Harbour, which is constructed within the mouth of the Swan River, is approached through a short entrance channel dredged to a depth of 11 metres at low water. It encloses 81 hectares of water dredged throughout to 13 metres at low water and is the centre of the general cargo trade of the port.

The Outer Harbour is protected from the west by islands and reefs. It embraces three main anchorages of depths of up to 19 metres. Gage Roads, the most northerly of these anchorages, serves as an approach to the Inner Harbour. Owen Anchorage is centrally situated between Success and Parmelia Banks. The largest and most

protected of the anchorages, Cockburn Sound, lies to the south and serves the Kwinana industrial area.

Geraldton. The port of Geraldton (28°S latitude) is situated in Champion Bay on the west coast, 215 nautical miles in a north-westerly direction from Fremantle. The outer harbour, which is 10 metres deep, provides a good holding anchorage. The inner harbour, enclosed by a breakwater, affords ample protection for shipping and shore works. The depth of the inner harbour is 9.1 metres, but the rock base of the entrance channel restricts the loaded draught of vessels to 8.7 metres. With the use of tides, vessels may load to 9.1 metres at mean sea level (0.8 metre tide), or to 9.3 metres at mean high water (1.1 metre tide).

Port Hedland. Port Hedland (20°S latitude) is situated on the north-west coast of Western Australia, 957 nautical miles from Fremantle. Access to the harbour is by means of a dredged channel approximately 20 kilometres in length with a further 25 kilometres delineated by beacons. The channel has a minimum depth of 14.1 metres, and minimum width of 183 metres. Subject to the height of tide, the channel is navigable by vessels of up to 250,000 tonnes deadweight, and 325 metres in length with a maximum draft of 18.35 metres.

TABLE 19.17 - OVERSEAS SEA CARGO LOADED AND DISCHARGED AT MAJOR PORTS 1989-90

	<i>Loaded</i>		<i>Discharged</i>	
	<i>Gross weight</i>	<i>Value</i>	<i>Gross weight</i>	<i>Value</i>
	tonnes	\$'000	tonnes	\$'000
Fremantle	18,196,657	4,306,416	1,762,001	2,290,507
Albany	612,251	126,554	167,796	14,013
Broome	1,305,845	74,661	30,737	14,702
Bunbury	3,784,896	1,057,986	1,150,948	127,602
Dampier	45,186,335	1,632,355	157,669	195,102
Geraldton	2,112,809	537,166	120,828	19,455
Kwinana	21,204	6,260	3,365,920	625,722
Port Hedland	27,599,967	663,978	35,340	23,950
Port Walcott	19,133,145	282,184	20,193	6,006
Other	6,531,836	273,998	180,283	30,841
Total	124,484,945	8,961,558	6,991,715	3,347,900

Communications

TELECOMMUNICATIONS

Internal services

Telecommunications in Western Australia are provided by the Australian and Overseas Telecommunications Corporation. The corporation operates under the trading name Telecom Australia and is responsible to the Minister for Transport and Communication.

Services provided include communications networks using landlines, microwave links and satellites.

TABLE 19.18 - TELECOM OPERATIONS IN WESTERN AUSTRALIA
(Source: Telecom)

	1986-87	1987-88	1988-89
Telephone services (a)—			
Metropolitan (b)	448,038	469,984	520,300
Country	157,172	165,802	156,500
Total	605,210	635,786	676,800
Telex services (a)	4,686	3,339	2,012
Telex internal calls ('000) (c)	3,979	2,946	138
Data services (a)—			
Datel services	7,415	6,892	6,426
Digital data services	4,291	5,786	6,345

(a) At 30 June. (b) Within a 32 kilometre radius of the General Post Office, Perth. (c) Includes Post Office official traffic.

Mobile telephones

The cellular telephone system operates within a service area which is divided into a number of cells up to 30 kilometres in diameter. Each cell interconnects with the standard telephone network, enabling mobile telephone customers the same facilities as standard telephone subscribers.

Mobile telephones were introduced in Perth in February 1987. There are now 13,500 mobile telephones in Western Australia, of which 50 per cent are car-mounted, 30 per cent hand-held and 20 per cent transportable or combination.

Mobile telephone customers in Western Australia place about 58,000 mobile calls each day. Coverage extends in the metropolitan area north to Quinns Rocks, south to Mandurah and Pinjarra, east to Sawyers Valley and west to Rottnest

Island. Country areas are Bunbury to Dunsborough, the Pilbara, Kalgoorlie, Port Hedland, Collie, Northam and Geraldton. In 1991, coverage will be extended to include Albany.

Telephones in service in Western Australia at 30 June 1990 were:

Fixed telephones	715,234
Mobile telephones	13,500
Total	728,734

Radio and television services

The Australian Broadcasting Tribunal (ABT) is responsible for the licensing of all commercial radio and television stations, with the national broadcasting and television services being under the control of the Australian Broadcasting Corporation (ABC). The ABT operates within a framework of complex provisions designed to ensure diversity of ownership and control of commercial broadcasting services, including cross media interests.

Radio broadcasting stations have operated in Western Australia since 1924 when station 6WF (Westralian Farmers) opened in Perth.

Perth is served by five ABC Radio Services — Metropolitan 6WF, Radio National, ABC-FM Stereo, Youth Network Triple J and Parliamentary 6PB.

In addition there five public and six commercial radio stations serving the metropolitan area on both AM and FM wavebands.

In country areas of the State, the ABC provides program material through six regional stations located at Broome, Karratha, Geraldton, Kalgoorlie, Bunbury and Albany. The Regional Program Unit in Perth broadcasts statewide to isolated areas of the state through the HACBSS receivers.

Country areas are also served by public and commercial radio stations ranging from Port Hedland in the north to Albany in the south and as far east as Kalgoorlie. More remote areas not serviced by commercial radio receive programs through the satellite-fed Remote Commercial Radio Service.

Full scale transmission from a television station in Western Australia began in 1959 with the commercial station TVW 7 (Channel 7). Metropolitan audiences now have access to five television stations consisting of the ABC, the Special Broadcasting Service (SBS) and three commercial stations.

Country areas are serviced via AUSSAT satellite by the national television service and five commercial stations based in Geraldton, Bunbury, Albany and Kalgoorlie. National television reaches remote areas through the HACBSS receivers. The satellite-fed Remote Commercial Television Service operates to ensure that remote area residents receive at least one commercial service.

The ABC simulcasts major orchestral concerts, ballets and operas using ABC TV and ABC-FM radio.

POSTAL SERVICES

Postal services throughout Australia are controlled by the Australian Postal Commission (Australia Post). Postal services made available by Australia Post include standard and special services, courier and electronic mail services.

Other services provided include money orders, bill payment, philatelic sales and banking.

**TABLE 19.19 - AUSTRALIA POST OPERATIONS
WESTERN AUSTRALIA**
(Source : Australia Post)

	1987-88	1988-89	1989-90
Post offices at 30 June (a)	400	397	400
Postal articles handled (b) ('000)—			
Posted in WA for delivery within Australia	266,774	281,757	290,969
Posted in WA for delivery overseas	14,626	15,274	16,680
Received from overseas for delivery in WA	13,402	14,117	14,791
Total	294,802	311,148	322,440

(a) Post Offices and Post Office Agencies. (b) Includes standard letters, large letters, security articles and parcels.

REFERENCES

ABS Publications

Motor Vehicle Registrations, Western Australia (9304.5)

Road Traffic Accidents Involving Casualties, Reported to the Police Department, Western Australia (9406.5)

Shipping and Cargo, Australia (9211.0)

Survey of Motor Vehicle Use (9208.0)

Vehicles on Register, Western Australia, (9305.5)

Other publications

Australia Post, *Annual Report*

Australian Broadcasting Corporation, *Annual Report*

Australian Broadcasting Tribunal, *Annual Report*

Department of Transport and Communications, *Air Transport Statistics, Domestic Air Transport*

Department of Transport and Communications, *Air Transport Statistics, International Air Transport*

Department of Transport, Western Australia, *Annual Report*

Main Roads Department, *Annual Report*

Taxi Control Board, *Annual Report*

Telecom, *Annual Report*

Transperth, *Annual Report*

Western Australian Police Department, *Annual Report*

Westrail, *Annual Report*

Chapter 20

FOREIGN AND INTERSTATE TRADE

The Customs Tariff	20-1
The Harmonised Commodity Description and Coding System	20-1
Valuation of Items of Trade	20-2
Direction of Trade	20-6
References	20-6

Chapter 20

FOREIGN AND INTERSTATE TRADE

Foreign trade statistics are compiled from information contained in documents prepared by importers and exporters or their agents in accordance with the Customs Act. Particulars of Western Australia's foreign trade, as presented in this Chapter, are derived from data supplied by the ABS, Canberra.

Statistics of Western Australia's trade with other Australian States are compiled by the Western Australian Office of the ABS. The information is collected under authority of the *Census and Statistics Act 1905* from importers, exporters and other persons concerned with the distribution of goods.

THE CUSTOMS TARIFF

The first Commonwealth Customs Tariff was introduced on 8 October 1901, from which date uniform duties came into effect throughout Australia. The Australian Customs Tariff was developed in conformity with the policy of protecting economic and efficient Australian industries and of granting preferential treatment to imports from certain countries. Duties are imposed on some goods, generally of a luxury nature, for revenue purposes. Customs collections are a major source of revenue, but in its protective character, the tariff has an important influence on the Australian economy.

The Australian Customs Tariff in use until December 1987, was introduced on 1 July 1965. The nomenclature used in the Tariff is that of the Convention on Nomenclature for the Classification of Goods in Customs Tariffs, an international agreement signed at Brussels on 15 December 1950. The system of naming established by the Convention is known as the 'Customs Co-operation Council Nomenclature' (previously the Brussels Tariff Nomenclature).

For periods up to and including December 1987, import and export statistics were presented according to the codes and descriptions of the Australian Import Commodity Classification

(A.I.C.C.) and the Australian Export Commodity Classification (A.E.C.C.) respectively. These classifications were based on the *United Nations Standard International Trade Classification, Revision 2*, (SITC Rev 2), with some modifications to take account of Australia's trade.

THE HARMONISED COMMODITY DESCRIPTION AND CODING SYSTEM

From 1 January 1988, import and export data have been reported solely according to the Harmonized Tariff and the Australian Harmonized Export Commodity Classification respectively.

These new classifications, which update those used formerly, reflect technological development and changes in international trade. They provide international uniformity in classifying and coding goods, and simplify the task of collecting, analysing and comparing foreign trade statistics. The Australian Harmonized Import Commodity Classification (A.H.I.C.C.) and Australian Harmonized Export Commodity Classification (A.H.E.C.C.) contain some 8,200 and 6,300 items respectively.

To coincide with the introduction of the Harmonized System, the third revision of SITC (i.e. SITC Rev 3) was introduced.

FOREIGN AND INTERSTATE TRADE

SITC Rev 3 incorporates significant changes to the numbering system and overall structure to align it more closely with the Harmonized System. The changes between the second and the third revisions of SITC, and the adoption by the ABS of the complete international version of the classification, have resulted in a break in the statistical series published by the ABS.

Interstate imports and exports are classified according to Interstate Trade Commodity Classifications which are based on the A.H.I.C.C. and the A.H.E.C.C. The basic items of the Australian classifications are compressed or expanded according to their significance in Western Australia's trade to form interstate trade commodity categories.

Lack of comparability between the A.I.C.C. and the A.H.I.C.C. and the A.E.C.C. and the A.H.E.C.C., has prevented the production of twelve months of data for 1987-88 on the basis of one commodity classification. Overseas trade statistics for 1987-88 were therefore not published in the *Western Australian Year Book*. Statistics on the new basis are available from the 1988-90 financial year.

VALUATION OF ITEMS OF TRADE

Foreign Trade. All values in foreign trade statistics are determined on a 'free on board (f.o.b.) port of shipment' basis. This means that all charges, (in particular the cost of freight and insurance), incurred after the goods have been exported from the port of shipment are excluded. Only transport and service charges incurred, or usually incurred, prior to export are included in the determination of trade values.

Re-exports are defined as goods, materials or articles which are exported either in the same condition as they were in when imported, or after minor repair or operations which leave them unchanged. These minor operations include blending, packaging, bottling, cleaning, sorting, husking or shelling.

Interstate Trade. Statistics of goods imported from other Australian States are recorded in terms of landed cost. The basis of valuation for goods exported to other Australian States is f.o.b., or its equivalent, at the point of final shipment.

TABLE 20.1 - VALUE OF IMPORTS INTO AND EXPORTS FROM WESTERN AUSTRALIA CLASSIFIED ACCORDING TO ORIGIN OR DESTINATION: 1990-91 (\$'000)

<i>Origin or destination</i>	<i>Imports</i>	<i>Exports</i>
Overseas—		
Argentina	15,212	102,671
Bahrain	—	150,527
Bangladesh	1,534	350
Belgium-Luxembourg	33,411	150,744
Brazil	13,218	12,225
Canada	109,552	222,890
China		
(excluding Taiwan Province)	100,178	577,084
Taiwan Province only	83,403	262,490
Christmas Island	22	6,375
Denmark	6,932	1,176
Egypt	1	73,694
Fiji	12	1,447
Finland	32,375	44,626
France	72,473	170,183
Germany	147,380	258,833
Hong Kong	29,243	287,855
India	13,761	59,743
Indonesia	107,896	338,354
Iran	479	114,112
Italy	157,136	179,001
Japan	639,255	3,716,813
Jordan	281	8,238
Korea, Republic of	52,710	731,889
Kuwait	6,270	2,352
Malaysia	84,722	112,776
Nauru	1,895	4
Netherlands	60,373	160,791
New Zealand	72,999	75,840
Norway	12,606	759
Pakistan	2,114	22,546
Papua New Guinea	6,828	11,423
Philippines	4,326	29,658
Poland	1,333	5,547
Qatar	11,017	5,180
Saudi Arabia	101,678	57,627
Singapore	137,345	1,214,676
South Africa	18,565	42,914
Spain	16,792	42,627
Sri Lanka	4,347	2,568
Sweden	32,138	2,008
Switzerland	55,261	783,020
Thailand	36,254	54,023
Union of Soviet Socialist Republics	19,407	58,358
United Arab Emirates	363,985	149,669
United Kingdom	236,615	278,770
United States of America	632,910	1,523,042
Yemen Arab Republic	—	42,636
Yugoslavia	3,592	12,117
Zimbabwe	308	3,482
Other countries, country unknown and re-exports	95,608	169,214
Ships' stores	—	91,871
Total overseas trade	3,635,752	12,426,818

FOREIGN AND INTERSTATE TRADE

TABLE 20.2 - VALUE OF FOREIGN EXPORTS OF SELECTED COMMODITIES
MAIN COUNTRIES OF DESTINATION: 1990-91
(\$'000)

<i>Commodity and destination</i>	<i>Value</i>	<i>Commodity and destination</i>	<i>Value</i>
Iron ore (a)—		Wool, degreased—	
Total exports	2,142,511	Japan	45,761
Wheat, (incl. spelt) and meslin, unmilled—		Italy	32,007
Japan	125,335	United States of America	13,505
China	111,036	Korea, Republic of	10,087
Indonesia	109,467	Total exports	136,985
Korea, Republic of	98,926	Rock lobsters, whole and tails, fresh or frozen—	
Iran	69,786	Japan	103,993
Egypt	67,621	Taiwan	40,454
Yemen Arab Republic	42,231	United States of America	37,282
Malaysia	22,181	Total exports	195,603
U.S.S.R.	21,811	Salt—	
Korea, Democratic People's Republic	19,389	Japan	109,157
South Africa	4,178	Taiwan	10,973
Total exports	708,217	Korea, Republic of	8,996
Wool, greasy—(incl. fleece washed wool)		Total exports	146,596
Japan	68,910	Live sheep—	
Italy	55,585	United Arab Emirates	16,432
France	48,568	Oman	7,476
Germany	39,486	Algeria	4,099
U.S.S.R.	20,346	Egypt	3,589
Belgium-Luxembourg	13,201	Qatar	3,428
United States of America	12,771	Total exports	43,432
Taiwan	11,220	Meat of bovine animals, fresh, chilled or frozen—	
Malaysia	10,614	United States of America	50,955
Spain	7,999	Malaysia	9,750
Korea, Republic of	7,821	Total exports	90,710
China	5,536	Feeding stuff for animals (b)—	
United Kingdom	5,301	Japan	29,963
Total exports	325,742	Korea, Republic of	19,735
Gold bullion—		Netherlands	11,346
Singapore	667,227	Total exports	89,392
Switzerland	299,141	Pigments, paints, varnishes and related materials—	
Hong Kong	215,322	Japan	19,461
Total exports	1,519,559	Korea, Republic of	18,107
Petroleum and petroleum products—		Algeria	12,455
Singapore	386,390	New Zealand	9,843
United States of America	260,244	Taiwan	9,346
Japan	111,886	Total exports	124,135
India	37,909	Mutton and lamb, fresh, chilled or frozen—	
Total exports	998,337	United Kingdom	11,208
Barley, unmilled—		Japan	10,591
China	29,827	Total exports	81,803
Japan	12,987	Hides and skins—	
Portugal	5,848	Italy	8,709
Brazil	4,792	France	5,145
Total exports	61,702	Total exports	24,779

(a) Source: Western Australian Department of Mines. No country details available. (b) Excludes unmilled cereals.

FOREIGN AND INTERSTATE TRADE

 TABLE 20.3 - VALUE OF FOREIGN TRADE WITH SELECTED COUNTRIES BY SELECTED DIVISIONS: 1990-91
 (\$'000)

Division	Description	Imports				Exports			
		Japan	United States of America	United Kingdom	All countries	Japan	United States of America	United Kingdom	All countries
01	Meat and meat preparations	—	47	25	490	15,811	54,839	15,669	188,908
03	Fish, (not marine mammals) crustaceans, molluscs and aquatic invertebrates, and preparations thereof	2,222	360	1,160	38,230	144,089	38,699	259	251,512
04	Cereals and cereal preparations	223	460	984	8,790	179,433	—	268	820,005
05	Vegetables and fruit	108	2,763	460	21,601	222	1,092	258	44,023
08	Feeding stuff for animals (excluding unmilled cereals)	—	1,432	117	6,222	29,963	—	—	89,392
11	Beverages	48	1,506	3,834	15,451	63	351	578	4,072
24	Cork and wood	—	3,041	—	10,113	586	629	3,666	6,737
26	Textile fibres and their wastes (not manufactured into yarn or fabric)	1,362	176	1,026	7,818	114,673	26,331	12,370	464,956
27	Crude fertilisers (excluding those of Divisions 56) and crude minerals (excluding coal, petroleum and precious stones)	357	3,468	155	17,627	122,729	15,408	990	189,675
28	Metalliferous ores and metal scrap (a)	46	1,389	246	2,226	1,539,143	33,930	71,264	2,669,839
29	Crude animal and vegetable materials, n.e.s.	548	1,118	137	7,299	6,972	2,277	434	31,562
33	Petroleum, petroleum products and related materials	1	7,272	161	711,096	111,886	260,244	5	998,337
51	Organic chemicals (a)	4,954	9,633	6,712	50,257	65	—	10	474
52	Inorganic chemicals (a)	2,395	19,729	10,202	59,595	14,505	1,373	646	76,121
56	Fertilisers (excl. crude)	95	44,041	180	82,533	—	—	—	33
58	Plastics in non-primary forms (a)	1,288	6,008	1,435	20,881	1	—	67	1,756
59	Chemical materials and products, n.e.c.	484	11,703	19,050	49,443	126	381	—	3,620
62	Rubber manufactures, n.e.s.	52,203	6,730	3,229	95,785	107	7	32	2,253
64	Paper, paperboard and articles of paper pulp, of paper or of paperboard (a)	7,423	3,655	2,849	59,823	—	20	45	9,382
65	Textile yarn, fabrics, made-up articles n.e.s. and related products (a)	2,944	2,023	3,302	45,049	8	13	52	4,168
66	Non-metallic mineral manufactures, n.e.s. (a)	6,261	5,261	15,333	113,871	38,820	7,550	33,479	134,380
67	Iron and steel	20,738	7,298	7,222	68,136	4	3	313	5,096
68	Non-ferrous metals (a)	4,065	1,577	3,248	51,716	203	2,456	196	8,153
69	Manufactures of metal, n.e.s. (a)	5,876	21,778	6,806	85,907	317	1,497	481	15,170
71	Power generating machinery and equipment	11,622	63,537	20,252	167,381	5	744	9,826	15,154
72	Machinery specialised for particular industries (a)	24,367	70,821	22,462	201,399	798	4,524	601	59,648
73	Metal working machinery	1,106	1,477	1,162	7,985	—	1,181	377	3,177
74	General industrial machinery and equipment, n.e.s. and machine parts, n.e.s. (a)	37,471	111,644	18,129	305,450	100	4,154	1,408	48,603
75	Office machines and automatic data processing equipment	3,325	10,545	2,940	50,517	103	2,036	1,238	9,054
76	Telecommunications and sound recording and reproducing apparatus and equipment	19,756	4,774	1,633	44,669	167	3,206	366	15,526
77	Electrical machinery, apparatus, appliances, parts (incl. non-elec. counterparts of electrical domestic equipment)	15,067	25,836	10,843	86,124	445	252	439	11,921
78	Road vehicles (incl. air cushion vehicles)	220,474	66,800	8,323	343,471	169	183	121	10,566
79	Transport equipment (excl. road vehicles)	149,855	15,449	1,930	204,609	13,099	557	409	48,327
87	Professional, scientific and controlling instruments and apparatus, n.e.s.	5,480	20,227	10,079	52,776	720	771	1,180	11,091
88	Photographic apparatus, equipment and supplies and optical goods, n.e.s., watches and clocks (a)	1,046	1,227	570	6,369	98	123	17	784
Total (b)		639,255	632,910	236,615	3,635,752	3,716,813	1,523,042	278,770	12,426,818

(a) Excludes commodities subject to a confidential restriction. These are included in totals. (b) Includes details not available for publication and divisions not shown separately.

FOREIGN AND INTERSTATE TRADE

 TABLE 20.4 - VALUE OF INTERSTATE IMPORTS AND EXPORTS (a) — SELECTED DIVISIONS
 (\$'000)

Division	Description	Imports			Exports		
		1987-88	1988-89	1989-90	1987-88	1988-89	1989-90
00	Live animals,	6,294	6,158	2,589	7,588	11,590	4,316
01	Meat and meat preparations	46,472	53,450	62,316	15,404	14,489	18,668
02	Dairy products and birds' eggs	53,348	66,206	67,860	n.p.	n.p.	629
03	Fish, crustaceans and molluscs, and preparations thereof	12,793	16,023	14,809	32,796	35,745	38,661
04	Cereals and cereal preparations	84,041	87,798	94,191	5,056	7,118	7,530
05	Vegetables and fruit	123,378	164,495	137,223	9,507	15,667	14,003
06	Sugar, sugar preparations and honey	42,714	56,360	50,038	n.p.	n.p.	n.p.
07	Coffee, tea, cocoa, spices and manufactures thereof	82,889	93,941	109,119	n.p.	n.p.	131
08	Feeding stuff for animals (excluding unmilled cereals)	35,192	42,602	n.p.	n.p.	n.p.	n.p.
11	Beverages	122,182	140,156	156,103	n.p.	n.p.	n.p.
12	Tobacco and tobacco manufactures	157,572	150,070	181,025	—	—	—
24	Cork and wood	8,973	n.p.	n.p.	n.p.	n.p.	n.p.
28	Metalliferous ores and metal scrap	n.p.	n.p.	n.p.	258,013	292,153	n.p.
51	Organic chemicals	17,047	17,173	16,842	n.p.	143	n.p.
52	Inorganic chemicals	35,274	41,157	20,342	n.p.	n.p.	n.p.
53	Dyeing, tanning and colouring materials	35,699	43,255	40,740	n.p.	n.p.	n.p.
54	Medicinal and pharmaceutical products	128,177	153,674	166,246	n.p.	n.p.	n.p.
55	Essential oils and perfume materials; toilet, polishing and cleansing preparations	137,603	174,373	179,062	162	206	883
58	Artificial resins and plastic materials, and cellulose esters and ethers	98,535	72,237	66,300	10,016	9,661	9,691
62	Rubber manufactures, n.e.s.	55,445	80,016	71,806	5,601	4,142	n.p.
63	Cork and wood manufactures (excluding furniture)	19,382	19,036	23,093	n.p.	n.p.	n.p.
64	Paper, paperboard, and articles of paper pulp, of paper or of paperboard	185,459	210,398	220,596	26,506	30,500	23,092
65	Textile yarn, fabrics, made-up articles n.e.s. and related products	150,584	154,117	155,602	40,123	41,918	45,162
66	Non-metallic mineral manufactures, n.e.s.	63,913	77,334	73,261	19,150	21,837	28,255
67	Iron and steel	331,642	426,893	345,903	20,745	18,689	23,605
68	Non-ferrous metals	84,089	134,559	103,693	16,623	n.p.	12,072
71	Power generating machinery and equipment	58,968	62,901	67,634	10,602	11,477	12,825
72	Machinery specialised for particular industries	208,670	298,196	309,618	52,259	59,627	39,873
73	Metalworking machinery	12,181	16,809	14,234	5,037	8,240	5,126
74	General industrial machinery and equipment, n.e.s. and machine parts n.e.s.	226,874	284,171	271,218	49,013	72,395	85,229
75	Office machines and automatic data processing equipment	151,551	182,632	188,752	6,391	11,861	9,204
76	Telecommunications and sound recording and reproducing apparatus and equipment	150,275	152,802	155,720	8,532	7,021	5,539
77	Electrical machinery, apparatus and appliances, n.e.s. and electrical parts thereof	281,925	312,697	354,477	9,615	11,918	14,996
78	Road vehicles (including air cushion vehicles)	757,475	1,172,964	1,102,526	22,032	29,962	29,829
81	Sanitary, plumbing, heating and lighting fixtures and fittings, n.e.s.	22,310	24,300	25,915	n.p.	n.p.	n.p.
82	Furniture and parts thereof	27,143	34,411	34,649	50,478	46,398	42,575
84	Articles of apparel and clothing accessories	247,280	300,313	353,309	45,130	53,868	51,457
85	Footwear	69,980	82,704	85,381	3,811	4,074	6,059
87	Professional, scientific and controlling instruments and apparatus, n.e.s.	83,446	92,650	110,353	4,467	9,909	5,519
88	Photographic apparatus, equipment and supplies and optical goods, n.e.s., watches and clocks	55,187	64,363	68,458	2,766	3,319	2,894
Total (a) (b)		5,404,518	6,517,667	6,515,966	1,808,478	1,777,058	2,282,389

(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.

FOREIGN AND INTERSTATE TRADE

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.

REFERENCES

ABS Publications

Exports, Australia, Annual Summary Tables
(5424.0)

Exports, Australia, Monthly Summary Tables
(5432.0)

Foreign Trade, Australia, Exports (5436.0)

Foreign Trade, Australia, Imports (5437.0)

Imports, Australia, Annual Summary Tables
(5426.0)

Imports, Australia, Monthly Summary Tables
(5433.0)

Chapter 21

EMPLOYMENT AND INDUSTRIAL CONDITIONS

The Labour Force	21-1
Teenage Unemployment	21-2
The Composition of the Labour Force	21-2
Labour Force Supplementary Surveys	21-4
Job Vacancies	21-4
Wages and Earnings	21-5
Weekly Award Rates of Pay	21-5
Major Labour Costs	21-6
Industrial Disputes	21-6
Industrial Authorities	21-8
References	21-8

Chapter 21

EMPLOYMENT AND INDUSTRIAL CONDITIONS

This chapter presents information on the labour force, including employment, unemployment, age and industry data, details of the cost of employing labour, industrial disputes and average weekly earnings for Western Australia.

THE LABOUR FORCE

The labour force is defined as those persons aged 15 years and over who are either employed or looking for work.

Characteristics of the labour force are obtained from the Monthly Labour Force Survey which is by far the largest household survey conducted by the Australian Bureau of Statistics (ABS). Each month, the survey records information from 70,000 individuals throughout Australia. A

random sample is taken of 31,000 private dwellings (5,000 in Western Australia) and a number of other dwellings such as hotels and caravan parks. The survey is conducted by specifically trained interviewers, generally during the second and third weeks of each month.

The survey is designed to enable analysis of the labour force by a number of characteristics, including sex, age, birthplace, occupation, hours worked and duration of unemployment. The Labour Force Survey is a major economic

TABLE 21.1 - LABOUR FORCE STATUS, NOVEMBER
(*000 persons)

Reference: Catalogue No. 6203.0

<i>Labour force status</i>	1986	1987	1988	1989	1990	1991
MALES						
Civilian population	561.0	579.8	600.1	619.3	635.0	648.0
Labour force—	427.3	446.1	465.5	473.6	485.1	498.4
Employed—						
full-time	369.2	387.3	407.3	414.0	406.7	402.6
part-time	26.0	28.8	31.1	35.5	38.0	41.8
Unemployed	32.1	30.0	27.2	24.0	40.3	53.9
Unemployment rate (per cent)—						
original	7.5	6.7	5.8	5.1	8.3	10.8
seasonally adjusted	7.9	7.1	6.1	5.4	8.8	11.4
Participation rate (per cent)	76.2	77.0	77.6	76.5	76.4	76.9
FEMALES						
Civilian population	560.1	578.0	597.6	616.9	632.9	646.5
Labour force—	289.3	293.5	313.5	325.1	336.9	343.3
Employed—						
full-time	155.6	153.3	165.8	175.4	171.7	167.6
part-time	112.5	119.1	124.8	133.1	139.5	143.6
Unemployed	21.2	21.1	22.8	16.7	25.7	32.1
Unemployment rate (per cent)—						
original	7.3	7.2	7.3	5.1	7.6	9.4
seasonally adjusted	8.2	8.1	8.2	5.8	8.6	10.5
Participation rate (per cent)	51.6	50.8	52.5	52.7	53.2	53.1

indicator and is essential to governments and other organisations for effective monitoring of the economy and performance of the workforce.

Two important labour force indicators are:

Participation rate, which is the number of persons in the labour force expressed as a percentage of the civilian population aged 15 years and over.

Unemployment rate, which is the number of unemployed persons expressed as a percentage of the labour force.

Table 21.1 shows the effect of the recession on the labour force. The number of people seeking work increased by a significant 23 per cent from a total of 66,000 in November 1990 to 86,000 in November 1991. The seasonally adjusted unemployment rate for males reached double figures in February 1991 and remained at this high level throughout the year, reaching a peak of 12.2 per cent in July. The female unemployment rate also showed an upward trend from 8.5 per cent in January 1991 and rising to 10.5 per cent by November 1991. The unemployment rate for persons stood at 11 per cent in November 1991, while Australia's rate climbed to a post war record of 10.5 per cent.

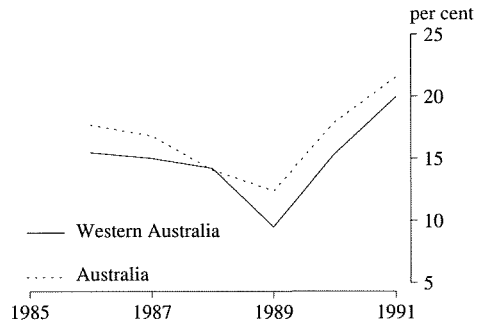
Western Australia's participation rate (65.0 per cent) remained higher than the national average (62.6 per cent) meaning more people, as a proportion of the population, were employed or looking for work in Western Australia than all other States. Only the Northern Territory and the Australian Capital Territory had higher rates (70.6 and 71.7 per cent respectively).

TEENAGE UNEMPLOYMENT

Table 21.2 demonstrates the high level of unemployment in the 15-19 age group. From the relatively low 9.5 per cent in 1989, the unemployment rate peaked at 24.9 per cent in February 1991 and stood at 20 per cent in November 1991.

The Labour Force Survey estimates indicated there were 128,741 people in the 15-19 age group in Western Australia in November 1991; of these 29,937 were employed full-time and 30,527 worked part-time. A total of 15,112 were unemployed while 53,165 were not in the labour force, comprising 38,100 at school, 10,300 attending a tertiary institution full-time and the remainder neither looking for work nor studying.

DIAGRAM 21.1
UNEMPLOYMENT RATE: AGE GROUP 15-19
November



THE COMPOSITION OF THE LABOUR FORCE

The composition of the labour force (Table 21.3) has remained relatively stable over the last six years. The exceptions are a large drop in the number of male employers and a predictable increase in the number of unemployed persons, rising 38 per cent from 53,300 in 1986 to 86,000 in 1991.

Over the period 1986 to 1991, the percentage distribution of employment between industries has varied only slightly. A trend has emerged of decreasing employment in Agriculture and increases in Finance and Recreation industries.

TABLE 21.2 – LABOUR FORCE UNEMPLOYMENT RATES BY AGE, NOVEMBER
(Per cent)
Reference: Catalogue No. 6203.0

Age group	1986	1987	1988	1989	1990	1991
WESTERN AUSTRALIA						
15 – 19	15.5	15.0	14.2	9.5	15.4	20.0
20 – 24	13.5	10.3	9.6	6.9	12.6	17.5
25 – 34	6.5	6.0	6.1	5.5	7.7	10.0
35 – 44	4.7	4.7	3.8	3.0	5.7	7.0
45 – 54	4.0	4.8	2.9	3.1	5.4	6.0
55 and over	3.6	*3.6	6.4	5.6	5.0	7.1
Total	7.4	6.9	6.4	5.1	8.0	10.2
AUSTRALIA						
15 – 19	17.7	16.8	14.1	12.4	17.9	21.6
20 – 24	11.2	10.8	8.9	7.4	10.9	14.4
25 – 34	6.7	6.8	5.8	5.1	7.2	9.0
35 – 44	4.7	4.7	3.9	3.4	4.8	7.0
45 – 54	5.4	4.2	3.6	3.5	4.4	6.0
55 and over	5.4	5.5	4.4	4.5	5.2	7.8
Total	7.7	7.3	6.1	5.4	7.4	9.6

* subject to sampling variability too high for most practical uses.

EMPLOYMENT AND INDUSTRIAL CONDITIONS

TABLE 21.3 – CIVILIAN POPULATION (AGE 15+) – EMPLOYMENT STATUS, NOVEMBER
(’000 persons)

Reference: Catalogue No. 6203.0

<i>Employment status</i>	1986	1987	1988	1989	1990	1991
MALES						
Employer	26.3	24.6	25.6	25.5	28.7	23.8
Self-employed	52.6	54.7	59.1	60.5	58.3	60.7
Wage or salary earner	313.2	333.0	350.8	362.0	355.1	357.0
Helper, unpaid	3.2	3.8	2.9	1.6	2.7	2.9
Unemployed	32.1	30.0	27.2	24.0	40.3	53.9
Not in labour force	133.7	133.6	134.5	145.7	149.9	149.6
Total	561.0	579.8	600.1	619.3	635.0	648.0
FEMALES						
Employer	12.2	11.1	12.6	13.4	12.1	12.0
Self-employed	24.6	20.0	26.7	25.2	26.9	28.2
Wage or salary earner	225.8	235.9	246.2	267.1	267.3	268.0
Helper, unpaid	5.5	5.3	5.1	2.8	4.9	3.0
Unemployed	21.2	21.1	22.8	16.7	25.7	32.1
Not in labour force	270.9	284.6	284.1	291.7	296.0	303.2
Total	560.1	578.0	597.6	616.9	632.9	646.5

The 28,300 persons employed in the mining industry represented 33 per cent of Australia's total employment in that industry. Employment continued to be dominated by four major

industries; Community services, Retail trade, Finance and Manufacturing. These industries between them employed 439,300 or 58 per cent of all workers in Western Australia.

TABLE 21.4 – EMPLOYED PERSONS BY INDUSTRY
NOVEMBER
(’000 persons)

Reference: Catalogue No. 6203.0

<i>Industry division</i>	1986	1987	1988	1989	1990	1991
Agriculture, forestry, fishing and hunting	54.0	47.3	54.6	47.4	49.9	37.9
Mining	25.7	24.9	26.3	28.9	27.3	28.3
Manufacturing	77.3	90.6	91.8	88.3	92.4	85.9
Electricity, gas and water	12.0	10.3	10.8	9.4	9.5	10.6
Construction	47.0	57.4	60.8	62.4	54.0	54.2
Wholesale trade	37.7	38.8	47.8	49.9	40.4	43.7
Retail trade	102.2	105.9	109.7	118.5	120.2	115.3
Transport and storage	36.2	34.9	35.8	34.6	37.5	40.9
Communication	10.9	10.2	9.7	10.7	11.4	9.9
Finance, property and business services	67.4	73.2	79.4	83.1	85.8	91.2
Public administration and defence	21.0	24.5	24.6	28.9	31.9	28.3
Community services	126.2	123.8	121.1	132.8	137.0	146.9
Recreation, personal and other services	45.6	46.8	56.7	63.1	58.6	62.5
Total all industries	663.3	688.5	729.1	758.0	755.9	755.6

Average weekly hours worked

Since January 1948, practically all employees in Australia have had a standard working week of forty hours or less. However, the number of hours constituting a full week's work (excluding overtime) differs between industries.

The average weekly hours worked by employees over all industries in November 1991 was 36.1 hours per week. In Table 21.5, the lower average weekly hours worked for females is because of the much greater proportion of females working part-time. The agricultural and mining industries are traditionally areas where long hours are worked. The average number of hours worked in agriculture in 1991 was 44.7 which was 25 per cent more than the overall average of 36.1 hours.

TABLE 21.5 – EMPLOYED PERSONS AVERAGE WEEKLY HOURS WORKED (a) BY INDUSTRY NOVEMBER 1991

<i>Industry</i>	<i>Males</i>	<i>Females</i>	<i>Total</i>
Agriculture, forestry, fishing and hunting	51.1	28.5	45.1
Mining	45.4	39.2	44.6
Manufacturing	41.9	28.2	38.7
Electricity, gas and water	37.5	38.2	37.6
Construction	41.2	21.3	38.2
Wholesale trade	42.9	31.5	39.5
Retail trade	39.5	25.2	32.1
Transport and storage	43.2	30.3	40.5
Communication	34.7	28.7	33.2
Finance, property and business services	41.4	30.4	36.2
Public administration and defence	37.3	32.5	35.6
Community services	40.1	28.6	32.6
Recreation, personal and other services	37.5	27.1	31.5
All industries	41.5	28.3	36.1

(a) The estimates refer to actual hours worked, not hours paid for.

LABOUR FORCE SUPPLEMENTARY SURVEYS

In addition to the monthly Labour Force Survey, there are some twenty-three supplementary surveys which measure labour force, social and demographic characteristics of households.

The supplementary surveys are conducted annually or less frequently depending on statistical demand and are grouped as *Educational* and *Other* topics.

Educational topics include:

- Labour force status and educational attainment
- Transition from education to work
- How workers get their training

Other topics include:

- Job search experience of unemployed persons
- Weekly earnings of employees
- Employment benefits

Labour Force Status and Educational Attainment

This supplementary survey is conducted annually and information collected relates to the month of February. The survey provides data on the level and main field of study for the highest educational qualification obtained and relates this information to various characteristics of the labour force.

More detailed information relating to supplementary surveys is available from ABS Information Services on (09) 323 5140.

JOB VACANCIES

Job vacancy statistics taken together with unemployment statistics, assist in the assessment of the demand for labour. However, unemployment and job vacancy statistics should be regarded as complementary indicators. This is because the monthly Labour Force Survey and the quarterly Job Vacancy Survey of employers use different collection methods, sample designs, definitions and concepts.

A *job vacancy* is a job available for immediate filling on the survey date and for which recruitment action had been taken by the employer.

Recruitment action includes efforts to fill vacancies by advertising, by factory notices, by notifying employment agencies or trade unions and by contacting, interviewing or selecting applicants already registered with the organisation. Excluded are jobs available only to persons already employed by the organisation. Statistics on job vacancies are produced from a quarterly

EMPLOYMENT AND INDUSTRIAL CONDITIONS

sample survey of 5,000 employers throughout Australia (500 in Western Australia).

WAGES AND EARNINGS

Average Weekly Earnings

Statistics of average weekly earnings of employees are produced quarterly and are based on employment and earnings information obtained from a sample survey of employers. They relate to earnings for a single weekly pay period ending near the middle of each quarter.

Earnings are gross earnings for the pay period, before taxation and any other deductions such as superannuation. Statistics are produced for average weekly ordinary earnings, including all allowances, payments, commissions etc, for full-time adults; average weekly total earnings, i.e. ordinary earnings plus overtime, for full-time adults; and average weekly total earnings for all employees. All average weekly earnings data is available by sex.

TABLE 21.6 – AVERAGE WEEKLY EARNINGS OF EMPLOYEES: AUGUST
(\$)

Reference: Catalogue No. 6302.0

Year	Full-time adult employees		All employees
	Ordinary earnings	Total earnings	Total earnings
MALES			
1986	446.40	482.70	449.10
1987	485.60	526.80	487.30
1988	506.00	552.30	510.30
1989	536.30	580.30	531.70
1990	585.60	630.70	576.90
1991	619.80	658.20	589.70
FEMALES			
1986	357.90	364.70	262.70
1987	388.20	399.00	286.80
1988	408.60	417.00	299.90
1989	438.50	448.40	327.20
1990	465.30	476.20	344.40
1991	506.60	515.60	371.70
PERSONS			
1986	420.70	448.50	370.70
1987	457.10	489.30	404.10
1988	475.70	510.20	418.40
1989	503.20	535.60	436.50
1990	542.70	575.70	465.10
1991	580.10	608.20	487.40

Table 21.6 shows the large difference between male and female average weekly earnings. In August 1991, average total earnings for all male employees were 58 per cent more than for females. Nationally, average earnings for males were \$575.40 which was 33 per cent higher than the \$384.10 average earnings for females. Much of this discrepancy is explained by the large percentage of females who work in part-time jobs. In November 1991, 46 per cent of females were employed part-time compared with only 9 per cent part-time employment for males (refer Table 21.1).

In the twelve months ended August 1991, average weekly ordinary time earnings for females increased at a substantially higher rate (8.2 per cent) than for males (5.5 per cent)

WEEKLY AWARD RATES OF PAY

TABLE 21.7 – INDEXES OF WEEKLY AWARD RATES OF PAY: AUGUST
(Base: Weighted average minimum weekly award rate, June 1985 = 100.0)
Reference: Catalogue No.6312.0

Industry	Full-time adult employees		
	1989	1990	1991
Mining	121.6	125.2	126.7
Manufacturing	124.0	133.1	134.7
Construction	122.4	131.0	132.3
Wholesale trade	124.8	133.0	133.6
Retail trade	124.3	133.0	133.8
Finance, property and business services	120.6	128.0	129.4
Community services	121.7	124.6	124.9
All industries (a)	122.5	129.0	130.2

(a) Excludes employees in the Defence forces, Agriculture, Services to agriculture and employees in private households employing staff.

The weekly award rates of pay indexes reflect movements in rates of pay which are normally varied in accordance with awards, determinations or registered and unregistered agreements, for full time adult wage and salary earners.

Award rates of pay used in this index include the base rate, any allowance or loading applicable under the award to all employees and any other supplementary payments specified in the award. Remunerative allowances in the form of reimbursements, superannuation and severance,

EMPLOYMENT AND INDUSTRIAL CONDITIONS

termination and redundancy payments are excluded.

MAJOR LABOUR COSTS

Labour costs are those costs, paid by the employer, associated with the employment of labour.

Details of major labour costs, i.e. earnings, payroll tax, superannuation, workers' compensation and fringe benefits tax, are collected through an annual survey of approximately 500 employers in the public and private sectors.

With the exception of superannuation, the composition of major labour costs remained relatively constant in both the public and private sectors between 1987-88 and 1989-90. The major labour cost in both sectors was employee earnings, accounting for approximately 90 per cent of total labour costs. The cost of providing superannuation continued to rise in line with government policy which encourages employers to become more responsible for the provision of adequate superannuation coverage for their employees.

TABLE 21.8 – MAJOR LABOUR COSTS
Reference: Catalogue No. 6348.0

Type of cost	1987-88		1988-89		1989-90	
	\$m	%	\$m	%	\$m	%
PRIVATE SECTOR						
Earnings—						
Gross wages and salaries	7,238	90.4	7,464	90.2	8,461	90.0
Other—						
Payroll tax	258	3.2	294	3.6	355	3.8
Workers' compensation	203	2.5	218	2.6	200	2.1
Superannuation	235	2.9	231	2.8	313	3.3
Fringe benefits tax (a)	70	0.9	65	0.8	76	0.8
Total other	765	9.6	808	9.8	944	10.0
Total	8,003	100.0	8,271	100.0	9,405	100.0
PUBLIC SECTOR						
Earnings—						
Gross wages and salaries	3,692	89.8	3,891	89.7	4,104	88.2
Other—						
Payroll tax	61	1.5	81	1.9	92	2.0
Workers' compensation	80	1.9	93	2.1	77	1.7
Superannuation	266	6.5	259	6.0	366	7.9
Fringe benefits tax (a)	11	0.3	13	0.3	14	0.3
Total other	418	10.2	445	10.3	548	11.8
Total	4,110	100.0	4,336	100.0	4,652	100.0

(a) Fringe benefits tax was introduced on 1 July 1986.

TABLE 21.9 – MAJOR LABOUR COSTS PER EMPLOYEE

Reference: Catalogue No. 6348.0

Type of cost	1987-88		1988-89		1990-91	
	\$	%	\$	%	\$	%
PRIVATE SECTOR						
Gross wages and salaries	20,468	90.4	21,998	90.2	23,762	90
Other—						
Payroll tax	728	3.2	865	3.6	996	3.8
Workers' compensation	573	2.5	643	2.6	562	2.1
Superannuation	665	2.9	681	2.8	880	3.3
Fringe benefits tax	199	0.9	191	0.8	213	0.8
Total other	2,165	9.6	2,380	9.8	2,651	11.8
Total	22,633	100.0	24,378	100.0	26,413	100.0
PUBLIC SECTOR						
Gross wages and salaries	23,499	89.8	25,056	89.7	26,510	88.2
Other—						
Payroll tax	387	1.5	519	1.9	591	2.0
Workers' compensation	509	1.9	602	2.2	498	1.7
Superannuation	1,695	6.5	1,677	6.0	2,363	7.9
Fringe benefits tax	71	0.3	81	0.3	88	0.3
Total other	2,661	10.2	2,879	10.3	3,540	11.8
Total	24,017	100.0	27,938	100.0	30,050	100.0

It is important to note that owing to differences in the compilation of superannuation statistics, no direct comparisons can be made between public and private sector superannuation costs.

INDUSTRIAL DISPUTES

Industrial disputes statistics relate only to disputes which involve stoppages of ten working days or more at the establishment where the stoppage occurred. The effects these disputes have on other establishments, such as stand downs because of lack of materials, disruption of transport services, power cuts etc., are not included.

Details of stoppages are obtained primarily from the Department of Industrial Relations, trade journals, publications, newspapers and the employers and trade unions involved in the dispute.

EMPLOYMENT AND INDUSTRIAL CONDITIONS

DIAGRAM 21.2
INDUSTRIAL DISPUTES BY INDUSTRY
'000

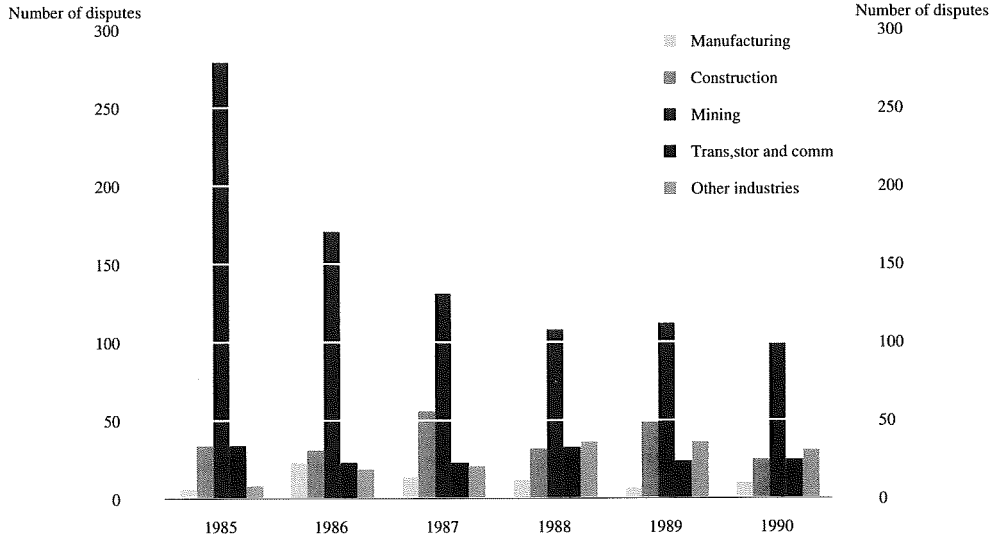
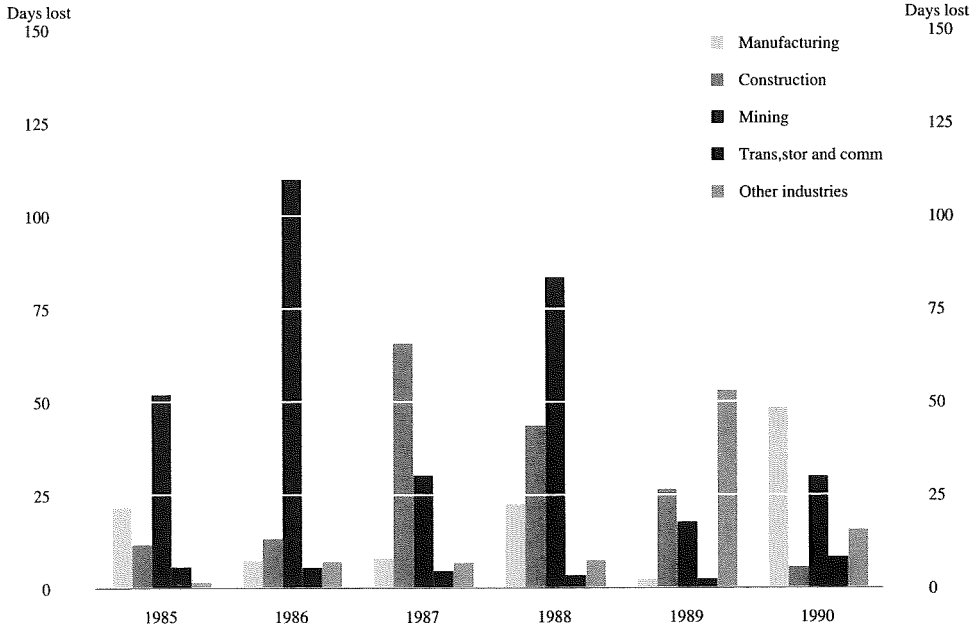


DIAGRAM 21.3
INDUSTRIAL DISPUTES: WORKING DAYS LOST BY INDUSTRY
'000



EMPLOYMENT AND INDUSTRIAL CONDITIONS

TABLE 21.10 – INDUSTRIAL DISPUTES BY INDUSTRY

Industry	1985	1986	1987	1988	1989	1990
NUMBER OF DISPUTES						
Mining	279	171	131	108	112	99
Manufacturing	6	23	14	12	7	10
Construction	34	31	56	32	49	25
Transport, storage and communication	34	23	23	33	24	25
Other industries	8	19	21	36	36	31
Total	361	267	245	221	228	190
WORKING DAYS LOST ('000)						
Mining	52.0	109.8	30.3	83.5	17.8	30.0
Manufacturing	21.7	7.3	7.9	22.5	2.3	48.4
Construction	11.7	13.3	65.8	43.7	26.5	5.7
Transport, storage and communication	5.8	5.6	4.6	3.4	2.5	8.5
Other industries	1.6	7.1	6.8	7.5	53.0	15.8
Total	92.9	143.1	115.3	160.6	102.1	108.4

INDUSTRIAL AUTHORITIES

Federal Authorities

Federal Court of Australia. The Federal Court of Australia comprises an Industrial Division and a General Division. The Industrial Division deals with all proceedings under the *Conciliation and Arbitration Act 1904* and related legislation. A single Judge and the Industrial Relations Commission may refer a question of law for the opinion of the Court. Appeal from a judgement of a Full Court may, in certain circumstances, be made to the High Court of Australia.

Industrial Relations Commission. The Commission has jurisdiction to prevent and to settle industrial disputes extending beyond the limits of any one State. The work of the Commission is normally done by individual members; however, certain matters must be determined by a Full Bench of the Commission consisting of at least three members, of which two must be presidential members. A Full Bench of

the Commission also deals with appeals and references from single members of the Commission.

Western Australian Authorities

The Western Australian Industrial Relations Commission may inquire into any industrial matter and make an award, order or declaration relating to such a matter. The Commission may also make inquiries where industrial action has occurred or is likely to occur.

The Commission in Court Session may make General Orders, hear matters referred by the Commission, and hear appeals from decision of Boards of Reference.

REFERENCES

ABS publications

Average Weekly Earnings, States and Australia (6302.0)

Award Rates of Pay Indexes, Australia (6312.0)

Employment Benefits (6334.0)

Labour Statistics (6101.0)

The Labour Force, Australia (6203.0)

Major Labour Costs, Australia (6348.0)

Industrial Disputes, Australia (6322.0)

Labour Force Status and Educational Attainment (6235.0)

Transition From Education to Work (6227.0)

How Workers Get Their Training (6278.0)

Job Search Experience of Unemployed Persons (6222.0)

Weekly Earnings of Employees (6310.0)

Chapter 22

PRICE INDEXES, PRICES AND HOUSEHOLD EXPENDITURE

Price Indexes	22-1
Average Retail Prices for Selected Commodities	22-3
Wholesale Prices of Materials used in Building	22-4
Other Price Indexes	22-4
Household Expenditure Survey	22-5
References	22-6

Chapter 22

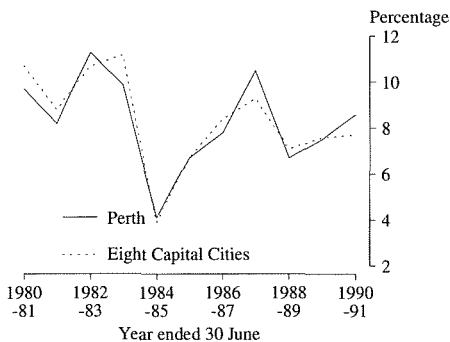
PRICE INDEXES, PRICES AND HOUSEHOLD EXPENDITURE

PRICE INDEXES

Information concerning the development of price indexes in Australia is given in *Year Book Australia* (Catalogue No. 1301.0) and *Labour Report* No. 58, 1973 (Reference No 6.7).

The Consumer Price Index

DIAGRAM 22.1
CONSUMER PRICE INDEX
Percentage change



The Consumer Price Index (CPI) measures quarterly price changes of a 'basket' of goods and services which account for a high proportion of expenditure by metropolitan employee households. This 'basket' covers a wide range of goods and services arranged in eight groups: Food; Clothing; Housing; Household equipment and operation; Transportation; Tobacco and alcohol; Health and personal care; and Recreation and education. The eight groups in turn are divided into thirty-five sub-groups and 107 expenditure classes. Indexes at the sub-group level and for individual expenditure classes are available on request. The CPI was published for the first time in August 1960 and

was compiled retrospectively to the September quarter 1948.

CPI population group. Because the spending patterns of various groups in the population differ, the pattern of one group, fairly homogeneous in its spending habits, is chosen for calculating the CPI. This population group is, in concept, *metropolitan employee households*. For this purpose, *employee households* are those households which obtain at least three-quarters of their total income from wages and salaries excluding the top ten per cent (in terms of income) of such households. *Metropolitan* means the six State capital cities and Canberra and Darwin.

Weighting pattern. Each of the 107 expenditure classes in the current CPI has a fixed weight (i.e. the measure of its relative importance) which reflects the expenditure pattern of the CPI population group as derived from Household Expenditure Surveys and other data collected by the ABS. More detailed information on weighting is published in *The Australian Consumer Price Index: Concepts, Sources and Methods* (Catalogue No. 6461.0)

Periodic reviews. The CPI is reviewed at approximately five-yearly intervals to take account of changes in household spending patterns. Following each review, the new series with its changed composition and weighting pattern is linked to the previous series to form one continuous series.

The eleventh (current) series of the CPI began with the release of the March quarter 1987 CPI and incorporates the following changes: expenditure on the purchase of dwellings was replaced by expenditure on mortgage interest

PRICE INDEXES, PRICES AND HOUSEHOLD EXPENDITURE

charges; interest charges for consumer credit used for household purposes other than dwelling purchase were included; expenditure on optical services, veterinary services and watches and clocks were included; and the range of fresh fruit and vegetables included in the index was expanded.

A further change to the CPI was introduced in the March quarter 1989 when the ABS replaced the simple revaluation method of calculating mortgage interest charges with the conceptually superior and more sophisticated debt profile method.

Price collection. Since the CPI is designed to measure the impact of changing prices on metropolitan employee households, information about prices is collected in the kinds of retail outlets or other establishments where households normally purchase goods or services. This involves collecting prices from many sources, including supermarkets, electrical appliance retailers, doctors, dentists, car dealers and repairers, service stations, hotels, real estate agents and financial institutions. For Perth, about 13,000 separate quotations are collected each quarter.

Prices are generally collected quarterly. However, for some important items, prices are collected more frequently (e.g. petrol, alcohol, bread, fresh fish, fresh meat, fruit and vegetables) and a small number annually (e.g. seasonal clothing, local government rates and charges).

The prices used in the CPI are those that any member of the public would have to pay on the pricing day to purchase the specified good or service. Any sales tax or excise which the consumer must pay when purchasing specific items is included in the CPI price. Sale prices, discount prices and 'specials' are accepted for the CPI so long as the items concerned are of normal quality (e.g. not damaged or shop soiled) and are offered for sale in reasonable quantities. To ensure that the price movements reflect the experience of the bulk of the metropolitan population, the brands and varieties of the items which are priced are generally those which sell in the greatest volume.

Analysis of CPI changes. Movements in the CPI from one period to another can be expressed either as changes in index points or as percentage changes. The following example illustrates the method of calculating index points changes and percentage changes between any two periods:

TABLE 22.1 - CONSUMER PRICE INDEX: PERTH
(Base year 1980-81 = 100 unless otherwise noted)
Reference: Catalogue No 6401.0

	Food	Clothing	Housing (a)	Household equipment and operation	Trans- portation	Tobacco and alcohol	Health and personal care	Recreation and education (b)	All groups
1988-89	181.2	177.4	(a)184.7	181.4	191.4	212.9	190.8	155.4	186.1
1989-90	192.8	185.6	217.5	192.1	205.2	232.2	207.8	164.1	201.7
1990-91	201.5	193.8	223.8	202.2	218.1	249.4	225.6	171.1	211.9
1988-89									
September	176.6	172.2	175.2	177.1	188.1	210.8	186.3	152.3	181.3
December	178.7	177.6	188.2	180.3	188.4	210.5	187.1	155.2	185.1
March	183.8	177.0	(a)182.1	182.9	192.0	213.0	193.9	157.4	187.0
June	185.7	182.7	(a)193.4	185.2	196.9	217.3	195.7	156.6	191.0
1989-90									
September	188.4	181.5	(a)206.6	188.6	200.4	222.2	199.2	158.8	195.5
December	190.6	186.4	215.1	189.5	203.1	229.1	204.1	162.8	199.5
March	194.0	185.8	222.6	192.6	207.7	236.4	212.2	167.0	204.1
June	198.2	188.6	225.8	197.6	209.6	240.9	215.8	167.8	207.5
1990-91									
September	198.9	189.2	226.7	199.8	212.7	245.8	218.9	167.4	209.1
December	201.1	194.1	227.7	202.3	228.6	247.2	223.4	174.7	214.3
March	203.2	195.3	222.1	202.8	214.9	249.6	229.5	172.6	212.1
June	202.8	196.5	218.7	203.8	216.3	254.8	230.5	169.8	212.0
1991-92									
September	206.2	197.1	211.9	206.5	221.3	253.8	234.0	169.5	213.1

(a) These series have been affected by the adoption of a new approach to the treatment of mortgage interest charges. For more detail refer to Information paper *The Australian Consumer Price Index: Treatment of Mortgage Interest Charges* (Catalogue No 6442.0). (b) New group index replacing former 'Recreation' group. Base: March quarter 1982 = 100.

PRICE INDEXES, PRICES AND HOUSEHOLD EXPENDITURE

All Groups CPI: Perth

Index numbers:	
September quarter 1989	195.5
less: June quarter 1989	191.0
Change in index points	+4.5
Percentage change = +4.5 × $\frac{100}{191.0}$	= 2.4%

House price indexes

House price indexes are compiled for use in calculating the mortgage interest charges component of the CPI. Separate indexes are constructed for established houses and project homes and are published quarterly for each of the capital cities in *House Price Indexes: Eight Capital Cities* (Catalogue No. 6416.0).

AVERAGE RETAIL PRICES FOR SELECTED COMMODITIES

'Average prices' of a limited range of commodities are recorded in the Blue Books of Western Australia from the early colonial years and in the Western Australian Year Book (Old Series) from 1886. Retail prices of food and groceries and average rentals of houses for years extending back to 1901 have been collected by the Australian Statistician but it was not until 1911 that a systematic collection of retail price statistics for compiling retail price indexes was begun. Since 1962 average retail prices for a range of selected (mainly food) items have been published quarterly in *Average Retail Prices of Selected Items* (Catalogue No. 6403.0).

TABLE 22.2 - AVERAGE RETAIL PRICES OF SELECTED ITEMS: PERTH (cents)
Reference: Catalogue No. 6403.0

Item	Unit	December quarter		
		1988	1989	1990
Dairy produce—				
Milk, carton, supermarket sales	1 litre	87	90	94
Milk, powdered, full cream	1 kg can	529	631	677
Cheese, processed, sliced, wrapped	500g	279	330	357
Butter	500g	167	182	183
Cereal products—				
Bread, white loaf, sliced, supermarket sales	680g	120	136	131
Biscuits, dry	250g	110	117	131
Breakfast cereal, corn based	500g	219	250	290
Flour, self-raising	2 kg	176	199	194
Rice, medium grain	1 kg	102	107	111

For footnote, see end of table.

TABLE 22.2 - AVERAGE RETAIL PRICES OF SELECTED ITEMS: PERTH — continued (cents)

Reference: Catalogue No. 6403.0

Item	Unit	December quarter		
		1988	1989	1990
Meat and seafoods—				
Beef				
Rib, without bone	1 kg	575	552	573
Rump steak	1 kg	906	1,014	1,020
T-bone steak, with fillet	1 kg	857	928	978
Chuck steak	1 kg	592	624	597
Silverside, corned	1 kg	595	637	637
Sausages	1 kg	336	366	392
Lamb				
Leg	1 kg	551	554	551
Loin chops	1 kg	661	686	677
Forequarter chops	1 kg	512	499	495
Pork				
Leg	1 kg	560	630	586
Loin chops	1 kg	649	744	758
Chicken, frozen	1 kg	323	346	370
Bacon, middle rashers	250g pkt	252	294	309
Beef, corned	340g can	228	241	255
Salmon, pink	210g can	316	284	271
Fresh fruit and vegetables—				
Oranges	1 kg	150	143	158
Bananas	1 kg	184	193	231
Potatoes	1 kg	124	122	121
Tomatoes	1 kg	234	298	269
Carrots	1 kg	109	108	96
Onions	1 kg	159	109	123
Processed fruit and vegetables—				
Peaches	825g can	170	177	206
Pineapple, sliced	450g can	80	85	90
Peas, frozen	500g pkt	110	136	152
Confectionery—				
Chocolate, milk, block (a)	250 g	187	205	209
Other food—				
Eggs	53g 1 dozen	181	193	194
Sugar, white	2 kg	178	234	222
Jam, strawberry	500g jar	182	193	215
Tea	250g	144	152	171
Coffee, instant	150g jar	475	465	448
Tomato sauce	600 ml	147	160	183
Margarine, poly-unsaturated	500 g	130	151	159
Baked beans, in tomato sauce	440 g	80	83	92
Baby food	125g can	37	40	44
Household supplies and services—				
Laundry detergent	1 kg	371	415	486
Dishwashing detergent	1 litre	380	392	446
Facial tissues	pkt of 224	183	195	217
Toilet paper	4 x 300 sheet rolls	304	330	362
Pet food	415g	88	90	97
Private motoring—				
Petrol, super grade	1 litre	53.6	62.0	80.9
Alcoholic beverages—				
Beer, full strength, unchilled	12 x 750 ml bottles	1,866	1,928	2,120
Draught beer, full strength, public bar	285 ml glass	139	158	160
Scotch, nip, public bar	30 ml	197	232	250
Personal care products—				
Toilet soap	2 x 125g	139	146	163
Toothpaste	140g	214	212	224

(a) Prior to 1989 prices relate to 200 gram blocks.

WHOLESALE PRICES OF MATERIALS USED IN BUILDING

There are two separate monthly price index series for materials used in building.

The Price Index of Materials used in House Building measures changes in prices of selected materials used in the construction of houses. For this index the weights reflect the usage of materials in detached single dwelling units constructed in the Perth Statistical Division in 1985-86.

The All Groups index numbers for Perth in the three years to 1990-91 were:

1988-89	128.1
1989-90	140.8
1990-91p	148.7

The Price Index of Materials used in Building Other than House Building. This index measures changes in prices of selected materials used in the construction of buildings other than houses. The weights used in this index are based on the usage of materials in the construction of buildings commenced in the six State capital cities in the three years ended June 1977. The same weighting pattern is used for each of the six capital cities.

For both of these indexes, prices are collected at the mid-point of each month from representative suppliers. In general the point of pricing is delivered on site, but in some cases it may be necessary to accept other pricing points, e.g. supplied and fixed.

A major influence on prices of building materials is the level of demand. The reduced demand for the construction of buildings is reflected in the reduction in the rate of increase of the price of materials as shown in these indexes. More information on building activity can be found in Chapter 18, Housing and Construction.

TABLE 22.3 - PRICE INDEX OF MATERIALS USED IN BUILDING OTHER THAN HOUSE BUILDING : PERTH
(Base year 1979-80 = 100)
Reference: Catalogue No. 6407.0

Materials	Index number		
	1988-89	1989-90	1990-91p
Selected major building materials—			
Structural timber	220.2	239.2	246.4
Clay bricks	205.6	217.4	234.5
Ready mixed concrete	200.4	220.5	245.6
Precast concrete products	199.9	218.6	239.7
Galvanised steel decking, cladding, etc.	207.9	232.1	243.9
Structural steel	255.8	273.3	276.6
Reinforcing steel bar, fabric and mesh	199.4	219.5	236.0
Aluminium windows	231.7	244.3	254.8
Steel windows, doors, louvres, etc.	214.1	236.3	254.3
Builders' hardware	222.6	240.6	255.7
Sand, aggregate and filling	223.4	248.1	270.0
Carpet	223.9	227.2	235.3
Paint	214.6	241.8	251.4
Non-ferrous pipes	213.4	228.6	228.6
Special combinations of building materials—			
All electrical materials	270.0	288.8	309.4
All mechanical services	230.9	247.9	254.9
All plumbing materials	211.6	234.9	246.9
All groups	221.8	240.0	253.2

OTHER PRICE INDEXES

In addition to the indexes already described, the ABS compiles price indexes related to the prices of selected import and export commodities, copper materials, materials used in manufacturing industries and articles produced by manufacturing industries. These monthly indexes are published on a national basis only. For further reference to these indexes, see *Year Book Australia* (Catalogue No. 1301.0) and other references listed at the end of this Chapter.

HOUSEHOLD EXPENDITURE SURVEY

During 1974-75 and 1975-76, the ABS conducted two surveys in order to obtain information about the expenditure patterns of private households. The 1974-75 survey was confined to a sample of households in the six State capital cities and Canberra, while the coverage of the 1975-76 survey was extended to include other urban and rural regions. Apart from limited attempts in 1910-11 and 1913 to assess the spending patterns of Australian households, these surveys were the first official collections of household expenditure statistics conducted in this country.

Further household expenditure surveys were conducted by the ABS in 1984 and for the financial year 1988-89. Coverage of these surveys, as in 1975-76, included households in urban and rural areas, except remote and sparsely settled areas.

The principal aim of the surveys was to measure levels and patterns of expenditure on commodities and services by private households and to identify key factors which influence these levels and patterns. Other uses for the data obtained include the provision of information for updating the weighting pattern of the CPI and development of government policy and planning for specific components of expenditure (e.g. housing, health, transport).

Table 22.4 shows household expenditure for Western Australia based on the 1988-89 Household Expenditure Survey compared with data from the 1984 survey. Since the 1984 survey, both average weekly household income and expenditure on commodities and services have increased in similar proportions. The most significant household outlays on commodities and services were on food and non-alcoholic beverages, transport and current housing costs.

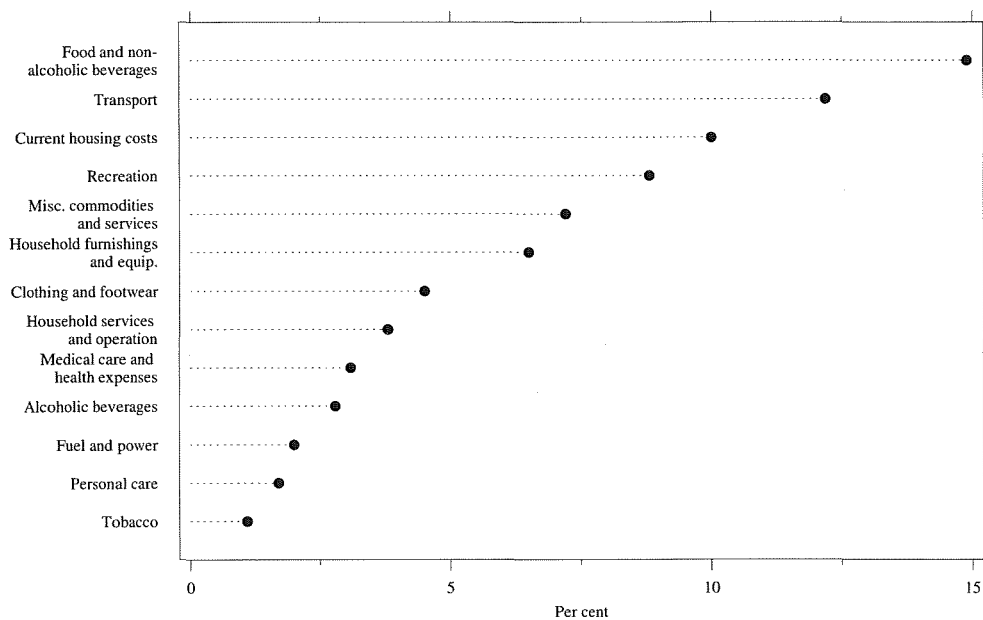
TABLE 22.4 – AVERAGE WEEKLY HOUSEHOLD EXPENDITURE AND INCOME (a)(b): 1984 AND 1988-89

Reference : Catalogue No. 6533.0

	1984		1988-89 (a)	
	\$	Per cent of total income	\$	Per cent of total income
Average weekly household expenditure (b)—				
Commodity or service—				
Current housing costs (selected dwelling)	41.50	9.2	65.26	10.0
Fuel and power	10.37	2.3	13.18	2.0
Food and non-alcoholic beverages	69.18	15.3	97.04	14.9
Alcoholic beverages	13.24	2.9	18.56	2.8
Tobacco	6.27	1.4	7.18	1.1
Clothing and footwear	20.72	4.6	29.31	4.5
Household furnishings and equipment	28.54	6.3	42.53	6.5
Household services and operation	15.74	3.5	24.48	3.8
Medical care and health expenses	12.72	2.8	20.10	3.1
Transport	62.47	13.8	79.56	12.2
Recreation	46.50	10.3	57.07	8.8
Personal care	6.24	1.4	10.97	1.7
Miscellaneous commodities and services	26.52	5.8	46.81	7.2
Total commodity or service expenditure (c)	360.01	79.5	512.05	78.6
Average weekly household income	452.87	..	651.80	..

(a) To enable a direct comparison of household income from the 1984 and 1988-89 surveys, the 1984 concept of income has been applied to the 1988-89 data. This entailed setting negative components of household income to zero. For more detailed information refer to the reference publication. (b) The average obtained when the total estimated expenditure for a particular broad expenditure group is divided by the estimated number of households within the scope of the survey. (c) Excludes payments such as income tax, superannuation and insurance and capital housing costs.

DIAGRAM 22.2
 AVERAGE WEEKLY HOUSEHOLD EXPENDITURE
 PROPORTION OF INCOME EXPENDED BY EXPENDITURE CATEGORY
 1988-89



REFERENCES

ABS Publications

Labour Report No. 58, 1973

Australian Consumer Price Index (6401.0)

The Australian Consumer Price Index: Concepts Sources and Methods (6461.0)

A Guide to the Consumer Price Index: Eleventh Series (6440.0)

Information Paper: The Australian Consumer Price Index Treatment of Mortgage Interest Charges (6442.0)

Information Paper: Review of the Consumer Price Index: (6450.0)

Export Price Index (6405.0)

Import Price Index (6414.0)

Price Index of Materials Used in House Building (6408.0)

Price Index of Materials Used in Building Other than House Building (6407.0)

Price Indexes of Articles Produced by Manufacturing Industry (6412.0)

Price Indexes of Copper Materials (6410.0)

Price Indexes of Materials Used in Coal Mining (6415.0)

Price Indexes of Materials Used in Manufacturing Industries (6412.0)

Information Paper: 1988-89 Household Expenditure Survey, Australia (6527.0)

Household Expenditure Survey by States and Territories (6533.0)

Chapter 23

PUBLIC FINANCE

Commonwealth–State Financial Relations	23-1
Commonwealth Cash Benefits to Persons in Western Australia	23-4
State Government Finance	23-4
Local Government Finance	23-7
State Government and Local Authority Taxation	23-8
References	23-8

Chapter 23

PUBLIC FINANCE

This chapter deals mainly with the financial activities of State and local government authorities in Western Australia. Particular emphasis has been given to Commonwealth-State financial relations, including details of Commonwealth cash benefits to persons in Western Australia.

In 1990-91, total current and capital outlays of State authorities were \$7,306m — 3.6 per cent above that of the previous year. Grants received from the Commonwealth totalled \$2,914m, an increase of 6 per cent over the previous year.

Total current and capital outlays of local authorities were \$582m in 1990-91. Revenue and grants received totalled \$627m.

COMMONWEALTH-STATE FINANCIAL RELATIONS

For a historical description of Commonwealth-State financial relations, refer to Chapter 24 of the *Western Australian Year Book*, No. 24 — 1986.

Management of Commonwealth-State funding

The major institutions assisting in the management of Commonwealth funding to States and Northern Territory governments are: the Premiers' Conference; the Commonwealth Grants Commission; and the Australian Loan Council.

Premiers' Conference. The annual Premiers' Conference determines the total amount of general revenue assistance and the shares of each State and the Northern Territory. Although these payments are at the Commonwealth's discretion, they are subject to negotiation between the Commonwealth and States at the Conference.

Commonwealth Grants Commission. This Commission was established in 1933 to recommend on applications made by States, under section 96 of the Constitution, for special financial

assistance grants. Since 1982, as a result of arrangements agreed at Premiers' Conferences, no State has sought such a grant.

Since 1978, under the *States (Personal Income Tax Sharing) Act 1976*, a special division of the Commission has also been responsible for recommending the per capita relativities to be used for the allocation of general revenue grants among the States.

Australian Loan Council. The Loan Council was established under the *Financial Agreement Act of 1928* with responsibility for determining the annual borrowing programs of the Commonwealth and State Governments, and the terms and conditions of loans to finance these programs. In 1936, the Gentlemen's Agreement extended the Loan Council's authority to include approval of semi-government and local authorities' borrowings.

By the early 1980s, the Loan Council had begun to exercise increasingly less influence under the Gentlemen's Agreement over total authority borrowings. Greater use of non-conventional financing techniques, such as finance leasing and

similar forms of borrowing, were being employed, which were outside the scope of the Agreement. These developments culminated in the Gentlemen's Agreement being suspended at the June 1984 Loan Council meeting, and the Global Approach was adopted on a trial basis in 1984-85. The objective of the Global Approach was to broaden the scope of Loan Council oversight of authority borrowings, by bringing within voluntarily agreed limits, all forms of borrowings by Commonwealth, State and Local Authorities.

Commonwealth financial assistance

Commonwealth Government payments to the States and Northern Territory Governments may be classified under two major headings: general purpose payments and specific purpose payments. These may be further classified into those provided for recurrent outlays and those provided for capital outlays. Payments are made in the form of grants (non-repayable) or loans (repayable).

TABLE 23.1 - COMMONWEALTH GENERAL AND SPECIFIC PURPOSE PAYMENTS FOR WESTERN AUSTRALIA AND AUSTRALIA: 1990-91(a)
(\$ million)

(Source: Commonwealth Budget Paper No. 4)

Payments	Western Australia	Australia
General purpose payments—		
Revenue	1,547.8	13,167.0
Capital	22.4	296.8
Total	1,570.2	13,463.8
Specific purpose payments—		
Revenue	985.9	10,786.1
Capital	358.5	3,531.4
Total	1,344.4	14,317.5
Total payments	2,914.6	27,781.3
General and specific purpose payments classified according to—		
Grants	2,914.2	27,762.1
Advances (loans)	0.4	19.2

(a) Excludes direct Commonwealth payments to local authorities.

General purpose payments provide general budgetary assistance and the States and Northern Territory are free to determine the spending of these monies according to their own budgetary priorities.

Specific purpose payments are generally a means of meeting the objectives and priorities of Commonwealth Budget programs. They are provided subject to certain conditions, for example, the Commonwealth specifying the purpose for which the funds may be spent; the States being required to contribute some specified amount of their own funds to the program to qualify for the assistance.

General purpose revenue payments. General purpose revenue is paid in the form of grants. The arrangements for determining the level and distribution of these grants among the States and Northern Territory, are set at the Premiers' Conference each year.

TABLE 23.2 - GENERAL PURPOSE REVENUE ASSISTANCE (a)
(\$ million)

(Source: Commonwealth Budget Paper No. 4)

Year	Western Australia	Australia
FINANCIAL ASSISTANCE GRANTS		
1988-89	1,452.0	12,405.0
1989-90	1,494.5	12,859.6
1990-91	1,547.8	13,117.0
SPECIAL REVENUE ASSISTANCE		
1988-89	8.3	137.9
1989-90	—	45.5
1990-91	—	50.0
TOTAL GENERAL REVENUE ASSISTANCE		
1988-89	1,460.3	12,542.9
1989-90	1,494.5	12,905.1
1990-91	1,547.8	13,167.0

(a) Excludes direct Commonwealth payments to local authorities.

General purpose capital payments. For 1990-91, the Loan Council approved a borrowing program of General Purpose Capital Funds for the States and Northern Territory of \$297m, of which Western Australia's share amounted to \$22.4m.

Specific purpose payments. Specific purpose recurrent payments to Western Australia for 1990-91 amounted to \$986m. The major payments were for schools (\$192m) higher education (\$246m) and hospital funding grants (\$326m). Specific purpose capital payments to Western Australia in 1990-91 amounted to \$359m with the largest amounts allocated to roads (\$172m) and public housing (\$69m).

PUBLIC FINANCE

TABLE 23.3 – COMMONWEALTH GOVERNMENT GRANTS TO WESTERN AUSTRALIA BY GOVERNMENT PURPOSE CLASSIFICATION
(\$ million)

<i>Item</i>	<i>1988-89</i>	<i>1989-90</i>	<i>1990-91</i>
CURRENT GRANTS			
General public services, defence, public order and safety	10.8	11.3	11.3
Education	367.2	411.7	473.3
Health	300.9	330.1	357.7
Social security and welfare	26.4	27.6	27.6
Housing and community amenities	0.7	0.7	1.4
Agriculture, forestry, fishing and hunting	13.6	16.7	17.3
Transport and communications	0.6	0.9	0.8
General purpose inter-government transactions	1,520.1	1,559.3	1,615.5
Other purpose	12.5	18.0	28.7
Total current grants	2,253.0	2,376.3	2,533.7
CAPITAL GRANTS			
General public service, defence, public order and safety	—	—	60.0
Education	51.6	57.9	70.8
Health	2.5	5.8	5.6
Social security and welfare	8.6	6.9	5.9
Housing and community amenities	66.7	89.5	92.1
Recreation and culture	1.5	0.6	4.2
Agriculture, forestry, fishing and hunting	5.4	9.9	1.0
Transport and communications	159.9	180.1	178.5
General purpose inter-government transactions	22.9	22.9	22.4
Total capital grants	319.2	373.5	380.5

TABLE 23.4 – COMMONWEALTH GOVERNMENT ADVANCES TO WESTERN AUSTRALIA CLASSIFIED BY GOVERNMENT PURPOSE CLASSIFICATION
(\$ million)

<i>Item</i>	<i>1988-89</i>	<i>1989-90</i>	<i>1990-91</i>
Net advances (a)—			
Defence	-0.1	-0.1	-0.1
Housing and community amenities—			
Housing	16.6	-6.6	-6.9
Community development	—	—	-1.5
Water supply	-1.0	-1.0	-1.0
Sanitation and protection of the environment	-0.2	-0.3	-0.3
Recreation and culture	-0.2	-0.2	—
Agriculture, forestry, fishing and hunting	-3.2	-1.9	-3.8
Transport and communications	-3.8	-1.3	-0.9
Other purposes—			
General purpose inter-government transactions	-17.8	-17.6	-114.7
Natural disaster relief	-4.4	-3.2	-1.9
Total net advances	-14.2	-32.4	-129.5

(a) Gross advances less repayments.

COMMONWEALTH CASH BENEFITS TO
PERSONS IN WESTERN AUSTRALIA

Commonwealth cash benefits to persons are paid from the National Welfare Fund which was established in 1943 by the *National Welfare Fund Act*. The main components of cash benefits are hospital, medical, pharmaceutical, sickness and unemployment benefits; family allowance; and sole parent, widows, age, invalid and repatriation pensions. Other cash benefits include scholarships and payments to trainee teachers.

Table 23.5 shows that cash benefits to or for persons in Western Australia for the period 1987-88 to 1989-90, increased from \$2,264m to \$2,673m. In 1989-90, social security and welfare amounted to \$2,056m or 76.9 per cent of the total cash benefits, followed by health with \$528m or 19.7 per cent.

STATE GOVERNMENT FINANCE

The data in Tables 23.6 and 23.7 relate to the financial activities of the Government of Western Australia, statutory authorities, boards, commissions and corporations, and incorporated bodies (other than financial enterprises) in which the State Government or its agencies have a controlling interest.

The revised series is designed to provide, for the public sector, statistics which complement the accounts for individual sectors provided in the Australian National Accounts. These statistics are intended to consolidate the transactions of the various public authorities and present them so that their economic impact may be assessed; to show the purposes that are being served by government expenditures; and to show the roles of the various levels of government in the undertaking and financing of these expenditures.

TABLE 23.5 – COMMONWEALTH GOVERNMENT CASH BENEFITS TO OR FOR
PERSONS IN WESTERN AUSTRALIA CLASSIFIED BY GOVERNMENT PURPOSE
CLASSIFICATION
(\$ million)

Item	1987-88	1988-89	1989-90
Education—			
Primary and secondary education	27.9	29.1	36.6
Tertiary education	47.6	48.6	48.6
Other education (including pre-school)	0.5	0.6	0.7
<i>Total education</i>	<i>76.0</i>	<i>78.3</i>	<i>84.1</i>
Health—			
Hospital and institutional services and benefits—			
Nursing home benefits	90.5	96.6	115.7
Hospital benefits re-insurance	0.9	1.0	0.2
Clinical and non-institutional services and benefits—			
Medical benefits	249.9	271.4	320.6
Other	3.6	2.0	2.4
Pharmaceutical benefits	71.1	76.8	88.6
<i>Total health</i>	<i>416.0</i>	<i>447.8</i>	<i>527.5</i>
Social security and welfare—			
Benefits to ex-servicemen and their dependents	260.8	271.4	289.0
Invalid and other permanent disabled benefits—			
Invalid pensions	205.5	230.6	260.3
Other	11.1	13.4	10.2
Old age pensions	537.7	584.5	640.0
Widows, deserted wives, divorcees and orphans benefits	81.3	142.4	45.5
Unemployed benefits	295.9	257.8	282.6
Sickness benefits	36.6	38.2	38.1
Sole parent benefits	162.0	167.2	229.7
Family and child benefits n.e.c.	152.1	110.7	236.0
Other social security and welfare benefits	19.2	22.8	24.2
<i>Total social security and welfare</i>	<i>1,762.2</i>	<i>1,839.0</i>	<i>2,055.6</i>
Other purposes	9.9	6.5	3.6
Total cash benefits	2,264.1	2,371.6	2,672.9

PUBLIC FINANCE

Basic principles which have been followed in developing the data for the economic accounts for the public sector are that all public authorities should be included; all funds under the control of those authorities should be analysed; and transfers between funds, accounts and authorities should be eliminated to present tables on a consolidated basis.

In this section of the Year Book, the public sector has been taken to comprise general government bodies (excluding local government authorities) and public trading enterprises. Public financial enterprises have been omitted from the consolidated accounts presented here, largely on the ground that combining the income and outlay and capital financing transactions of publicly-owned trading and savings banks, government insurance offices and other public financial institutions with the equivalent transactions of public trading enterprises and general government, seems to provide a less meaningful account of public sector activity.

General government bodies are government departments, offices, agencies and authorities engaged in providing services free of charge or at prices significantly below their cost of production.

Public trading enterprises are government undertakings which aim at covering the bulk of their expenses by revenue from sales of goods and services.

Over recent years, a range of new and revised classifications has been developed for use in the compilation and presentation of government finance statistics. For details of the new classifications, refer to the *Classification Manual For 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 programs of expenditure.

TABLE 23.6 – STATE AUTHORITIES – RECEIPTS AND FINANCING TRANSACTIONS CLASSIFIED BY ECONOMIC TRANSACTIONS FRAMEWORK (\$ million)

Item	1988-89	1989-90	1990-91p
Revenue—			
Taxes, fees, fines	1,682	1,790	1,877
Net operating surpluses of public trading enterprises	601	651	690
Income from public financial enterprises	65	39	21
Interest received	289	349	255
Other property income and other revenue	382	570	494
Grants received	2,574	2,750	2,914
<i>Total revenue</i>	<i>5,592</i>	<i>6,149</i>	<i>6,253</i>
Financing transactions—			
Net Advances received	-19	-35	-131
Net domestic borrowing	-218	391	786
Net borrowing from abroad	535	26	245
Increase in provisions	225	327	394
Other financing transactions	305	195	-241
<i>Total financing transactions</i>	<i>828</i>	<i>903</i>	<i>1,053</i>
Total funds available	6,420	7,051	7,306

Table 23.6 shows that the main components of the receipts of Western Australian State authorities are taxation, grants and financing transactions. Further details of taxation collections by State authorities and local government authorities are given later in this Chapter.

Figures for some items published in the public authority finance series may differ from issue to issue as a consequence of reclassification of items and other improvements made in the course of developing the most appropriate presentation of the financial transactions of public authorities.

Financing transactions are the means by which governments finance their deficits or invest their surpluses, which include transactions in securities of all types, borrowing, trade credit of public trading enterprises, and changes in bank balances. Financing transactions represent the difference between total revenue and grants received and total outlays.

Table 23.7 shows current and capital outlays by Western Australian State authorities classified by Economic Transaction Framework. The principal components, for current outlays, are general government final consumption expenditure and current transfer payments; and for capital outlays, capital expenditure on goods, capital transfer payments, and net advances.

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.

TABLE 23.7 - STATE AUTHORITIES - OUTLAYS
CLASSIFIED BY ECONOMIC TRANSACTIONS FRAMEWORK
(\$ million)

Item	1988-89	1989-90	1990-91 ^p
Current outlays—			
General government final consumption expenditure	3,261	3,459	3,751
Transfers payments—			
Interest paid	1,001	1,153	1,309
Subsidies paid to enterprises	211	212	137
Personal benefit payments	54	85	86
Grants—			
To non-profit institutions	297	354	373
To local government authorities	81	92	95
Other current transfer payments	—	—	—
<i>Total current transfer payments</i>	<i>1,643</i>	<i>1,897</i>	<i>2,000</i>
Total current outlays	4,904	5,356	5,751
Capital outlays—			
Gross fixed capital expenditure—			
On new fixed assets	1,387	1,678	1,508
On secondhand fixed assets (net)	-91	-17	-137
Increase in stocks	-40	-1	-16
Expenditure on land and intangible assets (net)	-49	-117	-44
<i>Total capital expenditure</i>	<i>1,207</i>	<i>1,543</i>	<i>1,311</i>
Transfer payments—			
Grants—			
To private sector and public financial enterprises	188	123	34
To local government authorities	58	51	45
<i>Total capital transfer payments</i>	<i>246</i>	<i>174</i>	<i>79</i>
Net advances paid—			
To private sector and public financial enterprises	63	-23	172
To local government authorities	-1	1	-7
<i>Total net advances paid</i>	<i>62</i>	<i>-22</i>	<i>165</i>
Total capital outlays	1,516	1,695	1,555
TOTAL OUTLAYS	6,420	7,051	7,306

Current transfer payments include such items as interest payments on public loans, personal benefit payments (e.g. age pensions), subsidies paid by general government to public and private enterprises, and grants for non-capital purposes, to local authorities and private non-profit organisations (e.g. charitable organisations).

Capital expenditure refers to expenditure on new fixed assets, whether for additions or replacements, including wages and salaries paid in connection with capital works. The acquisition and disposal of secondhand fixed assets, land and intangible assets and changes in the balance of stock accounts are included. Expenditure on new fixed assets for defence purposes is excluded.

Capital transfer payments consist mainly of grants to local governments, to public and private enterprises and persons for the purpose of acquiring capital assets.

Net advances. Advances are the creation of financial assets with the aim of funding particular enterprises, households or government activities. Repayments are offset against gross advances to give net advances. These advances are included in outlays, rather than financing transactions (refer to the definition on page 23-6), in order to bring together all the methods governments use to achieve expenditure policies. For example, advances are made to fund State housing projects.

LOCAL GOVERNMENT FINANCE

The financial powers of local government authorities in Western Australia are derived principally from the *Local Government Act 1960*, the main provisions of which are outlined in Chapter 5 — Government.

Outlays, Revenue and Financing Transactions

Table 23.8 summarises the outlays, revenue and financing transactions of local government authorities for 1989-90. Outlays are detailed by purpose, while revenue and financing transactions are detailed by type.

Loan Transactions

Under the provisions of local government legislation, local government authorities are constituted as corporate bodies and are authorised to raise loans for works and undertakings and for the liquidation of existing loan debts. The conditions imposed by the *Local Government Act 1960* in relation to loan raising, the levying of loan

**TABLE 23.8 – LOCAL GOVERNMENT AUTHORITIES
– OUTLAYS, REVENUE AND FINANCING
TRANSACTIONS: 1989-90**

<i>Item</i>	<i>\$'000</i>
Current outlays by purpose—	
General public services	71,271
Public order and safety	14,139
Education	456
Health	13,457
Social security and welfare	14,721
Housing and community development	10,562
Sanitation and protection of the environment	-1,942
Other community services	14,100
Recreation and culture	82,631
Road maintenance	54,335
Other purposes	45,169
<i>Total current outlays</i>	<i>318,896</i>
Capital outlays by purpose—	
General public services	10,504
Public order and safety	1,681
Education	76
Health	1,936
Social security and welfare	5,849
Housing and other community services	11,388
Sanitation and protection of the environment	15,042
Recreation and culture	41,402
Road transport	134,665
Other purposes	2,426
<i>Total capital outlays</i>	<i>224,964</i>
Total outlays	543,860
Revenue—	
Rates	327,446
Other taxes, fees and fines	15,109
Interest received	59,387
Government grants	164,123
Other revenue	20,567
<i>Total revenue</i>	<i>586,634</i>
Financing transactions—	
Net borrowings	-17,107
Decrease in cash and investments	-30,186
Other financing transactions	4,519
<i>Total financing transactions</i>	<i>-42,774</i>
Total revenue and financing transactions	543,860

rates, the expenditure of loan monies and the repayment of loans, are summarised in the section *The Local Government System* in Chapter 5 under the heading *Financial Provisions*.

Loans are raised mainly from banks, insurance companies and superannuation funds. A number of local authorities also raise loans through the WA Treasury Corporation. 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.

**STATE GOVERNMENT AND LOCAL
AUTHORITY TAXATION**

The principal sources of State Government and local authority taxes, fees and fines in 1989-90 were: employers' payroll taxes 22 per cent, municipal rates 15 per cent, stamp duties 14 per cent and vehicle registration fees and taxes 5 per cent. The following table shows, for the three years 1987-88 to 1989-90, taxes, fees and fines collected by State Government and local authorities.

REFERENCES

ABS publications

- Classification Manual For Government Finance Statistics* (1217.0)
Local Government, Western Australia (1303.5)
Government Financial Estimates, Australia (5501.0)
Commonwealth Government Finance (5502.0)
Taxation Revenue, Australia (5506.0)
Expenditure on Education, Australia (5510.0)

**TABLE 23.9 - STATE AND LOCAL AUTHORITIES:
TAXES, FEES AND FINES BY TYPE
(\$ million)**

<i>Item</i>	<i>1987-88</i>	<i>1988-89</i>	<i>1989-90</i>
Employers' payroll taxes	355	425	472
Taxes on property—			
Taxes on immovable property—			
Land taxes	63	74	91
Municipal rates	253	286	327
Metropolitan improvement rates	10	11	13
Taxes on immovable property n.e.c.	—	—	—
Taxes on financial and capital transactions—			
Stamp duties	337	416	303
Financial institutions' taxes	32	37	52
Taxes on provision of goods and services—			
Excises (levies on statutory corporations)	43	45	50
Taxes on gambling—			
Taxes on government lotteries	39	48	63
Casino taxes	11	22	21
Race betting taxes	32	31	33
Taxes on gambling n.e.c.	1	—	—
Taxes on insurance—			
Insurance companies' contributions to fire brigade	27	29	34
Third party insurance taxes	5	—	—
Taxes on insurance n.e.c.	33	44	38
Taxes on use of goods and performance of activities—			
Motor vehicle taxes—			
Vehicle registration fees and taxes	101	106	108
Stamp duty on vehicle registration	60	82	82
Drivers' licences	18	20	24
Road transport and maintenance taxes	3	3	4
Franchise taxes—			
Petroleum products franchise taxes	91	88	138
Tobacco franchise taxes	65	71	93
Liquor franchise taxes	52	57	63
Fees and fines—			
Fees from regulatory services	41	58	86
Fines	27	31	37
Total taxes, fees and fines	1,698	1,985	2,135

Chapter 24

PRIVATE FINANCE

Currency	24-1
Banking	24-1
Building Societies	24-2
Credit Unions	24-3
Other Financial Institutions	24-3
Lending by Financial Institutions	24-3
New Capital Expenditure	24-5
References	24-5

Chapter 24

PRIVATE FINANCE

The operations of the financial sector in Western Australia are controlled by both Commonwealth and Western Australian legislation.

The principal Australian legislation comprises the *Banking Act 1959*, *Reserve Bank Act 1959*, *Commonwealth Banks Act 1959*, *Life Insurance Act 1945* and the *Insurance Act 1973*. More detailed descriptions of the background and purpose of these Acts may be found in the *Year Book Australia*, No.71 — 1988 from page 812 (Catalogue No. 1300.0).

In addition, the *Financial Corporations Act of 1974* was introduced as a result of the increasing significance of the non-bank financial institutions in the early 1970s. The Government's aim in introducing this legislation was to regulate the activities of these non-bank institutions in order to achieve economic stability, maintenance of full employment, the efficient allocation of productive resources and to ensure adequate levels of finance for housing.

In the 1980s, Australian Governments sought to decrease the degree of regulation previously imposed on the financial sector and on banking activity in particular. As a result, controls on most bank interest and foreign exchange were relaxed and new private banks (including overseas banks) were permitted to commence operations.

In late 1989, the Banking Act was amended to give explicit powers to the Reserve Bank for prudential supervision of banks and enable regulations to be made for this purpose. It also provided the Bank with greater power to seek information from banks for prudential purposes and to investigate, either directly or through an agent, the affairs of banks.

State legislation exists to regulate the activities and monitor the solvency of particular types of financial institutions, which operate on a cooperative basis and lend predominantly to members or consumers. In general, these institutions are permanent building societies, cooperative housing societies and credit unions. In some States, including Western Australia, there is also legislation for State Government bodies to operate as banks or insurance offices.

CURRENCY

Australia has a decimal system of currency, the unit being the dollar which is divided into 100 cents. Australian notes are issued in the denominations of 5, 10, 20, 50 and 100 dollars and coins in the denominations of 5, 10, 20, 50 cents, and 1 and 2 dollars. The 2 dollar note was replaced by a 2 dollar coin in 1988. In 1991, the issue of 1 and 2 cent coins was discontinued.

BANKING

The banking system in Western Australia includes the Commonwealth banking institutions, The Rural and Industries Bank of Western Australia and, until late 1989, private trading and savings banks.

At 30 June 1989, thirty banks in Western Australia had deposits repayable in Australia and/or other lending. Table 24.1 provides individual bank details.

PRIVATE FINANCE

TABLE 24.1 – DEPOSITS AND LOANS ON
AUSTRALIAN BOOKS OF INDIVIDUAL BANKS:
AT 30 JUNE 1991
(\$ million)

Name	Deposits repayable in Australia	Other lending
Advance Bank Australia	—	86
ANZ Banking Group	1,076	834
ANZ Savings Bank	408	626
Australian Resources Development Bank	1	—
Bank of America Australia	22	4
Bank of Melbourne	—	507
Bank of New Zealand	135	44
BNZ Savings Bank	1	1
Bank of Singapore (Australia)	—	53
Banque Nationale de Paris	45	51
Challenge Bank	1,615	1,339
Chase AMP Bank	29	63
Citibank	1	1
Citibank Savings	93	599
Commonwealth Bank	1,131	1,060
Commonwealth Development Bank	18	333
Commonwealth Savings Bank	1,449	1,250
Hong Kong Bank of Australia	96	151
IBJ Australia Bank	28	5
Metway Bank	—	2
National Australia Bank	1,089	1,758
National Australia Savings Bank	524	584
National Mutual Royal Bank	35	56
NMR Savings Bank	4	20
NatWest Australia Bank	55	261
Primary Industry Bank	2	194
Rural & Industries Bank of WA	2,990	3,157
Standard Chartered Bank Australia	12	74
Westpac Banking Corporation	1,542	1,519
Westpac Savings Bank	1,101	979
Total	13,500	15,607

Trading and Savings Banks

The amended Banking Act has now largely removed the distinction between Trading and Savings banks.

State Bank

The Rural and Industries Bank of Western Australia is owned by the Western Australian government. The bank has an office in Sydney, which handles wholesale business, branches in London and the Cayman Islands, and a representative office in Tokyo. It is also authorised to deal in foreign exchange under the Banking (foreign exchange) Regulations and to operate a full foreign exchange dealing room in Perth.

Other Banks (excluding merchant banks)

Other banks operating in Western Australia comprise the Commonwealth Development Bank of Australia, which provides finance for the purpose of primary production, and for the establishment or development of small business undertakings where finance is not otherwise available on reasonable and suitable terms and conditions; the Australian Resources Development Bank Limited, which assists Australian enterprises to participate in the development of Australia's natural resources; and the Primary Industry Bank of Australia Limited, which provides loans to primary producers for longer terms than are otherwise generally available but which is restricted to refinancing loans made by banks and other financial institutions.

BUILDING SOCIETIES

Building societies in Western Australia are registered under the provisions of the *Building Societies Act 1976*, primarily for the purpose of raising funds to assist members by granting loans, secured on mortgage, to build or acquire homes.

TABLE 24.2 – BUILDING SOCIETIES
(\$ million)

	1987-88	1988-89	1989-90
PERMANENT SOCIETIES			
Liabilities—			
Withdrawable shares	1,097	1,469	1,496
Borrowings	518	397	381
Other	92	145	185
Total liabilities	1,707	2,011	2,062
Assets—			
Amount owing on loans	1,222	1,481	1,399
Placements and deposits	66	95	299
Other	419	435	364
Total assets	1,707	2,011	2,062
Expenditure	331	265	346
Income	350	301	362
TERMINATING SOCIETIES			
Liabilities—			
Loans—			
Banks	49	59	80
Government	158	152	158
Other	32	32	38
Other	6	6	11
Total liabilities	244	249	287
Assets—			
Amount owing on loans	208	203	246
Other	36	45	41
Total assets	244	249	287
Expenditure	23	27	30
Income	24	28	34

As shown by Table 24.2, permanent building societies obtain the majority of their funds from the public, while terminating societies derive funds primarily from government and banks. The Commonwealth Government contributes to these funds under the *Housing Assistance Act 1984*.

CREDIT UNIONS

Credit unions are registered in Western Australia under the *Credit Union Act 1979*. They operate on a cooperative basis by predominantly borrowing from and providing finance to their own members.

TABLE 24.3 - CREDIT UNIONS

	1987-88	1988-89	1989-90
Credit unions on register (a)	24	23	21
Number of members	186,262	184,370	168,406
	\$m	\$m	\$m
Income—			
Interest on loans	99	98	107
Income from placements and other deposits (b)	4	6	9
Income from securities	7	6	5
Other income	9	8	7
Total income	119	118	127
Expenditure—			
Interest on borrowings	73	68	79
Wages, salaries, etc	12	13	13
Other administrative expenses (c)	19	18	17
Other expenditure	11	10	11
Total expenditure	115	110	120
Liabilities—			
Members' funds—			
Share capital	6	6	6
Deposits	615	571	603
Other	61	82	77
Total liabilities	682	660	686
Assets—			
Loans to members	539	550	559
Other	142	110	127
Total assets	682	660	686

(a) At 30 June. (b) Includes interest on deposits with banks. (c) Includes bad debts written off and allowances for doubtful debts.

OTHER FINANCIAL INSTITUTIONS

Financial institutions registered under the Financial Corporations Act and not contained in the tables above, comprise authorised money market dealers, money market corporations, general financiers, pastoral finance companies, intra-group financiers and other financial corporations. These institutions together with public unit trusts, cash management trusts, insurance companies and private and public superannuation funds also contribute to financial

dealings in Western Australia. Statistical data for these institutions are generally available only on an Australian basis.

LENDING BY FINANCIAL INSTITUTIONS

New monthly statistical series were introduced in January 1985 to show a measure of the lending activity of significant lenders in fields of personal, commercial and lease finance. These were in addition to statistics already published on secured housing finance commitments to individuals for owner occupation.

Personal Finance Commitments

Personal finance commitments comprise those commitments made by significant lenders to individuals for their own personal (non-business) use. A lender is considered to be significant if it is a bank, a life insurance company or a corporation registered under the Financial Corporations Act and, during 1982-83, it committed funds exceeding \$4 million to individuals for their own use.

TABLE 24.4 - PERSONAL FINANCE COMMITMENTS (\$ million)

	1988-89	1989-90	1990-91
Total fixed loan commitments during period (including Personal investment loans)	1,501	1,353	1,164
Commitments under revolving credit facilities (including credit card facilities)—			
New and increased credit limits	685	833	702
Cancellations and reduction of credit limits during period	445	525	627
Credit limits at end of period—			
Total	1,796	2,046	2,069
Commitments used	690	818	838

Commercial Finance

Commercial finance commitments comprise those made by significant lenders to government, private and public enterprises, non-profit organisations, or individuals (for investment and business purposes). A lender is considered to be significant if it is a bank, a corporation registered under the Financial Corporation Act, or an insurance company and if it committed funds exceeding \$40.1 million for business purposes (excluding leasing of goods) during 1982-83.

PRIVATE FINANCE

TABLE 24.5 – COMMERCIAL FINANCE COMMITMENTS
(\$ million)

	1988-89	1989-90	1990-91
Fixed loan facilities (excluding some personal investment loans) by purpose of commitment—			
Construction finance for—			
Erection of—			
Dwellings for rental/resale	213	175	118
Non-residential buildings	487	271	117
Non-building structures	19	12	18
Alterations and additions	27	15	10
Purchase of real property—			
Dwellings for rental/resale	468	518	443
Non-residential buildings	481	381	220
Rural property	200	124	65
Residential block development	203	115	65
Other land	162	94	72
Wholesale finance	106	123	151
Purchase of plant and equipment—			
Motor vehicles	175	162	131
Other transport equipment	85	32	15
Other	200	134	96
Re-financing	829	404	312
Other (including factoring)	1,159	950	677
Total fixed loan commitments	4,813	3,511	2,508
Commitments not drawn at end of year	583	461	185
Revolving credit facilities—			
Total credit limits at end of year	6,225	6,695	6,890
Used credit at end of year	4,388	4,755	4,968

Lease Finance Commitments

Lease finance commitments comprise those made by significant lenders to trading and financial enterprises, non-profit organisations, governments, public authorities and individuals.

A lender is considered to be significant if it is a trading bank or a corporation registered under the Financial Corporations Act and categorised as a money market corporation or a finance company or a general financier and it committed funds exceeding \$13 million during 1982-83.

TABLE 24.6 – LEASE FINANCE COMMITMENTS
(\$ million)

	1988-89	1989-90	1990-91
Value of goods under new finance lease commitments (a)—			
Motor vehicles	296	224	150
Other transport equipment	21	9	5
Construction and earthmoving equipment	46	30	24
Agricultural machinery and equipment	38	43	15
Automatic data processing equipment and office machines	75	67	48
Shop and office furniture, fittings and equipment	39	40	25
Other revenue	140	69	46
Total lease finance commitments	656	482	314

(a) Excludes leveraged leases.

Housing Finance for Owner Occupation

Housing finance commitments comprise secured commitments to individuals for construction or purchase of dwellings for owner occupation.

TABLE 24.7 – HOUSING FINANCE FOR OWNER OCCUPATION
(\$ million)

	1988-89	1989-90	1990-91
Secured housing finance commitments to individuals—			
Construction of dwellings—			
Houses	636	430	408
Other dwellings	20	14	10
Purchase of newly erected dwellings—			
Houses	69	56	59
Other dwellings	20	14	14
Purchase of established dwellings—			
Houses	1,523	1,125	1,257
Other dwellings	115	80	76
Alterations and additions	85	88	104
Total commitments	2,468	1,806	1,930

NEW CAPITAL EXPENDITURE

New capital expenditure is expenditure on new fixed tangible assets including major improvements, alterations and additions. In general, this is expenditure charged to fixed tangible assets accounts excluding expenditure on second hand assets unless these are imported from overseas for the first time.

Data is collected by a quarterly sample survey of all private sector enterprises except those enterprises primarily engaged in the agriculture, construction and community services industries. State dissections of data have been produced since December 1978. Prior to that date, data was only available at the national level. Quarterly estimates of private new capital expenditure are available in *Private New Capital Expenditure, Australia* (Catalogue No. 5626.0 and *State Estimates of Private New Capital Expenditure* (Catalogue No. 5646.0).

In original current price terms, expenditure peaked in most sectors during 1989-90 and recorded falls in 1990-91. The only exception was the Mining sector which increased by an average of 1.9 per cent per year from 1988-89 to 1990-91. Overall, it was equipment, plant and machinery that sustained the fall in new capital expenditure in 1990-91.

TABLE 24.8 - PRIVATE NEW CAPITAL EXPENDITURE AT CURRENT PRICES BY SELECTED INDUSTRIES AND TYPE OF ASSET WESTERN AUSTRALIA (\$ million)

<i>Selected Industries and Type of Asset</i>	1988-89	1989-90	1990-91
Finance, property and business services	482	662	446
Mining	2,070	2,126	2,149
Manufacturing	694	560	543
Other selected industries	876	964	801
New capital expenditure—			
New buildings and structures	1,353	1,508	1,537
Equipment, plant and machinery	2,769	2,803	2,403
Total new capital expenditure	4,121	4,311	3,940

REFERENCES

ABS Publications

Authorised Dealers and Money Market Corporations, Australia (5638.0)

Banking, Australia (5605.0)

Building Societies, Australia (5637.0)

Cash Management Trusts, Australia (5635.0)

Census of Superannuation Funds, Australia 1982 - 83 (5636.0)

Co-operative Housing Societies: Assets, Liabilities, Income and Expenditure, Australia (5633.0)

Commercial Finance, Australia (5643.0)

Credit Co-operatives, General Financiers and Other Financial Corporations, Australia (5640.0)

Credit Unions: Assets, Liabilities, Income and Expenditure, Australia (5618.0)

Finance Companies: Assets, Liabilities, Income and Expenditure, Australia (5616.0)

Housing Finance for Owner Occupation, Australia (5609.0)

Lease Finance, Australia (5644.0)

Major Trading Banks, Australia (5603.0)

Monthly Summary of Statistics, Western Australia (1305.5)

New Capital Raisings by Companies Listed on Australian Stock Exchanges (5628.0)

Permanent Building Societies: Assets, Liabilities, Income and Expenditure, Australia (5632.0)

Personal Finance, Australia (5642.0)

Private New Capital Expenditure, Australia (5626.0)

Savings Banks, Australia (5602.0)

State Estimates of Private New Capital Expenditure (5646.0)

Other publications

Personal Investment Monthly

Reserve Bank Bulletin

Rural & Industries Bank of Western Australia, Annual Report

Chapter 25

CENTRAL STATISTICAL DIVISION PROFILE

THE GASCOYNE REGION	25-1
The Region	25-1
History	25-1
Physical Features	25-2
Population	25-3
Economic Base	25-3
Services and Infrastructure	25-7
The Future Outlook	25-8
GERALDTON MID-WEST REGION (GMWR)	25-9
The Region	25-9
History	25-9
Physical Features	25-10
Population	25-11
Economic Base	25-13
Services and Infrastructure	25-18
The Future Outlook	25-18
MAP OF CENTRAL STATISTICAL DIVISION	25-19

Chapter 25

CENTRAL STATISTICAL DIVISION PROFILE

The Central Statistical Division includes two of Western Australia's major economic regions - the Gascoyne and the Geraldton Mid-West.

The Gascoyne Region

THE REGION

The Gascoyne Region, or statistical sub-division, covers 140,912 square kilometres and is made up of the four shires of Carnarvon, Exmouth, Shark Bay and Upper Gascoyne. The Region is fringed by the Geraldton Mid-West to the south and east, the Pilbara to the north, and the Indian Ocean to the west.

The land area of the Gascoyne is approximately twice the size of Tasmania and represents six percent of the State's total area. Of all the regions in the State, the Gascoyne has the lowest population, with the number of estimated residents being approximately 11,800. However, the region has a vibrant economy based on fishing, pastoralism, horticulture and tourism.

HISTORY

The Gascoyne Region takes its name from the Gascoyne River discovered in 1839 by Lieutenant George Grey and named after Lieutenant Gascoyne RN. Pre-dating European settlement, Aborigines are believed to have lived in the area for at least 30,000 years.

A Dutchman, Dirk Hartog, was the first known westerner to land in the region, when, in October 1616 enroute to Java, he landed on an island west of Carnarvon that now bears his name. Many other early explorers visited the region over the next two hundred years but seem to have taken little interest in this part of the coast.

The first full exploration of the region did not commence until 1858. However, shortly afterwards, European settlers began moving into the region following the Legislative Council's inducement to pastoralists to take up leases for the grazing of sheep. The first permanent settlement along the Gascoyne River was in 1876 when Aubrey Brown and John Monger established Brickhouse Station.

The town of Carnarvon, named after Lord Carnarvon, Secretary of State for the Colonies 1873 to 1877, was gazetted as a township in 1883. Denham was proposed as a townsite in 1897 and settlement officially began there in the following year.

The early 1920's saw the establishment of banana plantations along the banks of the Gascoyne River at Carnarvon. This signalled the start of the region's horticultural industry. The diversity of the region was further increased when the town of Exmouth was established in 1963 to service the Naval Communication base.

The region originally born out of pastoralism, has matured through fishing, mining and horticulture. In recent years, the importance of tourism has increased, leaving the economic base for future growth both diversified and stable, reflecting the security of the industries in the region.

PHYSICAL FEATURES

Climate

The Gascoyne has a moderate tropical climate without the intense heat of the northern wet season or the cold winters of the south. The region is regarded as 'the sun's winter home' with approximately three hundred and twenty days of sunshine each year.

Geology

Much of the region is covered by a large sedimentary basin known as the Carnarvon Basin. The eastern portion of the basin is made up of a thick sequence of Palaeozoic sedimentary rocks. This sequence is made up of limestone, sandstone and shales of varying age, almost entirely of marine origin.

To the west these rocks are overlain by a layer of Cretaceous sandstones and limestone up to 600 metres thick.

To the east of the Carnarvon Basin is the Yilgarn Block consisting of Precambrian granites and sandstones.

Vegetation

The land of the Gascoyne Region is mostly low lying. It is almost entirely semi-arid scrub with little or no tree cover. The natural vegetation has not been cleared or otherwise disturbed. It consists of a layer of shrub of the Spinifex (*Triodia*), Wattle (*Acacia*) and Poverty Bush (*Eremophila*) varieties.

Along the rivers and adjacent flood plains, several varieties of Eucalypt grow together with Paperbarks (*Cadjeputs*). Sandalwood clumps, once common, are becoming a rarity. On the alluvial flats, Bluebush (*Maireana*) and Saltbush (*Atriplex*) are found.

When winter rains fall a transformation of the countryside occurs. Many colourful wildflowers of the Everlasting, Swainsona and other varieties spring up around existing shrubs, creating a kaleidoscope of colour.

TABLE 25.1 - CLIMATE AT REPRESENTATIVE CLIMATOLOGICAL STATIONS
GASCOYNE STATISTICAL SUB-DIVISION

Source: Bureau of Meteorology

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
RAINFALL													
Carnarvon M.O. (a)—													
Rainfall (mm)— Average	13	21	15	12	39	49	44	18	6	7	5	1	230
Wet days— Average number	2	3	2	3	5	7	7	5	3	3	1	1	42
Gascoyne Junction—													
Rainfall (mm)— Average	24	25	28	13	30	33	28	12	3	5	3	3	207
Wet days— Average number	3	3	2	2	4	5	4	3	1	1	1	1	30
Learmonth—													
Rainfall (mm)— Average	39	40	38	16	45	40	23	15	2	3	2	3	266
Wet days— Average number	2	3	2	2	4	5	3	2	1	0	0	0	24
TEMPERATURE													
Carnarvon—													
Mean max. °C	31.3	32.4	31.2	28.7	25.8	23.2	22.0	22.7	24.3	25.8	27.1	29.0	26.7
Mean min. °C	22.4	23.3	22.0	19.0	14.8	12.4	11.1	11.6	13.9	16.3	18.5	20.4	17.2
Highest max. °C	47.7	46.9	45.3	41.1	36.2	31.8	30.7	31.6	38.4	42.4	43.4	45.4	47.7
Lowest min. °C	15.9	17.1	13.4	9.5	6.1	3.6	2.4	3.5	5.9	8.8	10.7	12.6	2.4
Gascoyne Junction—													
Mean max. °C	41.0	40.4	37.7	32.2	27.0	23.5	22.5	23.8	27.8	32.2	35.0	38.9	31.8
Mean min. °C	23.1	24.4	22.0	18.0	13.1	10.3	9.1	9.1	11.3	15.1	17.3	20.8	16.1
Highest max. °C	47.0	47.3	46.1	44.2	37.2	30.6	31.0	32.9	37.4	42.5	44.4	45.8	47.3
Lowest min. °C	15.5	15.6	13.4	8.3	3.9	2.5	1.4	1.3	4.4	6.1	8.9	14.0	1.3
Learmonth—													
Mean max. °C	38.0	37.7	36.5	33.4	28.2	24.7	23.9	25.7	29.2	32.2	34.5	37.1	31.8
Mean min. °C	23.1	24.3	23.1	20.7	16.0	13.2	11.4	12.4	14.0	16.2	18.5	20.7	17.8
Highest max. °C	45.9	47.7	45.5	41.4	37.3	30.5	31.1	32.2	38.9	42.6	44.2	45.6	47.7
Lowest min. °C	16.3	18.1	16.7	13.7	7.6	6.0	3.8	4.2	7.8	10.2	12.0	14.4	3.8

(a) Meteorological Office.

Land Use

The Gascoyne Region covers an area of 137,153 square kilometres. Eighty-six percent of this is made up of pastoral and rural establishments. Of these establishments, less than half a percent of the land area is cleared for crops of any sort. The uncleared land is taken up by pastoral leases for the grazing of sheep and cattle.

The Cape Range National Park consists of approximately 500 square kilometres and the Ningaloo Marine Park a further 350 square kilometres.

POPULATION

The estimated resident population of the region is approximately 14,800 people. This makes the Gascoyne the least populated region in the State.

However, despite poor wool and livestock prices the region's population has continued to grow.

TABLE 25.2 – POPULATION IN STATISTICAL LOCAL AREAS (a)
GASCOYNE SUB-DIVISION

<i>Statistical local area</i>	1976	1981	1986	1991p
Carnarvon	6,725	7,215	10,259	9,038
Exmouth	2,821	2,899	4,352	3,823
Shark Bay	696	842	2,470	1,615
Upper Gascoyne	246	236	262	343
Total	10,488	11,192	17,343	14,819

(a) As at Census date.

NOTE: The 1986 Census was held during school holidays. Consequently the figures for this year are inflated due to visitors to the region.

ECONOMIC BASE

Fishing

The region is a rich source of seafood. Prawns are processed each season at Learmonth and Carnarvon. Scalefish are also plentiful. Snapper and a variety of other fish including whiting, shark, tuna, mackerel and squid are fished from Shark Bay to Exmouth Gulf. Schools of blue and yellow fin tuna move within a few kilometres of the coast. Scallops, trawled in Shark Bay, have become increasingly more important to the industry each year since 1980.

With the opening of the Fishing Boat Harbour in Carnarvon and processing facilities at Exmouth, virtually the entire catch of the area is landed within the region.

TABLE 25.3 – TONNES OF PRODUCE
GASCOYNE STATISTICAL SUB-DIVISION: 1989-90

<i>Locality</i>	<i>Fish</i>	<i>Crabs</i>	<i>Prawns</i>	<i>Lobsters</i>	<i>Molluscs</i>
Carnarvon	748	4	1,124	7	1,542
Denham	399	14	162	1	23
Exmouth	339	13	1,056	1	14
Total	1,486	31	2,342	9	1,579
Percent of State Catch	7.8	10.7	78.4	0.1	59.5

Horticulture

Some of the most fertile land in Australia can be found along the banks of the Gascoyne River five to eighteen kilometres from the mouth. The area is utilised by the plantation industry and comprises seven hundred and fifty hectares (or 7.5 square kilometres). Plantation size varies from 1.7 to 40 hectares.

The alluvial soils of the plantation area are loamy fine soils or silty loams. Combining these with the climate of the region gives ideal conditions for the growth of tropical and sub tropical fruits and in autumn, winter and spring, growth of vegetable crops. Average rainfall is 233mm but is irregular in occurrence and distribution. Crops are therefore grown under irrigation, using water pumped from aquifers in the sands of the Gascoyne River. Two thirds of the water used by growers is supplied by the Water Authority of Western Australia. The other third of the water used comes from growers' own metered aquifers. Irrigation water to plantations is rationed to around 7000 kilolitres per grower per month, regardless of source. Growers do not pay any charge for water from their own bores.

The relatively small area utilised for horticulture produced fruit and vegetables worth \$29.6 million in 1990 representing an increase of 15% over production in 1989. The region produced approximately 15% of the vegetables and 90% of all bananas produced in Western Australia in 1990.

CENTRAL STATISTICAL DIVISION PROFILE

TABLE 25.4 – CARNARVON PLANTATION INDUSTRY
 Source: Carnarvon Plantation Industry Production Statistics, 1990

Produce	1988		1989		1990	
	tonnes(a)	\$'000(b)	tonnes(a)	\$'000(b)	tonnes(a)	\$'000(b)
Bananas	9,571	6410.3	9,344	8,465.0	10,154	1,288.2
Vegetables	13,647	12,577.8	14,594	15,474.1	15,343	15,811.3
Tree Fruits	353	755.3	871	1,295.3	992	1,504.0
Total	23,571	19,743.4	24,809	25,234.4	26,489	29,603.5

(a) Production figures are taken from transport company and wholesaler records and do not include private or local sales. (b) Prices are the average of "most sales" as reported by the Metropolitan Market Trust.

Pastoralism

Within the Gascoyne Region there are eighty-two pastoral leases covering 11,744,866 hectares or 117,449 square kilometres. The relative numbers and sizes in the various shires are as follows:

Carnarvon Shire	29 leases	4,004,480 ha.
Exmouth Shire	3 leases	468,839 ha.
Shark Bay Shire	16 leases	1,982,325 ha.
Upper Gascoyne Shire	27 leases	5,041,507 ha.

Livestock in the region rely largely on natural pastures. These consist of varying mixtures of native perennial and annual plants. Within the industry there is general acceptance to maintain stock rates at about the dry season carrying capacity.

The sheep industry in the region exists primarily on wool. Sheep grazed in the region are predominantly Merinos. A typical station runs 8,000 to 12,000 sheep with an average stocking rate of between one sheep to ten hectares and one sheep to twenty hectares, depending on the country and conditions.

Relatively low wool prices in the early 1980's and more recently has led pastoralists to diversify away from sheep towards cattle.

TABLE 25.5 – VALUE OF PASTORAL COMMODITIES PRODUCED
GASCOYNE STATISTICAL SUB-DIVISION
 (\$'000)

Statistical local area	Livestock slaughtering and other disposals	Total wool	Livestock products excluding wool	Total
Carnarvon & Exmouth—				
1989-90	1,883	12,585	106	33,534
1988-89	1,767	15,123	68	33,546
1987-88	2,333	14,691	85	34,410
1986-87	2,592	11,020	60	34,051
1985-86	2,223	(a)8,592	(a)	27,318
Shark Bay—				
1989-90	685	2,539	—	3,224
1988-89	564	2,881	—	3,445
1987-88	748	3,182	14	3,944
1986-87	686	2,073	—	2,758
1985-86	530	(a)1,074	(a)	1,604
Upper Gascoyne—				
1989-90	3,761	6,032	130	9,923
1988-89	3,477	6,969	7	10,453
1987-88	3,798	6,853	—	10,651
1986-87	3,784	3,503	—	7,287
1985-86	3,236	(a)2,563	(a)	5,799

(a) Total livestock products including wool.

Mining

The main mineral produced by the Gascoyne Region is salt. Over 1.5 million tonnes of salt worth \$34.6 million was produced in 1990-91. Ideal conditions exist in the region for the production of salt (Sodium Chloride) by solar evaporation of sea-water or for harvesting from naturally occurring brines in salt lakes. Salt produced is exported primarily to Japan and the Far East for use in the manufacture of plastics and caustic soda.

Other mineral prospects in the region include sands for construction use, tantalite and various gemstones. While some precious gemstones may be mined in the area, there is no commercial production of these or the other minerals mentioned.

There is a continuing interest in exploration including drilling for petroleum oil and gas onshore and off-shore.

Secondary Industry

Secondary industry is classified as one where value is added to raw materials. This covers manufacturing processing, building and construction. The major secondary industry of the Gascoyne Region involves the processing of the catch of the fishing fleet. There are three large processing businesses and several smaller operators. Other businesses within the secondary sector are relatively small scale operators.

Manufacturing

There are seven fish processing businesses in the region and a number of fishermen who process their own catch, most of whom are single boat owners.

The remaining manufacturing industry in the region consists of several metal fabrication and sheetmetal work firms and a number of carpenters, joiners and cabinet makers. They are all relatively small operations with a correspondingly small number of employees.

In 1989 there were fourteen manufacturing establishments within the Gascoyne Statistical Sub-Division; ten in the Shire of Carnarvon, three in the Shire of Exmouth and one in the Shire of Shark Bay. Employment in manufacturing was 245 persons.

**TABLE 25.6 - MANUFACTURING ESTABLISHMENTS
SUMMARY OF OPERATIONS IN GASCOYNE
STATISTICAL SUB-DIVISION: 1988-89**

Statistical local areas	Estab- lish- ments at 30 June	Total employ- ment at 30 June (a)	Wages and Salaries (b)		Turnover
			\$'000	\$'000	
Carnarvon	10	n.p.	n.p.	n.p.	n.p.
Exmouth	3	14	129	525	
Shark Bay	1	n.p.	n.p.	n.p.	
Upper Gascoyne	—	—	—	—	
Total	14	245	n.p.	n.p.	

(a) Includes working proprietors. (b) Excludes the drawings of working proprietors.

CENTRAL STATISTICAL DIVISION PROFILE

Building and Construction

There are approximately eighteen businesses in the region engaged in the building trade. The majority of these are based in the Shire of Carnarvon. Building prices in the region are relatively high as there is no local manufacturer of building supplies.

Building in recent times has been associated with the development of public infrastructure and tourist facilities.

**TABLE 25.7 - BUILDING APPROVALS BY STATISTICAL LOCAL AREAS (a)
GASCOYNE STATISTICAL SUB-DIVISION
MARCH 1992**

Statistical local area	New residential building						Alterations and additions to residential buildings	Non-residential building		Total buildings
	Houses			Other residential buildings				Private sector	Total	
	Private sector	Public sector	Total value	Private sector	Public sector	Total value				
	No.	No.	\$'000	No.	No.	\$'000	\$'000	\$'000	\$'000	\$'000
Carnarvon (S)	—	—	—	—	—	—	46	—	—	46
Exmouth (S)	—	—	—	—	6	468	—	—	—	468
Shark Bay (S)	4	—	335	—	—	—	—	—	—	335
Upper Gascoyne (S)	—	—	—	—	—	—	—	—	—	—
Total	4	—	335	—	6	468	46	—	—	849

Commercial

A significant proportion of the region's wealth comes from the retail and wholesale trades. Consequently, a significant proportion of the region's small businesses are found in this sector. Many of these businesses cater for the needs of local residents, although the 1980s has seen the establishment of small businesses that rely on the tourism trade.

- 2 supermarkets
- 2 newsagencies
- 2 furniture stores
- 1 footwear store
- 2 hardware stores
- 2 pharmacies
- 4 liquor outlets
- 1 greengrocer
- 5 clothing stores and a variety of other stores.
- 1 butcher

Carnarvon is the commercial centre of the region. The retail sector within the town of Carnarvon in 1991 consisted of:

Carnarvon also has several wholesalers trading in fruit and vegetables, liquor, frozen foods, meat and pet foods.

TABLE 25.8 - RETAIL ESTABLISHMENTS: SELECTED ITEMS BY STATISTICAL LOCAL AREA, GASCOYNE STATISTICAL SUB-DIVISION: 1985-86

Statistical local area	Establishments at 30 June	Persons employed at 30 June (a)			Wages and Salaries (b)	Turnover	Total floor Space (c)
		Males	Females	Persons			
	No.	No.	No.	No.	\$'000	\$'000	'000m ²
Carnarvon (S)	78	160	238	398	2,740	35,859	11.1
Exmouth (S)	31	35	53	88	677	8,239	2.5
Shark Bay (S)	7	9	22	31	179	2,419	0.6
Upper Gascoyne (S)	—	—	—	—	—	—	—
Total	116	204	313	517	3,596	46,517	14.2

(a) Includes working proprietors. (b) Excludes drawings by working proprietors. (c) Excludes ASIC Group 486 - Motor vehicle dealers; petrol and tyre retailers.

Tourism

The combination of hundreds of kilometres of coastline and large inland areas gives the Gascoyne a wide variety of tourist attractions.

There are miles of beautiful sandy beaches and many colourful coral outcrops and reefs.

The surrounding waters contain a large variety of fish and the area is renowned as one of Australia's finest for the amateur fisherman whether fishing from beach, rock or boat. Charter boats are available all year round with expert fishermen who provide all equipment and experience necessary. Game fishing is popular, testing skill and wit against various fighting fish including sailfish, marlin and mackerel.

Tourism makes a major contribution to the economy of the Gascoyne Region. In 1990-91 the 230,000 visitors to the region were estimated to have spent \$57.6 million.

**TABLE 25.9 – TOURIST ACCOMMODATION
GASCOYNE STATISTICAL SUB-DIVISION
Holiday Flats and Units**

		1987-	1988-	1989-	1990-
	Unit	88	89	90	91
Letting entities	No.	4	5	6	8
Units	"	48	75	80	89
Bed spaces	"	247	350	374	434
Unit nights	'000	6.6	12.2	14.8	14.8
Unit occupancy rate	%	37.8	44.6	50.9	45.7
Takings	\$'000	245.3	426.8	606.1	667.2

**TABLE 25.10 – TOURISM
GASCOYNE STATISTICAL SUB-DIVISION
Hotels, motels and Guest Houses**

		1987-	1988-	1989-	1990-
	Unit	88	89	90	91
Establishments	No.	15	15	16	17
Guest rooms	"	433	446	500	567
Bed spaces	"	1,047	1,085	1,310	1,454
Room nights	'000	63.9	65.6	71.9	66.4
Room occupancy rate	%	40.4	40.3	39.4	32.1
Guest nights	'000	103.0	109.0	119.4	113.2
Arrivals	"	53.1	56.3	58.1	55.9
Takings	\$'000	2,802.9	3,085.6	3,555.7	3,560.4

SERVICES AND INFRASTRUCTURE

Energy

Power generation in Carnarvon and Denham is from natural gas supplied from the North West Shelf. The remaining towns in the region each have their own diesel generating plant for electric power operated by the State Energy Commission. The region is not linked to the State's interconnected grid system.

Water supply

The four towns of the region have their own source or sources of water. Bores and plant required to supply, purify and chlorinate the water are operated by the Water Authority of Western Australia. There is no interconnection of water supplies between towns.

The Carnarvon supply is taken from the bed of the Gascoyne River. From the seven bores situated on an island at the mouth of the river, an extensive system of bores and piping reaches over fifty kilometres up the river. Extending the capacity of the borefields is being examined to enable industry to expand.

Transport

The main method of transport to and around the region is by road. The North West Coastal Highway passes through the region and comes within six kilometres of the centre of Carnarvon. The town is a good place to stop, whether for food, fuel or an overnight stay for those travelling north along the Highway. In distance by road, Carnarvon is 902 kilometres north of Perth, 480 kilometres north of Geraldton and 876 kilometres south of Port Hedland.

The region is also serviced by daily flights to Perth from aerodromes at Carnarvon and Learmonth.

The Carnarvon jetty, built over eighty years ago, closed completely for use as a cargo jetty in 1984. This left the region without a public facility for unloading merchant vessels of any reasonable size. The State Government and Carnarvon Shire have agreed to finance maintenance of the jetty for tourist purposes.

Education

The region has ten schools, nine of which are Government schools, and one a private convent school. The School of the Air also has a base at Carnarvon which services children in remote communities and pastoral stations.

The region also provides TAFE and community courses through the Carnarvon TAFE campus.

Communication

The region is serviced by Australia Post although services to remote communities and pastoral properties are undertaken by private contractors. These services also deliver petroleum products and

general cargo. Most isolated properties are now integrated into the Telecom network via UHF radio links.

Health

The Gascoyne has two hospitals to service its resident population — one located at Carnarvon and the other at Exmouth. The region is also served by the Royal Flying Doctor. An Aboriginal Medical Service is located at Carnarvon.

THE FUTURE OUTLOOK

The continued expansion of the region's tourism sector and the possibilities for direct export of fish and horticulture production, will ensure the region's future.

Perhaps one of the major challenges facing the Gascoyne will be to encourage further development of new and existing industries whilst managing and protecting the region's unique environment.

Geraldton Mid-West Region (GMWR)

THE REGION

The GMWR comprises the statistical sub-divisions of Carnegie and Greenough River. It covers an area of some 616,000 square kilometres extending up the west coast from Greenhead to Kalbarri and more than 1,000 kilometres inland to the South Australian/Northern Territory border. It comprises nineteen local government areas: Cue, Meekatharra, Mount Magnet, Murchison, Sandstone, Wiluna, Yalgoo, Carnamah, Chapman Valley, Coorow, Geraldton, Greenough, Irwin, Mingenew, Morowa, Mullewa, Northampton, Perenjori and Three Springs.

Geraldton is the Mid-West's port, largest town and an important commercial, industrial, administrative, recreational and cultural centre. Meekatharra ranks second amongst the Mid-West's other towns.

HISTORY

Prepared by the Geraldton Branch of the West Australian Museum.

Although archaeological evidence suggests Aboriginal settlement in the Geraldton region extends back at least 40,000 years, it was probably not until the 17th century that Europeans took an interest in the west coast of 'New Holland'. Dirk Hartog left a crude plaque on the north west coast in 1616. Thirteen years later, Dutch East India Company sea captain Francisco Pelsaert was unlucky enough to run his vessel *Batavia* aground in the Houtman Abrolhos with tragic results. At least two other Dutch East India Company vessels were subsequently wrecked in the region, *Zuytdorp* (1711) and *Zeewijk* (1727). Although the events surrounding these wrecks include some of the most treacherous and bloodthirsty episodes in the annals of maritime history, the Dutch had no major impact on the region's development.

During the first half of the 19th century, two British sea captains played prominent parts in the later settlement of the region. In 1822, Captain Phillip King's voyage completed the circumnavigation of Australia's coastline from Rottneest northward.

Seventeen years later a small party led by George Grey was shipwrecked at Gantheaume Bay. After struggling ashore, Grey and his party walked southward to Fremantle, naming the Hutt, Bowes, Chapman, Greenough, Irwin and Arrowsmith Rivers en-route. Grey noted the fertility of the sand plain country south of the Chapman River and named this vast tract of land the Victoria District.

While Grey's report generally painted a very promising picture of the economic viability of the region, that of a later visitor did not. In 1842, *H.M.S. Beagle* visited Champion Bay under the command of Captain Stokes. His subsequent unfavourable report cooled much of the Swan River colony's earlier enthusiasm for the district. The different views of the region given by Grey and Stokes possibly resulted from their having seen the same region in widely differing seasons.

The discovery by the Gregory brothers of a coal seam in the Irwin River in 1846 and of high quality lead ore in the lower Murchison in 1848, drew attention to the region's potential for mining. These discoveries, together with the Gregorys' reports on the pastoral potential of both the Greenough Flats and areas to the north east of Champion Bay, attracted the interest of Governor Fitzgerald and resolved the earlier controversy over the feasibility of settling the district. By 1850, the Geraldton townsite had been gazetted, a harbour surveyed at Port Gregory and a garrison established.

Pastoral settlement followed rapidly on the heels of mining and a number of families trekked north to take up leases on either side of the Greenough River. During the 1850s and 1860s, pastoral development accelerated, while to the north, lead and copper mining formed the basis for the developing Northampton township.

In 1853, a convict depot was established at Port Gregory, however within four years it had closed and the contingent was moved to Geraldton. With the expansion of mining around Northampton and Geraldton, the port of Champion Bay eventually superseded Port Gregory and by the 1860s was the major sea port north of Fremantle.

With the establishment of the first government railway line from Northampton in 1879, growth progressed steadily if not spectacularly and Geraldton became the service, retail and transportation centre for the region. However, in the 1890s, the proclamation of the Murchison goldfields led to an explosion in development as Geraldton became the link between the outside world and the rich gold deposits of Cue, Day Dawn and Mt Magnet.

In the years following Federation, Geraldton consolidated its position, drawing additional trade from the emergent farming communities to the southeast. Railways constructed by the Midland Company and later the government, led to the development of townships such as Perenjori, Mingenew, Three Springs and Morawa, which added significantly to the growth of the regions production, revenue and population.

Although lead mining experienced a brief revival during the European scramble for munitions from 1908 - 1920 and gold mining towns have had brief but bright periods of existence, it has been the wool, wheat and fishing industries which have contributed to much of GMWR's subsequent growth.

PHYSICAL FEATURES

Climate

The coastal and adjacent parts of the Mid-West enjoy a Mediterranean type climate with mild wet winters and hot dry summers.

The central and eastern areas of the Mid-west experience semi-desert and desert conditions, with low unseasonal rainfall, hot summers and mild-cold nights.

Land Use

The western agricultural zone is characterised by extensive cropping and grazing activity, while pastoral activities abound in the central and eastern sections of the region.

Almost two and a half million hectares of land have been cleared for cropping, with cereal crops comprising over one million hectares annually. Approximately 60 per cent of this land is sown with wheat.

TABLE 25.11 - CLIMATE AT REPRESENTATIVE CLIMATOLOGICAL STATIONS
GERALDTON MID-WEST REGION

Reporting station and characteristic	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
RAINFALL													
Geraldton—													
Rainfall (mm)— Average	6	14	15	26	71	112	95	67	30	20	10	5	471
Wet days— Average number	2	2	3	6	10	14	15	13	9	7	4	2	87
Carnamah—													
Rainfall (mm)— Average	11	15	21	23	51	82	70	54	28	18	11	9	393
Wet days— Average number	2	2	3	5	9	13	14	11	8	5	3	2	77
Meekatharra M.O.—													
Rainfall (mm)— Average	26	31	23	13	25	35	22	11	6	6	13	9	220
Wet days— Average number	4	4	4	4	5	6	6	4	2	2	2	3	46
TEMPERATURE													
Geraldton—													
Mean max. °C	31.7	32.4	30.8	27.3	23.7	20.7	19.4	20.0	22.0	24.3	26.9	29.3	25.7
Mean min. °C	18.4	19.1	17.8	15.3	12.6	10.9	9.3	8.9	9.2	10.9	13.7	16.2	13.5
Highest max. °C	47.7	47.3	44.3	39.4	36.6	29.2	35.5	31.6	36.8	40.7	42.2	46.7	47.7
Lowest min. °C	10.2	10.0	8.9	6.9	2.1	0.5	0.8	1.3	1.8	2.4	3.8	7.7	0.5
Carnamah—													
Mean max. °C	35.9	35.5	32.7	27.3	22.3	18.9	17.7	19.0	22.1	25.7	29.8	33.4	26.7
Mean min. °C	18.3	18.9	17.0	13.7	10.5	8.6	7.2	7.1	8.1	10.2	13.0	15.8	12.1
Highest max. °C	48.1	46.3	43.9	40.0	34.4	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	—
Meekatharra—													
Mean max. °C	38.1	36.6	34.6	29.1	23.3	19.4	18.6	21.0	25.3	29.1	33.1	36.3	28.6
Mean min. °C	24.2	23.7	21.5	16.9	11.7	8.7	7.3	8.3	11.5	14.8	18.5	22.0	15.8
Highest max. °C	44.8	45.2	43.7	38.8	36.0	28.3	28.8	32.6	37.7	40.2	42.3	45.0	45.0
Lowest min. °C	12.2	12.3	10.3	5.8	1.7	-3.1	-0.2	—	3.5	5.2	5.2	11.1	-3.1

CENTRAL STATISTICAL DIVISION PROFILE

In other cereal crops, the region produces more than 12 per cent of the State's barley and 4 per cent of the State's oats. The region supports a flock of some 5 million sheep and lambs. Significant numbers are sold and slaughtered annually for human consumption.

POPULATION

As at June 30, 1990 it was estimated that 50,323 people resided in the GMWR. Of these, nearly 28,000 lived in the Geraldton urban area.

The people of the Mid-West are descended from many varied cultures and beliefs.

TABLE 25.13 - ESTIMATED RESIDENT POPULATION AT 30 JUNE

Source: ABS Cat No. 3203.5.

Statistical local area	1986	1987	1988	1989	1990
Cue	544	579	688	927	918
Meekatharra	1,416	1,654	1,947	2,204	2,250
Mt Magnet	1,167	1,262	1,349	1,446	1,493
Murchison	132	144	144	147	140
Sandstone	127	151	184	260	260
Wiluna	1,801	1,832	1,879	2,006	2,002
Yalgoo	270	285	324	512	699
Carnamah	1,418	1,433	1,435	1,534	1,677
Chapman Valley	771	773	775	775	764
Coorow	1,393	1,431	1,472	1,486	1,523
Geraldton	19,923	20,222	20,660	21,024	21,386
Greenough	5,798	5,985	6,204	6,492	6,880
Irwin	1,805	1,878	1,984	2,073	2,149
Mingenew	693	702	690	674	662
Morawa	1,165	1,165	1,168	1,160	1,146
Mullewa	1,455	1,425	1,403	1,381	1,368
Northampton	3,034	3,084	3,127	3,150	3,184
Perenjori	823	807	787	852	865
Three Springs	1,022	1,005	992	969	957
TOTAL GMWR	44,757	45,817	47,212	49,072	50,323

TABLE 25.12 - AGRICULTURAL LAND USE - GERALDTON MID-WEST REGION: 1989-90 (hectares)

Statistical local area	Establishments	Cleared land	Sown pastures and grasses	Wheat	Oats	Barley	Lupins	Pastoral
Carnamah	78	130,812	66,039	29,846	2,706	2,309	7,251	—
Chapman Valley	117	250,600	96,570	70,923	3,946	11,567	29,078	—
Coorow	107	206,613	89,584	43,006	4,765	1,102	14,054	—
Geraldton	5	28	—	—	—	—	—	—
Greenough	114	134,187	72,750	21,602	7,562	3,447	9,313	—
Irwin	42	89,390	47,633	11,009	2,581	1,486	5,699	—
Mingenew	53	167,098	40,690	40,213	2,823	5,473	19,366	—
Morawa	108	208,104	39,342	84,629	4,425	3,598	7,430	—
Mullewa	125	386,501	34,877	140,219	3,892	7,569	41,777	—
Northampton	158	292,447	127,979	56,717	5,953	16,567	35,586	—
Perenjori	122	294,475	26,117	11,976	4,406	1,598	14,017	—
Three Springs	90	18,823	94,987	41,912	3,985	3,814	12,364	—
Cue	10	5	—	—	—	—	—	1,013,878
Meekatharra	33	—	—	—	—	—	—	8,159,813
Mount Magnet	18	5	—	—	—	—	—	1,949,998
Murchison	21	—	—	—	—	—	—	4,119,326
Sandstone	13	—	—	—	—	—	—	2,385,122
Wiluna	21	33	—	—	—	—	—	5,855,196
Yalgoo	22	5	—	—	—	—	—	2,660,987

CENTRAL STATISTICAL DIVISION PROFILE

TABLE 25.14 – ESTIMATED RESIDENT POPULATION BY AGE, SEX AND STATISTICAL LOCAL AREA
30 JUNE 1990

Statistical local area	Sex	Males									Total
		0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75+	
Cue	M	45	57	88	166	107	47	30	19	11	570
	F	40	56	54	90	50	18	17	14	9	348
	P	85	113	142	256	157	65	47	33	20	918
Meekatharra	M	101	158	214	375	222	106	66	33	18	1,293
	F	99	121	188	264	129	60	43	33	20	957
	P	200	279	402	639	351	166	109	66	38	2,250
Mt Magnet	M	63	103	136	216	150	86	57	23	9	843
	F	62	95	120	167	96	51	27	16	16	650
	P	125	198	256	383	246	137	84	39	25	1,493
Murchison	M	2	8	15	20	11	12	11	3	—	82
	F	5	8	9	11	7	10	6	1	1	58
	P	7	16	24	31	18	22	17	4	1	140
Sandstone	M	11	17	23	41	31	15	6	7	2	153
	F	14	17	18	24	16	9	3	5	1	107
	P	25	34	41	65	47	24	9	12	3	260
Wiluna	M	92	203	192	197	162	91	45	38	20	1,040
	F	84	178	198	202	127	74	46	36	17	962
	P	176	381	390	399	289	165	91	74	37	2,002
Yalgoo	M	24	48	135	123	64	32	21	6	2	455
	F	26	43	62	48	32	17	7	3	6	244
	P	50	91	197	171	96	49	28	9	8	699
Carnamah	M	72	131	146	255	167	86	55	28	14	954
	F	66	120	120	172	113	54	43	22	13	723
	P	138	251	266	427	280	140	98	50	27	1,677
Chapman Valley	M	32	71	73	80	69	59	37	11	6	438
	F	26	52	48	52	60	49	22	10	7	326
	P	58	123	121	132	129	108	59	21	13	764
Coorow	M	69	132	88	149	129	94	77	41	22	801
	F	72	146	62	120	117	82	61	39	23	722
	P	141	278	150	269	246	176	138	80	45	1,523
Geraldton	M	931	1,608	2,027	2,060	1,463	1,057	844	553	326	10,869
	F	865	1,439	1,902	1,948	1,422	1,012	830	639	460	10,517
	P	1,796	3,047	3,929	4,008	2,885	2,069	1,674	1,192	786	21,386
Greenough	M	288	628	561	518	570	407	300	179	71	3,522
	F	280	580	517	518	592	375	267	142	87	3,358
	P	568	1,208	1,078	1,036	1,162	782	567	321	158	6,880
Irwin	M	82	172	173	224	185	109	82	77	31	1,135
	F	71	141	158	190	166	100	83	64	41	1,014
	P	153	313	331	414	351	209	165	141	72	2,149
Mingenew	M	40	81	44	77	61	36	26	12	2	379
	F	34	50	34	59	46	32	15	9	4	283
	P	74	131	78	136	107	68	41	21	6	662
Morawa	M	51	78	147	117	66	63	63	32	14	631
	F	47	76	101	94	61	61	38	18	19	515
	P	98	154	248	211	127	124	101	50	33	1,146
Mullewa	M	61	155	152	109	92	87	71	28	14	769
	F	50	132	110	89	77	73	43	18	7	599
	P	111	287	262	198	169	160	114	46	21	1,368
Northampton	M	125	257	231	305	263	174	144	115	52	1,666
	F	114	245	220	273	233	149	131	97	56	1,518
	P	239	502	451	578	496	323	275	212	108	3,184
Perenjori	M	37	77	70	86	70	54	44	30	7	475
	F	34	66	39	65	64	44	41	23	14	390
	P	71	143	109	151	134	98	85	53	21	865
Three Springs	M	39	99	97	88	90	52	34	22	10	531
	F	32	81	76	72	68	38	26	16	17	426
	P	71	180	173	160	158	90	60	38	27	957
TOTAL GMWR	M	2,165	4,083	4,612	5,206	3,972	2,667	2,013	1,237	631	26,586
	F	2,021	3,646	4,036	4,468	3,476	2,308	1,749	1,205	818	23,727
	P	4,186	7,729	8,648	9,664	7,448	4,975	3,762	2,462	1,449	50,323

ECONOMIC BASE

Employment

Table 25.15 reveals the majority of workers were employed in the agriculture, wholesale/retail trade and community service sectors of the economy.

TABLE 25.15 – EMPLOYED POPULATION BY INDUSTRY: GERALDTON MID-WEST REGION, CENSUSES 1981 AND 1986

Industry	1981		1986	
	No.	Per cent of total	No.	Per cent of total
Agriculture	4,625	26.0	4,378	24.3
Mining	841	4.7	1,179	6.5
Manufacturing	783	4.4	949	5.3
Electricity, gas and water	300	1.7	324	1.8
Construction	1,347	7.6	1,225	6.8
Wholesale and retail	2,547	14.3	3,020	16.8
Transport and storage	941	5.3	978	5.4
Communication	256	1.4	245	1.4
Finance	708	4.0	920	5.1
Public administration and defence	613	3.4	679	3.8
Community services	2,533	14.2	2,938	16.3
Entertainment and recreation	904	5.1	1,084	6.0
Non classified economic unit	1,405	7.9	98	0.5
Total	17,803	100.0	18,017	100.0

Agriculture

Gross value of agricultural products produced in the GMWR earned \$389.3 million in 1989-90, or 11.5 per cent of Western Australia's agricultural production.

TABLE 25.16 – GROSS VALUE OF AGRICULTURAL COMMODITIES PRODUCED: GERALDTON MID-WEST REGION

Year	Value (\$'000)	Per cent change on previous year
1980-81	217,540	—
1981-82	242,066	11.3
1982-83	256,159	5.8
1983-84	242,452	-5.4
1984-85	355,000	46.4
1985-86	277,519	-21.8
1986-87	332,035	19.6
1987-88	335,596	1.1
1988-89	465,397	38.7
1989-90	389,347	-16.3

Livestock

The Mid-West region produced more than 21,000 tonnes of wool in 1989-90; the value of which contributed 36 per cent to the total value of output.

Only modest numbers of cattle and pigs are reared in the region.

TABLE 25.17 – GROSS VALUE OF AGRICULTURAL PRODUCTION – GERALDTON MID-WEST REGION: 1989-90 (\$'000)

Statistical local area	Wheat for grain	Crops and pastures excluding wheat for grain	Livestock slaughtering and other disposals	Wool	Livestock products excluding wool	Total Agriculture
Cue	—	—	132	1,653	—	1,785
Meekathara	—	—	6,267	4,753	—	11,020
Mount Magnet	—	—	326	3,266	—	3,592
Murchison	—	—	1,085	6,600	—	7,685
Sandstone	—	—	172	1,642	—	1,814
Yalgoo	—	—	503	5,273	—	5,776
Wiluna	—	75	1,996	2,388	—	4,459
Carnamah	7,712	1,833	1,445	7,465	—	18,455
Chapman Valley	18,002	7,829	2,141	12,308	3	40,283
Coorow	11,319	2,688	1,810	12,922	26	28,765
Geraldton/Greenough	6,374	5,944	2,815	10,658	15	25,806
Irwin	3,762	2,505	977	6,230	4	13,478
Mingenew	12,183	5,576	932	9,456	1	28,148
Morowa	19,402	1,994	905	6,335	6	28,642
Mullewa	30,488	7,810	2,370	9,619	—	50,287
Northampton	18,224	12,047	2,466	19,248	19	52,004
Perenjori	26,032	1,991	1,423	8,934	12	38,392
Three Springs	11,997	3,512	1,737	11,695	15	28,956
Total	165,495	53,804	29,502	140,445	101	389,347
Total Western Australia	951,537	598,767	454,151	1,253,629	113,011	3,371,087

CENTRAL STATISTICAL DIVISION PROFILE

TABLE 25.18 – SHEEP AND LAMBS SHORN AND WOOL CLIP – GERALDTON MID-WEST REGION: 1989-90

Statistical local area	Sheep and Lambs Shorn			Woolclip		
	Sheep	Lambs	Total	Sheep	Lambs	Total
	'000	'000	'000	tonnes	tonnes	tonnes
Cue	48.1	9.1	57.2	240.2	17.6	257.8
Meekatharra	134.0	16.0	150.0	714.4	26.2	740.6
Mount Magnet	92.2	17.4	109.6	480.2	25.3	508.5
Murchison	186.5	39.4	225.9	967.0	60.5	1,027.5
Sandstone	59.4	8.2	67.6	244.7	11.6	256.3
Wiluna	77.0	4.1	81.1	367.3	5.3	372.6
Yalgoo	145.4	42.0	187.4	751.9	70.6	822.5
Carnamah	207.7	76.5	284.2	1,042.7	91.3	1,158.0
Chapman Valley	372.8	114.8	487.6	1,738.5	128.9	1,904.4
Coorow	373.4	115.0	488.4	1,809.3	160.3	1,969.6
Geraldton	—	—	—	—	—	—
Greenough	326.1	93.4	419.5	1,513.3	104.5	1,617.8
Irwin	177.3	58.6	235.9	859.6	84.7	944.3
Mingenew	264.4	83.7	348.1	1,312.9	114.8	1,427.7
Morawa	194.0	55.1	249.1	887.4	77.6	965.0
Mullewa	298.2	82.5	380.7	1,363.2	102.5	1,465.7
Northampton	565.3	176.6	741.9	2,692.2	214.9	2,907.1
Perenjori	282.0	75.1	357.1	1,256.1	107.1	1,363.2
Three Springs	336.9	117.1	454.0	1,626.1	158.3	1,784.4

Crops

Wheat is by far the major grain crop of the GMWR, followed by lupins, barley and oats. In 1989-90 wheat accounted for 42 per cent of the total value of output for the region. Hay for export is gaining popularity amongst farmers in close proximity to Geraldton.

Fruit and vegetables

This traditional industry in the coastal areas of the region is poised to grow, given the emerging markets in South-East Asia and the Far East. The area is well known for its production of tomatoes, rock melons, lettuces and oranges.

TABLE 25.19 – GRAIN PRODUCTION – GERALDTON MID-WEST REGION: 1989-90 ('000 tonnes)

Statistical local area	Wheat		Oats		Barley		Triticale Grain	Lupins Grain
	Grain	Hay	Grain	Hay	Grain	Hay		
Carnamah	38.9	0.2	1.3	1.4	3.3	0.1	0.1	3.9
Chapman Valley	90.8	0.1	2.1	2.6	14.3	0.1	0.1	28.0
Coorow	57.1	7.4	2.8	1.7	0.7	—	—	10.5
Geraldton	—	—	—	—	—	—	—	—
Greenough	32.2	1.7	3.1	19.0	5.8	—	—	9.0
Irwin	19.0	0.7	1.6	2.5	2.1	—	0.1	7.0
Mingenew	61.5	0.2	1.7	1.4	8.0	0.2	0.2	—
Morawa	97.9	0.1	1.9	0.5	4.4	—	—	4.8
Mullewa	153.8	0.1	1.2	0.5	9.4	0.6	0.7	34.4
Northampton	91.9	0.4	3.7	3.3	21.7	0.3	—	42.7
Perenjori	131.3	0.1	1.8	0.6	1.6	—	0.1	8.4
Three Springs	60.5	0.3	2.2	1.7	5.1	—	0.1	10.4
Total	834.9	11.3	23.4	35.2	76.4	1.3	1.4	159.1

CENTRAL STATISTICAL DIVISION PROFILE

TABLE 25.20 – FRUIT AND VEGETABLE PRODUCTION
GERALDTON MID-WEST REGION: 1989-90
(tonnes)

<i>Fruit and vegetables</i>	<i>Wiluna</i>	<i>Irwin</i>	<i>Chapman Valley</i>	<i>Geraldton</i>	<i>Greenough</i>	<i>Northampton</i>	<i>Total</i>
Oranges	190.0	—	—	—	—	16.7	206.7
Mandarins	4.2	—	—	—	—	13.1	17.3
Melons—							
Rock/Cantelope	—	240.0	18.0	—	149.0	114.0	521.0
Water	—	8.0	—	—	120.0	47.0	175.0
Tomatoes	—	—	5.0	100.0	180.0	23.0	308.0
Cucumber	—	—	—	—	—	7.8	7.8
Pumpkins	—	12.0	—	—	—	—	12.0
Marrows, Squashes and Zucchini	—	—	—	—	—	67.5	67.5
Grapes	—	—	—	—	—	1.0	1.0
Lettuces	—	315.0	—	—	—	—	315.0

Mining

The Mid-West mining industry generated total sales to the value of \$948.5 million in 1990-91. Mineral sands resources in the region are among the largest deposits of industrial minerals in Australia.

The second largest talc mine in the world is found at Three Springs. It produced over 140,000 tonnes in 1990-91. The production of natural gas is set to increase, in response to the sale of large quantities to Japan and growth in total demand.

TABLE 25.21 – QUANTITY AND VALUE OF MINERAL PRODUCTION – GERALDTON MID-WEST REGION
1990-91

Source: Statistical Digest of Mineral and Petroleum Production 1990-91, Department of Mines, Western Australia, Nov 1991.

<i>Mineral</i>	<i>Locality</i>	<i>Quantity</i>	<i>Unit</i>	<i>Value (\$'000)</i>	<i>Mineral</i>	<i>Locality</i>	<i>Quantity</i>	<i>Unit</i>	<i>Value (\$'000)</i>
Sand	Meekatharra	20.7	tonnes	107	Petroleum condensate	Carnamah	889	kltrs	38
Gold	Cue	12,034	kg	192,655		Irwin	759	"	104
	Meekatharra	11,868	"	189,989		Total	1,648	"	142
	Mt Magnet	7,457	"	119,377	Crude oil	Irwin	37,898	"	6,469
	Perenjori	210	"	3,365	Natural gas	Carnamah	102,203	"	11,474
	Sandstone	3,914	"	62,657		Irwin	111,215	"	12,738
	Wiluna	4,572	"	73,195		Total	213,418	kltrs	24,212
	Yalgoo	3,227	"	51,663	Red Iron Oxide	Cue	5,757	"	110
	Total	43,282	"	692,901	Silver				
Gypsum	Carnamah	3,791	tonnes	22	by-product	Meekatharra	7,269	kg	971
	Irwin	1,271	"	7		Yalgoo	6,585	"	986
	Total	5,062	"	29		Total	13,854	"	1,957
Garnet Sand	Northampton	20,976	"	1,993	Talc	Meekatharra	20,067	tonnes	1,787
Ilmenite	Carnamah	149,048	"	(a)13,190		Three Springs	141,493	"	9,904
Upgraded Ilmenite	Carnamah	75,274	"	(a)37,639		Total	161,560	"	11,691
Monazite	Carnamah	4,269	"	3,378	Copper Conc.	Meekatharra	22,563	"	9,777
Rutile	Carnamah	55,434	"	42,085		Yalgoo	2,599	"	1,065
Zircon	Carnamah	140,349	"	68,460		Total	25,162	"	10,842
Limestone/ Lime Sand	Irwin	8,254	..	16,309	Attapulgitite	Mullewa	15,403	"	3,915
					Zinc	Yalgoo	34,907	"	13,079

(a) Figures are approximated.

CENTRAL STATISTICAL DIVISION PROFILE

Fishing

A substantial rock lobster and wetfish industry is found along the Mid-West coast. It is estimated that the 1990-91 fishing season generated payments to fishermen in the vicinity of \$80 million. Almost half of Western Australia's registered fishing fleet operates in the region.

Manufacturing

The regions manufacturing industries are primarily based on minerals processing, lobster processing and fertiliser manufacture.

**TABLE 25.23
MANUFACTURING ESTABLISHMENTS
GERALDTON MID-WEST REGION**

Source: ABS Catalogue No. 1303.5.

Item	Unit	1983	1984	1986	1987
		-84	-85	-87	-88
Establishments					
operating at 30 June	No.	80	78	78	85
Persons employed (a)	"	761	716	605	929
Wages and salaries (b)	\$m	6.9	9.3	11.0	10.6

(a) Excluding single establishment enterprises employing fewer than four persons. (b) Wages and salaries for some Shires unavailable.

**TABLE 25.22 - FISH, CRUSTACEANS AND MOLLUSCS - CATCH BY MID-WEST FISHING LOCALITY: 1989-90
(tonnes)**

Source: ABS Catalogue No. 7601.5

Locality	Fish	Crabs	Prawns	Lobsters	Molluscs	Total
Cliff Head	—	—	—	100	1	101
Coronation Beach	—	—	—	29	—	29
Desperate Bay	—	—	—	41	—	41
Dongara	60	1	—	940	10	1,011
Drummond Cove	—	—	—	5	—	5
Easter Group	—	—	—	44	—	44
Freshwater Point	6	—	—	378	2	386
Geraldton	607	—	12	2,275	218	3,112
Greenhead	4	—	—	197	—	201
Horrocks Beach	—	—	—	104	3	107
Kalbarri	145	—	—	538	12	695
Knobby Head	—	—	—	74	—	74
Leeman	87	—	—	518	2	608
Little Bay	—	—	—	15	—	15
North Island	—	—	—	156	—	156
Pelsart Group	—	—	—	12	—	12
Port Gregory	26	—	13	73	2	114
Seven Mile Beach	—	—	—	62	1	63
Total	935	1	25	5,561	251	6,776

Building and Construction

The Mid-West building industry services residential, commercial and industrial construction requirements both within the region and in the north-west of the State.

TABLE 25.24 - DWELLING UNIT COMMENCEMENTS
GERALDTON MID-WEST REGION

Year	Houses		Other residential buildings	
	Number	Value	Number	Value
		\$'000		\$'000
1984-85—				
Carnegie	18	1,248	6	447
Greenough River	400	17,928	118	3,468
Total	418	19,176	124	3,915
1985-86—				
Carnegie	50	3,198	4	199
Greenough River	345	16,097	92	2,928
Total	395	19,295	96	3,127
1986-87—				
Carnegie	29	2,196	22	836
Greenough River	226	11,586	40	1,403
Total	255	13,782	62	2,239
1987-88—				
Carnegie	53	3,823	36	1,613
Greenough River	273	14,794	76	3,392
Total	326	18,617	112	5,005
1988-89—				
Carnegie	45	3,095	—	—
Greenough River	444	28,481	188	8,447
Total	489	31,576	188	8,447
1988-90—				
Carnegie	26	1,795	6	239
Greenough River	303	23,514	69	3,390
Total	329	25,309	75	3,629
1990-91—				
Carnegie	23	2,131	—	—
Greenough River	317	22,612	92	5,069
Total	340	24,743	92	5,069

Tourism

As in other regions of the State, tourism is becoming a major industry in the Mid-West. The region's attractions include Kalbarri and the adjoining National Park, Murchison Gorges, wildflowers, Murchison goldfields and the Batavia Coast.

TABLE 25.25 - TOURIST ACCOMMODATION
GREENOUGH RIVER STATISTICAL SUB-DIVISION (a)

Type	Unit	1987-88	1988-89	1989-90	1990-91
CARAVAN PARKS					
Establishments	No.	28	27	27	27
Sites	"	2,242	2,225	2,262	2,368
Site occupancy rate	%	30.5	35.4	37.1	34.3
Guest arrivals	'000	132	140	152	150
Takings from accommodation	\$'000	2,098	2,523	2,998	3,204
HOLIDAY FLATS AND UNITS					
Letting entities	No.	13	12	12	13
Units	"	207	231	233	254
Unit occupancy rate	%	57.5	55.3	58.0	51.0
Unit lettings	'000	n.a.	n.a.	n.a.	n.a.
Takings from accommodation	\$'000	1,442	1,737	2,099	2,307
HOTELS, MOTELS AND GUEST HOUSES					
Establishments	No.	32	31	29	29
Guest rooms	"	822	823	845	813
Room occupancy rate	%	40.3	43.1	43.6	42.5
Guest arrivals	'000	103	105	120	110
Takings from accommodation	\$'000	4,914	5,450	6,451	6,216

(a) Statistics available only for Greenough River S.S.D

SERVICES AND INFRASTRUCTURE**Education**

The GMWR enjoys a wide range of educational services from pre-schools through to TAFE.

**TABLE 25.26 – SCHOOLS AND STUDENTS
GERALDTON MID-WEST REGION
AUGUST 1991**

Source: Ministry of Education, Education Statistics System.

Type	Number
GOVERNMENT SCHOOLS	
Campuses	42
Students—	
Pre-primary	1,163
Primary	4,764
Secondary	2,230
<i>Total students</i>	<i>8,157</i>
NON-GOVERNMENT SCHOOLS	
Campuses	12
Students—	
Pre-primary	119
Primary	1,281
Secondary	834
<i>Total Students</i>	<i>2,234</i>
COMMUNITY PRE-SCHOOLS	
Campuses	2
Students	56
INDEPENDENT PRE-SCHOOLS	
Campuses	1
Students	19
ALL SCHOOLS	
Campuses	57
Students—	
Pre-primary	1,282
Primary	6,045
Secondary	3,064
Pre-school	75
TOTAL STUDENTS	10,466

Health

The Geraldton Regional and St John of God hospitals provide the focus for the Mid-West's health services. These are supported by a number of district hospitals located throughout the region, more than thirty general practitioners and local and visiting specialists.

Transport

The region enjoys a sophisticated range of transport services including commercial air, road and rail freight, air and road passenger services and a quality road highway network.

Communications

The region is linked to national postal and telecommunication networks. Two commercial FM radio stations and ABC FM and AM stations broadcast in the region. A Geraldton based newspaper and TV network complete the regions media contingent.

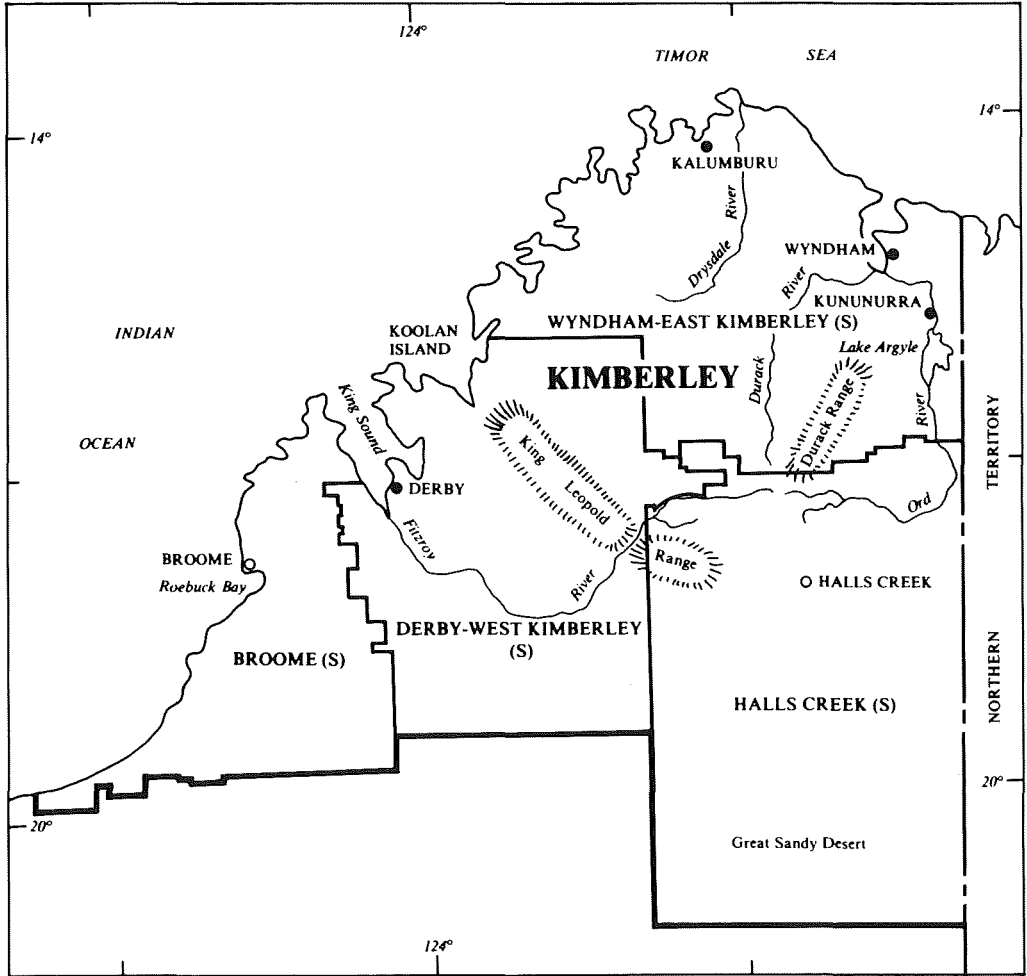
THE FUTURE OUTLOOK

In order to plan, coordinate and facilitate the regions economic and social development, the State Government established the Geraldton Mid-West Development Authority in 1988.

The Authority aims to achieve its goal by identifying new development opportunities, assisting new and existing businesses to either establish or expand, improving the delivery of government services and coordinating the provision of other services required by the community.

The Authority is optimistic about the regions future and looks forward to assisting its residents to further improve their quality of life.

CENTRAL STATISTICAL DIVISION PROFILE



Chapter 26

STATISTICAL SUMMARY

Table	Page
26.1 - Estimated Population, Natural Increase and Migration	26-2
26.2 - Vital Statistics	26-3
26.3 - Social Service Beneficiaries and Repatriation Pensions: Western Australia	26-4
26.4 - National Welfare Fund: Expenditure In Western Australia	26-5
26.5 - Commonwealth Government Cash Benefits to or for Persons in Western Australia	26-5
26.6 - Livestock; Wool Production; Agriculture	26-6
26.7 - Primary Production — Miscellaneous	26-8
26.8 - Secondary Production	26-9
26.9 - Building Completed	26-10
26.10 - Transport; Customs and Excise	26-11
26.11 - Motor Vehicle Registrations; Exports of Cattle and Sheep	26-12
26.12 - Exports of Certain Commodities	26-13
26.13 - External Trade	26-16
26.14 - Industrial Disputes; Wage Rates; Unemployment Benefit	26-17
26.15 - Consumer Price Index	26-18
26.16 - State and Local Authorities: Receipts and Outlay	26-18
26.17 - Public Revenue and Expenditure: Consolidated Revenue Fund	26-19
26.18 - Net Expenditure from Loan Funds; Public Debt	26-20
26.19 - Banking and Permanent Building Societies	26-21
26.20 - Western Australia in Relation to Australia	26-22

Chapter 26

STATISTICAL SUMMARY

In the following pages, a historical summary of some of the more important statistics relating to Western Australia is shown. This is intended to present a general picture of the development of the State. Naturally the range of statistics available in the early years of the colony is limited.

It is not always possible to achieve perfect comparability over long periods of time because of changes in definitions, scope of statistical collections etc. While major breaks in series are shown, minor changes are not shown and the statistics should be interpreted with this in mind.

Generally, the first year shown on each page is the earliest for which any series on that page is available. Because of space constraints, data for earlier years are shown at ten year intervals only.

The pages have been arranged in chapter order.

STATISTICAL SUMMARY

TABLE 26.1 - 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 (e)				Mean population (b)		Population of Perth Statistical Division (b) (h)
				Recorded natural increase (c)	Estimated net migration (d)	Total increase (f)		Year ended 31		
	Males	Females	Persons			Number	Per cent (g)	30 June	December	
1829	769	234	1,003	n.a.	n.a.	n.a.	n.a.			
1830	877	295	1,172	n.a.	n.a.	169	16.85		n.a.	
1840	1,434	877	2,311	34	123	157	7.29			
1850	3,576	2,310	5,886	132	1,109	1,241	26.72			
1860	9,597	5,749	15,346	379	130	509	3.43	n.a.	15,092	
1870	15,511	9,624	25,135	475	7	482	1.96		24,894	
1880	16,985	12,576	29,561	551	-129	422	1.45		29,350	
1890	28,854	19,648	48,502	1,021	1,821	2,842	6.22		47,081	20
1900	110,088	69,879	179,967	3,214	6,495	9,709	5.70		175,113	73
1910	157,971	118,861	276,832	4,845	6,312	11,157	4.20	266,686	271,019	115.7
1920	176,895	154,428	331,323	4,761	-1,298	3,463	1.06	327,152	330,023	167.0
1930	232,868	198,742	431,610	5,426	-453	4,973	1.17	425,785	429,079	235.1
1940	248,734	225,342	474,076	4,598	-2,902	1,696	0.36	472,060	473,397	255.5
1950	294,758	277,891	572,649	9,170	19,295	28,465	5.23	545,134	557,878	351.7
1951	304,454	285,885	590,339	9,506	8,184	17,690	3.09	570,346	580,317	362.8
1952	316,700	296,235	612,935	10,204	12,392	22,596	3.83	589,887	600,615	378.1
1953	326,372	305,371	631,743	10,790	8,018	18,808	3.07	611,191	621,034	390.1
1954	334,342	314,365	648,707	10,564	6,400	16,964	2.69	630,705	639,963	402.2
1955	343,838	324,771	668,609	11,244	8,658	19,902	3.07	648,222	657,323	416.8
1956	350,333	330,935	681,268	11,344	1,315	12,659	1.89	666,898	674,459	427.4
1957	356,195	339,039	695,234	11,627	2,339	13,966	2.05	680,949	687,448	438.9
1958	361,441	345,755	707,196	11,177	785	11,962	1.72	693,568	699,915	449.3
1959	366,253	352,438	718,691	11,614	-119	11,495	1.63	705,869	711,737	459.5
1960	372,665	358,368	731,033	11,229	1,113	12,342	1.72	717,316	722,900	470.3
1961	384,773	370,440	755,213	11,349	2,571	13,920	1.90	729,770	737,596	482.7
1962	395,891	381,357	777,248	11,254	10,499	22,035	2.92	755,770	766,205	500.3
1963	407,024	391,871	798,895	11,314	10,068	21,647	2.79	777,413	788,457	517.8
1964	417,023	401,098	818,121	10,256	8,705	19,226	2.41	798,824	808,300	534.0
1965	427,330	410,918	838,248	9,912	9,963	20,127	2.46	817,157	826,481	550.9
1966	440,913	423,180	864,093	10,292	15,553	25,845	3.08	837,290	849,189	571.8
1967	458,438	438,550	896,988	11,244	21,651	32,895	3.81	863,539	879,815	597.7
1968	479,938	457,862	937,800	12,073	28,739	40,812	4.55	896,761	915,757	629.2
1969	500,378	476,242	976,620	13,404	25,416	38,820	4.14	935,985	955,660	659.7
1970	520,174	493,878	1,014,052	14,075	23,357	37,432	3.83	975,063	994,201	689.6
1971	547,563	522,784	1,070,347	16,433	16,352	33,033	3.26	1,013,455	1,052,785	733.0
1972	558,030	534,574	1,092,604	14,780	7,875	22,257	2.08	1,068,972	1,081,634	753.5
1973	568,500	545,482	1,113,982	12,700	8,910	21,378	1.96	1,091,845	1,101,921	773.6
1974	584,552	561,439	1,145,991	12,506	19,700	32,009	2.87	1,113,723	1,127,887	801.4
1975	594,518	572,885	1,167,403	12,411	9,410	21,412	1.87	1,142,777	1,155,499	822.1
1976	605,932	585,748	1,191,680	12,972	10,921	24,277	2.08	1,166,902	1,178,928	842.5
1977	618,210	599,006	1,217,216	12,815	11,392	25,536	2.14	1,191,588	1,204,454	861.1
1978	627,238	609,163	1,236,401	12,880	4,980	19,185	1.58	1,217,062	1,227,903	875.3
1979	636,442	620,650	1,257,092	12,499	6,847	20,691	1.67	1,237,090	1,246,800	890.6
1980	648,922	634,583	1,283,505	12,505	12,627	26,413	2.10	1,257,214	1,269,270	910.0
1981	667,381	652,840	1,320,221	13,905	20,858	36,716	2.86	1,284,014	1,301,528	937.7
1982	684,771	670,200	1,354,971	14,060	17,640	34,750	2.63	1,320,278	1,338,681	965.3
1983	697,570	683,441	1,381,011	14,718	8,126	26,040	1.92	1,354,814	1,368,546	986.8
1984	708,066	694,966	1,403,032	13,123	5,586	22,021	1.59	1,380,566	1,391,775	1,005.5
1985	724,952	711,948	1,436,900	14,272	16,304	33,868	2.41	1,404,053	1,419,004	1,032.9
1986	746,560	732,919	1,479,479	14,929	25,569	42,579	2.96	1,437,490	1,458,526	1,066.7
1987	767,648	752,659	1,520,307	14,452	26,376	40,828	2.76	1,479,779	1,500,249	1,099.4
1988	793,614	777,774	1,571,388	15,611	35,470	51,081	3.36	1,522,066	1,546,259	1,118.8
1989 r	815,358	799,414	1,614,772	15,512	23,704	39,216	2.50	1,571,276	1,594,531	1,161.2
1990 p	832,904	817,016	1,649,920	15,943	19,205	35,148	2.18	1,615,344	1,633,829	1,193.1

(a) Estimates for years prior to 1987 are based on final census results. (b) Figures for 1971 and later refer to the estimated resident population. (c) Excess of births registered over deaths registered, including deaths of defence personnel, whether in Australia or overseas, between September 1939 and June 1947. (d) Interstate and overseas. (e) 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) For the years 1972 to 1986 differences between the sum of natural increase and net migration, and total increase, are owing to distribution of intercensal discrepancy. (g) 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. (h) Prior to 1988 figures are at 31 December. Those for 1988 and later are as at 30 June.

STATISTICAL SUMMARY

TABLE 26.2 – VITAL STATISTICS

NOTE: Figures for 1965 and earlier (i.e. those above the double lines) exclude persons of predominantly Aboriginal descent.

Year	Marriages registered	Divorces (b)	Live births registered (c)	Deaths registered (c)(d)	Natural increase (c)(e)	Rate per 1,000 of mean population (a)				Infant mortality	
						Marriages	Births	Deaths (c)(d)	Natural increase (c)(d)	Number (c)(f)	Rate (c)(g)
1840	25		54	20	34	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1850	37		186	54	132	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1860	151		588	209	379	10.01	38.96	13.18	25.11	n.a.	n.a.
1870	153		853	378	475	6.15	34.27	15.18	19.08	100	117.23
1880	214		933	382	551	7.29	31.79	13.02	18.77	72	77.17
1890	278		1,561	540	1,021	5.90	33.16	11.47	21.69	140	89.69
1900	1,781		5,454	2,240	3,214	10.17	31.15	12.79	18.35	688	126.15
1910	2,107		7,585	2,740	4,845	7.77	27.99	10.11	17.88	593	78.18
1920	2,932	n.a.	8,149	3,388	4,761	8.88	24.69	10.27	14.42	538	66.02
1930	3,205		9,200	3,774	5,426	7.47	21.44	8.80	12.64	430	46.74
1940	5,234		9,121	4,486	4,635	11.06	19.27	9.48	9.79	403	44.18
1941	5,077		10,118	4,769	5,349	10.71	21.35	10.06	11.29	357	35.28
1942	5,441		9,901	5,076	4,825	11.42	20.77	10.65	10.12	365	36.86
1943	4,528		10,481	4,587	5,894	9.50	21.98	9.62	12.36	342	32.63
1944	4,506		10,870	4,478	6,392	9.36	22.58	9.30	13.28	354	32.57
1945	3,788		10,672	4,712	5,960	7.77	21.89	9.67	12.23	315	29.52
1946	5,171	725	12,105	4,753	7,352	10.49	24.57	9.65	14.92	376	31.06
1947	5,282	807	12,874	4,723	8,151	10.50	25.60	9.39	16.21	398	30.92
1948	5,186	696	12,931	4,685	8,246	10.08	25.13	9.10	16.02	331	25.60
1949	4,951	566	13,511	4,790	8,721	9.30	25.37	8.99	16.37	357	26.42
1950	5,434	720	14,228	5,058	9,170	9.74	25.50	9.07	16.44	386	27.13
1951	5,390	682	14,794	5,288	9,506	9.29	25.49	9.11	16.38	425	28.73
1952	5,389	585	15,413	5,209	10,204	8.97	25.66	8.67	16.99	384	24.98
1953	5,032	535	15,862	5,072	10,790	8.10	25.54	8.17	17.37	378	23.83
1954	5,204	530	15,928	5,364	10,564	8.13	24.89	8.38	16.51	359	22.54
1955	5,145	479	16,623	5,379	11,244	7.83	25.29	8.18	17.11	373	22.44
1956	5,080	544	16,916	5,572	11,344	7.53	25.08	8.26	16.82	384	22.70
1957	4,897	541	16,924	5,297	11,627	7.12	24.62	7.71	16.91	357	21.09
1958	5,038	536	16,731	5,554	11,177	7.20	23.90	7.94	15.97	360	21.52
1959	5,387	584	17,111	5,497	11,614	7.57	24.04	7.72	16.32	345	20.16
1960	5,323	540	16,926	5,697	11,229	7.36	23.41	7.88	15.53	366	21.62
1961	5,150	466	17,078	5,729	11,349	6.98	23.15	7.77	15.39	336	19.67
1962	5,466	582	17,064	5,810	11,254	7.23	22.58	7.69	14.89	380	22.27
1963	5,755	553	17,290	5,976	11,314	7.40	22.23	7.68	14.55	353	20.42
1964	6,023	542	16,685	6,429	10,256	7.55	20.93	8.06	12.86	328	19.66
1965	6,448	604	16,186	6,274	9,912	7.91	19.85	7.70	12.16	351	21.68
1966	7,002	637	17,194	6,902	10,292	8.25	20.25	8.13	12.12	343	19.95
1967	7,430	726	18,023	6,779	11,244	8.44	20.48	7.71	12.78	314	17.42
1968	8,086	812	19,541	7,468	12,073	8.83	21.34	8.16	13.18	398	20.37
1969	8,993	872	20,754	7,350	13,404	9.41	21.72	7.69	14.03	453	21.83
1970	9,227	889	21,618	7,543	14,075	9.28	21.74	7.59	14.16	459	21.23
1971	9,382	1,064	24,239	7,806	16,433	8.91	23.02	7.41	15.61	464	19.14
1972	9,120	1,243	22,177	7,441	14,736	8.43	20.50	6.88	13.62	348	15.69
1973	9,102	1,424	20,510	7,845	12,665	8.26	18.61	7.12	11.49	394	19.21
1974	9,295	1,761	20,207	7,778	12,429	8.24	17.92	6.90	11.02	327	16.18
1975	9,026	2,240	20,338	7,972	12,366	7.81	17.60	6.90	10.70	271	13.32
1976	9,517	4,818	20,670	7,740	12,930	8.07	17.53	6.57	10.97	273	13.21
1977	10,063	3,975	20,651	7,899	12,752	8.35	17.15	6.56	10.59	251	12.15
1978	9,404	3,387	20,611	7,794	12,817	7.66	16.79	6.35	10.44	230	11.16
1979	9,239	3,397	20,469	8,020	12,449	7.41	16.42	6.43	9.98	247	12.07
1980	9,594	3,073	20,607	8,166	12,441	7.56	16.24	6.43	9.80	239	11.60
1981	10,111	3,481	21,877	7,993	13,884	7.77	16.81	6.14	10.67	193	8.82
1982	10,455	3,842	22,236	8,187	14,049	7.81	16.61	6.15	10.49	204	9.17
1983	10,519	3,822	23,087	8,369	14,718	7.69	16.87	6.12	10.75	179	7.75
1984	9,920	4,069	21,625	8,503	13,122	7.13	15.54	6.11	9.43	232	10.72
1985	10,398	4,039	23,109	8,836	14,273	7.33	16.29	6.23	10.06	209	9.04
1986	10,379	4,001	24,236	9,307	14,929	7.12	16.62	6.38	10.24	214	8.83
1987	10,150	4,044	23,332	8,880	14,452	6.77	15.55	5.92	9.63	196	8.40
1988	10,578	3,964	25,143	9,532	15,611	6.85	16.27	6.17	10.18	214	8.51
1989	10,739	4,089	25,051	9,543	15,508	6.73	15.71	5.98	9.72	195	7.78
1990	10,613	3,845	25,356	9,407	15,949	6.50	15.52	5.76	9.76	217	8.56

(a) Rates for 1971 and later are based on the estimated resident population. Rates for years prior to 1987 are based on final census results. (b) Final orders - dissolution of marriages. (c) Births, deaths and natural increase figures for 1982 and earlier years are on a State of registration basis. Figures for 1983 and later are based on State of usual residence. (d) Excludes fetal deaths (stillbirths) and between September 1939 and June 1947, deaths of defence personnel, whether in Australia or overseas. (e) Excess of live births registered over deaths registered. (f) Deaths under 1 year of age included in deaths registered. (g) Per 1,000 live births.

STATISTICAL SUMMARY

TABLE 26.3 - SOCIAL SERVICE BENEFICIARIES AND REPATRIATION PENSIONS: WESTERN AUSTRALIA

Year ended 30 June	Social service benefits								Repatriation pensions				
	Pensioners (a)			Family Allowance (a) (b)				Un-employment benefit (h)	Disability		Service		
	Age (c)(d)	Invalid (c)(d)	Total Age and Invalid	Widow	Under 16 years of age (e)(f)	Students (g)	Total		Number (a)(i)	Amount paid \$'000	Number (a)(j)	Amount paid \$'000	
1910	2,361	..	2,361						n.a.	n.a.	n.a.	n.a.	
1920	4,791	1,788	6,579						22,311	1,087	n.a.	n.a.	
1930	8,913	3,284	12,197				n.a.		28,407	1,586	n.a.	n.a.	
1940	19,024	3,454	22,478	n.a.	n.a.				21,449	1,370	1,489	103	
1941	19,423	3,425	22,848						n.a.	20,388	1,343	1,545	112
1942	19,156	3,557	22,713		68,533		68,533			19,757	1,337	1,561	129
1943	18,575	3,580	22,155	2,596	65,777		65,777			20,245	1,506	1,454	147
1944	18,109	3,443	21,552	2,796	66,938		66,938			22,511	1,884	1,369	144
1945	17,713	3,414	21,127	2,894	68,316		68,316			27,686	2,105	1,343	144
1946	18,797	3,538	22,335	2,870	69,325		69,325	422		37,921	2,530	1,403	173
1947	21,162	4,002	25,164	2,570	71,968		71,968	1,095		42,127	2,856	1,580	192
1948	22,210	4,387	26,597	2,719	75,186		75,186	409		44,818	3,000	1,715	290
1949	23,739	4,340	28,079	2,876	79,693		79,693	126		46,785	3,516	1,832	301
1950	24,316	4,294	28,610	2,883	133,557	n.a.	133,557	267		48,878	3,776	1,953	331
1951	24,317	4,184	28,501	2,789	172,186		172,186	60		51,027	4,545	2,022	369
1952	24,782	3,964	28,746	2,676	183,257		183,257	57		52,071	5,429	2,136	449
1953	25,679	3,996	29,675	2,686	192,991		192,991	844		52,607	5,843	2,343	556
1954	27,248	4,101	31,349	2,753	202,098		202,098	427		53,352	6,174	2,468	605
1955	28,833	4,191	33,024	2,848	212,025		212,025	157		54,117	6,877	2,692	723
1956	30,244	4,425	34,669	3,015	220,792		220,792	473		54,427	6,902	3,648	964
1957	32,192	5,039	37,231	3,243	230,922		230,922	1,940		54,987	7,169	4,306	1,095
1958	33,124	5,519	38,643	3,542	237,732		237,732	2,330		55,251	8,017	4,672	1,395
1959	34,629	5,941	40,570	3,833	245,090		245,090	2,852		56,008	7,893	5,009	1,552
1960	36,575	6,152	42,727	4,039	250,449		250,449	2,512		56,644	8,471	5,344	1,751
1961	37,656	6,945	44,601	4,348	257,037		257,037	2,154		57,123	9,310	6,101	2,102
1962	39,104	7,826	46,930	4,570	266,067		266,067	2,932		57,947	10,177	7,115	2,687
1963	40,661	8,170	48,831	4,486	270,736		270,736	2,674		57,580	10,527	7,526	2,927
1964	41,819	8,306	50,125	4,734	275,910	7,865	283,775	2,677		57,047	11,564	7,754	3,177
1965	42,706	8,615	51,321	4,926	279,642	8,844	288,486	1,679		55,920	11,447	7,780	3,320
1966	43,876	8,575	52,451	5,071	286,534	8,769	295,303	785		54,560	12,637	7,757	3,571
1967	45,741	8,307	54,048	5,228	295,628	10,697	306,325	718		52,967	11,889	7,674	3,612
1968	48,850	8,310	57,160	5,482	306,492	10,999	317,491	608		51,193	11,934	7,586	3,777
1969	50,432	8,413	58,845	5,559	318,147	11,446	329,593	524		49,526	13,061	7,298	4,071
1970	56,017	7,933	63,950	6,086	322,058	11,539	333,597	474		47,993	12,811	7,783	4,491
1971	58,224	8,155	66,379	6,392	333,848	13,737	347,585	872		46,514	13,140	7,767	4,769
1972	60,523	8,485	69,008	6,795	343,455	15,452	358,907	2,808		45,079	14,413	7,864	5,298
1973	68,701	9,518	78,219	7,948	346,769	17,821	364,590	4,960		44,093	15,462	9,599	7,394
1974	76,124	10,406	86,530	8,763	343,404	17,585	360,989	2,863		42,807	17,363	10,669	10,191
1975	79,831	10,961	90,792	9,442	349,702	18,924	368,626	9,317		41,747	21,845	11,814	15,149
1976	84,087	12,265	96,352	10,027	352,998	20,151	373,149	13,598		40,619	23,118	13,472	20,560
1977	86,470	13,263	99,733	10,691			376,346	15,706		39,459	25,587	15,338	26,933
1978	94,491	13,653	108,144	11,494			377,545	20,470		38,053	28,728	16,975	33,785
1979	96,558	15,045	111,603	12,232			371,315	(k)29,000		36,883	28,183	18,794	38,896
1980	98,887	15,894	114,781	12,476			375,013	(k)29,800		35,857	29,097	21,131	45,911
1981	101,042	16,352	117,394	12,526			377,113	28,638		34,920	33,411	23,704	59,328
1982	103,397	17,195	120,592	12,654	n.a.	n.a.	385,708	31,636		34,696	35,597	26,121	69,549
1983	105,784	18,598	124,382	12,830			391,885	50,992		34,726	44,394	29,346	90,417
1984	103,889	21,124	125,013	12,934			393,952	(k)59,400		34,808	49,981	32,640	110,663
1985	102,943	23,889	126,832	12,977			396,851	(k)57,900		34,952	58,502	34,815	127,841
1986	103,085	25,769	128,854	12,817			388,251	(k)54,358		35,223	67,345	36,423	144,009
1987	103,339	27,886	131,225	12,647			388,360	56,441		31,760	72,596	36,532	155,389
1988	103,743	28,522	132,265	11,898			367,107	46,091		31,362	80,593	36,798	179,711
1989	104,816	29,706	134,522	6,901	352,405	14,085	366,490	35,621		30,761	84,091	36,246	184,171
1990	106,301	30,590	136,891	6,488	353,348	9,582	362,930	34,770		30,285	92,674	35,570	195,559
1991	109,592	32,508	142,100	6,070	360,749	10,704	371,453	55,756		29,776	96,259	35,003	203,512

(a) Number at 30 June. (b) Previously child and student endowment. Name of benefit, rates and conditions changed from 15 June 1976. (c) Prior to June 1957 excludes pensioners in benevolent homes. (d) At 30 June 1940 invalid pensioners who qualified were reclassified as age pensioners. (e) Prior to 30 June 1957 excludes endowed children in institutions. (f) Child endowment commenced 1 July 1941 for second and subsequent children. From 20 June 1950 endowment extended to include first or only children. (g) From 14 January 1964 includes students aged 16 and under 21; extended to 25 years in 1976. (h) Average number of persons on benefit at end of each week. (i) Includes pensions paid to incapacitated veterans and to dependants of incapacitated or deceased veterans. (j) Comprises pensions paid to veterans and their dependants. (k) Estimated.

STATISTICAL SUMMARY

TABLE 26.4 – NATIONAL WELFARE FUND: EXPENDITURE IN WESTERN AUSTRALIA

NOTE: The National Welfare Fund was established, with effect from 1 July 1943, in terms of the National Welfare Fund Act 1943. During the first two years of operation, only maternity allowances and funeral benefits were paid from the Fund. Under the provisions of the National Welfare Fund Act 1945, effective from 1 July 1945, expenditure on age pensions (introduced in 1909), invalid pensions (1910), widows' pensions (1942), and child endowment (1941) became a charge on the Fund. Unemployment, sickness, and special benefits came into operation on 1 July 1945. Hospital benefit was first paid in 1945-46 (for public hospitals from 1 January 1946, and private hospitals from 18 February 1946).

(\$'000)

Year ended 30 June	Social services					Health services					Total expenditure on health services (b)	Total expenditure from National Welfare Fund (b)
	Pensions		Child endowment (a)	Un-employment, sickness, and special benefits	Total expenditure on social services	Hospital and nursing home benefits	Medical benefits	Pharmaceutical benefits	Tuberculosis campaign (a)	Milk for school children		
	Age and invalid	Widows'										
1960	19,833	1,827	9,720	1,504	33,652	3,351	2,241	3,178	1,163	458	10,427	44,079
1961	21,586	2,104	11,402	1,309	37,180	3,817	2,339	3,630	1,111	448	11,386	48,812
1962	24,344	2,371	10,205	1,887	39,575	3,996	2,455	4,809	873	526	12,695	52,270
1963	25,582	2,377	10,485	2,006	41,203	4,189	2,657	5,161	885	584	13,501	54,705
1964	27,373	3,115	12,994	1,978	46,223	4,705	2,808	5,242	839	615	14,238	60,460
1965	29,413	3,463	13,406	1,401	48,450	4,987	3,716	5,294	822	637	15,486	64,635
1966	30,760	3,602	13,624	872	49,648	5,286	4,345	5,870	758	619	16,906	67,316
1967	33,794	4,011	15,498	855	55,001	5,881	4,944	6,719	600	698	18,998	74,666
1968	36,418	4,346	14,845	758	57,295	6,598	5,265	7,117	862	850	20,860	78,894
1969	39,404	4,786	15,540	795	61,729	7,401	5,600	8,702	645	797	23,340	85,828
1970	44,637	5,600	17,894	1,039	70,725	9,153	6,373	9,836	828	797	27,262	98,577
1971	48,979	6,172	16,423	1,699	75,279	10,256	9,782	11,215	800	835	33,246	109,216
1972	57,374	7,180	18,188	4,298	89,623	14,492	13,800	12,418	907	997	43,032	133,770
1973	76,188	10,064	21,407	8,372	119,622	19,062	15,958	13,258	824	1,086	50,827	171,763
1974	98,011	13,409	19,009	8,314	147,040	21,222	16,478	16,153	803	596	56,535	205,778
1975	138,812	18,459	19,085	24,944	213,981	25,758	19,437	19,830	1,023	..	68,542	284,016

(a) Comprises amounts paid to individuals in the form of allowances and to the State Government as reimbursements for expenditure incurred in the provision and maintenance of facilities. (b) Excludes some relatively minor expenditure not allocatable among States.

NOTE: This series has been replaced by 'Commonwealth Government Cash Benefits to or for Persons in Western Australia'.

TABLE 26.5 – COMMONWEALTH GOVERNMENT CASH BENEFITS TO OR FOR PERSONS IN WESTERN AUSTRALIA

NOTE: This series replaced 'National Welfare Fund: Expenditure in Western Australia' (\$m)

Year ended 30 June	Health services and benefits				Social security and welfare benefits						Total cash benefits	
	Hospital and institutional	Clinical and non-institutional and public health		Pharmaceutical	Total	Ex-service men and dependants	Age pensions	Unemployment and sickness benefits	Sole parent, family and child benefits n.e.c.	Other		Total
		Other services										
1979	24.3	37.3	18.3	79.9	67.1	238.2	90.0	111.5	94.2	601.0	28.8	709.7
1980	27.8	42.1	18.7	88.6	75.0	258.6	96.1	117.1	108.9	655.8	28.6	773.0
1981	37.1	48.8	22.1	108.0	92.7	290.4	98.6	128.4	126.8	737.0	32.2	877.2
1982	47.0	58.9	28.5	134.3	105.1	334.8	125.4	156.7	146.9	868.9	36.7	1,039.9
1983	55.0	71.7	33.1	159.8	134.8	364.2	224.6	199.4	169.7	1,092.7	42.5	1,295.0
1984	42.2	114.2	35.7	192.0	160.7	400.4	294.8	234.8	192.5	1,283.1	55.2	1,530.3
1985	51.7	176.2	49.2	277.1	186.2	428.5	310.5	256.6	227.6	1,409.4	53.8	1,740.3
1986	60.6	200.9	53.9	315.4	211.7	450.2	317.5	281.5	255.6	1,516.5	59.5	1,891.4
1987	64.2	235.1	55.9	355.2	228.0	478.3	357.1	282.7	280.9	1,627.0	78.5	2,060.7
1988	91.4	253.5	71.1	416.0	260.8	537.7	332.5	314.1	317.1	1,762.2	85.9	2,264.1
1989	97.6	273.4	76.8	447.8	268.3	584.5	296.0	277.9	450.5	1,839.0	84.8	2,371.6
1990	n.a.	n.a.	n.a.	n.a.	288.2	640.0	320.6	465.9	336.5	209.9	n.a.	n.a.

STATISTICAL SUMMARY

TABLE 26.6 - LIVESTOCK; WOOL PRODUCTION; AGRICULTURE

Year (a)	Livestock (b)			Wool production (c)		Area and production of principal grain crops (e)			
	Cattle	Sheep	Pigs	Quantity	Gross value (d)	Area	Yield per hectare	Wheat Production	
								Total	Gross value
	'000	'000	'000	tonnes	\$'000	'000 hectares	tonnes	'000 tonnes	'000 \$'000
1829	—	1	—	n.a.	—	n.a.	n.a.	n.a.	—
1830	1	8	—	n.a.	—	n.a.	n.a.	n.a.	—
1840	2	31	2	n.a.	—	1	1.11	1	—
1850	13	128	3	n.a.	—	2	n.a.	n.a.	n.a.
1860	32	260	11	298	n.a.	6	1.00	6	—
1870	45	609	13	811	—	11	0.79	9	—
1880	64	1,232	24	1,970	—	11	0.62	7	—
1890	131	2,525	29	3,161	—	14	0.92	13	—
1900	339	2,434	62	4,323	—	30	0.70	21	310
1910	825	5,159	58	13,210	2,141	236	0.68	161	2,162
1920	850	6,533	61	18,947	4,552	516	0.65	333	11,023
1930	813	9,883	101	32,451	4,829	1,601	0.91	1,456	12,201
1940	789	9,516	218	32,362	7,889	1,062	0.54	573	8,648
1950	865	10,923	79	42,071	47,237	1,171	0.89	1,048	51,339
1951	841	11,362	90	46,680	118,068	1,289	1.05	1,358	65,328
1952	852	12,188	86	52,681	64,027	1,253	0.87	1,089	58,984
1953	846	12,475	76	54,760	75,121	1,214	0.80	965	55,194
1954	830	13,087	101	58,497	82,567	1,168	0.93	1,030	55,423
1955	861	13,411	107	56,324	67,985	1,206	0.77	933	43,655
1956	897	14,128	99	67,932	69,642	1,170	1.24	1,449	68,840
1957	957	14,887	140	67,301	90,283	1,119	0.78	874	44,055
1958	997	15,724	151	68,504	75,228	1,197	0.75	901	45,912
1959	1,000	16,215	115	71,376	59,407	1,332	1.18	1,569	77,639
1960	1,030	16,412	131	72,979	75,302	1,505	1.06	1,597	82,361
1961	1,100	17,151	176	82,652	73,863	1,627	1.07	1,739	92,290
1962	1,218	18,314	174	83,159	79,283	1,773	1.01	1,788	100,023
1963	1,298	18,727	131	80,366	80,071	1,944	1.01	1,973	107,023
1964	1,299	20,165	128	95,053	116,331	1,878	0.76	1,424	74,389
1965	1,258	22,392	137	91,170	93,275	2,085	0.82	1,717	88,557
1966	1,271	24,427	144	108,116	115,183	2,489	1.12	2,780	153,050
1967	1,357	27,370	161	119,681	121,509	2,569	1.09	2,809	153,157
1968	1,427	30,161	183	131,379	116,653	2,690	1.08	2,911	170,102
1969	1,546	32,901	220	164,307	158,264	2,952	1.04	3,060	151,306
1970	1,681	33,634	250	144,527	120,819	2,747	0.66	1,815	90,961
1971	1,781	34,709	278	151,808	92,009	2,361	1.25	2,957	153,227
1972	1,975	34,405	427	170,219	135,137	2,042	1.06	2,165	115,934
1973	2,182	30,919	476	140,649	225,041	2,437	0.82	2,003	109,399
1974	2,330	32,451	344	143,147	251,712	2,978	1.41	4,211	461,049
1975	2,544	34,476	264	172,659	218,859	2,810	1.17	3,277	361,211
1976	2,654	34,771	260	174,807	242,027	3,171	1.30	4,122	427,507
1977	2,464	31,158	242	156,237	291,358	3,314	0.98	3,249	290,489
1978	2,271	29,823	237	143,127	258,034	3,609	0.82	2,945	292,901
1979	2,092	30,265	271	150,284	286,601	3,706	1.19	4,400	546,827
1980	2,065	30,431	293	147,840	348,214	4,121	0.91	3,739	571,158
1981	2,033	30,764	289	160,096	401,030	4,333	0.77	3,315	508,734
1982	1,942	30,268	263	145,126	378,540	4,593	1.05	4,803	762,706
1983	1,754	30,164	300	148,190	395,896	4,865	1.14	5,534	982,505
1984	1,730	29,518	300	141,359	407,451	4,746	0.91	4,316	702,330
1985	1,673	31,574	274	170,030	503,963	4,652	1.41	6,580	1,134,766
1986	1,690	33,213	278	175,859	577,273	4,148	1.05	4,362	736,334
1987	1,660	33,463	295	188,773	716,263	4,260	1.26	5,377	836,016
1988	1,705	33,951	307	188,527	1,252,674	3,312	1.17	3,882	649,969
1989	1,702	37,090	285	203,173	1,395,116	3,297	1.58	5,225	1,122,328
1990	r1,672	38,422	272	236,079	1,253,637	3,476	1.38	4,800	r951,537
1991	1,584	36,465	271	226,532	891,033	3,632	1.50	5,449	727,482

(a) Figures relate to varying time periods (e.g. year ended 30 June, year ended 31 December, year ended 31 March), owing to changes in the method of data collection. (b) From 1943 figures relate to the season ended 31 March. (c) Comprises shorn, dead and fellmongered wool and wool exported on skins. For 1947 and earlier, year ended 31 December; for the years 1949 to 1964 figures are for the year ended 31 March. From 1965 figures relate to the year ended 30 June in the following year. (d) 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. (e) From 1944 figures relate to the season ended 31 March.

STATISTICAL SUMMARY

TABLE 26.6 – AGRICULTURE - continued

Year (a)	Area and production of principal grain crops (b)—continued						Area used for crops (c)	Gross value of primary commodities produced (d)	
	Oats		Barley		Hay (all kinds)			Agri- culture	Fisheries (e)
	Area	Production	Area	Production	Area	Production			
	'000 hectares	'000 tonnes	'000 hectares	'000 tonnes	'000 hectares	'000 tonnes	'000 hectares	\$'000	\$'000
1840	n.a.	n.a.	n.a.	n.a.	—	n.a.	1	—	—
1850	n.a.	n.a.	n.a.	n.a.	1	n.a.	3	—	—
1860	—	—	1	1	2	8	10	—	—
1870	1	1	2	2	7	21	22	n.a.	n.a.
1880	—	—	2	2	8	20	26	—	—
1890	1	1	2	2	9	25	28	—	—
1900	2	2	1	1	42	106	81	—	—
1910	25	14	1	1	71	182	346	—	—
1920	78	37	4	3	108	268	730	(f)29,364	—
1930	111	60	7	4	161	500	1,939	(f)38,747	—
1940	174	59	27	16	169	381	1,614	39,520	r562
1950	237	132	28	22	87	276	1,737	141,348	1,432
1951	237	144	24	21	72	231	1,834	233,827	1,649
1952	266	140	23	16	70	215	1,824	189,153	2,505
1953	337	189	43	40	92	295	1,877	201,380	3,286
1954	297	174	85	62	89	299	1,812	210,428	3,808
1955	354	174	105	64	117	310	2,041	186,361	4,383
1956	442	300	136	106	109	390	2,118	221,435	4,915
1957	425	189	139	85	98	293	2,080	216,295	5,563
1958	467	250	124	81	137	392	2,230	204,911	6,530
1959	538	410	130	123	135	462	2,434	231,149	7,818
1960	502	356	170	161	129	440	2,583	256,002	8,621
1961	538	396	219	193	115	387	2,734	266,972	8,569
1962	498	366	199	165	119	402	2,823	280,475	10,689
1963	476	367	158	137	138	460	2,965	292,615	11,219
1964	455	324	121	92	117	395	2,714	300,766	10,187
1965	466	254	123	84	123	396	2,950	296,147	15,218
1966	502	422	167	147	118	421	3,419	406,097	15,733
1967	487	401	151	152	119	424	3,463	411,084	16,525
1968	469	359	168	159	129	428	3,595	428,258	21,954
1969	442	416	224	208	138	508	3,840	461,479	23,717
1970	461	281	364	273	202	576	3,916	370,557	19,660
1971	520	520	632	769	190	673	3,831	445,390	25,127
1972	454	414	911	1,000	177	653	3,751	461,581	30,817
1973	297	212	744	640	224	664	3,855	574,665	28,158
1974	325	383	510	626	220	734	4,133	1,034,191	30,494
1975	262	250	387	329	164	508	3,758	845,169	35,130
1976	320	386	419	505	163	536	4,207	996,633	51,079
1977	372	347	452	553	169	560	4,416	959,160	69,094
1978	415	416	614	751	191	597	4,910	993,889	88,340
1979	427	491	616	778	184	586	4,993	1,343,932	96,055
1980	370	399	523	632	208	636	5,280	1,572,744	85,652
1981	382	384	535	504	240	703	5,547	1,678,031	82,764
1982	432	442	580	576	255	711	5,963	1,874,267	99,254
1983	461	534	603	717	252	754	6,379	2,196,230	126,208
1984	448	456	771	797	238	676	6,526	1,940,863	142,658
1985	351	460	965	1,431	226	747	6,723	2,602,205	165,443
1986	288	338	826	1,024	201	633	5,970	2,213,118	143,034
1987	302	414	468	601	218	681	5,930	2,554,658	182,421
1988	373	502	461	617	243	778	5,334	2,991,232	254,399
1989	389	618	383	552	248	873	5,082	3,719,597	242,412
1990	340	529	421	628	229	811	5,174	r3,369,132	231,677
1991	324	497	498	742	223	785	5,187	2,758,693	n.y.a.

(a) Figures relate to varying time periods (e.g. year ended 30 June, year ended 31 December, year ended 31 March), owing to changes in the method of data collection. (b) From 1944 figures relate to the season ended 31 March. (c) Excludes pasture hay and from 1967 also excludes lucerne. (d) Estimated value of recorded production based on wholesale prices realised at principal market. (e) From 1980 excludes pearling and whaling. (f) Includes hunting.

STATISTICAL SUMMARY

TABLE 26.7 - PRIMARY PRODUCTION - MISCELLANEOUS

Year	Gold production (a) (b)		Coal production (b)		Average values f.o.b. (c)	
	Quantity	Value	Quantity	Value	Wool (greasy) per kg (d)	Wheat per tonne (e)
	'000 grams	\$'000	'000 tonnes	\$'000	cents	\$
1860	—	—	—	—	—	19.83
1870	—	—	—	—	—	..
1880	—	—	—	—	n.a.	18.37
1890	622	171	—	—	—	..
1900	43,980	12,015	120	110	—	5.51
1910	45,753	12,494	266	227	16.20	14.85
1920	19,222	6,951	469	701	28.26	26.33
1930	13,001	3,729	509	770	19.37	16.69
1940	37,044	25,393	548	729	25.68	11.19
1941	34,494	23,703	566	779	28.70	14.49
1942	26,376	17,731	590	923	28.64	15.12
1943	16,982	11,421	541	979	32.19	15.09
1944	14,494	9,800	567	1,166	34.81	17.71
1945	14,588	10,021	552	1,146	34.24	23.30
1946	19,191	13,280	652	1,460	34.92	31.81
1947	21,897	15,151	743	1,680	45.64	48.42
1948	20,684	14,314	745	1,760	76.41	64.33
1949	20,155	15,926	763	1,944	94.20	56.11
1950	18,973	18,933	827	2,575	105.91	57.03
1951	19,533	19,451	862	3,434	263.50	62.25
1952	22,706	23,696	843	4,915	138.10	62.64
1953	25,629	26,598	900	6,146	148.04	63.57
1954	26,469	26,627	1,034	7,178	156.20	60.90
1955	26,189	26,749	919	6,179	135.39	52.22
1956	25,256	26,405	843	5,448	112.66	46.57
1957	27,900	29,102	852	5,105	144.67	48.12
1958	26,967	28,357	885	4,561	130.80	56.35
1959	26,967	28,388	926	4,713	91.87	51.76
1960	26,625	28,140	937	4,878	115.37	49.48
1961	27,122	28,584	778	3,361	99.10	49.91
1962	26,717	28,115	934	3,962	109.80	51.90
1963	24,883	26,375	916	3,970	111.38	52.30
1964	22,177	23,383	1,003	4,679	134.47	52.01
1965	20,497	22,381	1,010	4,410	120.58	51.66
1966	19,564	23,316	1,078	4,562	116.00	51.12
1967	17,916	21,690	1,079	4,765	117.46	54.88
1968	15,925	19,407	1,104	4,817	105.69	51.31
1969	14,961	19,040	1,120	4,853	107.60	51.26
1970	12,310	15,811	1,178	5,407	98.11	47.72
1971	10,736	13,674	1,190	5,653	75.33	48.88
1972	10,848	14,835	1,188	5,855	74.94	49.52
1973	9,264	16,718	1,154	6,422	150.21	49.67
1974	7,173	19,183	1,197	7,237	215.36	98.75
1975	6,305	29,788	1,879	12,511	144.37	126.39
1976	7,644	27,141	2,157	17,613	147.62	116.89
1977	7,619	31,586	2,339	21,896	188.10	105.10
1978	13,653	64,741	2,435	24,846	195.76	92.52
1979	12,231	78,313	2,406	34,484	207.87	116.53
1980	11,598	158,253	3,039	54,464	253.81	146.45
1981	10,532	165,376	3,127	63,100	270.01	160.32
1982	16,135	178,566	3,435	75,132	288.61	155.48
1983	22,992	334,802	3,903	95,529	303.41	168.10
1984	26,183	365,453	3,942	106,325	317.08	173.81
1985	37,425	508,892	3,673	109,120	353.01	187.09
1986	46,072	707,114	3,765	126,841	376.50	185.14
1987	64,911	1,300,079	3,782	n.p.	430.31	144.86
1988	90,546	1,843,770	3,702	150,965	651.33	146.18
1989	130,565	2,072,692	3,800	161,241	721.94	202.00
1990	148,420	2,371,726	4,161	183,698	627.18	223.06

(a) Prior to 1971 comprises gold refined at the Mint and gold contained in gold-bearing materials exported. From 1971 covers gold production as notified by the Department of Mines. (b) From 1969 figures relate to year ended 30 June. (c) From 1978 figures relate to foreign exports only. (d) From 1920 figures relate to year ended 30 June. (e) Prior to 1940 averages generally are based on exports of the previous season's wheat; from 1940 they relate to exports during the year ended 30 June.

STATISTICAL SUMMARY

TABLE 26.8 - SECONDARY PRODUCTION

Year (a)	Manu- facturing establi- shments (b)	Persons employed (c)	Wages and salaries (d)	Turn- over (e)	Value added (f)	Production of selected commodities						Timber from local logs (l)
						Bricks (g)	Scoured wool (h)	Bacon and ham (i)	Butter (j)	Flour (plain) (k)	Cheese (k)	
	No.	No.	\$'000	\$'000	\$'000	'000	tonnes	tonnes	tonnes	tonnes	tonnes	'000 cu m
1900	632	11,166	2,589	n.a.	n.a.	25,234	|	n.a.	132	11,375	|	266
1910	822	14,894	3,532	10,158	5,472	23,162	n.a.	n.a.	291	33,401	n.a.	412
1920	998	16,942	6,073	26,283	9,708	31,838	|	850	553	108,976	|	325
1930	1,466	19,643	8,310	33,783	14,976	47,720	|	1,180	2,143	109,402	|	377
1940	2,129	22,967	9,150	40,615	18,055	43,786	2,459	2,106	6,351	127,776	382	360
1950	3,023	40,733	30,586	172,956	522,088	58,943	7,110	3,599	6,878	144,691	712	363
1951	3,111	43,761	39,316	168,862	68,441	67,312	5,828	3,615	6,906	197,172	760	416
1952	3,267	45,097	50,769	213,143	85,491	76,884	5,884	3,739	6,813	201,255	634	471
1953	3,424	45,188	56,687	238,620	98,383	86,043	6,162	3,752	6,584	203,509	909	527
1954	3,523	47,459	63,181	269,174	110,294	101,240	6,914	3,503	6,241	170,513	1,224	569
1955	3,727	49,314	69,476	299,169	121,912	115,412	7,226	3,369	7,260	150,381	1,100	593
1956	3,871	50,108	74,413	350,293	139,466	102,359	9,483	3,283	7,523	162,715	775	578
1957	3,935	48,748	73,833	375,272	146,884	101,209	11,044	3,103	7,582	153,800	1,201	539
1958	3,941	48,462	75,870	392,525	150,624	111,082	11,708	2,999	6,916	134,398	1,033	550
1959	4,125	48,417	77,464	392,405	157,524	101,521	12,791	3,002	6,265	126,736	1,200	561
1960	4,279	49,651	83,285	431,165	172,747	110,359	15,271	3,228	7,494	136,780	1,466	532
1961	4,334	50,666	90,255	481,140	193,262	119,998	13,420	3,214	7,784	152,622	1,373	496
1962	4,418	51,033	92,840	486,988	196,083	119,868	14,459	3,556	7,603	128,007	1,386	505
1963	4,492	53,435	99,880	517,899	216,422	131,176	13,312	3,899	7,075	123,296	1,462	486
1964	4,609	55,705	108,515	555,058	230,511	155,792	12,464	3,841	7,026	129,996	1,530	517
1965	4,734	58,097	119,978	616,422	260,637	146,057	12,040	4,047	7,887	121,906	1,838	550
1966	4,906	60,282	134,171	678,751	288,803	140,611	12,107	4,357	8,225	103,115	1,230	552
1967	5,167	63,757	153,597	765,224	335,788	163,166	12,148	4,654	6,529	91,725	1,726	533
1968	5,404	67,335	175,100	887,372	388,257	207,575	12,662	5,173	6,009	100,418	1,983	557
1969	2,585	59,853	183,168	919,555	361,473	273,078	14,415	5,591	6,332	96,641	2,022	444
1970	2,705	62,597	208,410	1,028,778	414,999	288,949	14,940	5,399	5,915	92,635	1,718	450
1971			(m)			240,323	10,724	4,863	5,425	96,411	1,917	449
1972	2,727	64,217	255,879	1,240,106	472,013	227,581	17,009	5,116	5,988	84,227	1,979	407
1973	2,814	64,074	275,455	1,375,859	501,034	278,610	11,987	5,257	5,324	77,680	1,869	405
1974	2,818	67,884	346,942	1,741,029	658,412	304,178	10,791	5,530	5,223	79,114	1,922	408
1975	1,974	65,852	434,272	2,032,374	779,842	262,905	11,779	5,294	4,981	84,486	2,291	392
1976	2,054	65,953	508,931	2,432,654	944,459	328,356	13,969	5,439	4,531	78,447	2,673	388
1977	2,035	66,750	594,514	2,882,421	1,151,619	385,942	15,818	5,836	3,340	|	2,074	375
1978	2,037	65,740	629,095	3,031,505	1,208,749	357,391	13,308	5,666	2,212	|	1,812	386
1979	2,202	65,232	670,772	3,498,828	1,321,683	381,092	16,129	5,516	1,373	|	2,364	341
1980	2,301	65,987	734,204	4,259,065	1,643,325	404,954	20,128	5,930	995	|	2,866	349
1981	2,426	68,870	869,223	4,902,236	1,876,664	381,909	21,645	6,062	834	|	3,342	347
1982	2,603	70,799	1,013,397	5,490,999	2,052,683	391,743	19,574	6,074	799	n.a.	3,322	334
1983	2,499	64,980	1,038,300	5,596,500	2,040,900	279,164	13,747	6,405	914	|	3,417	257
1984	2,408	61,997	1,047,393	5,922,692	2,136,745	n.p.	17,053	6,807	1,269	|	3,665	265
1985	2,451	64,242	1,137,558	6,788,471	2,513,218	n.p.	21,938	7,862	1,582	|	3,736	305
1986			(m)			n.p.	22,992	8,174	1,595	|	3,400	329
1987	2,660	69,327	1,406,965	8,215,095	2,998,694	n.p.	29,109	8,502	1,400	|	3,727	317
1988	2,675	72,069	1,604,782	9,416,932	n.a.	n.p.	25,820	8,377	1,505	|	3,772	319
1989	2,651	72,722	1,710,547	10,578,958	n.a.	n.a.	19,475	9,937	1,339	|	4,129	324

(a) From 1930 year ended 30 June. (b) Excludes details of single establishment manufacturing enterprises employing fewer than four persons. For details of breaks in series refer to publications of Censuses of Manufacturing Establishments statistics. (c) Average over whole year including working proprietors. Prior to 1926-27 includes fellers and haulers employed by sawmills. From 1988, employment at 30 June. (d) Figures for 1929-30 and later exclude amounts drawn by working proprietors. (e) Selling value 'at the factory'. (f) Value added in course of manufacture, representing sum available for payment of wages, rent, depreciation, other sundry expenses and for interest and profit. (g) For years prior to 1964-65 figures represent clay bricks only (all sizes). (h) Excludes fellmongered, dead or waste wool. (i) From 1977-78 excludes canned bacon and ham. (j) For 1917 and earlier years, includes butter made on farms. Source: From 1977-78 to 1980-81, Western Australian Department of Agriculture; from 1981-82, the Australian Dairy Corporation. (k) Source: 1933-34 to 1967-68, annual manufacturing census; 1968-69 to 1970-71, Commonwealth Dairy Produce Equalisation Committee Limited; from 1971-72 to 1980-81, Western Australian Department of Agriculture; from 1981-82, the Australian Dairy Corporation. (l) Prior to 1968-69, figures also include hewn timber. (m) No census of manufacturing establishments was conducted for this year.

STATISTICAL SUMMARY

TABLE 26.9 – BUILDING COMPLETED (a)

Year ended 30 June	Houses (b) (c)		Other Residential buildings (b)(c)		Alterations and additions (f) to residential buildings	Non-residential building (g)				Total building (e)
	Number (d)	Value (e)	Number of units	Value (e)	Value (e)	Factories	Offices	Edu- cational	Total	
		\$m		\$m	\$m	\$m	\$m	\$m	\$m	\$m
1947	1,792	3.5	—	—		0.1			0.7	4.2
1948	2,771	5.8	—	—		0.2			0.9	6.7
1949	3,244	7.6	—	—		0.4			1.8	9.4
1950	3,509	9.0	101	0.2		0.4			1.5	10.7
1951	5,160	15.0	305	0.6		0.4	n.a.	n.a.	2.3	17.9
1952	6,577	24.5	215	0.3		1.4			4.1	28.9
1953	7,965	38.0	100	0.3		1.7			7.5	45.8
1954	7,627	39.8	22	0.8		1.7			11.0	51.6
1955	8,792	48.4	316	1.2		6.2			18.6	68.2
1956	7,760	45.1	584	2.6		3.8	0.8	2.2	19.7	67.4
1957	5,030	29.1	365	1.5	(h)	2.2	2.0	1.2	16.3	46.8
1958	6,196	36.5	171	0.7		2.5	3.9	1.1	17.3	54.5
1959	5,846	34.4	212	0.8		2.8	2.4	4.6	25.3	60.5
1960	5,997	35.5	263	1.0		2.4	1.5	5.8	23.8	60.2
1961	5,973	38.1	440	1.6		4.7	4.1	8.0	32.4	72.0
1962	6,082	39.5	265	1.3		3.0	2.9	6.0	27.3	68.1
1963	6,593	45.8	642	3.0		4.9	1.6	7.7	37.7	86.4
1964	7,276	51.8	1,295	5.6		5.4	6.0	6.2	35.5	92.9
1965	7,445	57.2	1,841	9.0		6.8	2.8	8.0	40.8	107.1
1966	7,265	58.1	1,624	9.1		9.6	10.6	8.5	63.0	130.2
1967	8,272	78.1	1,742	9.3		9.8	7.1	10.5	74.7	162.1
1968	9,858	97.4	2,392	12.6		15.1	14.6	12.1	85.5	195.4
1969	12,840	133.3	3,491	22.4		15.8	10.9	14.1	99.2	254.8
1970	13,933	151.3	5,596	40.5		16.6	14.3	13.3	111.6	303.4
1971	11,900	149.3	5,013	40.0	0.4	18.0	39.7	20.6	175.4	365.0
1972	13,209	165.5	1,595	13.9	1.2	21.3	19.4	16.3	150.8	331.4
1973	13,660	163.4	920	7.3	1.8	15.6	21.2	24.8	151.5	324.0
1974	12,517	176.4	3,546	32.8	2.8	23.4	19.0	21.8	139.2	351.2
1975	10,994	198.6	3,300	38.9	4.4	18.2	18.4	40.0	170.1	412.0
1976	12,080	253.8	2,948	44.0	8.7	22.4	45.7	58.3	227.3	533.8
1977	15,155	395.0	6,152	113.9	15.4	26.6	43.5	29.5	226.4	750.7
1978	12,685	378.8	4,681	98.9	21.5	34.6	18.2	46.1	234.1	733.3
1979	11,148	349.1	3,507	74.9	30.5	44.0	33.2	56.3	339.3	793.8
1980	11,648	380.9	4,156	93.2	33.3	51.5	49.9	33.2	301.9	809.4
1981	10,120	375.5	4,531	108.0	37.5	37.0	75.0	29.6	308.8	829.7
1982	9,440	398.5	5,255	165.0	51.9	52.6	131.5	39.9	495.6	1,111.0
1983	9,070	372.5	4,020	143.4	47.4	45.2	152.1	37.7	464.3	1,027.5
1984	10,340	407.4	2,124	75.9	41.0	19.0	75.0	45.1	351.0	875.4
1985	14,000	583.9	3,735	115.3	51.9	27.9	55.6	30.7	357.5	1,108.6
1986	12,620	615.7	4,217	158.1	60.5	91.5	149.9	65.3	630.8	1,465.1
1987	12,330	651.5	3,619	144.3	70.4	39.0	155.8	99.2	795.0	1,661.2
1988	12,390	694.4	3,518	140.6	80.2	63.4	208.1	120.9	884.5	1,799.7
1989	14,660	906.9	4,631	193.6	99.5	81.3	263.6	65.1	959.5	2,159.5
1990	17,690	1,296.1	7,229	367.9	142.0	97.4	343.5	161.9	1,194.0	3,000.0
1991p	11,390	904.3	3,959	240.6	143.5	59.3	203.1	117.5	761.4	2,049.8

(a) From 1981 figures are not strictly comparable with those for earlier periods. (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) From 1981 numbers of new houses are rounded to nearest ten units. (e) Excludes the value of land. (f) Valued at \$10,000 and over. (g) From 1 July 1990 valued at \$50,000 and over (includes alterations and additions). From 1 July 1985 to 30 June 1990 valued at \$30,000 and over (includes alterations and additions). Prior to 1 July 1985 valued at \$10,000 and over (includes alterations and additions). (h) Not available separately; included with Houses and Other residential buildings as appropriate.

STATISTICAL SUMMARY

TABLE 26.10 – TRANSPORT; CUSTOMS AND EXCISE

Year	State Government railways (a)		Private railways	Air passenger movements Perth Airport		Customs and excise gross revenue (c)		
	Route kilometres at end of year (b)	Paying goods	Route kilometres at end of year	Internal	International	Customs	Excise	Total
		'000 t		'000	'000	\$'000	\$'000	\$'000
1870	—	—	—	..	..	81	—	81
1880	55	2	61	..	..	186	—	186
1890	303	62	620	..	..	356	—	356
1900	2,181	1,406	1,003	..	..	1,889	63	1,952
1910	3,452	2,278	1,452	..	..	1,543	213	1,756
1920	5,695	2,656	1,477	..	..	1,311	799	2,110
1930	6,616	3,587	1,363	..	..	3,882	1,527	5,409
1940	7,051	2,702	1,337	..	..	3,769	2,395	6,164
1950	6,843	2,889	1,246	..	..	10,166	10,943	21,109
1951	6,804	3,082	1,210	..	..	10,839	11,973	22,812
1952	6,619	3,112	1,210	..	..	14,045	16,312	30,357
1953	6,611	2,661	1,165	..	..	9,908	18,395	28,303
1954	6,616	3,257	1,220	..	..	12,241	19,447	31,688
1955	6,616	3,461	1,204	n.a.	..	12,196	21,812	34,008
1956	6,629	3,854	1,168	..	..	8,473	24,092	32,565
1957	6,626	4,291	1,136	..	n.a.	5,504	30,078	35,582
1958	6,626	3,647	925	..	..	5,476	32,547	38,023
1959	6,626	3,976	925	..	..	4,800	32,398	37,198
1960	6,630	4,605	832	..	..	5,614	33,634	39,248
1961	6,635	4,911	755	..	..	7,470	33,835	41,305
1962	6,198	5,428	898	..	..	7,156	35,705	42,861
1963	6,111	4,870	888	..	..	8,996	35,944	44,940
1964	5,918	5,271	665	..	..	10,369	37,839	48,208
1965	6,008	5,133	34	..	..	10,692	43,349	54,041
1966	6,030	6,486	460	270	26	15,251	53,536	68,787
1967	6,140	7,999	455	294	36	13,569	58,176	71,745
1968	6,140	9,053	455	340	49	19,468	62,903	82,371
1969	6,157	9,078	882	382	54	21,202	69,289	90,490
1970	6,161	10,837	884	467	69	24,649	76,637	101,286
1971	6,175	13,457	884	541	84	32,262	88,978	121,240
1972	6,116	13,867	884	524	105	30,072	101,883	131,955
1973	6,168	13,706	1,220	596	117	25,714	106,054	131,768
1974	6,192	15,059	1,222	668	139	30,612	138,197	168,809
1975	6,075	16,348	1,181	681	165	44,114	148,310	192,424
1976	6,163	17,812	1,179	658	197	46,767	183,838	230,605
1977	6,165	19,003	1,155	746	206	63,037	203,852	266,889
1978	5,764	18,625	1,150	815	225	68,118	216,929	285,047
1979	5,764	19,288	1,155	879	261	71,704	256,486	328,190
1980	5,773	21,388	1,159	928	325	83,620	260,299	343,919
1981	5,773	20,271	1,160	960	377	110,939	283,499	394,438
1982	5,609	19,776	1,181	1,027	434	128,866	198,397	327,263
1983	5,610	19,791	1,177	1,005	414	130,752	379,889	510,641
1984	5,623	19,870	1,177	1,075	455	133,088	492,117	625,205
1985	5,563	22,085	1,285	1,195	502	176,416	496,172	672,588
1986	5,553	20,877	1,185	1,264	569	196,027	444,311	640,338
1987	5,553	21,264	1,185	1,432	649	213,647	284,677	498,324
1988	5,553	21,946	1,191	1,471	714	232,397	330,699	563,096
1989	5,553	24,294	1,198	1,140	r812	260,204	326,816	587,020
1990	5,554	24,906	n.a.	1,399	r861	258,328	376,293	634,621
1991	5,554	24,410	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

(a) From 1900, year ended 30 June. (b) Open for general and passenger traffic.. (c) From 1915, year ended 30 June.

STATISTICAL SUMMARY

TABLE 26.11 - MOTOR VEHICLE REGISTRATIONS; EXPORTS OF CATTLE AND SHEEP

Year	New motor vehicles registered (a)				Motor vehicles on register (d)				Exports of-	
	Motor panel cars (b)	Utilities, vans, trucks and buses (c)	Motor cycles (c)	Total	Motor panel cars (e)	Utilities, trucks and buses (c)	Motor cycles (c)	Total	Cattle	Sheep (f)
									\$'000	\$'000
1860									—	4
1870									—	—
1880									—	—
1890	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1	2
1900									—	2
1910									16	9
1920					3,404			73		28
1930					31,130	11,358	7,707	50,195	1	46
1940	2,871	1,517	399	4,787	38,907	25,026	6,789	70,222	—	65
1941	1,015	632	200	1,847	36,995	24,788	6,704	68,487	2	112
1942	250	353	74	677	29,022	21,625	4,057	54,704	1	97
1943	218	151	57	426	29,750	21,189	3,935	54,874	1	—
1944	19	1,102	109	1,230	30,295	22,459	4,324	57,078	27	—
1945	40	597	192	829	30,635	23,943	4,501	59,079	2	1
1946	101	456	271	828	31,408	28,904	6,799	67,111	2	91
1947	1,354	1,126	678	3,158	32,879	32,097	8,199	73,175	27	362
1948	2,963	1,975	1,059	5,997	35,596	35,285	8,877	79,758	10	347
1949	4,684	3,122	1,769	9,575	40,199	38,901	10,974	89,994	11	374
1950	8,926	4,707	2,346	15,979	48,632	43,206	12,897	104,735	5	426
1951	8,201	6,610	2,802	17,613	56,235	47,908	14,535	118,678	9	616
1952	8,836	5,750	2,740	17,326	64,277	52,627	16,047	132,951	23	631
1953	6,879	4,881	1,416	13,176	69,917	56,445	15,565	141,927	23	501
1954	9,926	5,601	1,258	16,785	78,312	60,362	15,243	153,917	29	568
1955	12,394	5,993	1,202	19,589	90,255	63,870	14,662	168,787	68	612
1956	10,100	5,203	1,089	16,392	99,206	62,809	12,959	174,974	177	625
1957	9,321	4,418	1,192	14,931	104,506	63,315	12,731	180,552	243	923
1958	10,140	5,562	1,702	17,404	111,825	63,598	12,631	188,054	308	841
1959	10,389	5,140	2,071	17,600	119,957	65,588	12,814	198,359	396	764
1960	13,492	5,695	1,949	21,136	130,476	68,702	12,876	212,054	325	845
1961	15,161	5,542	1,080	21,783	141,612	70,974	12,589	225,175	318	881
1962	17,082	5,833	902	23,817	155,447	74,224	12,390	242,061	55	1,254
1963	23,175	6,367	754	30,296	169,800	75,500	11,500	256,800	160	1,495
1964	24,958	7,013	628	32,599	186,200	77,700	10,200	274,100	331	1,433
1965	23,304	6,897	553	30,754	197,800	78,500	8,900	285,200	427	1,376
1966	23,418	9,170	706	33,294	212,600	83,300	8,400	304,300	283	1,633
1967	27,922	9,404	1,158	38,484	231,200	86,300	8,400	325,900	381	1,771
1968	33,368	10,448	1,525	45,341	252,300	90,800	8,900	352,000	1,229	2,191
1969	35,379	11,018	1,539	47,936	275,300	94,500	9,600	379,400	972	2,943
1970	37,764	11,138	1,945	50,847	301,000	99,900	10,800	411,700	760	2,876
1971	37,769	10,872	2,718	51,359	328,500	104,900	12,200	445,600	1,159	2,710
1972	37,274	9,819	3,985	51,078	346,300	104,600	14,200	465,100	1,865	3,871
1973	36,904	11,425	4,914	53,243	364,400	107,400	16,800	488,600	1,661	7,959
1974	40,302	12,241	7,062	59,605	389,300	112,700	21,000	523,000	2,111	12,539
1975	41,474	13,693	6,613	61,780	414,800	125,000	24,600	564,400	1,498	12,862
1976	40,338	15,863	5,731	61,932	437,200	140,000	27,600	604,800	1,464	14,436
1977	44,363	17,362	3,887	65,612	473,731	153,174	28,022	654,927	2,533	34,905
1978	40,990	16,538	3,339	60,867	500,365	167,107	28,051	695,523	3,071	35,985
1979	40,882	14,025	2,713	57,620	518,705	174,064	26,916	719,685	3,182	45,915
1980	40,232	13,716	4,600	58,548	535,613	179,844	29,531	744,988	1,748	91,763
1981	41,660	15,223	6,088	62,971	552,552	187,599	33,009	773,160	2,899	100,340
1982	42,329	16,079	5,835	64,243	573,400	197,344	35,213	805,957	3,039	94,825
1983	38,812	15,043	5,147	59,002	576,893	196,539	35,852	809,284	5,476	94,630
1984	39,737	15,199	3,969	58,905	592,495	201,754	35,770	830,019	5,824	92,700
1985	46,070	17,956	4,310	68,336	615,442	214,649	36,229	866,320	3,432	82,430
1986	42,645	13,676	3,350	59,671	632,182	218,851	36,324	887,357	5,339	84,317
1987	33,642	10,198	2,305	46,145	647,734	223,030	35,287	906,051	4,969	105,015
1988	36,040	10,617	2,215	48,872	670,158	230,161	35,442	935,761	(g)	
1989	44,100	14,149	2,522	60,771	708,253	241,698	36,294	986,245	3,371	62,256
1990	42,728	13,735	2,875	59,338	746,194	254,009	37,452	1,037,655	6,094	62,046
1991	36,926	10,874	2,784	50,584	764,157	259,246	38,240	1,061,643	7,663	43,432

(a) Year ended 30 June. (b) From 1959, includes station wagons previously included with commercial vehicles. (c) Including motor scooters. (d) 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. (e) From June 1956, includes station wagons previously included with commercial vehicles. (f) Excludes interstate exports. Details are not available for publication. (g) Details not available; see Chapter 20.

STATISTICAL SUMMARY

TABLE 26.12 - EXPORTS OF CERTAIN COMMODITIES (a)

Year (b)	Meats—Fresh, chilled or frozen						Rock lobsters (c)		Wheat exports (d)	
	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	—	—	—	—	—	—	—	—	—	—
1850	—	—	—	—	—	—	—	—	1	—
1860	—	—	—	—	—	—	—	—	—	—
1870	—	—	—	—	—	—	—	—	408	8
1880	—	—	—	—	—	—	—	—	—	—
1890	—	—	—	—	—	—	—	—	27	—
1900	—	—	—	(e)	—	—	—	—	54,839	813
1910	—	—	—	—	—	—	—	—	249,049	5,083
1920	300	33	—	—	—	—	—	—	679,109	12,258
1930	5,162	272	—	—	—	—	—	—	—	—
1940	4,826	329	4,665	533	2,263	324	—	—	417,214	4,669
1941	5,583	407	4,396	496	6,015	851	—	—	404,314	5,858
1942	3,576	327	3,684	435	4,670	682	—	—	266,005	4,021
1943	—	—	3,985	458	1,053	155	—	—	139,833	2,111
1944	1,445	190	6,664	763	1,568	238	—	—	328,138	5,813
1945	1,202	168	4,002	410	1,697	254	—	—	642,015	14,955
1946	4,317	558	2,269	275	3,401	545	—	—	367,682	11,696
1947	6,358	691	4,081	409	1,306	248	—	—	185,102	8,964
1948	6,353	604	5,079	584	303	53	—	—	525,857	33,809
1949	8,056	840	4,607	608	624	179	n.a.	(f)500	500,793	28,100
1950	8,625	1,183	2,392	485	163	59	518	463	585,406	33,384
1951	7,699	1,221	939	217	279	113	1,436	1,517	830,346	51,688
1952	6,028	1,135	1,044	301	424	232	1,311	1,861	730,002	45,728
1953	5,016	1,437	6,589	1,463	463	303	1,329	2,085	634,639	40,347
1954	6,148	1,748	3,309	875	215	152	1,461	2,342	185,066	11,272
1955	6,776	2,038	3,225	1,328	1,049	532	1,532	2,490	526,212	27,478
1956	7,601	2,343	6,602	2,156	743	482	1,601	3,022	619,779	28,860
1957	4,127	1,221	5,788	1,741	733	588	1,618	3,514	1,273,578	61,291
1958	11,025	3,302	5,083	1,900	2,324	1,462	2,136	3,965	725,131	40,861
1959	10,535	4,342	9,944	3,177	1,983	1,178	2,715	5,281	639,647	33,113
1960	13,597	6,742	8,735	2,378	1,188	953	2,996	6,499	999,164	49,442
1961	12,413	6,141	11,367	3,901	1,894	1,501	2,316	5,881	1,428,272	71,280
1962	12,544	6,299	8,468	2,436	3,151	2,025	3,607	9,778	2,010,766	104,356
1963	17,268	9,382	7,428	2,401	2,061	1,404	3,490	8,910	1,380,372	72,197
1964	20,528	11,497	5,385	1,895	861	718	3,416	9,211	1,497,453	77,881
1965	19,360	11,730	5,040	1,981	571	516	2,672	10,592	1,102,420	56,955
1966	18,115	12,108	10,319	4,357	420	376	3,193	13,821	1,887,996	96,515
1967	16,912	11,987	9,652	3,723	565	470	3,643	13,873	2,312,777	126,918
1968	16,821	12,995	13,153	4,745	547	474	3,919	17,989	2,373,195	121,764
1969	20,210	16,939	21,523	7,218	642	564	3,038	17,133	1,521,376	77,987
1970	23,645	21,508	29,661	11,271	1,437	1,175	2,976	15,695	1,814,787	86,593
1971	20,257	17,626	24,244	9,396	1,126	895	3,155	19,413	2,670,890	130,564
1972	24,435	22,528	42,994	17,645	2,503	1,995	3,425	24,626	2,587,504	128,132
1973	33,325	36,614	39,853	26,103	7,630	6,382	3,171	20,919	2,249,934	111,744
1974	34,778	43,039	27,189	23,682	5,939	5,772	2,656	18,511	2,139,973	211,333
1975	31,083	25,993	33,240	22,107	2,283	3,037	3,328	25,258	3,241,895	409,758
1976	35,732	32,693	52,120	34,009	2,451	3,696	3,128	27,777	3,215,792	375,897
1977	53,051	53,291	60,373	48,913	1,292	1,968	4,071	47,061	3,009,101	316,258
1978	57,827	64,896	42,532	40,885	620	984	3,902	48,043	3,795,969	351,190
1979	51,932	90,216	26,250	31,059	382	693	4,170	51,064	2,208,985	257,414
1980	41,372	93,547	44,699	51,230	204	460	3,626	50,448	4,205,774	615,944
1981	40,672	87,669	44,142	57,515	144	334	2,858	42,480	2,634,951	422,433
1982	38,399	73,673	25,367	37,057	225	446	4,849	77,930	3,826,760	594,992
1983	41,659	88,972	29,073	43,133	99	344	5,424	88,175	5,031,977	845,855
1984	32,492	80,442	26,000	39,114	282	829	6,506	111,954	3,637,624	632,247
1985	30,327	77,403	21,329	33,808	150	567	4,778	126,644	4,543,782	850,090
1986	28,012	76,709	27,055	41,766	122	373	4,267	114,568	5,342,611	989,144
1987	29,928	88,348	31,010	50,305	481	1,542	4,884	143,665	4,872,265	697,557
1988	—	—	—	—	—	—	—	—	—	—
1989	24,980	74,722	19,844	38,006	36	133	7,750	172,779	4,995,551	1,009,103
1990	31,576	104,210	31,928	57,682	68	136	6,835	181,047	4,244,130	946,683
1991	32,038	90,710	45,219	81,803	74	180	6,854	195,603	5,013,047	708,217

(a) From 1980 figures relate to foreign exports only. (b) From 1920, year ended 30 June. (c) For years 1950 to 1952, foreign exports only. Figures relate to rock lobster tails only until 1982. From 1982 figures include whole rock lobsters and tails. (d) From 1920, year ended 30 June; from 1978, excludes interstate exports. (e) Separate details not available. Total exports of fresh meats were 84 tonnes valued at \$9,164. (f) Estimated. (g) Details not available; see Chapter 20.

STATISTICAL SUMMARY

TABLE 26.12 - EXPORTS OF CERTAIN COMMODITIES (a) - continued

Year (b)	Flour (c)		Potatoes		Fresh fruit (d)	Hides and skins	Timber (e)		Wool (f)	
	Quantity	Value	Quantity	Value	Value	Value	Quantity	Value	Quantity	Value
	tonnes	\$'000	tonnes	\$'000	\$'000	\$'000	'000 cu m	\$'000	tonnes	\$'000
1860	11	—	71	1	—	1	—	2	141	31
1870	—	—	26	—	—	—	2	10	298	99
1880	n.a.	2	—	—	—	—	6	35	811	179
1890	—	—	—	—	—	8	19	133	1,970	543
1900	47	1	113	1	1	49	33	164	3,161	523
1910	2,559	49	18	—	11	150	162	916	4,125	541
1920	117,254	5,045	1,637	54	300	482	342	1,945	11,883	1,934
1930	62,659	1,540	5,037	151	312	1,246	143	931	27,034	7,875
1940	83,159	1,301	11,953	214	740	745	143	1,251	28,487	5,558
1941	107,588	2,185	18,501	373	282	580	172	1,546	10,334	3,119
1942	77,087	1,681	10,452	213	114	772	148	1,369	36,590	10,866
1943	70,412	1,581	6,410	139	139	348	100	1,189	14,173	4,757
1944	96,941	2,344	772	22	96	680	103	1,216	33,240	11,759
1945	92,438	2,505	17,939	581	132	537	81	1,131	25,829	9,107
1946	106,088	4,667	13,219	446	488	1,274	96	1,429	54,398	19,914
1947	117,661	7,628	12,939	484	1,445	2,131	98	1,719	42,022	20,521
1948	127,002	11,326	18,623	681	1,688	2,048	102	2,230	43,671	33,244
1949	119,025	10,516	13,723	431	1,452	2,134	91	1,986	45,135	43,069
1950	105,065	8,335	10,090	384	1,780	2,329	81	1,949	45,766	50,923
1951	144,914	11,774	11,181	506	2,295	5,294	66	1,783	41,633	112,559
1952	146,584	13,669	13,514	733	2,853	3,194	68	2,075	46,633	67,680
1953	159,883	15,090	12,860	750	4,556	3,942	112	4,147	51,489	79,122
1954	134,126	11,704	16,026	1,300	3,300	3,295	109	4,480	51,083	82,260
1955	109,172	7,219	9,020	512	3,845	2,921	99	3,847	49,811	70,563
1956	117,409	7,766	2,275	171	3,393	3,274	129	5,598	58,982	70,313
1957	115,658	7,474	7,728	736	4,598	4,650	132	6,215	57,755	87,510
1958	101,448	6,907	13,998	832	3,725	3,898	158	7,496	52,167	72,686
1959	94,854	6,337	8,577	368	3,609	3,489	183	8,415	60,280	58,537
1960	79,697	5,100	9,612	436	2,437	4,767	174	7,760	62,838	77,957
1961	122,839	7,840	7,821	437	4,636	3,828	157	7,175	71,681	74,842
1962	88,889	5,891	10,328	632	2,818	4,580	161	7,528	73,584	83,865
1963	67,652	4,645	18,032	810	4,982	4,339	155	7,241	71,058	82,107
1964	62,677	4,396	9,925	353	4,016	4,966	149	6,813	82,628	114,239
1965	83,826	5,926	12,935	841	5,165	4,177	133	6,279	79,106	98,294
1966	49,130	3,378	21,362	1,393	4,838	5,447	69	3,687	97,698	115,128
1967	34,804	2,507	17,478	692	5,704	5,377	139	7,475	106,886	126,995
1968	41,918	2,944	13,142	622	4,068	4,699	85	4,947	124,708	126,417
1969	35,100	2,433	21,944	1,149	6,552	6,013	88	5,068	144,388	157,950
1970	31,173	2,257	19,888	831	6,054	7,968	96	5,666	132,778	134,796
1971	26,670	1,958	9,390	510	7,208	5,395	79	4,808	128,388	98,289
1972	18,882	1,345	8,600	371	5,245	5,356	101	6,440	159,284	120,460
1973	9,798	859	(g)4,911	(g)334	6,135	13,945	113	7,087	146,456	220,719
1974	11,232	1,380	(g)9,576	(g)1,113	5,835	13,536	100	7,407	121,113	263,330
1975	19,281	3,439	8,527	1,217	7,547	11,195	109	9,252	114,069	167,631
1976	11,658	2,022	12,196	1,636	6,047	13,728	94	9,823	153,248	231,301
1977	11,355	2,051	7,190	1,127	5,285	24,708	78	10,152	169,674	331,164
1978	8,291	1,481	5,853	390	5,976	21,147	59	8,885	123,071	251,321
1979	7,872	1,660	2,735	373	8,703	29,280	66	10,508	150,185	326,466
1980	(h)4,342	(h)1,055	(h)5,292	(h)616	(h)10,314	(h)34,716	72	12,226	141,262	378,557
1981	4,952	1,279	3,824	585	9,506	17,467	32	7,050	135,529	398,051
1982	1,578	594	5,466	947	10,783	16,736	25	5,830	127,308	394,367
1983	1,086	343	7,274	1,278	12,655	18,783	18	4,813	123,953	392,144
1984	3,127	833	2,806	756	10,013	23,998	20	5,251	121,511	406,207
1985	3,140	876	5,084	946	10,220	27,629	22	7,173	140,675	523,304
1986	1,750	550	2,338	511	12,573	13,979	22	7,330	153,987	614,202
1987	1,879	528	2,311	570	13,879	40,292	10	4,199	161,085	731,352
1988						(i)				
1989	1,957	642	740	153	8,338	32,009	13	5,497	153,548	1,167,056
1990	650	276	4,271	1,000	10,575	39,078	20	7,556	124,308	779,639
1991	1,388	389	12,112	3,651	1,252	24,779	13	6,670	102,570	462,849

(a) From 1981 figures relate to foreign exports only. (b) From 1920, year ended 30 June. (c) From 1973, figures include meal and flour of wheat or meslin; from 1978, figures include meal and flour of all cereal grains. (d) Includes tomatoes for 1933 and earlier years. (e) Excludes plywood and veneers and small quantities of timber for which details are not recorded. (f) Includes greasy and degreased wool. (g) Some interstate details for 1973 included in 1974. (h) Figures represent foreign exports only. (i) Details not available; see Chapter 20.

STATISTICAL SUMMARY

TABLE 26.12 - EXPORTS OF CERTAIN COMMODITIES (a) - continued

Year (b)	Iron ore and concentrates		Lead and zinc ores (c) (d)	Tin ore concentrates	Ilmenite concentrate (including leucoxene) (e)		Iron and steel (f)	Gold mint bullion (g)	
	Quantity	Value	Value	Value	Quantity	Value	Value	Quantity	Value (h)
	'000 tonnes	\$'000	\$'000	\$'000	'000 tonnes	\$'000	\$'000	kg	\$'000
1870	—	—	29	—	—	—	—	—	—
1880	—	—	31	—	—	—	—	—	—
1890	—	—	4	11	—	—	—	715	173
1900	—	—	—	76	—	—	7	31,103	7,589
1910	—	—	4	93	—	—	5	10,389	2,835
1920	—	—	102	129	—	—	16	1,275	452
1930	—	—	19	29	—	—	3	4	1
1940	—	—	2	14	—	—	31	36,329	24,056
1941	—	—	2	12	—	—	35	37,386	25,096
1942	—	—	2	6	—	—	19	30,326	20,590
1943	—	—	1	5	—	—	5	23,514	15,744
1944	—	—	1	6	—	—	23	10,855	7,250
1945	—	—	1	5	—	—	100	—	—
1946	—	—	—	8	—	—	9	—	—
1947	—	—	5	12	—	—	99	—	—
1948	—	—	146	17	—	—	89	11,073	7,656
1949	—	—	235	31	—	—	59	—	—
1950	—	—	272	49	—	—	95	2	2
1951	—	—	263	62	—	—	83	—	—
1952	53	102	1,369	107	—	—	58	12,286	13,143
1953	553	1,079	1,681	153	—	—	357	23,608	24,798
1954	592	1,157	270	97	—	—	279	13,001	13,280
1955	589	1,149	108	146	—	—	602	19,222	19,338
1956	480	936	888	322	—	—	530	12,752	12,842
1957	334	649	960	293	—	—	1,174	23,950	24,119
1958	446	870	410	166	89	1,011	2,470	6,470	6,511
1959	598	1,169	238	304	66	648	4,218	4,106	4,118
1960	809	1,601	229	415	90	713	11,198	18,662	18,738
1961	1,035	2,101	83	325	132	1,198	12,781	78,754	79,271
1962	1,069	2,209	45	563	159	1,441	13,826	14,090	12,195
1963	1,495	2,898	33	532	183	1,717	15,107	12,970	13,048
1964	1,381	2,743	18	1,080	263	2,571	15,029	11,975	12,045
1965	1,562	3,040	662	1,229	330	3,194	17,933	15,956	16,127
1966	2,657	6,967	124	1,521	430	4,181	14,458	25,909	26,147
1967	8,530	50,890	177	2,214	443	4,440	15,658	14,930	15,107
1968	14,563	104,506	58	2,330	462	4,645	11,442	11,602	11,816
1969	19,898	151,797	161	1,843	557	5,751	27,002	11,228	12,701
1970	31,542	233,580	41	1,386	573	6,068	34,306	12,037	13,874
1971	46,273	341,702	—	1,511	563	6,631	34,571	14,665	15,760
1972	48,658	347,500	—	2,043	580	7,416	36,415	17,646	21,950
1973	66,036	420,255	6	2,277	595	7,696	36,529	16,314	30,193
1974	79,286	488,239	15	2,732	728	9,774	60,811	10,093	27,393
1975	88,070	699,843	—	3,019	672	9,893	71,493	9,263	36,666
1976	83,090	772,199	—	2,538	647	9,995	60,765	13,659	50,527
1977	84,939	900,987	—	3,939	1,184	20,155	74,508	9,980	36,863
1978	80,128	935,018	—	4,947	986	17,653	50,285	10,344	50,906
1979	84,016	978,315	—	5,074	883	17,475	72,591	n.a.	(i)99,708
1980	76,725	1,025,660	220	5,841	1,119	25,433	83,447	n.a.	(i)56,317
1981	72,756	1,069,087	—	2,469	929	23,726	42,423	1,279	22,024
1982	72,532	1,195,486	11,285	1,057	890	25,003	6,645	5,054	72,060
1983	64,551	1,405,840	14,925	1,234	780	21,986	2,959	9,536	141,340
1984	80,942	1,551,299	18,420	127	1,068	35,176	2,473	21,312	308,580
1985	87,670	1,796,578	17,407	—	1,009	36,473	741	23,036	308,424
1986	80,309	1,861,779	6,040	—	999	45,149	747	28,483	458,728
1987	74,321	1,701,851	—	—	864	55,398	916	23,247	479,790
1988	—	—	—	—	(j)	—	—	—	—
1989	(k)94,949	(k)1,718,621	31,891	—	825	73,075	944	26,539	414,025
1990	(k)101,017	(k)2,142,511	52,171	—	752	73,146	1,087	19,844	331,658
1991	n.a.	n.a.	124,836	22	907	90,823	5,096	95,874	1,519,559

(a) From 1980, figures relate to foreign exports only. (b) From 1920, year ended 30 June. (c) Includes silver-lead and silver-lead-zinc ores and concentrates. (d) Between 1971 and 1988, the value of foreign exports of lead was nil. From 1973, figures exclude interstate exports of lead ores and concentrates, and from 1978 interstate exports of zinc ores and concentrates. (e) From 1972, figures exclude foreign exports of beneficiated ilmenite; from 1978, figures also exclude interstate exports of all ilmenite and leucoxene. From April 1987 figures exclude ilmenite ores and concentrates in bags, drums and similar containers. (f) Principally pig-iron, cast iron and basic shapes and sections of iron and steel. (g) Gold sold abroad before consignment is not recorded as an export until actually shipped. (h) Includes additional premiums on sales of industrial gold. (i) Includes all processed gold, but excludes gold ores and concentrates. (j) Details not available; see Chapter 20. (k) Source: Western Australian Department of Mines.

STATISTICAL SUMMARY

TABLE 26.13 - EXTERNAL TRADE
(\$'000)

Year (a)	Imports (b)			Exports (b) (c)			Excess of -		Ships' stores
	Foreign	Interstate	Total	Foreign	Interstate	Total	Imports	Exports	
1850	n.a.	n.a.	125	n.a.	n.a.	44	80	..	n.a.
1860	318	20	338	160	16	175	163	..	3
1870	260	167	427	348	46	394	33	..	8
1880	349	358	707	736	252	988	..	280	11
1890	1,025	724	1,749	961	369	1,330	419	..	14
1900	6,574	5,350	11,924	11,246	2,250	13,496	..	1,572	208
1910	8,750	7,067	15,817	11,679	4,627	16,306	..	489	294
1920	9,918	14,819	24,737	28,918	2,392	31,311	..	6,574	827
1930	17,758	19,805	37,563	32,009	2,213	34,223	3,341	..	1,316
1940	12,568	27,450	40,017	19,256	28,518	47,774	..	7,756	1,380
1941	9,710	27,519	37,229	16,900	30,808	47,708	..	10,479	1,971
1942	10,391	26,110	36,501	23,157	25,241	48,398	..	11,897	2,305
1943	7,383	24,803	32,186	10,625	20,117	30,741	1,445	..	1,983
1944	7,770	26,628	34,399	22,845	13,472	36,317	..	1,919	2,747
1945	9,215	26,863	36,079	24,765	11,533	36,298	..	219	2,508
1946	11,018	32,238	43,256	38,917	11,662	50,579	..	7,322	2,511
1947	18,929	42,253	61,182	46,015	11,459	57,474	3,708	..	1,966
1948	34,311	51,329	85,640	97,389	11,599	108,989	..	23,349	2,474
1949	44,075	61,182	105,258	96,982	9,495	106,477	..	1,220	4,710
1950	68,844	70,044	138,887	106,590	12,421	119,011	19,876	..	4,720
1951	80,517	95,828	176,345	197,686	18,780	216,466	..	40,122	7,249
1952	120,474	124,209	244,683	151,562	35,404	186,966	57,717	..	8,419
1953	59,748	137,213	196,961	166,286	49,659	215,945	..	18,984	10,321
1954	85,051	165,374	250,425	136,849	39,190	176,039	74,386	..	7,266
1955	101,295	182,110	283,405	137,013	47,310	184,323	99,082	..	7,865
1956	92,963	177,952	270,915	152,286	68,466	220,752	50,164	..	10,592
1957	80,423	188,680	269,103	216,599	81,545	298,144	..	29,041	12,902
1958	91,775	195,103	286,879	179,516	79,836	259,352	27,527	..	11,602
1959	89,972	202,430	292,402	174,585	68,919	243,504	48,898	..	9,482
1960	92,363	246,696	339,059	231,766	77,278	309,043	30,016	..	8,954
1961	110,531	245,474	356,005	309,332	89,922	399,254	..	43,249	10,285
1962	100,178	245,208	345,386	287,619	84,626	372,245	..	26,859	9,379
1963	112,640	313,712	426,351	246,823	91,636	338,459	87,892	..	7,904
1964	121,677	323,176	444,854	286,132	101,811	387,943	56,911	..	9,733
1965	153,540	343,899	497,439	243,078	119,954	363,033	134,407	..	9,009
1966	175,690	403,054	578,744	314,404	119,619	434,023	144,721	..	10,058
1967	159,390	474,852	634,242	421,325	116,030	537,355	96,887	..	10,936
1968	206,980	527,052	734,031	475,260	124,505	599,765	134,266	..	14,824
1969	203,533	562,312	765,846	546,366	149,892	696,258	69,588	..	14,327
1970	242,299	640,189	882,487	675,027	149,861	824,888	57,600	..	15,092
1971	278,344	726,778	1,005,122	862,421	163,812	1,026,233	..	21,111	20,561
1972	283,263	787,788	1,071,051	946,504	156,303	1,102,807	..	31,756	22,477
1973	227,305	786,177	1,013,483	1,154,359	173,839	1,328,198	..	314,715	17,542
1974	368,910	939,361	1,308,272	1,414,968	222,208	1,637,176	..	328,904	29,224
1975	577,416	1,134,510	1,711,926	1,880,082	253,424	2,133,506	..	421,580	50,157
1976	637,439	1,418,726	2,056,165	2,117,898	290,733	2,408,631	..	352,466	46,638
1977	829,411	1,641,545	2,470,955	2,596,107	305,836	2,901,943	..	430,987	64,141
1978	937,350	1,828,510	2,765,860	2,588,954	355,151	2,944,105	..	178,245	71,009
1979	1,161,164	2,044,447	3,205,611	2,820,134	446,208	3,266,343	..	60,732	72,611
1980	1,449,694	2,337,808	3,787,502	3,854,047	635,388	4,489,434	..	701,933	126,176
1981	1,663,378	2,841,110	4,504,488	3,595,048	812,996	4,408,044	96,444	..	144,285
1982	2,535,112	3,141,096	5,676,208	3,907,623	888,540	4,796,163	880,045	..	134,198
1983	2,523,046	3,160,789	5,683,835	4,797,766	1,155,698	5,953,464	..	269,129	129,484
1984	1,935,552	3,638,883	5,574,436	5,062,112	1,410,145	6,466,257	..	891,822	110,706
1985	2,155,270	4,291,229	6,446,499	6,028,430	1,507,370	7,535,800	..	1,089,351	123,237
1986	2,202,948	4,783,474	6,986,422	6,529,348	1,623,017	8,152,365	..	1,165,943	87,674
1987	2,768,663	5,071,476	7,840,139	6,911,427	1,805,667	8,717,094	..	876,955	84,476
1988	3,216,985	5,404,518	8,621,503	7,491,773	1,808,478	9,300,251	..	678,748	87,220
1989	3,581,772	6,430,737	10,012,509	8,856,643	1,777,058	10,633,701	..	621,291	72,455
1990	3,984,818	6,515,966	10,500,784	10,227,858	2,282,389	12,510,247	..	2,282,389	90,093
1991	3,635,752	n.a.	n.a.	12,426,818	n.a.	n.a.	..	8,791,066	91,871

(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.

STATISTICAL SUMMARY

TABLE 26.14 – INDUSTRIAL DISPUTES; WAGE RATES; UNEMPLOYMENT BENEFIT

Year	Industrial disputes (a)				Award rates of pay index numbers (c)		Persons on Unemployment benefit (f)
	Number of disputes	Workers involved (b)	Working days lost		Adult male wage and salary earners (d)(e) Weekly	Hourly	
			Number	Average per worker involved			
		'000	'000	No.			
1930	2	0.5	27.1	57.85	n.a.	n.a.	..
1940	4	3.0	7.4	2.44	36.8	33.1	..
1941	3	0.3	0.8	2.79	39.0	35.4	..
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	364	72.9	244.0	3.35	166.1	166.2	28,638
1982	436	63.6	158.9	2.50	187.6	190.3	31,636
1983	300	42.3	270.6	6.40	197.2	200.9	50,992
1984	406	69.2	119.2	1.72	205.9	210.7	(g)57,514
1985	361	48.7	92.9	1.91	103.8	103.8	(g)54,028
1986	267	50.6	143.1	2.83	106.3	106.5	55,089
1987	245	43.1	115.3	2.68	110.0	110.3	52,755
1988	221	60.9	160.6	2.64	118.5	119.1	46,091
1989	226	54.7	102.1	1.87	124.4	126.7	37,285
1990	190	73.2	108.4	1.48	129.1	132.3	36,240
1991	156	63.1	119.1	1.89	134.0	134.7	55,756

(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) Includes workers indirectly involved, i.e. those put out of work at an establishment where a stoppage occurred but not themselves parties to the dispute. (c) End of December. Prior to 1976 - Base: weighted average wage rate for Australia, 1954=100. From 1976 to June 1985 - Base: weighted average wage rate for Australia, June 1976=100. From June 1985 - Base: weighted average wage rate for Australia, June 1985=100. (d) Excludes workers in rural industry. (e) Prior to June 1985 index related to wage earners only. From June 1985 relates to wage and salary earners. (f) Year ended 30 June; average number of persons on benefit at end of each week. As from 1st January 1988 includes persons receiving job search allowance. (g) Estimated.

STATISTICAL SUMMARY

TABLE 26.15 - CONSUMER PRICE INDEX (a)

Year ended 30 June	Group index numbers—Perth									Weighted average of eight capital cities (c) All groups	
	Food	Clothing	Housing	Household equipment and operation	Transportation	Tobacco and alcohol	Health and personal care	Recreation and education (b)	All groups		
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	n.a.	n.a.	n.a.				28.7	28.8
1965	28.7	30.4	29.1				n.a.			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	n.a.		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	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	105.8		122.5	123.1
1984	128.9	120.9	124.1	129.1	133.9	141.0	156.9	111.8		131.0	131.6
1985	136.2	128.8	131.6	134.7	142.8	153.2	125.7	115.1		136.1	137.2
1986	146.3	140.2	141.7	145.7	153.7	168.7	135.9	123.9		147.1	148.7
1987	157.1	154.4	154.7	159.0	172.3	188.1	156.0	135.7		161.8	162.6
1988	166.3	165.8	163.6	170.3	184.5	203.0	175.1	146.5		173.3	174.5
1989	181.2	177.4	(d)184.7	181.4	191.4	212.9	190.8	155.4		186.1	187.3
1990	192.8	185.6	217.5	192.1	205.2	232.2	207.8	164.1		201.7	202.3
1991	201.5	193.8	223.8	202.2	218.1	249.4	225.6	171.1		211.9	213.0

(a) The base of each index is Year 1980-81 = 100 unless otherwise noted. (b) Base of index is March quarter 1982=100. (c) Prior to 1980-81, weighted average of six State capital cities. (d) These series have been affected by the adoption of a new approach to the treatment of mortgage interest charges. For more detail refer to an information paper *The Australian Consumer Price Index: Treatment of Mortgage Interest Charges* (ABS Catalogue No. 6442.0).

TABLE 26.16 - STATE AND LOCAL AUTHORITIES: RECEIPTS AND OUTLAY
NOTE: This series replaces 'Public Revenue and Expenditure: Consolidated Revenue Fund' and 'Net Expenditure from Loan Funds; Public Debt' on later pages.
(\$ million)

Year ended 30 June	Receipts and financing transactions						Outlay				
	Taxes, fees, fines enterprises	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	Total outlay
1976	322	66	99	772	53	1,312	728	435	131	18	1,312
1977	371	37	120	844	155	1,528	871	483	157	17	1,528
1978	423	80	168	974	259	1,905	1,005	551	330	19	1,905
1979	466	90	172	1,056	315	2,100	1,113	608	363	16	2,100
1980	519	98	185	1,168	352	2,321	1,267	646	409	—	2,321
1981	590	130	212	1,307	281	2,520	1,425	627	466	2	2,520
1982	690	155	249	1,430	316	2,840	1,609	717	516	-1	2,841
1983	772	194	316	1,619	857	3,757	1,864	1,196	677	20	3,757
1984	924	274	355	1,874	835	4,262	2,096	1,252	850	63	4,262
1985	1,062	301	394	2,067	585	4,410	2,313	1,102	972	22	4,409
1986	1,145	401	510	2,214	644	4,915	2,581	1,147	1,110	76	4,915
1987	1,397	518	529	2,395	679	5,518	2,815	1,328	1,294	81	5,518
1988	1,699	563	600	2,594	432	5,888	3,134	1,222	1,482	50	5,888
1989	1,984	601	793	2,586	805	6,769	3,505	1,414	1,601	60	6,769
1990	2,133	651	1,028	2,768	866	7,445	3,730	1,900	1,845	-25	7,446

(a) Includes gross fixed capital expenditure, increase in stocks and expenditure on land and intangible assets (net).

STATISTICAL SUMMARY

TABLE 26.17 – PUBLIC REVENUE AND EXPENDITURE: CONSOLIDATED REVENUE FUND
(\$'000)

Year (a)	Revenue					Expenditure						
	Common-wealth funds	Public utilities	Departmental (b)	Taxation	Territorial (c)	Total revenue	Public utilities	Interest and sinking fund	Departmental			Total expenditure
									Educational	Health	Other	
1840					5	34			n.a.			30
1850					4	38			n.a.			33
1860					35	140			3			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
1930	1,547	10,596	3,134	2,906	950	19,501	8,073	6,891	1,385	649	2,872	20,537
1931	1,547	9,228	3,279	2,269	678	17,374	6,654	7,243	1,346	486	3,950	20,215
1932	1,547	8,818	2,766	2,014	585	16,071	5,724	7,015	1,098	328	4,543	19,186
1933	1,947	8,873	2,701	2,257	558	16,664	5,682	7,009	1,108	333	3,761	18,392
1934	2,147	8,867	2,240	2,737	626	16,963	5,870	7,095	1,153	309	3,560	18,541
1935	2,413	9,837	1,562	3,804	812	18,663	6,391	7,100	1,225	326	3,342	18,997
1936	2,617	10,366	1,677	4,372	767	20,067	6,756	7,135	1,331	341	3,595	19,891
1937	2,013	10,633	1,727	4,807	773	20,371	7,247	7,237	1,432	381	4,024	21,113
1938	2,097	11,148	1,980	5,190	749	21,638	7,249	7,579	1,474	380	4,158	21,659
1939	2,087	11,159	1,786	5,728	634	21,899	7,857	7,779	1,514	401	3,992	22,340
1940	2,137	11,102	1,942	5,992	632	22,240	7,662	8,021	1,545	416	4,070	22,534
1941	2,247	11,366	1,916	6,255	638	22,864	7,534	8,114	1,568	421	4,262	22,842
1942	2,207	12,133	2,204	6,222	620	23,880	8,282	8,204	1,662	436	4,293	23,877
1943	7,852	13,518	2,497	1,330	634	26,303	9,377	8,183	1,627	458	5,564	26,254
1944	7,935	13,626	2,868	1,553	700	27,178	9,870	8,185	1,747	506	5,780	27,102
1945	8,044	13,618	3,402	1,715	697	27,908	10,064	8,251	1,778	485	6,261	27,899
1946	9,960	13,303	2,519	1,936	709	28,815	10,825	8,168	2,005	1,010	5,621	28,815
1947	11,461	11,769	3,105	2,138	1,053	29,962	10,866	8,012	2,447	1,369	5,910	30,057
1948	14,515	13,242	3,575	2,354	1,202	35,421	13,996	8,089	3,298	1,841	7,280	36,125
1949	17,136	15,032	4,564	2,683	1,106	41,121	16,720	8,215	3,519	2,613	9,942	42,756
1950	22,975	17,792	5,733	3,240	1,225	51,622	20,237	8,508	4,160	3,633	13,096	51,574
1951	25,343	19,085	5,911	3,912	1,230	56,312	21,974	8,994	5,269	4,465	13,180	55,994
1952	29,923	24,335	6,863	4,633	1,300	67,910	27,490	9,741	7,262	6,269	15,696	69,094
1953	39,056	22,385	8,557	5,247	1,513	77,768	32,044	10,611	8,686	6,926	17,639	78,784
1954	38,342	29,860	8,378	6,468	1,929	86,292	35,234	12,147	9,503	7,675	18,797	86,497
1955	38,759	32,645	9,433	7,258	2,014	91,440	36,089	13,857	11,217	8,026	19,838	92,408
1956	43,373	33,969	9,779	8,036	2,498	99,225	39,184	15,451	12,482	9,344	21,501	102,886
1957	46,759	37,133	12,548	9,027	2,433	108,662	42,022	17,043	13,636	10,067	33,645	112,487
1958	51,808	34,525	13,640	10,729	2,516	114,108	40,103	19,303	15,172	11,026	25,572	116,355
1959	55,496	36,080	14,522	10,368	2,783	120,136	40,317	20,844	15,819	11,967	29,244	123,506
1960	58,871	38,575	15,696	11,834	2,878	128,776	42,418	23,053	17,282	13,565	29,861	131,587
1961	65,519	40,830	16,372	12,079	2,797	138,665	41,072	24,628	19,541	15,018	35,160	141,075
1962	73,430	42,456	16,549	12,926	3,283	149,852	42,097	27,250	21,417	14,935	40,131	151,780
1963	75,847	43,559	18,134	14,762	3,501	157,182	42,267	29,980	22,850	16,073	41,254	158,687
1964	78,988	45,376	20,948	17,604	3,751	167,888	44,247	31,771	25,880	18,705	43,430	170,681
1965	88,565	39,778	26,712	19,512	4,107	180,143	43,360	34,669	29,133	21,160	49,401	184,840
1966	103,459	45,683	28,753	22,574	4,598	206,655	47,106	37,926	34,016	23,086	56,869	206,665
1967	106,748	52,787	31,461	27,536	7,655	228,146	53,182	41,662	36,746	26,429	61,512	228,174
1968	112,617	56,226	33,135	34,916	11,845	250,738	60,728	43,864	41,224	29,294	65,362	249,909
1969	126,621	54,407	33,035	41,602	17,301	275,081	64,016	47,083	46,441	33,613	74,822	276,135
1970	141,326	62,921	36,905	50,865	23,633	318,189	71,166	51,427	55,839	41,343	87,660	318,901
1971	170,396	68,350	45,583	48,434	32,187	367,252	79,717	54,178	66,341	52,575	107,129	371,620
1972	180,132	73,446	54,131	78,490	34,992	423,999	82,410	62,029	82,472	59,862	125,260	424,890
1973	200,633	69,158	66,711	97,141	37,162	473,840	88,372	65,280	94,547	71,866	144,005	477,330
1974	232,111	85,291	76,306	126,929	43,346	567,683	104,178	69,200	115,982	100,841	168,122	573,414
1975	313,846	108,921	96,930	160,307	49,010	734,240	121,494	75,300	165,705	148,161	213,042	743,373

(a) From 1900, year ended 30 June. (b) Reimbursements, fees, etc. (c) Revenue from sales, leases, licences and royalties relating to land, mining and timber.

NOTE: This table has been replaced by a new series 'State and Local Authorities: Receipts and Outlays' on previous page.

STATISTICAL SUMMARY

TABLE 26.18 – NET EXPENDITURE FROM LOAN FUNDS; PUBLIC DEBT
(\$'000)

Year (a)	<i>Net expenditure from loan funds on public works and services (b)</i>							<i>Public debt (at end of year)</i>	
	<i>Railways, tramways and buses</i>	<i>Electricity supply</i>	<i>Harbours, rivers, light- houses, etc.</i>	<i>Water supplies sewerage, drainage and irrigation</i>	<i>Public buildings</i>	<i>Other</i>	<i>Total</i>	<i>Gross amount out- standing</i>	<i>Sinking fund</i>
1860	—	—	—	—	—	—	—	4	—
1870	—	—	—	—	—	—	—	—	—
1880	(c)549	—	(d)38	—	—	n.a.	(d)802	722	n.a.
1890	3	—	6	2	(e)76	n.a.	32	2,735	170
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
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 Suspense Account. (c) Total amount for the years 1877 to 1881. (d) Total amount for the years 1872 to 1881. (e) Includes expenditure prior to 1890.

NOTE: This table has been replaced by a new series 'State and Local Authorities: Receipts and Outlay' on an earlier page.

STATISTICAL SUMMARY

TABLE 26.19 - BANKING AND PERMANENT BUILDING SOCIETIES

Year	Trading banks			Savings banks (c)		Permanent building societies (d)			
	Depositors' balances (a)	Loans advances and bills discounted (a)	Weekly debits to customers' accounts (b)	Operative accounts at end of year	Depositors' balances at end of year	Liabilities		Assets	
							With-drawable shares	Deposits	Amount due on loans	Total
	\$'000	\$'000	\$m	No.	\$'000	\$'000	\$'000	\$'000	\$'000
1870	n.a.	n.a.		895	27				
1880	n.a.	n.a.		1,299	45				
1890	1,904	2,809		3,014	69				
1900	8,781	5,514	n.a.	33,646	2,598				
1910	12,627	12,228		84,262	6,955				
1920	24,742	21,594		211,415	14,516				
1930	25,524	41,773		367,665	23,457				
1940	42,219	47,529		233,649	23,720				
1950	116,458	55,301	27.4	378,670	79,225				
1951	149,244	66,680	38.6	392,790	89,345				
1952	170,923	83,353	43.6	403,678	94,342				
1953	170,234	87,353	44.2	414,288	99,589				
1954	181,863	106,429	50.8	422,480	105,229				
1955	180,895	137,830	52.4	426,637	107,258				
1956	174,070	142,156	53.9	446,419	115,868				
1957	185,576	135,074	57.1	473,548	125,386				
1958	186,478	141,198	60.4	497,690	131,896				
1959	180,300	147,106	61.5	527,079	142,998				
1960	192,076	142,064	69.7	550,966	157,246	n.a.	n.a.	n.a.	n.a.
1961	190,094	146,244	75.7	577,619	161,424				
1962	209,274	139,204	80.4	625,070	181,056				
1963	219,952	153,528	88.2	683,417	208,812				
1964	242,268	164,878	96.4	736,009	239,766				
1965	272,430	186,000	106.3	786,340	261,654				
1966	310,432	195,190	122.4	848,562	292,871				
1967	355,899	212,023	138.6	905,349	330,807				
1968	398,837	252,627	169.1	970,120	373,602				
1969	462,559	280,147	209.0	1,036,180	412,984				
1970	558,017	323,824	246.4	1,096,466	431,877				
1971	544,732	351,110	295.3	1,153,420	464,611				
1972	552,546	357,410	318.4	1,205,448	511,457				
1973	693,456	443,330	355.9	1,250,576	608,133				
1974	829,002	604,460	439.4	1,327,699	684,974				
1975	906,589	673,526	515.9	1,401,485	779,427				
1976	1,092,350	791,376	680.0	1,443,883	897,693	522,517	286,320	632,929	849,182
1977	1,376,813	927,709	814.4	1,466,200	960,548	646,176	383,451	851,896	1,078,720
1978	1,448,206	1,163,207	975.9	1,511,092	1,048,510	747,307	508,710	1,046,718	1,308,935
1979	1,621,852	1,368,657	1,173.7	1,539,416	1,133,627	858,380	681,851	1,270,625	1,601,527
1980	1,742,801	1,678,121	1,463.3	1,579,722	1,216,182	966,319	812,817	1,491,983	1,849,490
1981	2,026,507	1,943,299	1,826.3	1,647,837	1,360,315	1,020,465	994,100	1,650,304	2,100,204
1982	2,521,072	2,288,020	2,283.4	1,741,114	1,514,207	1,129,730	1,030,780	1,793,793	2,261,263
1983	2,877,685	2,571,177	2,651.2	1,835,917	1,910,538	1,265,212	948,426	1,743,068	2,312,162
1984	3,004,651	2,874,000	3,043.7	1,961,811	2,214,373	1,374,872	861,647	1,664,158	2,345,479
1985	3,622,307	3,342,663	3,857.6	2,051,681	2,402,828	1,463,808	908,036	1,807,865	2,468,670
1986	4,653,781	4,032,226	4,846.9	2,153,457	2,649,943	1,534,979	1,058,426	1,977,938	2,702,788
1987	5,143,047	4,652,428	5,133.2	2,618,596	3,975,333	1,685,760	1,104,696	2,056,374	2,913,559
1988	5,881,611	5,440,095	6,167.8	2,638,557	5,442,147	1,105,345	1,108,082	1,222,144	1,707,310
1989	(e)	(e)	5,382.4	(e)	(e)	1,469,005	396,992	1,480,756	2,010,820
1990	(e)	(e)	(e)	(e)	(e)	1,469,192	381,433	1,398,739	2,061,966

(a) Average based on amounts as at close of business each week. From 1927, year ended 30 June. (b) 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). (c) From 1900, year ended 30 June. (d) At 30 June. (e) No longer available.

STATISTICAL SUMMARY

TABLE 26.20 - WESTERN AUSTRALIA IN RELATION TO AUSTRALIA

	Unit	Date or period	Western Australia	Australia	Percentage
Area	sq km	..	2,525,500	7,682,300	32.9
Proportion of area having rainfall —					
Under 250 mm	per cent	..	58.0	39.0	..
250 mm and under 500 mm	per cent	..	29.2	31.8	..
500 mm and over	per cent	..	12.8	29.2	..
Population (a)	number	31 December 1990p	1,649,920	17,210,757	9.6
Population increase	number	1989-1990	35,148	253,996	13.8
Rate of population increase	per cent	1989-1990	2.2	1.5	..
Births registered (b)	number	1990	25,356	262,648	9.7
Deaths registered (b)	number	1990	9,407	120,062	7.8
Marriages registered	number	1990	10,613	116,959	9.1
Divorce - Dissolutions granted	number	1990	3,845	42,635	9.0
Employed labour force (c)	'000	November 1991	755.6	7,674.1	9.8
Average weekly earnings - all male employees (d)	\$	August 1991	589.70	575.40	..
Unemployed on benefit	number	30 June 1990	36,240	385,014	9.4
Industrial disputes - Working days lost	'000	1990	108.4	1,376.5	7.9
Area under crop	'000 hectares	1990-91p	5,187	17,267	3.0
Area under sown pasture	'000 hectares	1990-91p	6,803	28,644	23.8
Area of —					
Wheat for grain	'000 hectares	1990-91p	3,632	9,236	39.3
Oats for grain	'000 hectares	1990-91p	324	1,051	30.8
Barley for grain	'000 hectares	1990-91p	498	2,510	19.8
Hay	'000 hectares	1990-91p	223	1,330	16.8
Fruit and vineyards	'000 hectares	1990-91p	8	173	4.6
Livestock —					
Sheep	'000	31 March 1991p	36,465	161,092	22.6
Cattle	'000	31 March 1991p	1,584	23,347	6.8
Pigs	'000	31 March 1991p	271	2,531	10.7
Production —					
Wheat for grain	'000 tonnes	1990-91p	5,449	13,053	41.7
Wool (e)	'000 tonnes	1990-91p	226.5	1,012.1	22.3
Meat (f)	'000 tonnes	1990-91p	265.8	3,102.4	8.7
Whole milk (g)	mil. litres	1989-90	266	6,263	4.2
Butter (g)	tonnes	1989-90	1,339	104,158	1.3
Value of agricultural commodities produced	\$m	1990-91p	2,759	20,906	13.2
Mining establishments - Value added	\$m	1988-89	(h)4,084	12,567	32.5
Iron ore production	'000 tonnes	1988-89	92,977	97,618	95.1
Coal production	'000 tonnes	1988-89	(i)3,800	149,125	2.5
Crude oil production (j)	megalitres	1989-90	5,809	31,962	18.2
Manufacturing establishments (k) —					
Number	..	1988-89	2,651	31,249	8.5
Employment - At 30 June	'000	1988-89	72.7	1,072.6	6.8
Wages and salaries paid	\$m	1988-89	1,710.5	25,599.1	6.7
Turnover	\$m	1988-89	10,579.5	151,856.6	7.0
New dwelling units commenced (l)	number	1990-91p	13,380	121,260	11.0
Value of all building commenced	\$m	1990-91p	1,697.2	21,794.7	7.8
Foreign imports	\$m f.o.b.	1990-91	3,635.8	48,911.6	7.4
Foreign exports	\$m f.o.b.	1990-91	12,426.8	52,447.2	23.7
Motor vehicles on register	'000	30 June 1991	1,061.6	p9,934.1	10.7
New motor vehicles registered	'000	1990-91	50.6	563.5	9.0
Road traffic accidents—					
Persons killed	number	1989	243	2,796	8.7
Retail turnover (excluding motor vehicles, etc.)	\$m	1990-91	7,972.6	89,094.9	8.9

See footnotes at end of table.

STATISTICAL SUMMARY

TABLE 26.20 – WESTERN AUSTRALIA IN RELATION TO AUSTRALIA - *continued*

	<i>Unit</i>	<i>Date or period</i>	<i>Western Australia</i>	<i>Australia</i>	<i>Percentage</i>
Savings bank deposits per head	\$	31 December 1988	3,799	4,091	..
Household income per head	\$	1988-89	15,092	15,702	..
Age and invalid pensions (including wives and spouse/ carers pensions)	number	30 June 1990	148,692	1,780,811	8.3
Disability and service pensions (including dependants)	number	30 June 1990	65,855	740,430	8.9
Education Institutions—					
Government schools	number	1990	760	7,490	10.1
Non-government schools	number	1990	244	2,517	9.7
Higher education institutions (m)	number	31 March 1990	4	76	5.3
Student enrolment —					
Government schools	number	1990	215,311	2,193,347	9.8
Non-government schools	number	1990	69,575	848,310	8.2
Higher education institutions (m)	number	31 March 1990	48,474	485,075	10.0

(a) Based on Estimated Resident Population. (b) Based on State of usual residence. (c) In civilian employment. Excludes defence forces and employees in agriculture and private domestic service, and trainee teachers. (d) Not comparable with 'Average weekly earnings per employed male unit' previously published. (e) In terms of greasy wool. Comprises shorn wool, dead wool, fellmongered wool and wool exported on skins. (f) Comprises sheep, cattle, pig and poultry meat. Excluding Tasmanian poultry production. Dressed carcass weight. Excludes offal. (g) *Source:* Australian Dairy Corporation. (h) Excludes establishments predominantly engaged in quarrying sand and gravel. (i) *Source:* Department of Mines. (j) *Source:* Department of Primary Industries and Energy. (k) Excludes details for single establishments manufacturing enterprises employing fewer than four persons. Excludes electricity and gas establishments. (l) Number of new dwelling units has been rounded to nearest ten. (m) Commonwealth-funded only.

APPENDIX

Articles Published in Previous Issues	A-1
Statistical Divisions, Sub Divisions and Component Local Government Areas At June 1991	A-4
Local Government Areas At 30 June 1991	A-5
Statistical Areas, Western Australia: Map 1	A-6
Statistical Areas, Western Australia: Map 2	A-7
Statistical Areas, Western Australia: Map 3	A-8
Maps Published in Previous Issues	A-9
Publications of the Western Australian Office of the Australian Bureau of Statistics	A-10

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.

<i>Article</i>	<i>Year Book</i>
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
Australian Stock Exchange (Perth) Ltd.	1989, pp. 257-9
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 name 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
Flora of Western Australia—	
Acacia	1965, pp. 59-60
'Christmas tree' (<i>Nuytsia floribunda</i>)	1962, p. 51
Economic value of the flora	1968, pp. 54-5
Grasses	1976, pp. 69-72
Orchids	1968, pp. 48-9
Proteaceae family in Western Australia	1974, pp. 52-4

Articles Published in Previous Issues (a) – *continued*

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
Flora of Western Australia— <i>continued</i>	
Rutaceae family in Western Australia	1972, pp. 53-5
Special features of the flora	1962, pp. 51-2
Forests Department, history of	1976, pp. 125-7
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 1931, text of	1979, pp. 12-16
Historical review — chronological notes from 1829	1967, pp. 2-33
Historical survey of Western Australia	1973, pp. 1-15
History of the Royal Agricultural Society of Western Australia (Inc.)	1991, pp. 181-4
History of Western Australia	1990, pp. 1-5
Housing and Construction, historical review	1986, pp. 367-9
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
Jesus People	1989, pp. 115-6
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
Lower Great Southern Statistical Division Profile	1989, pp. 260-71
McNess Housing Trust	1969, p. 205
Major Lockyer's letter to Colonial Secretary MacLeay, text of	1977, pp. 553-7
Maritime Museum, Western Australian	1986, pp. 237-8
Meteorites, Western Australian	1973, pp. 34-5
Meteorological services—	
History of	1960, pp. 34-5
Provision of	1966, pp. 46-7
Metric conversion for Australia	1972, pp. 571-4
Midlands Statistical Division Profile	1990, pp. 290-8
Mines, Department of, history of	1977, pp. 117-25
One Hundred Years of Responsible Government	1990, pp. 70-83
Overseas arrivals and departures	1971, pp. 145-6
Parliamentary procedure and administrative machinery	1970, pp. 106-9
Perth's underground water	1980, pp. 43-5
Pest control without insecticides	1973, pp. 93-5
Pesticides, effect on beneficial forms of life	1969, pp. 90-1
Physical features and geology	1986, pp. 7-30
Poisonous plants of Western Australia	1970, pp. 56-9
Police Department, history of	1973, pp. 113-16
Population in local government areas	1972, pp. 542-3
Port Hedland, Port of	1974, pp. 435-8
Premier's Department, history of	1974, pp. 109-13
Principal events of 1970	1971, p. 571
Public Works Department, history of	1971, pp. 116-19
Pyrites, production of	1973, pp. 393-4

Articles Published in Previous Issues (a) – *continued*

In cases where an article has been published in more than one previous issue, the reference to its last appearance only is given.

<i>Article</i>	<i>Year Book</i>
Railways—	
Origin and development	1968, pp. 360-1
Private	1965, p. 365
Timber	1968, pp. 363-4
Rainfall in agricultural areas, 1969	1970, p. 529
Rents (weekly) of unfurnished houses and flats	1973, p. 216
Satellites and Meteorology	1973, pp. 51-4
Settlement at King George's Sound, early history of	1977, pp. 556-9
South-West Statistical Division Profile	1986, pp.260-9
Sport and Recreation, Department of	1985, pp. 115-123
Sporting organisations	1970, pp. 196-200
State Basic Wage	1976, pp. 485-7
State Government Departments, functions of	1972, pp. 108-16
Third Party Claims Tribunal	1973, p. 254
Tornadoes	1970, pp. 48-51
Tourism, Department of, history of	1975, pp. 132-6
Trade, constitutional provisions and legislation	1973, p. 412
Trade, historical summary of	1967, pp. 346-7
Trade, overseas, encouragement of	1973, pp. 412-13
Treasury Department, history of	1982, pp. 134-9
Tropical cyclones	1983, pp. 52-61
University — principal benefactions	1969, p. 173
Use of pesticides in Western Australia	1971, pp. 87-90
West Australian Ballet	1989, pp. 140-1
West Australian Economy, 1959 to 1973	1973, pp. 565-71
Western Australia: History of,	1989, pp. 1-10
Western Australian Economy, Retrospect and Prospect	1984, pp. 471-7
Wheat, development of production	1968, p. 270

(a) Commencing with the present series: No. 1 1957

Statistical Divisions, Sub Divisions and Component Local Government Areas At June 1991

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

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

APPENDIX

Local Government Areas At 30 June 1991

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

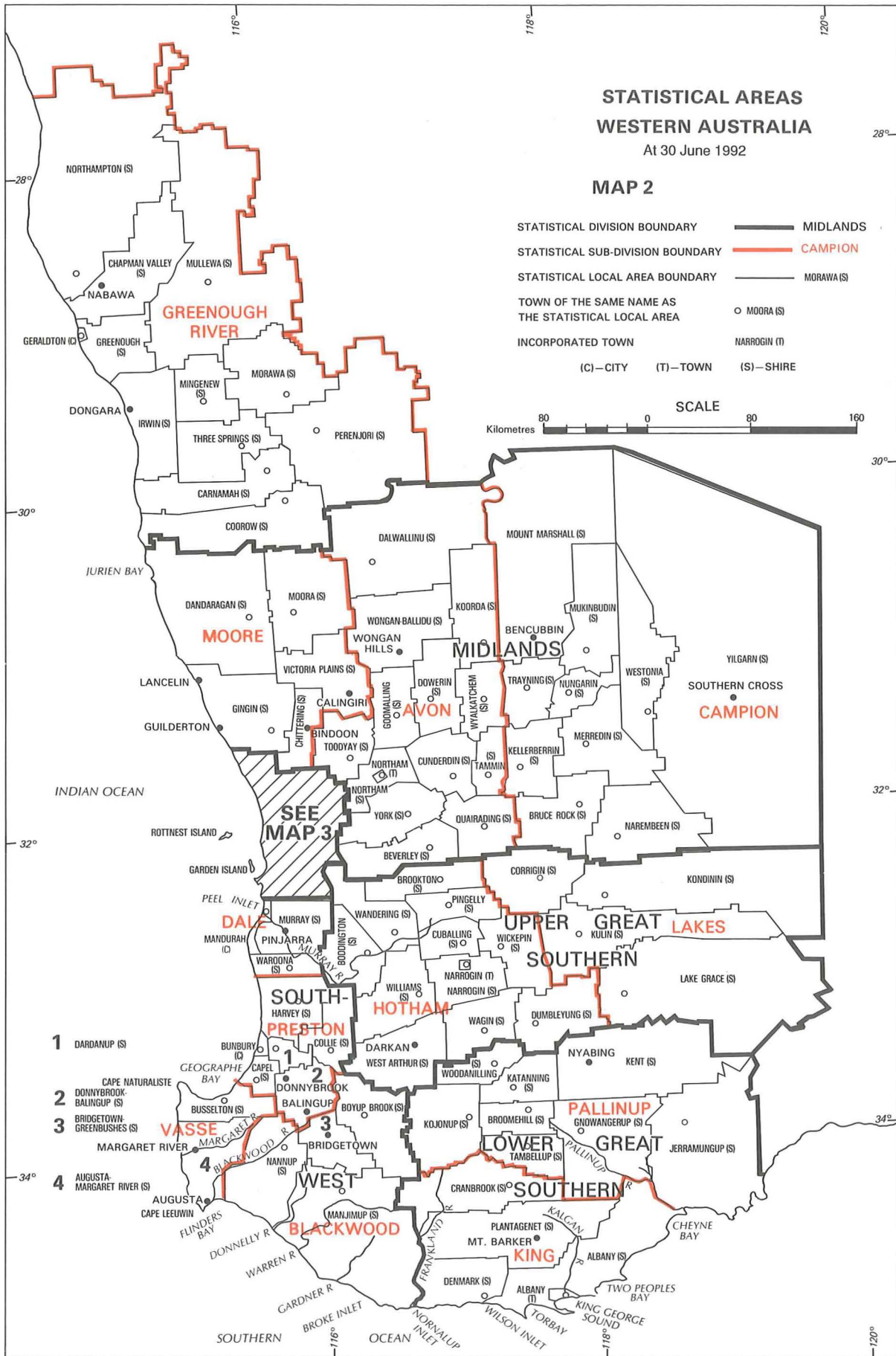
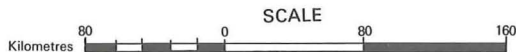
(a) Shire, unless marked (C) indicating city, or (T) indicating Town.

STATISTICAL AREAS WESTERN AUSTRALIA

At 30 June 1992

MAP 2

- | | | |
|--|------------|--------------|
| STATISTICAL DIVISION BOUNDARY | — | MIDLANDS |
| STATISTICAL SUB-DIVISION BOUNDARY | — | CAMPION |
| STATISTICAL LOCAL AREA BOUNDARY | — | MORAWA (S) |
| TOWN OF THE SAME NAME AS
THE STATISTICAL LOCAL AREA | ○ | MOORA (S) |
| INCORPORATED TOWN | ● | NARROGIN (T) |
| (C) — CITY | (T) — TOWN | (S) — SHIRE |

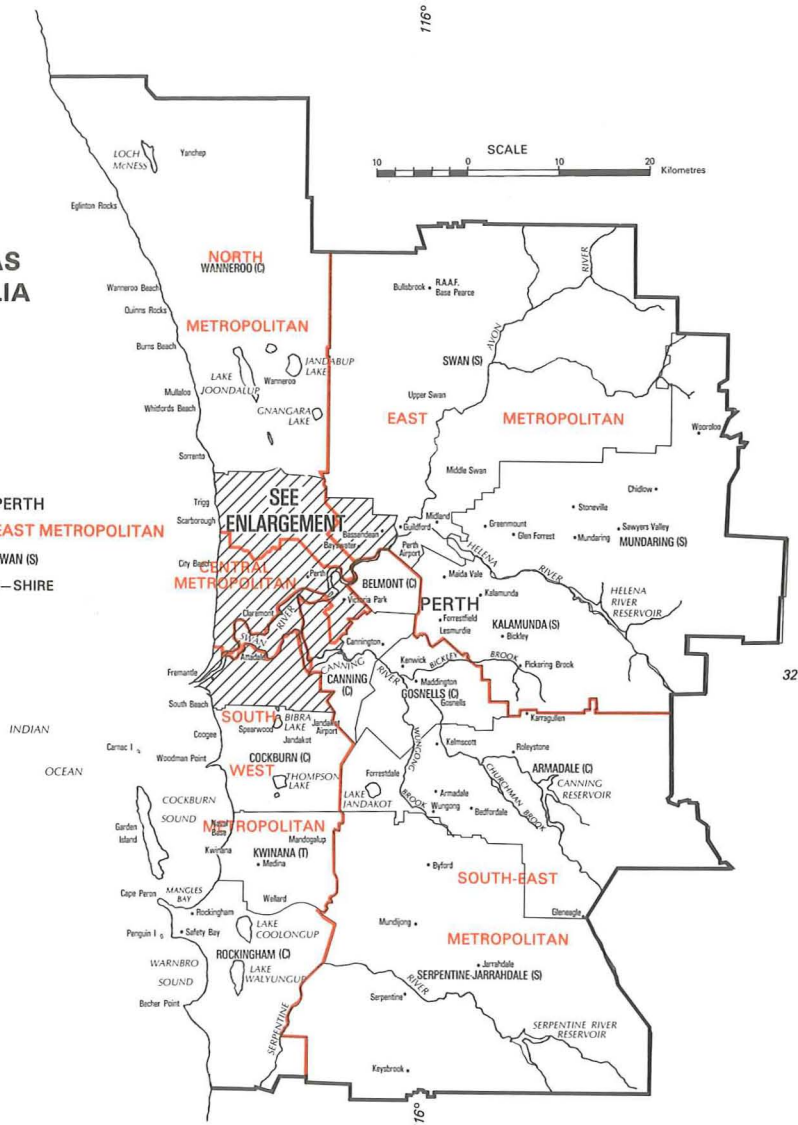


STATISTICAL AREAS WESTERN AUSTRALIA

At 30 June 1992

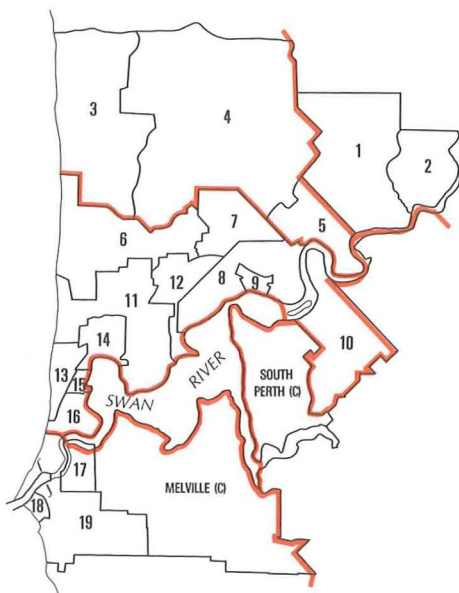
MAP 3

STATISTICAL DIVISION BOUNDARY ——— PERTH
 STATISTICAL SUB-DIVISION BOUNDARY ——— EAST METROPOLITAN
 STATISTICAL LOCAL AREA BOUNDARY ——— SWAN (S)
 (C)—CITY (T)—TOWN (S)—SHIRE



ENLARGEMENT

1. BAYSWATER (C)
2. BASSENDEAN (T)
3. STIRLING (C)—WEST
4. STIRLING (C)—CENTRAL
5. STIRLING (C)—SOUTH-EASTERN
6. PERTH (C)—WEMBLEY—COASTAL
7. PERTH (C)—NORTH
8. PERTH (C)—OUTER
9. PERTH (C)—INNER
10. PERTH (C)—SOUTH
11. NEDLANDS (C)
12. SUBIACO (C)
13. COTTESLOE (T)
14. CLAREMONT (T)
15. PEPPERMINT GROVE (S)
16. MOSMAN PARK (T)
17. EAST FREMANTLE (T)
18. FREMANTLE (C)—INNER
19. FREMANTLE (C)—REMAINDER



APPENDIX

Maps Published in Previous Issues (a)

<i>Map</i>	<i>Year Book</i>
Agricultural Areas — Growing Season	1982, p. 64
Air routes at 31 December 1956	1957, p. 289
Air routes at 30 June 1969	1970, <i>between</i> p. 448 and p. 449
Areas of current development	1970, <i>facing</i> p. 336
Comprehensive Agricultural Areas Water Supply Scheme	1985, p. 258
Electoral Boundaries(Federal)	1989 p. 78
Electoral Provinces and Electoral Districts (State)	1969, <i>between</i> p. 96 and p. 97
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</i> cover
General map of the State showing physical features, roads, railways and airfields	<i>inside back</i> cover
Geological sketch map	1986, p. 12
Mineral production, major centres	1990, p. 203
Perth Statistical Division	1978, <i>facing</i> p. 112
Port of Fremantle (Outer and Inner Harbour)	1970, <i>facing</i> p. 448
Port of Port Hedland	1974, p. 437
Principal ports, Western Australia	1989 p. 212
Production, main areas of	1975, <i>inside back</i> cover
Railways and road services — routes operated	1967, <i>facing</i> p 384
Railways road services — routes operated	1964, p. 354
Rainfall	1969, <i>facing</i> p. 32
Rainfall in agricultural areas, 1969	1970, p. 529
Roads, main and important secondary	1968, <i>facing</i> p.368
Sedimentary basins and Precambrian blocks	1986, p. 17
South-West Irrigation Districts	1985, p. 262
South-West of Western Australia showing median rainfall, July-September	1986, p. 47
South-West of Western Australia showing decile 1 rainfall, July-September	1986, p. 47
South-West of Western Australia showing predominant agricultural activities	1986, <i>facing</i> p. 300
The forest estate	1986, <i>facing</i> p. 268
Tracks of tropical cyclones (1975-1982)	1983, p. 60
Vegetation Provinces of Western Australia	1974, p. 56
Wettest six monthly period of year	1986, p. 34

(a) Commencing with the present series: No. 1 — 1957

APPENDIX

Publications of the Western Australian Office of the Australian Bureau of Statistics

Publications are issued annually unless marked q (quarterly), m (monthly) or irr (irregular).

<i>Catalogue number</i>	<i>Price</i>	<i>Publication</i>
		GENERAL—
1300.5	\$25.00	Western Australian Year Book (Softcover)
1302.5	\$9.50	Western Australian Facts and Figures (Previously Western Australian Pocket Year Book)
1303.5	\$15.00	Local Government
1305.5	\$10.50	Monthly Summary of Statistics m
1306.5	Free	Western Australia in Brief
1307.5	\$6.00	Economic Indicators m
		POPULATION, VITAL STATISTICS, MIGRATION AND SOCIAL—
3203.5	\$11.50	Estimated Resident Population By Age and Sex in Statistical Local Areas
3204.5	\$10.50	Estimated Resident Population in Statistical Local Areas: Preliminary
3311.5	\$27.00	Demography
3312.5	\$14.50	Deaths
4103.5	\$25.00	Compendium of Demographic and Social Statistics irr
4111.5	\$15.00	Arts and Crafts Purchasing and Participation irr Court Statistics:
4501.5	\$12.50	Higher Criminal Courts
4502.5	\$7.50	Courts of Petty Sessions
4503.5	\$7.50	Childrens Courts
4504.5	\$18.00	Summary of Criminal Court Proceedings
		CENSUS OF POPULATION AND HOUSING 1991 —
2701.5	\$20.00	First Counts for Statistical Local Areas irr
2710.5	\$85.00	Census Characteristics of States, Western Australia irr
2730.5	\$25.00	1991 Census Counts for Small Areas irr
		AGRICULTURE, FISHING AND FORESTRY—
7106.5	Free	Western Australian Agriculture in Brief
7111.5	\$10.50	Principal Agricultural Commodities: Preliminary
7113.5	\$14.50	Agriculture
7221.5	\$16.00	Livestock and Livestock Products
7322.5	\$12.50	Fruit
7330.5	\$20.00	Summary of Crops
7411.5	\$15.00	Agricultural Land Use and Selected Inputs
7421.5	\$11.50	Ryegrass Toxicity in Western Australia irr
7503.5	\$16.00	Value of Agricultural Commodities Produced
7601.5	\$8.00	Fisheries
		MANUFACTURING AND MINING—
8207.5	\$12.50	Manufacturing, Western Australia
8221.5	\$16.00	Manufacturing Industry
8404.5	\$10.00	Mining
8405.5	\$3.00	Principal Mining Statistics, Australia and Western Australia , Preliminary
8412.0	\$10.00	Actual and Expected Private Mineral Exploration, Australia q
		TRADE—
8635.5	\$20.00	Tourist Accommodation q
8636.5	\$4.50	Tourist Accommodation (Preliminary), Perth Statistical Division q
		BUILDING AND CONSTRUCTION—
8705.5	\$19.00	Estimated Stocks of Dwellings in Census Collection Districts and Statistical Local Areas
8731.5	\$10.50	Building Approvals m
8732.5	\$5.00	Building Approvals - Private Sector, Perth Statistical Division m
8741.5	\$10.50	Dwelling Unit Commencements m
8752.5	\$10.50	Building Activity q

APPENDIX

Publications of the Western Australian Office of the Australian Bureau of Statistics — *continued*

Publications are issued annually unless marked q (quarterly), m (monthly) or irr (irregular).

<i>Catalogue number</i>	<i>Price</i>	<i>Publication</i>
		TRANSPORT—
9215.5	\$13.50	Bicycle Usage and Safety irr
9303.5	\$7.50	Motor Vehicle Registrations m
9304.5	\$10.50	Motor Vehicle Registrations
9305.5	\$10.50	Vehicles on Register
9405.5	\$4.00	Road Traffic Accidents Involving Casualties q
9406.5	\$10.00	Road Traffic Accidents Involving Casualties

INDEX

For articles and maps published in previous issues see the appendix.

A

- Aboriginal
 - Arts 11-5
 - Legal Service 9-4
 - Medical Service, Perth 8-4
 - Population 6-6
- Agriculture
 - Advisory Committees 13-16
 - Australian statistics 13-3
 - financial statistics 13-2
 - Protection Board 13-16
 - sources of statistics 13-1
 - value of commodities produced 13-2, 26-7
- Air services
 - See Transport
- Alcohol and Drug Authority
 - See Authority
- Animals
 - See fauna
- Apiary
 - See Beekeeping
- Arts
 - Aboriginal 11-5
 - Art Gallery of Western Australia 11-4
 - grants to arts agencies 11-2
 - Perth Cultural Centre 11-1
 - Regional Art Galleries 11-4 – 11-5
- ASIC
 - See Australian Standard Industrial Classification
- Association
 - Family Planning 8-5
 - Safety House 9-9
 - Silver Chain Nursing 8-5
- Australia Post 19-10
- Australian Standard Industrial Classification 14-2
- AUSTUDY
 - See Education
- Authority
 - Alcohol and Drug 8-4
 - for Intellectually Handicapped Persons 7-5
- Average
 - retail prices 22-3
 - weekly earnings 21-5
 - weekly hours worked 21-4
- Award rates of pay 21-5, 26-17
 - indexes 21-5

B

- Banks 24-1 – 24-2, 26-21
 - State 24-2
 - Trading and Saving 24-2
- Barley 13-5, 26-7
- Beekeeping 13-15
- Bicycle services
 - See Transport
- Births 6-8 – 6-9, 26-3
- Botanic Garden
 - See Gardens
- Building
 - activity 18-3
 - approvals 18-2
 - completed 26-10
 - control of 18-2
 - dwelling 18-2
 - dwelling approved 18-2
 - dwelling commenced 18-4
 - dwelling completed 26-10
 - price index 22-4
 - statistics 18-2 – 18-4
 - value 18-3
- Building societies 24-2, 26-21
- Bus and ferry services
 - See Transport

C

- CALM
 - See Conservation and Land Management
- Cattle 26-6
 - dairy 13-13
 - meat 13-12
- Census
 - dwelling 18-1
 - of Mining Establishments 14-2
 - of Retail Establishments 17-1
- Chemistry Centre 10-10
- Climate 3-1 – 3-15
 - evaporation 3-13
 - the Gascoyne 25-2
 - metropolitan 3-15
 - pressure systems 3-1
 - rainfall 3-3, 3-13

- Climate (continued)
 rainfall statistics 3-3 – 3-7, 25-2, 25-9
 snow 3-15
 temperature 3-7
 temperature statistics 3-8 – 3-11, 3-13
 thunderstorms 3-13
- Coal 26-8
See Energy
- Commonwealth
 payments to States 23-2
- Commonwealth Government
 cash benefits to persons 23-4, 26-5
 Consolidated Revenue Fund 26-19
See also Federal
 grants and advances 23-3
 payments to States 23-2 – 23-3
- Commonwealth Scientific and
 Industrial Research Organization 10-10, 15-5
- Commonwealth-State financial relations 23-1 – 23-3
- Communications
 radio, television services 19-9
 telecommunications 19-9
- Community Services
See Department of
- Community Services and Health
See Department of
- Conservation and Land Management
See Department
- Constable Care
See Public Safety
- Construction
See Surveys
- Consular services
 in Western Australia 5-11
- Consumer affairs
See Department
See Ministry
- Consumer Price Index 22-1 – 22-2, 26-18
- Convicts
See History
- Courts
 Coroner's 9-2
 Criminal 9-3
 The Judicature 5-10
 Local 9-2
- CPI
See Consumer Price Index
- Credit unions 24-3
- Crops 13-4, 13-9, 26-6 – 26-7
See also specific crops
- C.S.I.R.O.
See Commonwealth Scientific and Industrial Research
 Organization
- Culture 11-1 – 11-5
- Currency 24-1
- Customs Tariff 20-1, 26-11
- D**
- Dance Triennium 11-6
- Deaths 6-10 – 6-12, 26-3
- Department for the Arts 11-1
- Department of
 Agriculture 13-15
 Community Services and Health 7-3
 Community Services 7-4
 Conservation and Land Management 11-7
 Consumer Affairs 17-3
 Health 8-3
 Mines 14-2
 Social Security 7-1
 State Development 14-2, 16-1
 Veterans' Affairs 7-2
- Depression
See History
- Disability pension (veterans') 26-4
- Divorces 6-14, 26-3
- Drainage
See Water
- E**
- Early Settlement
See History
- Earnings
See average weekly earnings
- Education 10-1 – 10-10
 AUSTUDY 10-9
 Commonwealth Government assistance 10-8 – 10-9
 financial assistance 10-8 – 10-9
 Higher Education Contribution Scheme 10-8
 post-secondary 10-3
 post-secondary colleges 10-5
 pre-primary 10-1
 primary schools 10-2
 Secondary Education Authority 10-3
 secondary schools 10-3
 State and local authority assistance 10-9
 technical and further 10-4
 tertiary 10-5 – 10-8
 W. A. Higher Education Council 10-3
- Elections 5-6
- Electricity
See Energy
- Emergency Services 9-6 – 9-8
 Bush Fire Board 9-7
 Fire Brigades Board 9-7
 Royal Flying Doctor 9-8
 St. John Ambulance 9-8
 State Emergency Service 9-8
 W.A. Police Service 9-6
- Employment
 by industry 21-3
 Job Vacancies 21-4
 status 21-3
- Energy
 biomass 15-4
 coal 15-4
 electricity 15-2
 National Energy Survey 15-6 – 15-7
 petroleum fuels 15-2
 petroleum products 15-4
 policies 15-7
 production 15-2

INDEX

Energy (continued)
 research 15-6
 resources 15-1
 solar 15-4
 uranium 15-4
 wind 15-4
Excise revenue 26-11
Expenditure
 new capital 24-5
Exports 20-2 - 20-5, 26-12 - 26-16

F

Family allowance 26-4
Family Planning Association
 See Association
Farm Management Service Laboratory 13-16
Fauna 4-14
 amphibians 4-21
 arachnids 4-24
 birds 4-20
 contemporary 4-16 - 4-25
 corals 4-23
 crustaceans 4-23
 echinoderms 4-22
 extinct 4-14 - 4-15
 fishes 4-21
 insects 4-26
 mammals 4-18
 molluscs 4-22
 myriapods 4-24
 origin and distribution 4-16
 reptiles 4-20
Federal Parliament 5-2, 5-4
 elections 5-6
 House of Representatives 5-3 - 5-4
 Senate 5-3
Federation
 See History
Fertilisers 13-9 - 13-10
Festival of Perth 11-5
Finance
 commercial 24-3 - 24-4
 housing 24-4
 lease 24-4
 Local Government 23-7, 26-18
 personal 24-3
 private 24-1 - 24-5
 public 23-1 - 23-8, 26-19 - 26-20
 State Government 23-4 - 23-6, 26-18
Financial institutions 24-2 - 24-3
Fire
 Bush Fires Board 9-7
 Fire Brigade Board 9-7
 statistics 9-7
Fisheries 13-18
 administration 13-19
 general 13-18
 value of catch 13-19, 26-7
Flora 4-1
 botanical provinces and districts 4-2, 4-4 - 4-8
 formations and alliances 4-2

Forestry 13-16
Forests
 administration 13-17
 indigenous 13-17
 inland 13-17
 location 13-16
 production 13-17
Forrest, John
 See History
 See also Premiers
Fruit 13-8 - 13-9

G

Gardens
 Botanic 10-11
 Zoological 11-8
The Gascoyne 25-1 - 25-7
Geology 2-1 - 2-17
 Development and Geomorphological Regions 2-1
 Development of landsurface 2-13
 Major geomorphological divisions 2-4, 2-6
 Morphotectonic Divisions 2-3
The Geraldton Mid-West Region 25-8 - 25-17
Gold 26-8
Gold rushes
 See History
Government
 departments 5-10
 elections 5-6
 responsible 1-4
 Vice-Regal representation 5-2
Governor
 of Western Australia 5-2

H

Harmonized Trade Classification System 20-1
Hay 13-6, 26-7
Health
 benefits 8-1
 Commonwealth benefits 8-1 - 8-2
 Commonwealth services 8-3 - 8-4
 Commonwealth subsidies 8-2
 See also Department of
 Insurance Commission 8-1
 insurance funds 8-2
 insurance surveys 8-9 - 8-10
 Medications 8-9
 services 8-1, 8-4
 State programs 8-3 - 8-4
 State services 8-4
 subsidies 8-2
 surveys 8-6 - 8-9
Health services
 expenditure 26-5
Herd Improvement Service
 of Western Australia 13-16
History
 Convicts 1-4
 Depression 1-9

- History (continued)
 Early Settlement 1-2 – 1-4
 Federation 1-6, 1-8
 Forrest expedition party 1-5
 the Gascoyne 25-1
 Gold rushes 1-4 – 1-6
 of Western Australia 1-1 – 1-14
 The mineral boom 1-13 – 1-14
 World War I 1-6 – 1-7
 World War II 1-9 – 1-10
- Hospitals
 State programs 8-4
- House of Representatives
See Federal Parliament
- Household surveys
See Surveys
- Housing
See Building
- I**
- Imports 20-2 – 20-5, 26-16
- Industrial
 authorities 21-8
 disputes 21-6 – 21-8, 26-17
 Relations Commission 21-8
- Intellectually Handicapped Persons
See Authority
- Irrigation
See Water
- J**
- The Judicature
See Courts
- K**
- Kings Park
See Parks
- L**
- Labour costs 21-6
- Labour force
 composition 21-2
 definition 21-1
 status 21-1
- Land use 13-3 – 13-4
- The Law Courts 9-1 – 9-2
- Lawrence, Carmen
See Premiers
- Legal Aid 9-3
 Aboriginal Legal Service of Western Australia 9-4
 Commission of Western Australia 9-3
- Legislation 5-8
- Legislative Assembly
See State Parliament
- Legislative Council
See State Parliament
- Library, libraries
 Alexander 11-3
 Battye, J S 11-3
 Board of Western Australia 11-2
 Information Service of Western Australia 11-2 – 11-3
 public and lending services 11-3
 State Archives 11-3
- Life expectancy 6-12
- Life Savers
See Public Safety
- Livestock 26-6
 products 13-11 – 13-14
 slaughtering 13-12 – 13-13
See also specific livestock
- Livestock products 13-15
- Local government 5-12
 finance 23-7, 26-18
 taxation 23-8
- Lupins 13-6
- M**
- MERIWA
See Minerals and Energy Research Institute
- MTT
See Transperth
- Manufacturing 16-1, 16-5
 employment 16-3, 26-9
 establishments 16-2, 26-9
 principal commodities produced 16-4, 26-9
 statistics 16-3 – 16-4
 turnover 16-3, 26-9
 wages and salaries 16-3
- Marriages 6-12 – 6-13, 26-3
- Medical benefits
See Health
- Medicare 8-1
- Medications 8-7
- Meteorology
See Climate
- The Mid-West Region 25-8 – 25-17
- Migration 26-2
 overseas 6-14 – 6-15
- Mineral
 expenditure 14-5
 exploration 14-5
 production 14-3 – 14-4
- Mineral boom
See History
- Minerals and Energy Research Institute 15-5
- Mining 14-1 – 14-6
- Ministries 5-4 – 5-6
 current 5-5
 list of 5-4
- Ministry
 of Consumer Affairs 17-3
- Motor vehicles 19-1
 drivers' licences 19-2
 registrations 19-2, 26-12
See also Survey

INDEX

- Museum
Western Australian 11-3 – 11-4
- N**
- National Welfare Fund 26-5
Northern Suburbs Railway 19-5
Nurseries 13-9
- O**
- Oats 13-5, 26-7
Ombudsman 9-4
- P**
- Parks
Cape Range 11-7
Kings Park 10-11, 11-8
National 11-7 – 11-8
Rottneest Island Reserve 11-9
- Parliament, Federal
See Federal Parliament
- Parliament, State
See State Parliament
- Parliamentary Commissioner
for Administrative Investigations 9-4
- Pasoral production
See also Cattle, Sheep
- Pastures 13-6 – 13-7
- Pensions, benefits and allowances 26-4
- Perth Landfill Gas Project 15-5
- Perth Observatory 10-10
- Petroleum
See also Energy
exploration 14-5
fuels 15-2
Products 15-4
- Pharmaceutical Benefits Scheme
See Health, Commonwealth benefits
- Pigs 13-13 – 13-14, 26-6
- Population 6-1 – 6-6
Aboriginal and Islander 6-6
birthplace 6-5
characteristics 6-4
Estimated Resident 26-2
estimates 6-2 – 6-5, 26-2
marital status 6-12, 6-14
migration 6-14 – 6-15
religion 6-5
vital statistics 6-6, 6-8 – 6-12, 6-14, 26-3
- Ports
Albany 19-7
Bunbury 19-7
Esperance 19-7
Fremantle 19-8
Geraldton 19-8
Port Hedland 19-8
- Post-secondary education
See Education
- Postal services 19-10
See Australia Post
- Poultry 13-14 – 13-15
- Premiers
conference 23-1
current 5-7
list of 5-4
- Pressure systems
See Climate
- Price indexes 22-1, 22-4
consumer 22-1 – 22-2
house 22-3
retail 22-3
wholesale 22-4
- Primary education
See Education
- Prisons 9-4 – 9-5
- Public debt 26-20
- Public Safety 9-8 – 9-10
Constable Care 9-9
Neighbourhood Watch 9-8
Royal Life Saving Society 9-9
Rural Watch 9-9
Safety House Association 9-9
- Publications, list of, A-10 – A-11
- R**
- Rail services
See Transport
- Rainfall
See Climate
- Recreation 11-7 – 11-9
- Red Cross Society (WA Division) 8-5
- Register of Encumbered Vehicles 17-4
- Retail
price indexes 22-3
prices 22-3
trade 17-1 – 17-2
turnover 17-1 – 17-2
- Roads 19-1
- Rottneest Island Authority 11-9
- Rural Watch
See Public Safety
- S**
- Schools 10-1 – 10-2
curricula 10-2 – 10-3
See also Education
government 10-2
non-government 10-3
- Science 10-10 – 10-11
- Secondary education
See Education
- Secondary Education Authority 10-3
- SECWA 15-2
policies 15-7
research 15-6
- Senate 5-3
See Federal Parliament
- Service industries 17-3

Service pension (veterans') 26-4
 Sewerage schemes
 See Water
 Sheep 13-11, 26-6
 See also Wool
 Shipping 19-6
 ports administration 19-7
 Silver Chain Nursing Association
 See Association
 Social Security
 See Department of
 Social Services
 benefits 26-4
 expenditure 26-5
 Western Australian Council of 7-5
 Sport and Recreation
 Ministry of 11-9
 State
 Emergency Service 9-8
 Government Departments 5-9
 representation overseas and other States 5-10
 State Development
 See Department
 State Energy Commission of W.A.
 See SECWA
 State government
 departments 5-10
 finance 23-4 – 23-6, 26-18
 taxation 23-8
 State Parliament 5-4 – 5-6
 elections 5-6
 electoral regions and districts 5-6
 legislation 5-8
 Legislative Assembly 5-8
 Legislative Council 5-8
 Ministries 5-4
 Statistical divisions 5-14
 Statistical summary 26-1 – 26-22
 WA in comparison with Australia 26-22 – 26-23
 Surveys
 Building activity 18-3
 Engineering Construction 18-5
 Health 8-6 – 8-9
 health related actions 8-7
 Household Expenditure 22-5 – 22-6
 Labour Force 21-1
 Labour Force - supplementary 21-4
 long term health conditions 8-6
 Motor Vehicle Usage 19-2 – 19-3
 National Energy Survey 15-7
 of Retail Establishments 17-1

T

TAFE
 See Technical and Further Education
 Taxation
 State Government and Local Authority 23-8
 Taxi services
 See Transport
 Technical and Further Education 10-4
 Telecommunications 19-9

Temperature
 See Climate
 Tertiary education 10-5
 Tertiary Institutions Service Centre 10-8
 Tourism 11-10 – 11-11
 Trade
 direction of 20-6
 external 26-16
 foreign 20-2 – 20-4
 interstate 20-5
 retail 17-1 – 17-2
 valuation 20-2
 wholesale 17-1
 Transperth 19-3
 Transport
 air 19-5 – 19-6, 26-11
 bicycle services 19-3
 bus and ferry services 19-3
 rail 19-4 – 19-5
 railways 26-11
 road 19-1 – 19-4
 sea 19-6
 taxi services 19-4

U

Unemployment
 benefit 26-4, 26-17
 rate (definition) 21-2
 rates by age 21-2
 teenage 21-2
 Unions
 credit 24-3
 Universities 10-5
 Curtin 10-7
 Edith Cowan 10-5
 enrolments 10-8
 Murdoch 10-6 – 10-7
 Muresk Institute of Agriculture 10-7
 staff 10-8
 University of Western Australia 10-6
 Western Australian School of Mines 10-7
 Universities finance
 See specific universities

V

Vegetables 13-7
 Vegetation
 See flora
 Veterans' Affairs
 See Department of

W

Wage rates 26-17
 Wages
 See average weekly earnings

INDEX

- Water 12-1 – 12-9
 - Authority of Western Australia 12-1
 - drainage 12-6, 12-8
 - irrigation 12-6 – 12-7
 - management 12-7
 - resources 12-1
 - schemes 12-7
 - sewerage 12-8 – 12-9
 - supply 12-2 – 12-5, 12-7
- Western Australian Film Council 11-1
- Western Australian Higher Education Authority
 - See* Authority
- Westrail 19-4
- Wheat 13-4
 - exports 13-5
 - production 26-6
 - value 26-8
- Wholesale price indexes 22-4
- Wholesale trade
 - See* Trade
- Widow's pension 26-4
- Wool 13-11
 - production 26-6
 - See also* Sheep
 - value 26-8
- World War I
 - See* History
- World War II
 - See* History

Z

- Zoological Gardens
 - See* Gardens