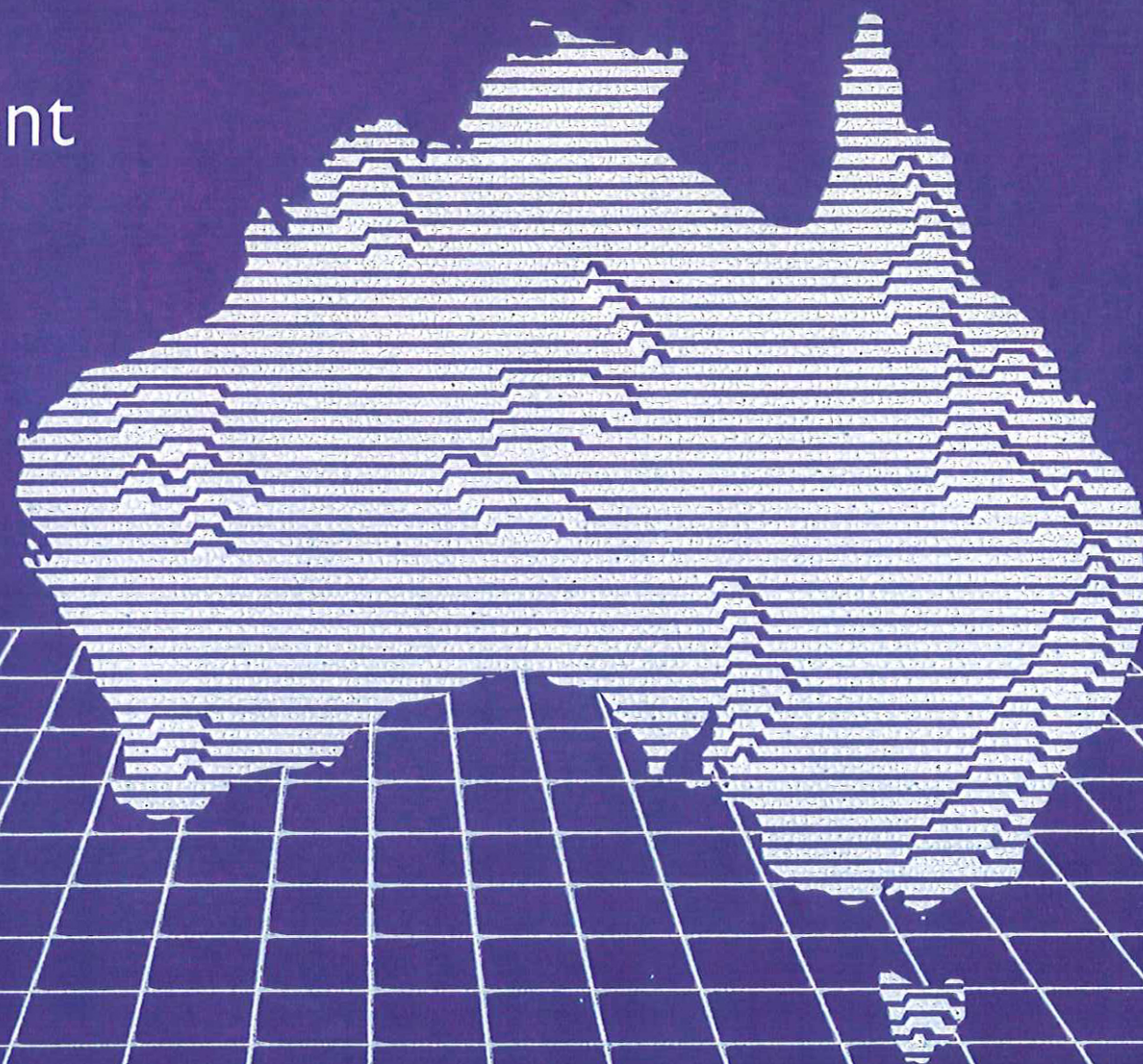


Tactual Atlas of Australia

MAPS

General Reference
Physical Environment



Tactual Atlas of Australia

MAPS

General Reference
Physical Environment



DIVISION OF NATIONAL MAPPING, DEPARTMENT OF RESOURCES AND ENERGY, CANBERRA, AUSTRALIA



Foreword



Senator The Hon. Gareth Evans, QC,
Minister for Resources and Energy.

As an integral part of government's resources and energy portfolio, the Division of National Mapping (Natmap) has now been proudly satisfying the Commonwealth's mapping programs for many years.

For both government and all those Australians who wish to know more about our nation's physical and human resources, an atlas is a vital reference tool. Consequently a significant amount of Natmap's mapping activity covers the production of maps and atlases of Australia containing a wealth of information on many diverse subjects.

To date these products have been designed for the sighted members of our community. However, this unique two-volume braille atlas is the first step in providing similar information for the visually impaired, particularly the youth, amongst whom there is a growing demand for equal opportunity in education.

The contents are based on Natmap's *Atlas of Australian Resources* and provide a national overview of Australia's physical characteristics, its industry, transportation, people and social structure. Additional sections have been added to depict Australia's neighbours and the world at large as well as the main geographical features of Australia's major metropolitan areas. All maps are accompanied by brief explanatory commentaries which not only provide descriptive information about each map but in many cases guide the reader around the map.

The *Tactual Atlas of Australia* is a comprehensive and up to date atlas which I commend to all visually impaired Australians. It is an essential learning tool which will provide the reader with an authoritative and appealing source of essential information.

A handwritten signature in dark ink, which appears to read 'Gareth Evans'.

Acknowledgements

The valuable assistance provided so willingly by the following people during preparation of this Atlas is gratefully acknowledged: Robert Altamore, David Clulow, Samantha Harvey, Amanda Heal and Roslyn Sackerley for the many hours spent testing the draft maps, reading strategies and descriptive texts; the Braille Transcribers Group of the Blind Society of the A.C.T. for transcribing and supplying draft texts used in testing, Mr Byrne Goodrick, consultant, and Natmap and contract staff for their dedication and hard work throughout the project.

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Contents

Foreword

Preface

Acknowledgements

Section A: Introduction to Reading Tactual Maps

- Introducing Maps
- Map Scale
- Map Symbols and Legend
- Map Generalisation
- Map Direction
- Map Referencing Systems
- Standard Abbreviations
- Map Reading Strategies

Section B: Australia—General Reference

- Map 1. Australia - Coastal Features
- Map 2. Australia - State Borders
- Map 3. Australia - Capital Cities
- Map 4. Australia - Cities and Towns
- Map 5. Australia - Regions

Section C: Australia and the World

- Map 6. Australia and its Neighbours
- Map 7. World - Continents and Oceans
- Map 8. World - Latitude and Longitude
- Map 8a. World - Time Zones

Section D: Australia's Capital Cities

- Map 9. Canberra
- Map 10. Inner Canberra
- Map 11. Sydney
- Map 12. Inner Sydney
- Map 13. Melbourne
- Map 14. Inner Melbourne
- Map 15. Brisbane
- Map 16. Inner Brisbane
- Map 17. Perth
- Map 18. Inner Perth
- Map 19. Adelaide
- Map 20. Inner Adelaide
- Map 21. Hobart
- Map 22. Darwin

Section E: The Physical Environment

- Map 23. Elevation
- Map 24. Relief
- Map 25. Deserts
- Map 26. Drainage Systems
- Map 27. Rivers
- Map 28. Landform Types
- Map 29. Geology - Surface Rocks
- Map 30. Geology - Bedrock Types
- Map 31. Geology - Bedrock Age
- Map 32. Soils
- Map 33. Climatic Types
- Map 34. Annual Rainfall
- Map 35. Monthly Rainfall
 - January
 - July
- Map 36. Rainfall Characteristics
 - Wet Days
 - Seasonal Rainfall
 - Rainfall Variability
- Map 37. Annual Temperatures
 - Annual Temperature
 - Temperature Range
- Map 38. Monthly Temperatures
 - January Maximum
 - January Minimum
 - July Maximum
 - July Minimum
- Map 39. Temperature Characteristics - I
 - Hot Days
 - Cold Days
- Map 40. Temperature Characteristics - II
 - Warm Months
 - Frost Period
- Map 41. Sunshine
 - Annual
 - January
 - July
- Map 42. Climatic Hazards - I
 - Tropical Cyclones
 - Bushfires
- Map 43. Climatic Hazards - II
 - Drought Incidence 1965–80
 - Drought 1982–83
- Map 44. Surface Water

- Map 45. Groundwater
- Map 46. Natural Vegetation
- Map 47. Major Vegetation Types - I
 - Rainforest and Spinifex
 - Saltbush, Bluebush and Grasslands
- Map 48. Major Vegetation Types - II
 - Eucalyptus
 - Acacia

Section F: Gazetteer

Section A

Introduction to Reading Tactual Maps

INTRODUCING MAPS

Maps are accurate but much-stylised pictures of where places and things are located on the earth's surface.

We need maps to communicate information about where such features are actually located and their spatial relationships with other places and things.

Maps are essentially graphical drawings even though they do sometimes include words, for example place names. Because they are always very small compared to the actual area of the earth's surface they represent, maps have to be much simplified and entirely codified. This need to compress and codify information, by symbolism, on a small area of paper has led to the development of the graphical 'language' of cartography.

We have to learn this 'language' of cartography before we can 'read' a map.

The contents of this section will provide you with an understanding of the cartographic language and principles upon which the maps in this Atlas are based.

Before attempting to read any maps, it will be beneficial if you understand some basic mapping concepts and conventions, and learn to adopt systematic reading strategies. These are described in detail in the companion volume *'A Map User Guide to Reading Tactual and Low Vision Maps'* and summarised later in this section. Initially, however, you should understand that:

- A map is a bird's-eye view depicted on a flat surface.
- Mapped size and distance relates to real world size and distance.
- Mapped shape relates to real world shape.

- Map direction relates to direction in the real world.
- Map symbols usually represent real and tangible features of the earth's surface.
- Lines on a map signify continuity, even through changes in direction and intersection with other symbols.

The cartographer's first problem is that the earth's surface is curved but the paper on which the map is to be drawn is flat. While this is not a great problem for maps covering small areas, it is a paramount concern for maps of large areas and, especially, world maps.

To help overcome this problem, cartographers have devised methods for projecting lines drawn on the surface of a globe onto the flat map surface. These 'map projections', as they are known, are at best compromises between distortions of shape, scale and direction.

For efficient map reading, skills which need to be developed include:

- Systematic scanning and perception of map data

- Use of map scale
- Map and user orientation
- Use of map reference systems
- Symbol recognition and discrimination
- Shape (outline) recognition
- Tracing line symbols

MAP SCALE

Map scale is the ratio between a distance on the map and the corresponding distance between the same two points on the ground. Map scale can be expressed in the following ways:

SCALE STATEMENT

Sometimes a map scale is described in words and numbers. For example, 1 centimetre equals 1000 kilometres or 1 centimetre to 1000 kilometres. This means that 1 centimetre on the map represents 1000 kilometres on the earth's surface.

GRAPHIC OR BAR SCALE

A line or bar marked at regular intervals to enable readers to measure distances between points on the map to be measured directly in the ground distances they represent is known as a graphic or bar scale.

Find the scales in the lower left-hand corner of Maps 1 and 2. These are examples of bar scales.

REPRESENTATIVE FRACTION

Map scale is commonly expressed as a 'representative fraction' (RF for short), in which map distances are expressed as ratios of real distances, for example 1:10 000. This means that 1 mm or 1 cm on the map represents 10 000 mm or 10 000 cm respectively on the earth's surface. Stated another way, a map drawn 1000 times smaller than that part of the earth's surface it represents would have an RF scale of 1:1000.

The representative fractions for most of the maps in this Atlas are 1:17 million and 1:31 million.

You will often encounter the terms 'large scale' map and 'small scale' map. A large scale map is a detailed map of a small area, for example a town map, whereas a small scale map is a map of a large area in less detail, such as the maps of Australia in the Atlas.

MAP DIRECTION

Map direction relates to direction in the real world and is usually described in terms of the four main points of the compass — north (N), south (S), east (E) and west (W). These four points can be subdivided into a further four points half-way between, for example, south-east (SE) which is half-way between south and east, north-east (NE) half-way between north and east and so on. The diagram at the top of Map 1 shows these eight main points of the compass.

It is standard practice to have north at the top of a map. South is therefore towards the bottom, east towards the right-hand edge and west towards the left.

MAP REFERENCE SYSTEMS

These enable the reader to easily describe or find the location of a feature on a map. The best known and most universal geographic reference system is 'latitude and longitude', which is depicted on Map 8 and described in its accompanying text.

For ease of use, map pages in this Atlas have a simple alphanumeric grid represented by ticks labelled with letters and numbers around the edge. The letters start at the top left corner and run across the top of the page. The numbers also start at the top left corner but run down the page.

To find a particular point on the map you should:

- (1) Find the letter at the top of the page and draw an imaginary N-S line down the page.
- (2) Find the number on the left-hand edge of the page and draw an imaginary line E-W line across the page.

- (3) The area you are searching for is where these two lines intersect.

On Map 3 *Australia-Capital Cities* find Sydney, which is located at H5.

MAP SYMBOLS AND LEGENDS

Maps as graphic systems of communication use a variety of symbols to represent data. These symbols are the language of maps and can be divided into three types:

POINT SYMBOLS

Point symbols are used to represent features or data at specific locations. Circles, crosses and squares are examples of point symbols used in this Atlas to locate towns, points of interest, mountain peaks, etc.

LINE SYMBOLS

Lines are used on maps to depict linear features. In this Atlas continuous or broken lines are used to represent features such as coastlines, borders, rivers and roads.

AREA SYMBOLS

Area symbols are used to depict features which cover areas too large to be mapped by point symbols. Distinctive patterns and textures, usually bounded by a continuous line, are used to represent areas in this Atlas, for example parts of the country with a particular type of vegetation or rock type.

Individual maps can include one, two or even all three types of symbols.

A map legend is a list of the symbols used on a map together with simple statements explaining what each symbol represents. It allows you to decode the map. In this Atlas letters or numbers are often used on the map area instead of complete place or feature names to save space and minimise congestion. In these cases a list of letters and numbers and features they represent will also appear in conjunction with the legend.

GENERALISATION OF MAP DETAIL

While map scale is the relationship between distance on a map to the same distance in reality, it also dictates the amount of detail which can be depicted on a map. As the scale becomes smaller, the amount of detail which can be depicted decreases. Maps which include too much detail become cluttered and are difficult to read.

Simplification and selection of features are the techniques used to ensure that maps retain the desired information but remain readable. This process is known as 'generalisation'.

Cartographers simplify data by smoothing out lines and making shapes less complex so they are more easily read; by aggregating data so that a number of small features are represented by a single symbol; and by grouping categories of data to reduce the number of categories shown.

Selection is undertaken by first organising data in order of importance, then omitting or amalgamating the least important as map scale decreases. For example, a large scale map may show six categories of roads whereas a map of the same area at a much smaller scale may show only the two most important categories, or combine all six into only two categories.

The size of braille lettering and the need to leave enough space between features on tactual maps so they can be identified by touch further limits the amount of detail which can be included. In some cases this necessitates shifting the position of features slightly to ensure clarity.

As map scales in this Atlas are very small indeed — mainly 1:17 million and 1:31 million — information is very much generalised. Nevertheless, important relativities are maintained and comparison of data on different maps remains valid.

STANDARD ABBREVIATIONS

Throughout the Atlas you will find the following standard abbreviations used on many of the maps and in the accompanying text.

DIRECTION

- N North
- S South
- E East
- W West
- NE North-east
- SE South-east
- NW North-west
- SW South-west

AUSTRALIAN STATES AND TERRITORIES

- Q Queensland
- NSW New South Wales
- ACT Australian Capital Territory
- V Victoria
- T Tasmania
- SA South Australia
- WA Western Australia
- NT Northern Territory

DISTANCES AND MEASUREMENTS

- mm Millimetre
- cm Centimetre
- m Metre
- km Kilometre
- sq m Square metre
- sq km Square kilometre
- L Litre
- ML Megalitre
- C Celsius

MAP READING STRATEGIES

Maps, like books, should be read systematically. A mental image of a whole tactical map can only be achieved by acquiring map information piece by piece and building it into a complete picture. This will require concentration and practice on your part, but if you adopt a systematic approach the building of such an image will be made easier.

The following is a recommended sequence of reading:

1. Scanning the Map

A preliminary scan of the whole map will provide you with a picture of its general layout and contents. The scan should be done carefully and systematically, covering all parts of the map.

Experience has shown that an effective scan can be achieved by using both hands simultaneously to scan in vertical strips from top to bottom. Using three fingers on each hand gives a six-finger wide perceptual window and covers the whole map in relatively few scans. Using six fingers also helps in the recognition of linear features and their orientation.

Users accustomed to reading braille horizontally will need to adapt to vertical scanning but will find the result rewarding when used on tactual maps.

It may be necessary to repeat the scan to achieve even a broad understanding of the map but having gained a generalised mental picture you can next consider the best strategy for making a more detailed study of the map, (see 'Reading Map Content' below).

2. Reading Map Title

The map title should be the first item of information you read because it provides a brief description of map content and, when read in conjunction with map scale, can indicate the extent of the mapped area. In general, map titles in this Atlas are found at the top left corner of the page.

3. Determining Map Scale

Most of the maps in Sections B and D have a bar scale, which is almost always located in the bottom left corner of the page.

In order to conserve space for legends and other notes, the scale is not given on the single maps of Australia at 1:17 million scale or on the pages with two or more maps of Australia at 1:31 million scale in other sections of the Atlas. It is expected that, having read the general reference maps, you will be familiar with maps at these 'standard' scales.

4. Reading Map Legend

Locate the legend and familiarise yourself with what has been mapped and how it has been depicted. In this Atlas, legends are generally located on the left-hand side of the page but when they are too large, or additional data is in list form, the remainder of the information will appear on the following page.

Knowledge gained from reading the map title, scale and legend is essential for understanding map content.

5. Reading Map Content

Tactual perception of a whole map can only be achieved by exploring small parts of the map and fitting them together into a coherent whole. Map detail, however, comes in a variety of forms and patterns which can be difficult to break into pieces suitable for tactual exploration and memorising.

Furthermore, different map types can lend themselves to different strategies for reading.

The following hints will be helpful when you are reading the maps in this Atlas:

Maps which depict data by the use of lines, for example rivers or roads, may best be explored by tracing the length of individual features and relating them to State borders and/or the coastline.

Area data such as soil types and rainfall distribution may best be explored category by category, again using the familiar shapes of coastal features and perhaps also State borders to establish a mental picture of their distribution.

Successful map reading will depend a great deal on the ingenuity of readers to break data into parts which can be explored, memorised and put together into a meaningful whole.

Section B

Australia – General Reference

The maps in this section are intended to help you locate features and places of general interest. They will also help you to understand the distribution of data shown on maps in other sections of the Atlas.

Reading these maps and the accompanying texts is an exercise in discovering the shape of Australia and its States, the differences in map detail which can be expected at the different scales used, and the location of features mentioned in the texts.

You should refer back to this section in the course of reading other sections. It is important, however, that the General Reference maps be read systematically in order to gain a mental image of the outline of Australia, the shape of the State borders, and the location of places and features shown on the maps. Without this mental picture, effective reading of other maps will be much more difficult.

Australia - Coastal Features

This map is intended to make you familiar with the shape of Australia. It highlights the coastline and some major coastal features.

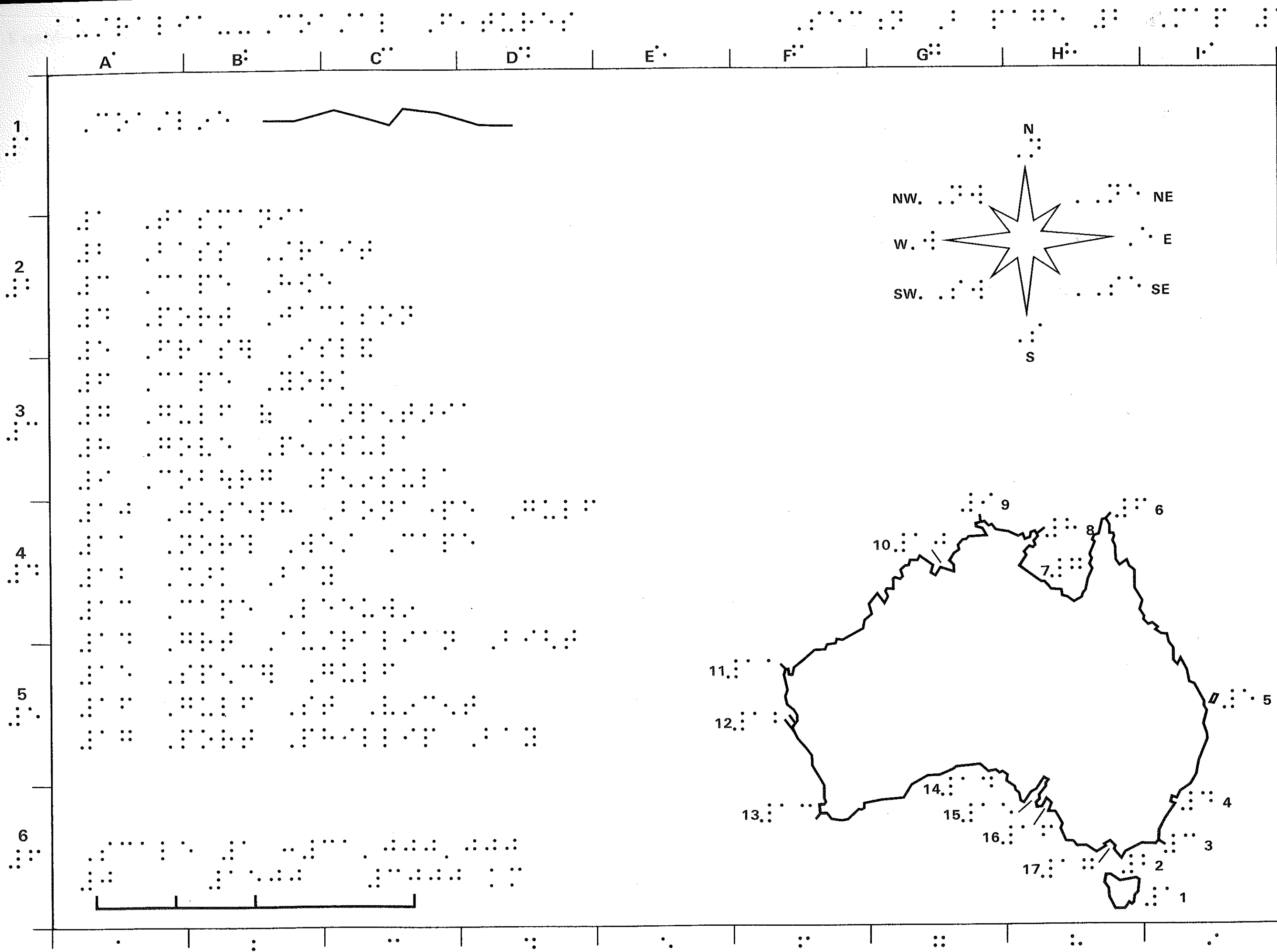
READING STRATEGY

- Step 1: Carry out a preliminary scan of the map-sheet in vertical strips using both hands. Note the position of the title, legend, scale bar and compass.
- Step 2: Read the map title.
- Step 3: Find out what features are represented in the legend.
- Step 4: Determine the distances represented by each division on the scale bar.
- Step 5: Using a ruler, or thumb and forefinger, measure the total width of Australia and place it against the scale bar to calculate the E-W direction in kilometres.
- Step 6: Trace the outline of Australia in the following sequence. If you are unsure of the direction given, refer to the compass in the top right-hand corner of the map-sheet.
- Beginning in the SE, locate the island State of Tasmania (T) at 1. Trace the outline of T.
 - From the NE tip of T, go N across Bass Strait (2) and locate Cape Howe on the mainland at 3.
 - Follow the coastline N from Cape Howe and locate Port Jackson (Sydney Harbour) at 4.
 - Continue following the coastline N to Fraser Island off the coast of Queensland (Q) at 5.
 - Continue generally NW to the most northerly point on the Australian mainland—the tip of Cape York at 6.
 - Now follow the coastline S along the western side of Cape York then NW and N around the Gulf of Carpentaria (7) to Gove Peninsula at 8.
 - From Gove Peninsula proceed W to Cobourg Peninsula (9), then generally SW to Joseph Bonaparte Gulf at 10. (Note that a leadline points from the 10 to the Gulf.)
 - Follow the coast W for a short distance and then SW to North West Cape at 11.
 - Further S locate Shark Bay (12) and further S still locate Cape Leeuwin in the far SW corner of Western Australia (WA) at 13.
 - Now follow the coastline generally eastward across the long sweep of the Great Australian Bight (14) to Spencer Gulf (15) and Gulf St Vincent at 16.
 - Continue SE along the coast to Port Phillip Bay (17) and then E back to Cape Howe at 3.

Coastline 

- | | |
|----|------------------------|
| 1 | Tasmania |
| 2 | Bass Strait |
| 3 | Cape Howe |
| 4 | Port Jackson |
| 5 | Fraser Island |
| 6 | Cape York |
| 7 | Gulf of Carpentaria |
| 8 | Gove Peninsula |
| 9 | Cobourg Peninsula |
| 10 | Joseph Bonaparte Gulf |
| 11 | North West Cape |
| 12 | Shark Bay |
| 13 | Cape Leeuwin |
| 14 | Great Australian Bight |
| 15 | Spencer Gulf |
| 16 | Gulf St Vincent |
| 17 | Port Phillip Bay |





Australia - State Borders

The object of this map is to familiarise you with the shape of each State and Territory.

READING STRATEGY

Step 1: Carry out a preliminary scan of the map-sheet. Note the position of the title, legend, scale bar and compass.

Step 2: Read the map title.

Step 3: Find out what features are represented in the legend.

Step 4: Scan the whole map in vertical strips using both hands.

Step 5: Locate and memorise the letters denoting each State and Territory name.

Step 6: Trace the outline of Western Australia, the largest of all the States (area 2 525 000 sq km).

Beginning on the coast of the Great Australian Bight (14), locate the border between WA and SA. From here, follow the coastline SW to Cape Leeuwin (13) then N and NE to Joseph Bonaparte Gulf (10), where it meets the WA-NT border. Follow this border S, noting where the NT-SA border joins from the E. Continue S to the point of commencement on the Great Australian Bight.

Step 7: Trace the outline of South Australia (area 984 000 sq km).

Beginning at the border between WA and SA on the coast of the Great Australian Bight (14), follow the coast SE past Spencer Gulf (15) and Gulf St Vincent (16) to where the SA-V border meets the coast. Follow this border N, noting the points where the V-NSW then NSW-Q borders join from the E. Continue N to where the border turns directly W. Trace this border W, noting where the Q-NT border joins from the N. Continue W to the intersection with the border of WA then S to the point of commencement on the Great Australian Bight.

Step 8: Trace the outline of Victoria (area 227 600 sq km).

SE of Gulf St Vincent (16), locate the junction of the V-SA border with the coast. Follow the coastline generally E past Port Phillip Bay (17) and along the edge of Bass Strait (2) to Cape Howe (3), where the V-NSW border joins the coast. Follow the V-NSW border NW to where it meets the SA border. (After a short, straight section the border in fact follows the Murray River to the SA border.) Follow the V-SA border S back to the starting point on the coast.

Step 9: Trace the outline of New South Wales (area 801 600 sq km).

Beginning on the coast at Cape Howe (3) follow the coast N, passing Port Jackson at 4, to where it intersects with the NSW-Q border from the W. (This is at Tweed Heads.) Follow the NSW-Q border generally W (via the Tweed River, McPherson Range, and Dumaresq, Macintyre and Barwon Rivers) and then directly W to its intersection with the SA border. Follow the NSW-SA border S to where the NSW-V border joins it from the E. Now follow the NSW-V border generally SE to Cape Howe (3). (For most of the way the NSW-V border follows the Murray River.)

Step 10: Locate the Australian Capital Territory (area 2400 sq km).

In the SE of NSW locate a small area bounded by the border symbol. This is the Australian Capital Territory. The letters denoting its name have been placed immediately to the left of the boundary symbol.

Step 11: Trace the outline of Queensland, the second largest State (area 1 727 000 sq km).

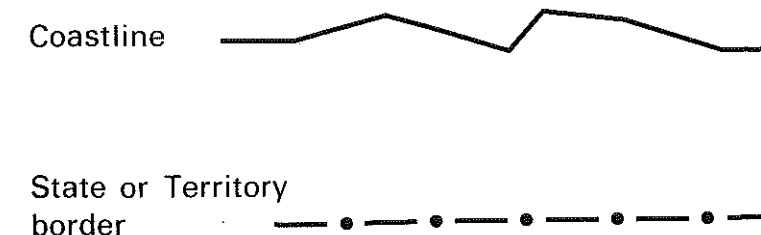
Locate the junction of the Q-NSW border with the coast at Tweed Heads. Follow the coastline N to Fraser Island (5) and then continue NW to the tip of Cape York at 6. Now follow the coastline S and then NW around the Gulf of Carpentaria (7) to where the Q-NT border intersects the coast. Follow the Q-NT border S to its intersection with the SA border. Trace the Q-SA border E then S to where the Q-NSW border joins from the E. Follow the Q-NSW border E and then generally E via the Barwon, Dumaresq and Macintyre Rivers, the McPherson Range and the Tweed River to the coast at Tweed Heads.

Step 12: Trace the outline of the Northern Territory (area 1 346 200 sq km).

Locate the Gulf of Carpentaria (7) and on its southern shoreline find the intersection of the NT-Q border. Trace the coast NW and then N and W around Gove Peninsula (8) to Cobourg Peninsula (9). Continue SW to where the NT-WA border meets the coast at Joseph Bonaparte Gulf (10). Follow the NT-WA border S to where the NT-SA border joins from the E. Trace this border E to where the NT-Q border joins from the N. Turn N at this intersection and trace the NT-Q border back to the point of commencement on the Gulf of Carpentaria.

Step 13: Trace the outline of Tasmania (area 67 800 sq km).

Locate the island State of T in the SE corner of the map. Note that it lies S of V and is separated from the mainland by Bass Strait (2).



ACT — Australian Capital Territory

NSW — New South Wales

NT — Northern Territory

Q — Queensland

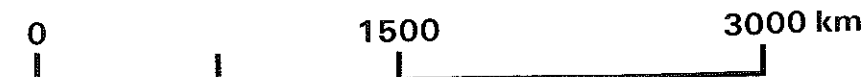
SA — South Australia

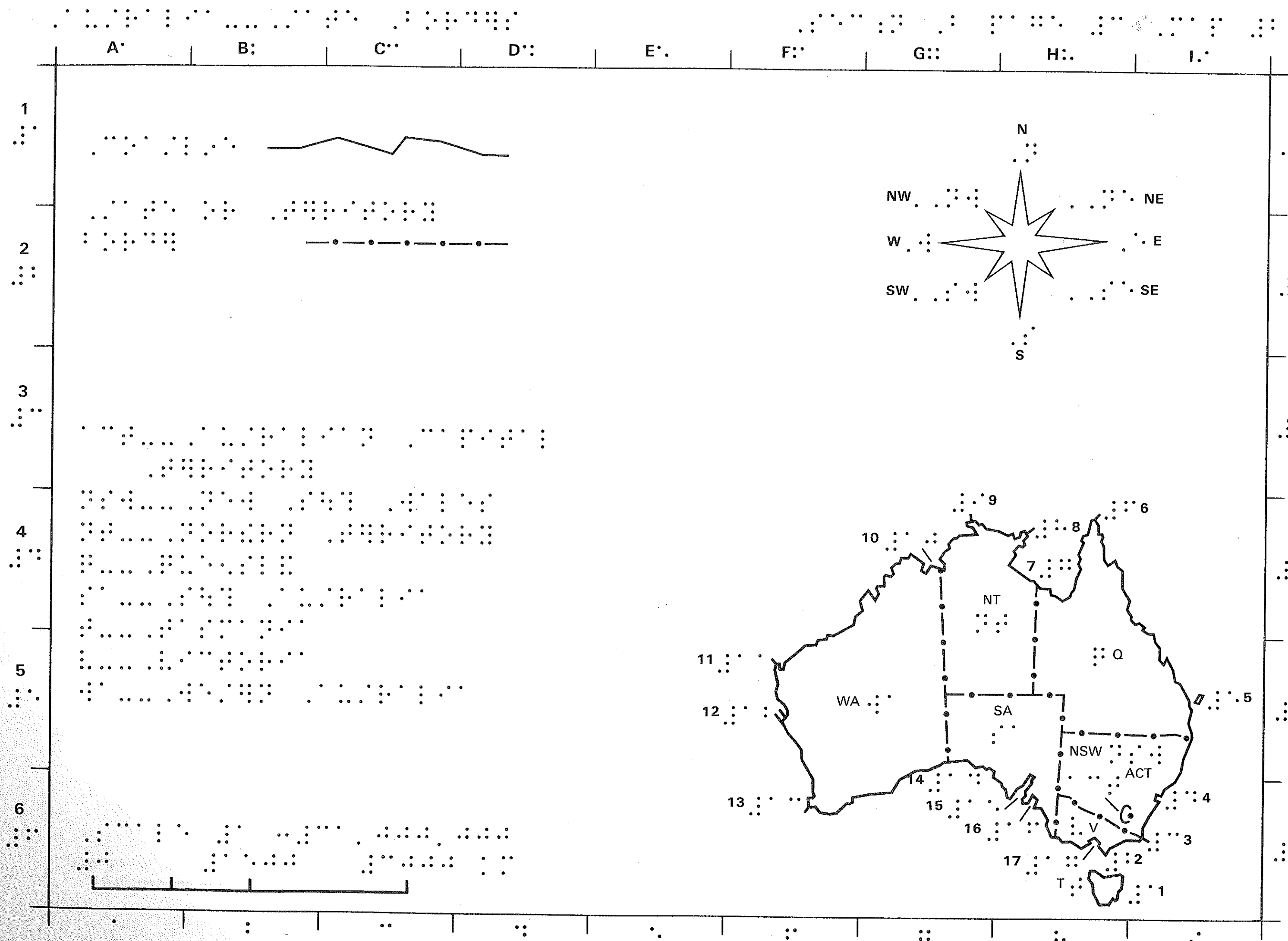
T — Tasmania

V — Victoria

WA — Western Australia

Scale 1: 31 000 000





Australia - Capital Cities

This map at 1:17 million scale (approximately twice the scale of Maps 1 and 2), the larger of the two scales most commonly used in this Atlas, aims to:

- reinforce your mental image of Australia;
- give you the locations of the capital cities; and
- provide you with the location of more features of interest which may be used for locating other data.

READING STRATEGY

Step 1: Carry out a preliminary scan of the map-sheet in vertical strips using both hands.

Step 2: Read the map title.

Step 3: Find out what features are represented in the legend.

Step 4: Determine the distances represented by each division on the scale bar.

Step 5: Use a ruler to measure WA at its maximum E-W width and Q from the tip of Cape York to its southern border. Place these distances against the scale bar to determine the ground distances in kilometres. The answers are given at the end of this commentary.

Step 6: Trace the outline of Australia.

Beginning at the southern-most tip of T, South East Cape (1), move N along the E coast of T then cross Bass Strait (noting Flinders Island at 2) and locate Cape Howe (3), where the NSW-V border joins the coast.

Proceed northward along the E coast of the mainland and locate the following features in order as you move around the coast:

- 4 Port Jackson
- 5 North Stradbroke and Moreton Islands
- 6 Fraser Island
- 7 Whitsunday Island
- 8 Cape Melville
- 9 Cape York
- 10 Thursday Island
- 11 Gulf of Carpentaria
- 12 Groote Eylandt
- 13 Gove Peninsula
- 14 Cobourg Peninsula
- 15 Melville and Bathurst Islands
- 16 Joseph Bonaparte Gulf

- 17 Yampi Sound
- 18 Barrow Island
- 19 North West Cape
- 20 Shark Bay
- 21 Cape Naturaliste
- 22 Cape Leeuwin
- 23 Great Australian Bight
- 24 Spencer Gulf (a leadline from the name points to the Gulf)
- 25 Gulf St Vincent (a leadline from the name points to the Gulf)
- 26 Kangaroo Island (off Gulf St Vincent)
- 27 Port Phillip Bay (note the lead-line pointing to the Bay)

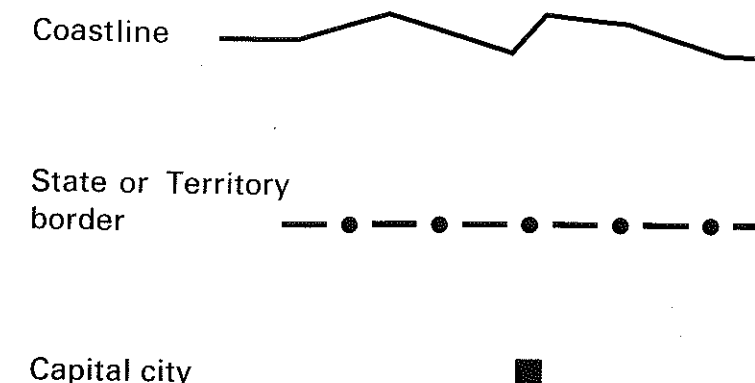
From Port Phillip Bay, head S across Bass Strait to the NW tip of T, noting King Island slightly to the W at 28. Continue S along the W coast of T to South East Cape (1).

Step 7: Locate the capital cities as follows:

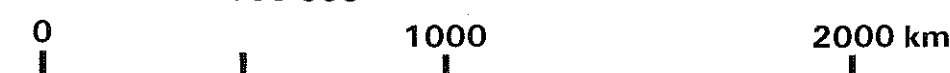
- | | |
|----------------|--|
| Canberra (C): | National capital — in the ACT — in SE NSW. |
| Brisbane (B): | State capital of Q — in the extreme SE of the State on the Brisbane River, opposite North Stradbroke Island (5). |
| Sydney (S): | State capital of NSW — on Port Jackson (4). |
| Melbourne (M): | State capital of V — on Port Phillip Bay (27). |
| Hobart (H): | State capital of T — in the SE of the State on the Derwent River. |
| Adelaide (A): | State capital of SA — on Gulf St Vincent (25). |
| Perth (P): | State capital of WA — on the Swan River in the SW corner of the State. |
| Darwin (D): | Capital city of NT — on the NW coast opposite Melville Island (15). |

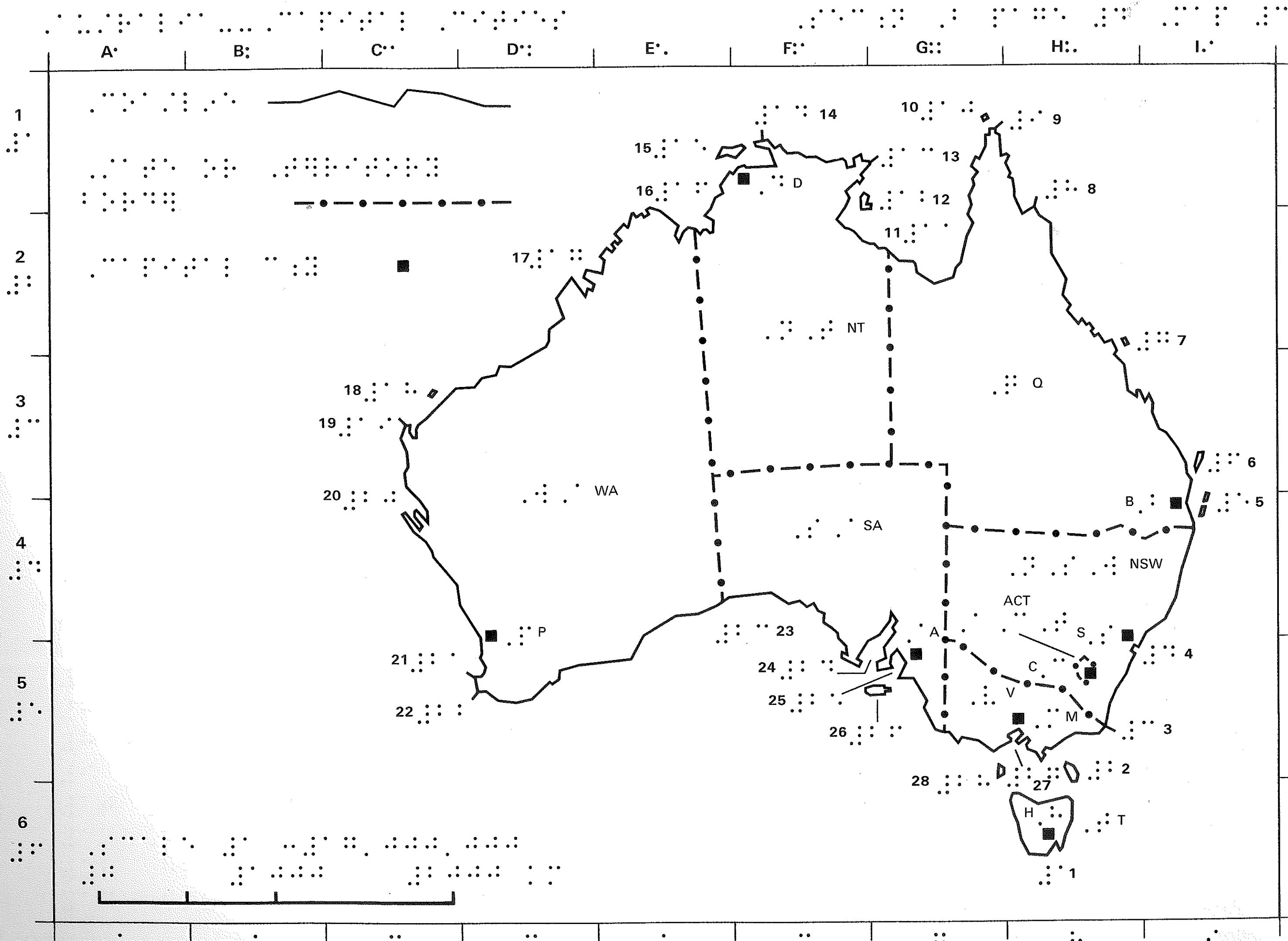
Note that many more features can be shown on this larger scale map than on Map 2.

Distances: Maximum E-W width of WA is 1700 km
Cape York to the southern Q border is 2200 km



Scale 1: 17 000 000





List of Abbreviations

A Adelaide
 B Brisbane
 C Canberra
 D Darwin
 H Hobart
 M Melbourne
 P Perth
 S Sydney

1 South East Cape
 2 Flinders Island (in Bass Strait)
 3 Cape Howe
 4 Port Jackson
 5 Stradbroke and Moreton Islands
 6 Fraser Island
 7 Whitsunday Island
 8 Cape Melville
 9 Cape York
 10 Thursday Island
 11 Gulf of Carpentaria
 12 Groote Eylandt
 13 Gove Peninsula

14 Cobourg Peninsula
 15 Melville and Bathurst Islands
 16 Joseph Bonaparte Gulf
 17 Yampi Sound
 18 Barrow Island
 19 North West Cape
 20 Shark Bay
 21 Cape Naturaliste
 22 Cape Leeuwin
 23 Great Australian Bight
 24 Spencer Gulf
 25 Gulf St Vincent
 26 Kangaroo Island
 27 Port Phillip Bay
 28 King Island

Australia - Cities and Towns

The two maps, *Cities and Towns* and *Regions* (Map 5) together provide a guide to the location of well-known places and areas in Australia.

Identical base data appear on each map — the coastline, State borders and capital city symbols. The first map depicts major cities and towns as well as many smaller towns which are associated with activities like mining or tourism. The *Regions* map includes features of interest and regional names. Abbreviations for city and town names are in boxes with leadlines pointing to the feature.

After having read these two maps separately, you will find it useful to study them together so that you can link the regional names to towns which lie in or near them.

You can return to these maps to check the location of places mentioned throughout the Atlas. You will also find that all the names on the maps are listed in the Gazetteer in the back of this volume.

READING STRATEGY

Begin by making a preliminary scan of the map and reading the title, legend and scale. Now that you have a general picture of the map you can explore the settlements in each State. As you locate each place, check the surrounding area to find the position of nearby cities and towns, State borders or the coastline.

New South Wales (NSW)

Locate the capital city symbol for Sydney and follow the coastline N to Newcastle (**nc**) and then Coffs Harbour (**ch**). On the coast S of Sydney locate Wollongong (**wl**) and Eden (**ed**) in the far S near the V border.

Return to Sydney and just to the W find Bathurst (**bt**); then NW of Bathurst find Dubbo (**du**) and further to the NW, Bourke (**bo**) which is on the Darling River. Broken Hill (**bh**) is in the far W of NSW near the SA border (name appears in SA).

Victoria (V)

Start from the capital city symbol for Melbourne on Port Phillip Bay and locate the following cities around it: Geelong (**ge**) to the SW, Ballarat (**ba**) to the W and Sale (**sl**) to the E.

In the NW corner of V locate Mildura (**ma**) on the Murray River and, following the Murray (the NSW-V border) upstream to the SE, find Albury-Wodonga (**aw**), which is to the SW of Canberra.

Tasmania (T)

From the capital city symbol for Hobart in the SE corner of T, Launceston (**la**) is to the N and Devonport (**dp**) is on the N coast to the NW.

South Australia (SA)

Starting from the capital city symbol for Adelaide, first follow the coast to the SE and locate Mount Gambier (**mg**) near the point where the SA-V border meets the coast. Returning to Adelaide, follow the coastline NW to Whyalla (**wy**) on Spencer Gulf and then to the SW where Port Lincoln (**pl**) lies at the tip of the Eyre Peninsula. From here the coastline sweeps to the NW to Ceduna (**cd**) on the Great Australian Bight. N of Ceduna in the dry interior of SA is Coober Pedy (**cp**), the famous opal mining town, and further N, Oodnadatta (**od**).

Western Australia (WA)

Locate the capital city symbol for Perth in the SW corner of WA and follow the coastline S to Bunbury (**by**), then around Cape Leeuwin and E to Albany (**ay**) and on to Esperance (**es**). Inland to the N of Esperance is Kalgoorlie (**kg**), and far to the NE is the remote settlement of Warburton (**wb**). Warburton is just W of the point where the WA, SA and NT borders meet.

Return to Perth and trace the coastline N to Geraldton (**gr**), Carnarvon (**cr**) and Port Hedland (**ph**). From here, Newman (**nm**), is inland to the S. Follow the coast NE from Port Hedland to Broome (**br**), Derby (**dy**) and then Wyndham (**wm**), near where the WA-NT border meets the coast.

Northern Territory (NT)

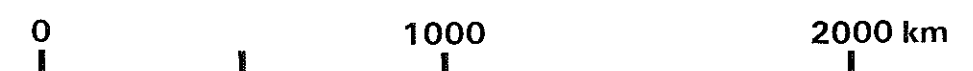
From the capital city symbol for Darwin, follow the coast to the E to Maningrida (**mn**) and Nhulunbuy (**ny**) on the NW tip of Arnhem Land. Then return to Darwin and locate Katherine (**kt**) inland to the SE. Further S, Tennant Creek (**tc**) is almost in the centre of the NT. To the S of Tennant Creek locate Alice Springs (**as**) in central Australia.

Queensland (Q)

Begin from the capital city symbol for Brisbane in the SE corner of Q and trace the coast N to Bundaberg (**bg**) and then Rockhampton (**rk**), which lies on the Tropic of Capricorn. Then continue up the coastline to Mackay (**mk**), Townsville (**tv**) and Cairns (**cn**). To the W of Cairns find Normanton (**no**) on the Gulf of Carpentaria. Follow the coast N from Normanton to Weipa (**wp**) on the W side of Cape York Peninsula. Now return to Brisbane and just to the W find Toowoomba (**to**). From Toowoomba travel W and slightly N to Charleville (**cv**), then NW to Longreach (**lr**) and further NW to Mount Isa (**mi**) close to the NT border. Over 500 km to the S of Mount Isa is Birdsville (**bv**) on the Q-SA border.



Scale 1: 17 000 000



A

B

C

D

E

F

G

H

I

1

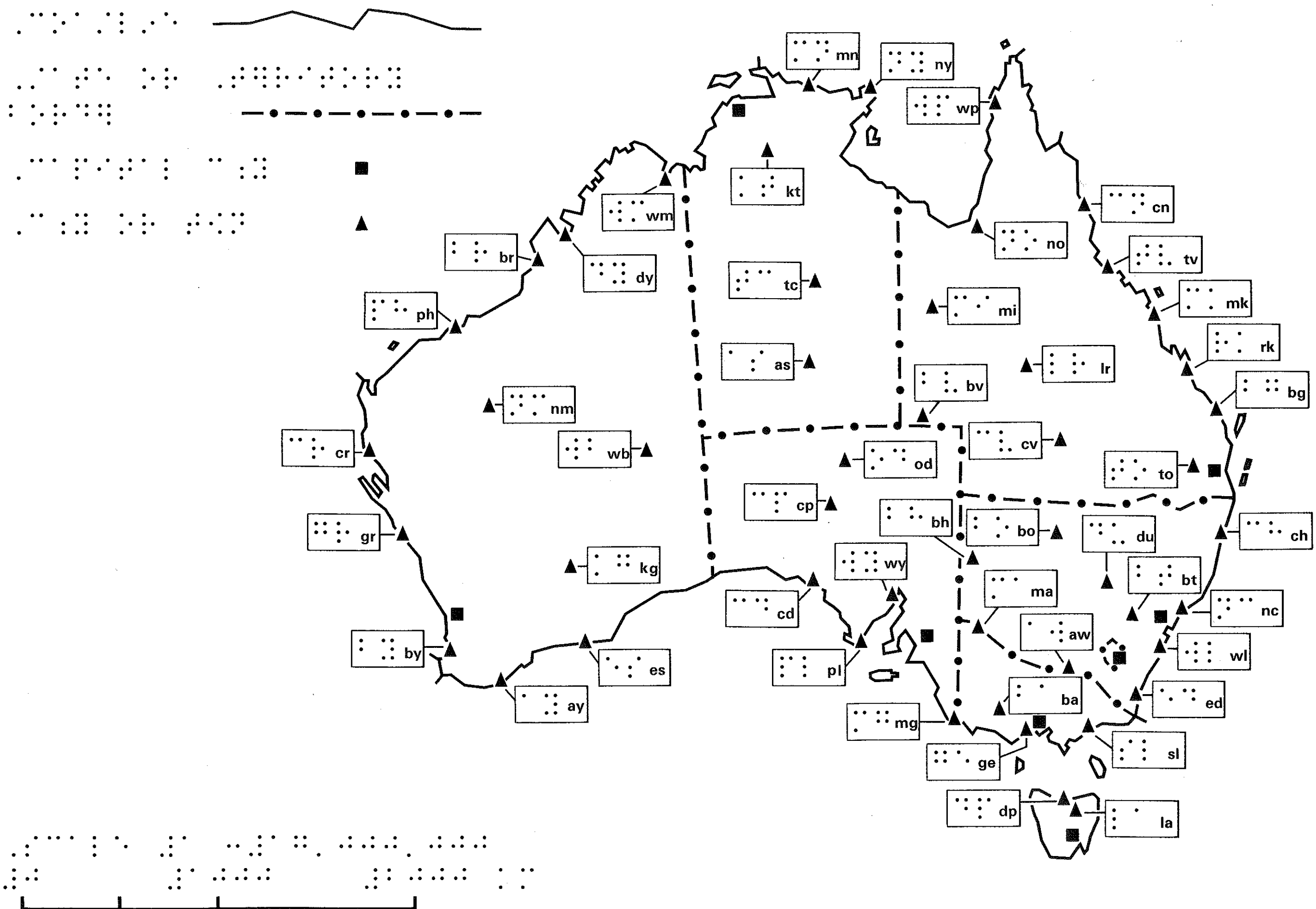
2

3

4

5

6



List of Abbreviations

as	Alice Springs	kt	Katherine
aw	Albury–Wodonga	la	Launceston
ay	Albany	lr	Longreach
ba	Ballarat	ma	Mildura
bg	Bundaberg	mg	Mount Gambier
bh	Broken Hill	mi	Mount Isa
bo	Bourke	mk	Mackay
br	Broome	mn	Maningrida
bt	Bathurst	nc	Newcastle
bv	Birdsville	nm	Newman
by	Bunbury	no	Normanton
cd	Ceduna	ny	Nhulunbuy
ch	Coffs Harbour	od	Oodnadatta
cn	Cairns	ph	Port Hedland
cp	Cooper Pedy	pl	Port Lincoln
cr	Carnarvon	rk	Rockhampton
cv	Charleville	sl	Sale
dp	Devonport	tc	Tennant Creek
du	Dubbo	to	Toowoomba
dy	Derby	tv	Townsville
ed	Eden	wb	Warburton
es	Esperance	wl	Wollongong
ge	Geelong	wm	Wyndham
gr	Geraldton	wp	Weipa
kg	Kalgoorlie	wy	Whyalla

This map is a guide to many well-known areas which you will find mentioned in this Atlas or referred to in the news media.

Firstly, make a preliminary scan of the whole map and then read the title, legend and scale.

Then, starting from Sydney move N to the Hunter Valley (hv) which extends inland to the NW from Newcastle. It is known for its farming, wine production, coal mining and associated power generation. N of the Hunter Valley are the grazing lands of the New England (ne) tablelands area. Further N, across the Q border, is the Darling Downs (dd), an important grain growing area on rich clay soil plains just W of Toowoomba. To the E find the Gold Coast (gd), a holiday resort area extending S from Brisbane to just across the NSW border.

The most outstanding feature of the Q coast is the world famous Great Barrier Reef (gbr), a chain of reefs in the Coral Sea (cs). It extends for nearly 2000 km S from Torres Strait (tr) at the tip of Cape York Peninsula (cy) to near Gladstone, on the central Q coast and ranges from 250 km offshore at the southern end to just a few kilometres from the shore in the N.

The Central Highlands (ce) of Q lie well inland from the central Q coast W of Rockhampton. It is an area of low tablelands and ranges where the Great Dividing Range lies 300–400 km inland. Primarily farming country, it is now also an important coal mining area for the export market.

In the SW corner of Q is a vast area of river floodplains known as The Channel Country (cc). Here, a number of rivers which have their sources in the better-watered country of inland Q flood out in wet years into a system of spreading channels and lakes that lead towards Lake Eyre (le) in SA. Lake Eyre, the surface of which is 16 m below sea-level, is the largest of a number of dry salt lakes in the NE of SA. This area is the most arid part of Australia. Return to Sydney, and in the SE of NSW, below the symbol for Canberra, locate the Snowy Mountains (sm), which include the highest peak in Australia — Mt Kosciusko, 2228 m high — near the V border.

To the W of Canberra, between the Murray and the Murrumbidgee Rivers, lie the flat plains of the Riverina region (ri), with its extensive irrigation networks watered by these inland rivers.

In V, to the E of Melbourne, is the Gippsland region (gi), well known for its agriculture and rich brown coal deposits which are used to provide much of Victoria's power requirements. W of Melbourne and Ballarat is the wheat cropping area of the Wimmera (wi), and in the far NW, straddling the SA border, is another wheat area, the Murray–Mallee (mm), named after the mallee scrub which covered its sandy dune soils.

From V, cross Bass Strait (bs) to T, where the rugged wilderness areas of south-west (st) can be found to the W of Hobart.

Returning to SA, the Eyre Peninsula (ep) and Yorke Peninsula (yp) form the distinctive coastline of that State. They are covered by a patchwork of farmland which contrasts with the native shrub cover of most of inland SA. Further W, the Nullarbor Plain (np) stretches for 500 km into WA around the Great Australian Bight (gb).

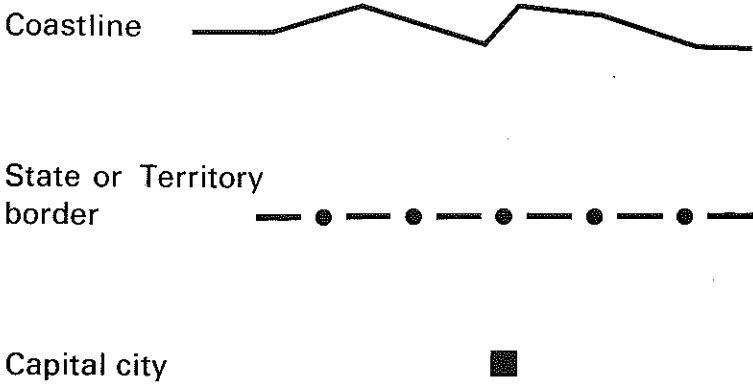
S of Perth, in the corner of WA between Bunbury and Albany, is the forested country of the south-west (sw). To the NE of Perth is the Goldfields (go) district centred around the famous gold mining town of Kalgoorlie.

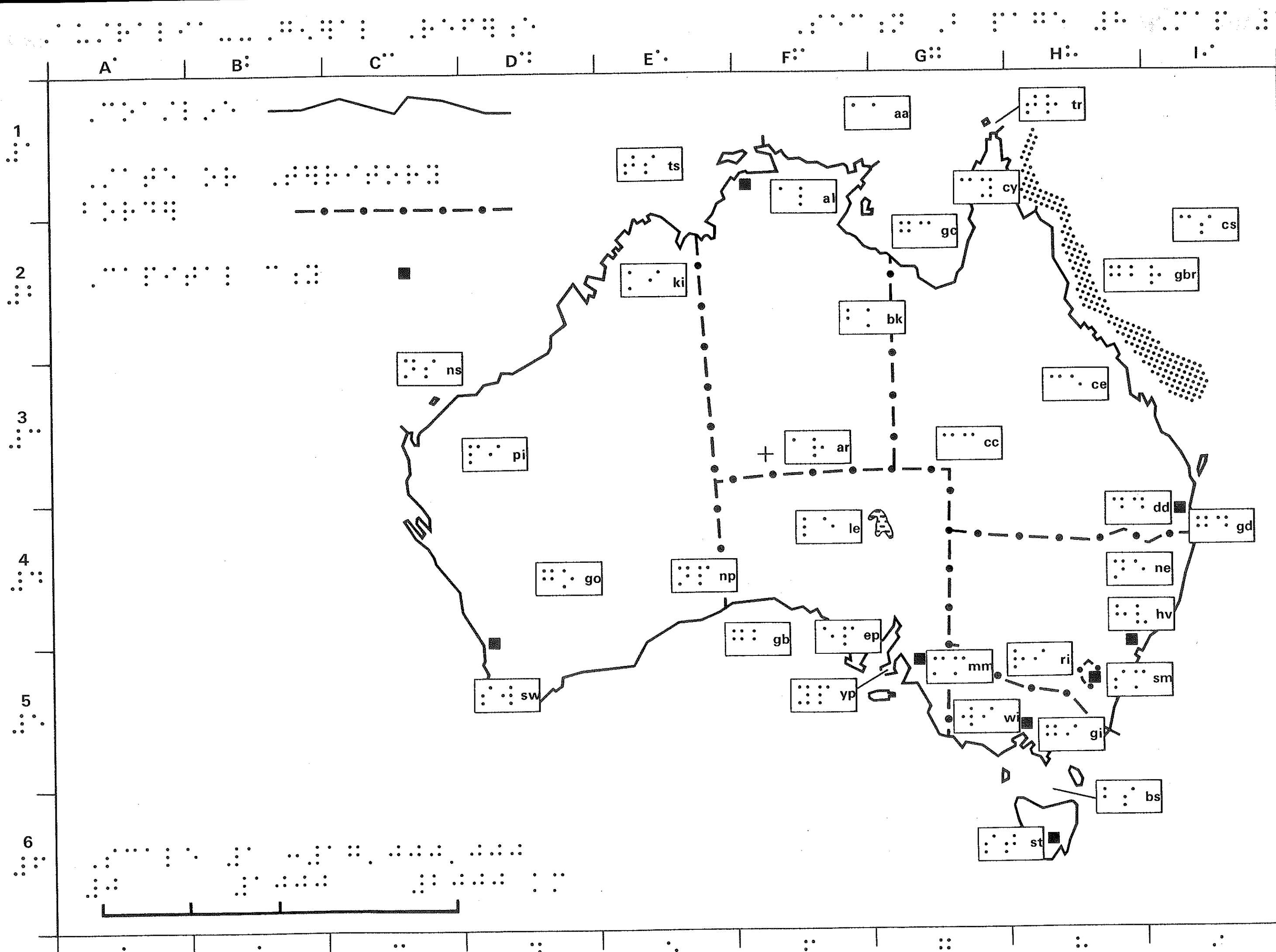
Far to the N of Perth is the Pilbara region (pi), a large block of ancient mountain ranges with important deposits of iron ore. Offshore to the N of the Pilbara is the North West Shelf (ns), which contains enormous natural gas reserves.

In the far N of WA is the Kimberley region (ki), another area of rugged ranges. From here, locate Darwin to the E and then to the W the Timor Sea (ts).

To the E of Darwin is Arnhem Land (al), an area of sandstone plateaux and wetland plains forming the NE corner of the NT. To the N is the Arafura Sea (aa) and to the SE is the Gulf of Carpentaria (gc).

In the NT, to the S of the Gulf of Carpentaria, is the Barkly Tableland (bk), a large area of grassland plains well-known as good cattle grazing country. Ayers Rock (ar) lies in the far S of the NT, to the SW of Alice Springs.





List of Abbreviations

aa	Arafura Sea	hv	Hunter Valley
al	Arnhem Land	ki	Kimberley
ar	Ayers Rock	le	Lake Eyre
bk	Barkly Tableland	mm	Murray-Mallee
bs	Bass Strait	ne	New England
cc	The Channel Country	np	Nullarbor Plain
ce	Central Highlands (Q)	ns	North West Shelf
cs	Coral Sea	pi	Pilbara
cy	Cape York Peninsula	ri	Riverina
dd	Darling Downs	sm	Snowy Mountains
ep	Eyre Peninsula	st	South-west (T)
gb	Great Australian Bight	sw	South-west (WA)
gbr	Great Barrier Reef	tr	Torres Strait
gc	Gulf of Carpentaria	ts	Timor Sea
gd	Gold Coast	wi	Wimmera
gi	Gippsland	yp	Yorke Peninsula
go	Goldfields (WA)		

Section C

Australia and the World

Australia is an old continent, so weathered that its highest point, Mount Kosciusko, rises only 2228 m above sea-level. It is isolated from the world's other major land masses and apart from Antarctica is the only continent without a land connection to another.

The maps in this section are intended to show Australia in relation to its neighbouring countries; its position in relation to the oceans and the world's other continents; and to provide an understanding of how the earth is divided into major geographic and time zones.

All four maps in this section differ from other maps in the atlas in that, instead of land areas being depicted by raised outlines, all land areas are raised.

Also, map scale is necessarily much smaller and only the larger and more important islands are included. As an example, over seven thousand islands make up the Philippines, though on one of the following maps these are depicted by about the twenty largest, and on the world map by only six islands.

So that the names of continents can be included in raised areas, and to avoid confusion between braille dots and dots representing small islands, braille cells denoting country or island names are shown in boxes.

In the few instances where international land boundaries or divisions between continents do occur, they can be traced by following a narrow gap in the raised surface.

Because three of the maps depict the whole world, and the other a large part of it, they are necessarily complex and in reading each map you should be particularly careful to discover how the data are presented and then read the text slowly in conjunction with the map.

The four maps are designed to be read sequentially so that what is learned from one map can be applied to the next.

Reading time will be more than halved if you have someone reading the text while you read the map; alternatively read the text a paragraph at a time and use a marker while you concentrate on the maps.

As an island continent, located far from other continents, Australia does not have land boundaries with any other countries. With the exception of New Zealand, Australia's nearest neighbours are the South-East Asian countries and the island nations and territories of the Pacific Ocean.

Begin reading the map by scanning in vertical strips to locate the main land masses. Become familiar with how dashed lines are used to delimit island groups and how boxed characters are used to label each of them. Note that ocean and sea names are not boxed.

You will find that dashed lines circling groups of islands are often close to and parallel with lines circling adjoining groups. In addition, braille characters denoting country names have been positioned according to the available space, and are found only occasionally within the boundary but more often straddling the dashed lines. Extreme care will therefore be needed when tracing dashed boundary lines and locating the boxed characters denoting the relevant country name.

AUSTRALIA

Commence exploration of the map by first locating Australia near the centre of the map-sheet. Trace the outline of Australia and note that it is much smaller here than on many of the previous maps because the scale of this map is smaller.

There are no close neighbours to the S and W. Antarctica, way to the S across the Southern Ocean, and Africa, to the W across the Indian Ocean, are both too far distant to be included. You should, however, locate and note the position of both oceans in relation to Australia.

NEW ZEALAND

New Zealand (**nz**) consists of two main islands, the North Island and the South Island, and can be located across the Tasman Sea, to the E of T. The much smaller island to the S of the South Island is Stewart Island. New Zealand's capital city, Wellington, is located on the southern tip of the North Island, facing Cook Strait which separates the two main islands.

Note the proximity of New Zealand to Australia and how much smaller it is.

LORD HOWE ISLAND AND NORFOLK ISLAND

To the NW of the North Island of New Zealand and to the E of NSW are Norfolk Island (**nf** at G4) and Lord Howe Island (**lh** at F5). Lord Howe Island is part of NSW whilst Norfolk Island is an external territory of Australia.

PAPUA NEW GUINEA

The closest landmass to Australia is the island of New Guinea to the N. It can be found just N of Cape York Peninsula, across Torres Strait. Note the gap running N-S through the centre of New Guinea denoting the international boundary between Papua New Guinea (**png**) on the E and Irian Jaya, which is part of Indonesia, to the W.

Trace the dashed line surrounding Papua New Guinea from the northern end of the international boundary and note the distribution of islands within it. The largest islands are New Britain, New Ireland and Bougainville. (These islands are not named on the map.) The capital city, Port Moresby, is located on the SE coast of the island of New Guinea.

INDONESIA

Indonesia is Australia's largest and most populous neighbour. It lies to the N and NW of Australia and extends for some 5000 km westward from its eastern border with Papua New Guinea (at E3).

Indonesia consists of over 13 000 islands, less than half of which are inhabited, and occupies most of the large archipelago lying between the South-East Asian mainland and Australia. With a population of 165 million, Indonesia is the world's fifth most populous country.

To trace the outline of Indonesia, commence at the southern end of the land border with Papua New Guinea. Follow the dashed line westward below Irian Jaya and the long island chain which trends W and then NW to the Malay Peninsula (**mp**). The three largest islands in this chain, from E to W, are Timor (**tm**), Java (**ju**) and Sumatra (**su**). The capital of Indonesia, Jakarta (with a population of about 8 million), is situated on the NW coast of Java.

At the NW extremity of Sumatra the boundary turns SE and passes between the Malay Peninsula (**mp**), which is part of the Asian mainland, and Sumatra. It then skirts around the small island country of Singapore (**sg**) at the tip of the Malay Peninsula before turning NE and SE again for a short distance to where it joins the coast of the island of Borneo (not named on the map).

Borneo is a very large island, much of which belongs to Indonesia. The remainder consists of Sarawak (**sk**) in the NW, which together with the Malay Peninsula (**mp**) makes up the country of Malaysia, and the small independent state of Brunei (**bn**) on the NW coast. Because Brunei is so small, its border with surrounding Sarawak is not depicted on the map. However, the leadline from its abbreviation to the Borneo coast will give you its approximate location.

Across Borneo, the international border between Indonesia and Malaysia can be traced by following the gap in the raised area. From the eastern coast of Borneo, continue to follow the northern boundary of Indonesia eastwards as it passes above the large finger-like island of Sulawesi and the northern coast of Irian Jaya back to where it joins the N-S running international border between Indonesia and Papua New Guinea.

PHILIPPINES

To the N of Indonesia, close to the island of Borneo, locate and trace the boundary around the Philippines (**ph**), an archipelago with a total land area about the same as V and T combined. Whereas V and T together have a population of some 4.5 million, the Philippines has approximately 53 million people, 8 million of whom live in the capital, Manila, situated on the western side of the largest island, Luzon. In contrast to Luzon, the other large island, Mindanao to the S, is quite sparsely populated.

CHRISTMAS ISLAND AND COCOS (KEELING) ISLAND

Finally, locate Christmas Island (**cr** at B3) and Cocos (Keeling) Island (**co** at A3) in the northern Indian Ocean to the NW of WA. Both are external territories of Australia.

PACIFIC ISLANDS

The Pacific Islands are generally held to include the island of New Guinea, and all the islands above and to the E of New Guinea and E of the northern half of Australia. This definition excludes a number of islands which are in fact in the Pacific Ocean, for example the islands of Japan, the Philippines and Indonesia. For our purposes, the western half of the island of New Guinea (Irian Jaya) is treated under Indonesia, of which politically it is an integral part.

There are approximately 10 000 inhabited and uninhabited islands in the Pacific Island group which cover a total land area of some 520 000 sq km. They can be conveniently grouped into those countries and islands which are independent and those which are trust territories.

Independent nations: Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Northern Mariana Islands, Palau, Solomon Islands, Tonga, Tuvalu, Vanuatu and Western Samoa.

Trust territories: New Caledonia, and Wallis and Futuna (under French control); Cook Islands, Niue and Tokelau (New Zealand); and American Samoa and Guam (USA).

In the following text you will be guided around these Pacific Island nations and territories commencing with the Solomon Islands, to the E of Papua New Guinea. In most cases, each nation and territory consists of many more islands than are depicted on the accompanying map.

SOLOMON ISLANDS

The Solomon Islands share a common border with Papua New Guinea just to the SE of the island of Bougainville (F3). Trace the line which surrounds the Solomon Islands (**sm**) and note the generally E-W distribution of the islands.

VANUATU

To the S of the Solomon Islands (**sm**), trace the boundary of Vanuatu (**va**), formerly known as the New Hebrides. Vanuatu is a scattered group of about 80 islands.

NEW CALEDONIA

Immediately to the S of Vanuatu (**va**), locate New Caledonia (**nc**), which lies about 1500 km across the Coral Sea (not named on the map) from Q. The capital, Noumea, is situated on the southern end of the main island, Grande Terre.

FIJI, TONGA, NIUE AND COOK ISLANDS

To the E of New Caledonia (**nc**) and Vanuatu (**va**) and progressively moving eastward locate Fiji (**fj**), then the Kingdom of Tonga (**tg**), Niue (**nu**) and the Cook Islands (**ci**) in that order.

Fiji is a country of more than 300 islands and many more coral atolls. The capital, Suva, is on Viti Levu, the largest island.

To the E of the Cook Islands (and beyond the eastern edge of the map-sheet) are the two most easterly of the Pacific Island territories — French Polynesia and Pitcairn Island (a British dependency).

AMERICAN SAMOA AND WESTERN SAMOA

To the NW of the Cook Islands (ci), locate American Samoa (as) and, immediately to the W, Western Samoa (not named on the map because of lack of space) with which it has a common boundary.

The capital of Western Samoa, Apia, is situated on the easternmost island.

WALLIS AND FUTUNA

Now locate the tiny territory of Wallis and Futuna (not named on the map), just to the W of Western Samoa and NE of Fiji (fj).

TOKELAU AND TUVALU

Return to American Samoa (as) and directly to the N locate Tokelau (tk). To the W of Tokelau find Tuvalu (tv).

KIRIBATI

Just to the N of Tuvalu (tv), locate Kiribati (kb), which consists of three main groups of islands straddling the Equator. The easternmost group of islands making up Kiribati is beyond the eastern edge of the map-sheet.

NAURU

Immediately to the W of Kiribati (kb), locate the tiny island nation of Nauru (nr), a coral-based island noted for its large phosphate deposits.

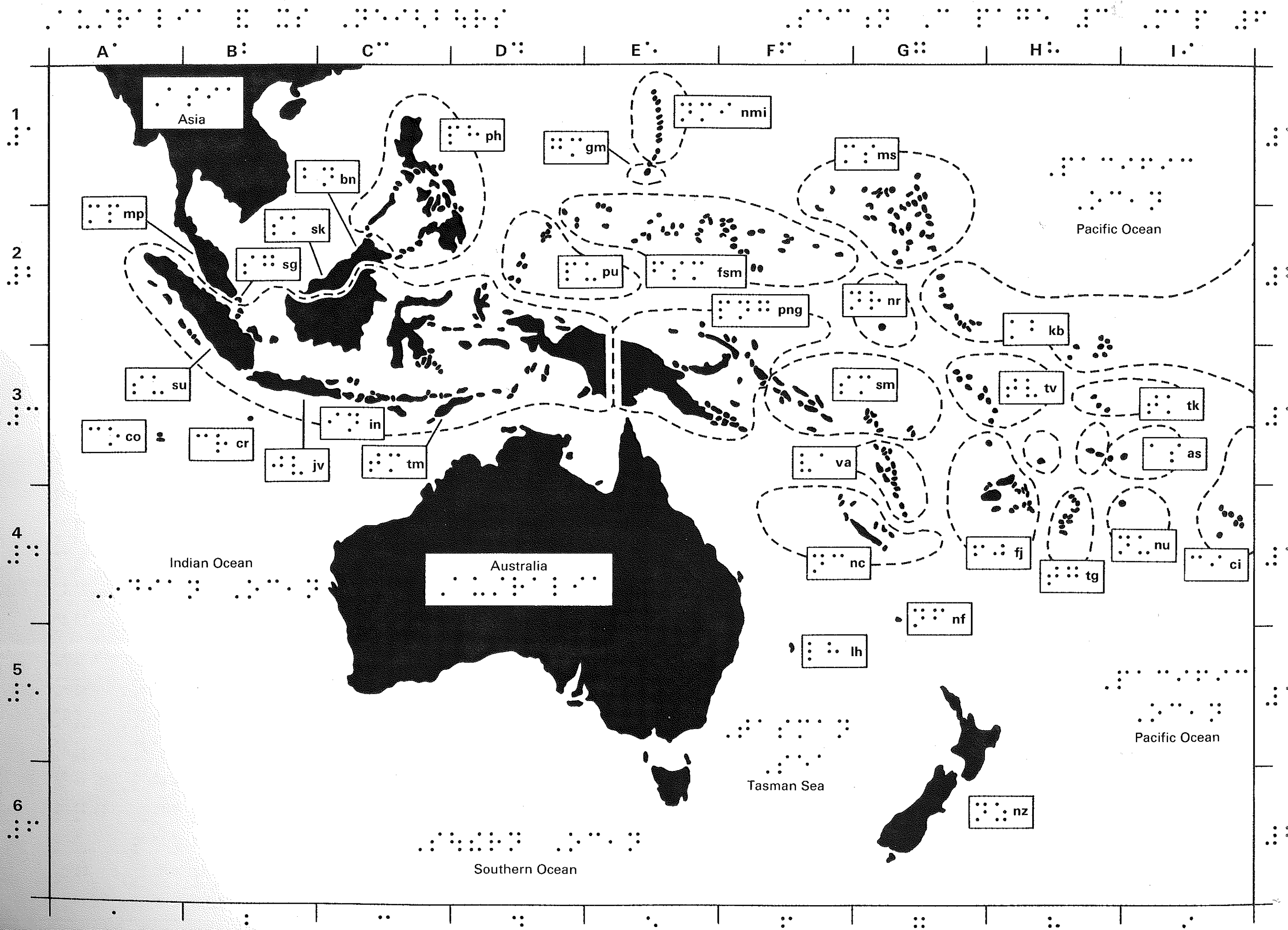
MARSHALL ISLANDS, FEDERATED STATES OF MICRONESIA, PALAU AND NORTHERN MARIANA ISLANDS

These four island groups until quite recently comprised the Trust Territory of the Pacific Islands, which was under the control of the United Nations but administered by the USA. Now they are all independent nations.

Firstly, locate the Marshall Islands (ms) directly N of Nauru (nr) then, to the W and the N of Papua New Guinea, the large elongated group of islands known as the Federated States of Micronesia (fsm). Further W, above Irian Jaya, locate Palau (pu).

Return to the Federated States of Micronesia (fsm) and then to the N locate the Northern Mariana Islands (nmi), the northernmost of the Pacific Island nations (E1).

Between the Federated States of Micronesia (fsm) and the Northern Mariana Islands (nmi), locate Guam (gm), a strategically important dependency of the USA.



List of Abbreviations

as	American Samoa	nmi	Northern Mariana Islands
bn	Brunei	nr	Nauru
ci	Cook Islands	nu	Niue
co	Cocos (Keeling) Islands	nz	New Zealand
cr	Christmas Island	ph	Philippines
fj	Fiji	png	Papua New Guinea
fsm	Federated States of Micronesia	pu	Palau
gm	Guam	sg	Singapore
in	Indonesia	sk	Sarawak
jv	Java	sm	Solomon Islands
kb	Kiribati	su	Sumatra
lh	Lord Howe Island	tg	Tonga
mp	Malay Peninsula	tk	Tokelau
ms	Marshall Islands	tm	Timor
nc	New Caledonia	tv	Tuvalu
nf	Norfolk Island	va	Vanuatu

The aim of this map is to make you familiar with the shape and distribution of the continents, and the extent of the oceans.

ABOUT THE MAP

As with the map *Australia and its Neighbours*, whole land areas on this map are raised and braille characters representing continents, selected countries and feature names are shown in boxes. Leadlines are used to indicate position where appropriate. Ocean names are not boxed.

Land boundaries between continents are shown by narrow gaps in the raised surface of the land.

It is not possible to produce a single map of the entire world without considerably distorting the shape and area of the continents. Two separate map projections have been used to make this map — one for Antarctica and the other for the rest of the world. Together, these two projections give a good balance between distortion of area and shape. The Antarctic continent is shown in its correct position in relation to Australia but is not in its correct position in relation to other continents.

READING THE MAP

Because this map covers the whole world, it is necessarily complex, and you will need to exercise patience in both initial scanning and when reading the map in conjunction with the accompanying text.

Scan the whole map to discover the general distribution of the largest land masses.

Australia and Antarctica

Locate Australia (**aus**) near the centre of the map and note how it appears quite small because of the greatly reduced map scale.

Then, locate the continent of Antarctica (**aa** at E6) to the S of Australia across the Southern Ocean. Trace its outline, discover the position of the South Pole which is indicated by a dot within a circle, and compare the sizes of Antarctica and Australia.

South America

Far to the E of Australia, across the South Pacific Ocean, locate South America (**sa**).

Commencing at its most northerly point where a narrow neck of land joins it from the W, trace the western coastline S around Cape Horn (**ch**) and back to the starting point. Compare its size with that of Australia.

North America

The North American and South American continents are joined by an isthmus referred to generally as Central America but there is no geographic boundary between the two continents. For the purposes of this map, we will refer to the point where the Central American isthmus joins the north-westernmost point of South America as the division between the two continents.

Beginning at this point follow the isthmus NW. Close to the starting point locate the Panama Canal (**pc**) which is named in the sea to the SW and has a leadline pointing to the canal (depicted as a narrow gap in the isthmus).

Continue to follow the W coast NW past the United States of America (**usa**) and Canada (**cd**) to where the coastline turns generally W along the shores of Alaska (**ak**). The coastline of Alaska is very indented but trends generally W and then N through the Bering Strait (**bs**) between Alaska and Asia to the W. Now the coastline turns E for some distance then NE around the mass of islands which form the northernmost parts of Canada. At the most northerly of the islands, it turns S through a narrow strait dividing North America from Greenland (**gl**). Trace the outline of Greenland and discover the island of Iceland (**ic**) to the SE.

Continue to follow the E coast of North America generally SE and then SW along the shores of Canada and the USA to where it turns W around the Gulf of Mexico (not named) and then follow the Central American isthmus back to where it joins South America. The islands to the NE of this point are the West Indies (**wi**), situated in the Caribbean Sea (not named). The North Atlantic Ocean is further to the N and E.

Africa

Far to the W of Australia, across the Indian Ocean locate the continent of Africa.

Begin at the southern tip of Africa, at the Cape of Good Hope (**gh**), and follow the eastern coast N past the island of Madagascar (**ma**), to where it turns sharply W then NW along the narrow waters of the Red Sea (not named).

Follow the Red Sea NW and at its head discover a small break between the Red Sea and the waters to the N. This is the Suez Canal (not named), which connects the Red Sea with the Mediterranean Sea (not named).

At this point the African coast turns W along the southern shore of the Mediterranean Sea to the quite narrow Strait of Gibralter (**gb**) between northern Africa and Spain. Here it turns SW, S, E and then S again before reaching your starting point at the Cape of Good Hope.

Europe

Europe and Asia are really different parts of the one super land mass and the boundary between them is an imaginary line linking the Arctic coast of the Soviet Union with the Mediterranean Sea via mainly mountain ranges and inland seas.

Europe is the second smallest continent, after Australia, but contains a fifth of world's population. The southernmost countries in Europe are Spain, which covers most of the Iberian Peninsula, and Portugal, which occupies a narrow strip along the W coast of the Peninsula. (They are represented by the abbreviation **sp**.) Spain lies across the narrow Strait of Gibralter (**gb**) from northern Africa and is a good point to begin exploring the extent of Europe.

Commencing at the Strait of Gibraltar (**gb**), follow the Atlantic coast of the Iberian Peninsula N past Portugal, E along the northern coast of Spain then N and NE past France (not named) to Scandinavia (**sc**), a large peninsula which includes all of Norway and Sweden and part of Finland. To the NW of France, across the narrow English Channel, locate the United Kingdom (**uk**).

The waters to the W of Scandinavia are the North Atlantic Ocean.

From Scandinavia, continue eastwards along what is the northern coastline of the Soviet Union and locate the boundary between Europe and Asia where it joins the coast. Trace this boundary S, along the Ural Mountains (not named), then W and S again to the land-locked Caspian Sea (not named). From the Caspian the boundary turns W along the Caucasus Mountains (not named) to the Black Sea (not named), which it then follows to the Mediterranean Sea between Greece (not named) on the W and Turkey (not named) on the E.

Now follow the northern shoreline of the Mediterranean westward around a small peninsula (Greece) then a second peninsula (Italy) and back to your starting point at the Strait of Gibraltar (**gb**).

Asia

Asia is so large that its area is almost the equivalent of North and South America and Australia combined. It covers nearly 30 per cent of the world's land area and contains nearly 60 per cent of the world's population.

To discover its extent, begin with the islands of Indonesia (**in**), close to the NW of Australia, and follow the island chain NW to the island of Sumatra, which is located next to the box containing the abbreviation for Indonesia.

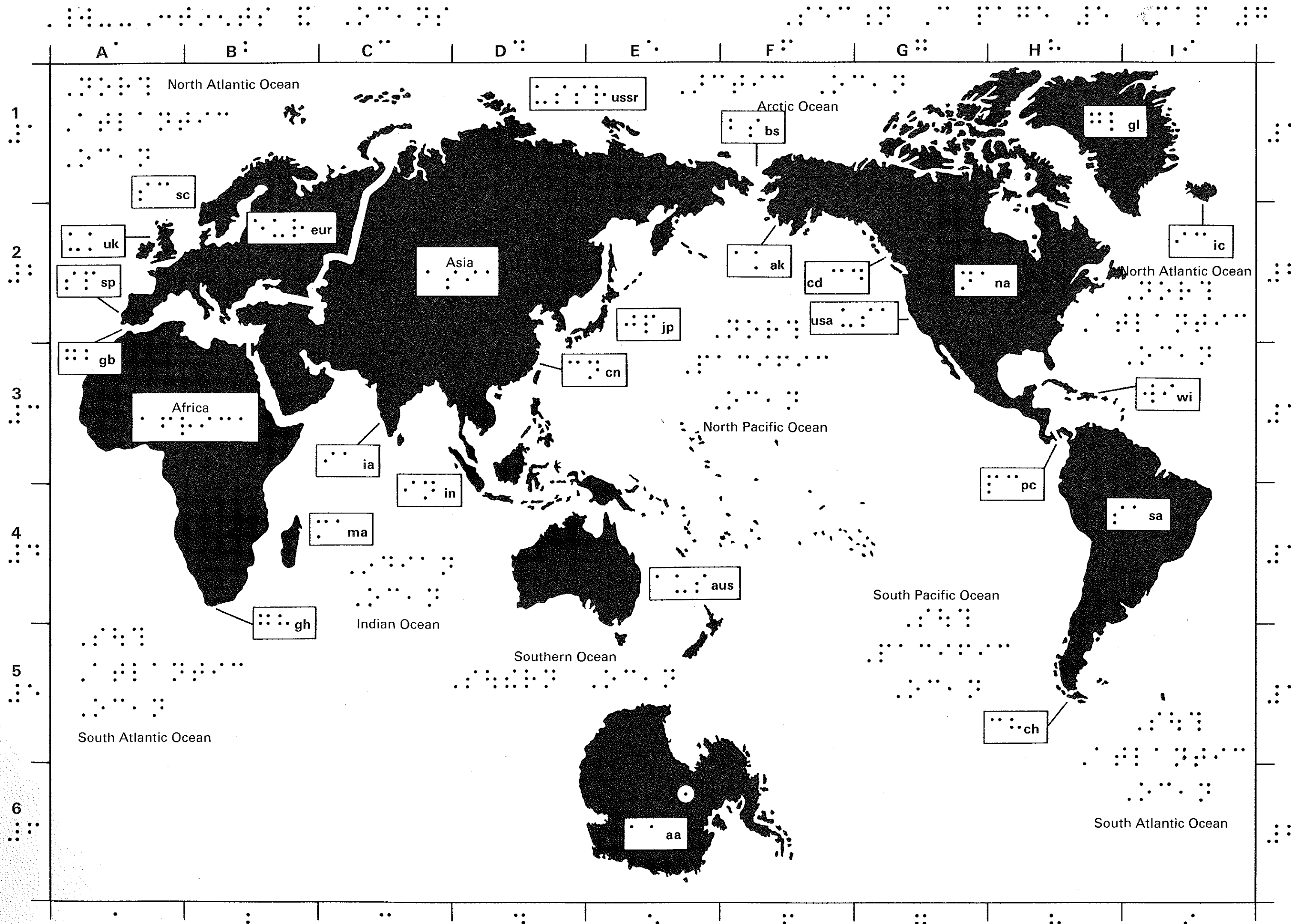
Immediately to the N of Sumatra is the Malay Peninsula (not named), the southernmost part of the Asian continent. (For clarification, you can refer back to the previous map *Australia and its Neighbours*.) Trace the W coast of the Malay Peninsula N around what is the Bay of Bengal (not named) to where it turns SW and S around India (**ia**), with the island country of Sri Lanka (not named) off its southern tip.

Follow the coast northward, along the western coast of India, then W to the Persian Gulf (not named) and SW along the coast of the Arabian Peninsula (not named) to the Red Sea (not named), which divides Asia and Africa. Follow the Red Sea NW to the Suez Canal, the small break between the head of the Red Sea and the waters to the N. From the Suez Canal, trace the eastern shore of the Mediterranean Sea N, then W, N and E around Turkey (not named) and into the Black Sea (not named).

From the eastern end of the Black Sea, the narrow gap denoting the boundary between Asia and Europe passes along the Caucasus Mountains (not named) and joins the Caspian Sea (not named). The boundary continues N and E to the Ural Mountains (not named), which it follows northward to the Arctic Ocean.

At this point the Soviet Union (**ussr**) extends W to Scandinavia and E to the Bering Strait. Trace the Arctic coast of the Soviet Union E until it turns generally S through the Bering Strait (**bs**).

Continue to trace the coastline generally W and S past the islands of Japan (**jp**), opposite China (**cn**), and further SW along the coast of China and Vietnam (not named) to the Malay Peninsula, your point of commencement on the Asian mainland.



List of Abbreviations

aa	Antarctica
ak	Alaska
aus	Australia
bs	Bering Strait
cd	Canada
ch	Cape Horn
cn	China
eur	Europe
gb	Strait of Gibraltar
gh	Cape of Good Hope
gl	Greenland
ia	India
ic	Iceland
in	Indonesia
jp	Japan
ma	Madagascar
na	North America
pc	Panama Canal
sa	South America
sc	Scandinavia
sp	Spain/Portugal
uk	United Kingdom
usa	United States of America
ussr	Union of Soviet Socialist Republic
wi	West Indies

The object of this map is to illustrate latitude and longitude, the best known and most universal geographic reference system for locating points or features on the earth's surface. The division of the earth into areas of low latitude, mid latitude and high latitude by the Tropics and the Polar Circles is also explained.

LATITUDE AND LONGITUDE

Latitude is measured in degrees, minutes and seconds N and S of the Equator, an imaginary line midway between the North and South Poles. Longitude is also measured in degrees, minutes and seconds but E and W of the O degree line, which passes through Greenwich Observatory in London (United Kingdom). The longitude values measured E from Greenwich meet those measured W from Greenwich half-way around the world at the 180 degree line (in the Pacific Ocean). Lines of latitude are called 'parallels' and run E-W. Lines of longitude are called 'meridians' and run N-S. The grid produced by the crossing of lines of latitude and longitude is referred to as a graticule.

Map 8 is a map of the world which includes selected latitude and longitude lines depicted by dashed broken lines.

Ignoring the individual dashed lines for the time being, scan the map and note:

- its elliptical shape (by tracing the outline);
- the North and South Poles, at the top and bottom of the map; and
- that the shape and distribution of the continents is similar to the previous map (*World—Continents and Oceans*) but that Antarctica extends along the whole southern edge of the map.

The North and South Poles are, in reality, single points at the northern and southern extremities of the earth. However, on this map each is represented by the ends of all of the lines of longitude which, for clarity, are not joined together in the particular projection used here. Hence, the gross exaggeration in the size of Antarctica compared to the other continents and to its representation on the previous map.

LATITUDE

As already mentioned, latitude is measured in degrees, minutes and seconds N and S of the Equator. The Equator is therefore the O degree line and is depicted on this map as a heavy line running E and W through the centre of the map, thus dividing the earth into two hemispheres — the Northern Hemisphere and the Southern Hemisphere. Locate the Equator (O degrees) at the western edge of the map and trace its length eastwards to the eastern edge. You will notice that the Equator passes through central Africa, Indonesia (to the N of Australia), and northern South America.

On this map other latitude lines are included as dashed lines at 30 degree intervals N and S of the Equator. Find the values for these latitude lines, which are unboxed near the E and W map margins.

Trace the 30 degree S latitude line, noting that it passes through the southern part of Africa, Australia and South America.

You may like to trace other latitude lines across the map and note which continents they pass through.

LONGITUDE

Longitude is measured E and W of the O degree line passing through Greenwich. Before examining the longitude lines on this map in detail, use the western portion of the map to note how longitude lines trend N and S but converge towards the North and South Poles.

The O degree longitude line is distinguished from all others on this map by being depicted as a heavy dotted line. Locate where it cuts the Equator just in from the western edge of the map and trace it N and S, noting that it passes through western Africa and Europe in the N before passing through Greenwich (gn), labelled with a leadline from the W.

The longitude lines on this map are 15 degrees apart. The longitude values, in degrees for every second line, are depicted in boxes just below and parallel to the Equator. Beginning with the zero line, note that the values increase E and W, and meet at the 180 degree line in the Pacific Ocean. Only one value appears W of Greenwich on this map, the next appearing on the eastern edge with the values increasing W to the 180 degree line.

Note that Australia mostly lies between 120 degrees and 150 degrees E of Greenwich.

You can use latitude and longitude to find any point on the earth's surface. For example, locate New Zealand at approximately 45 degrees S latitude and 170 degrees E longitude.

Because of limitations imposed by map scale and space, graticule divisions on this map are necessarily widely spaced. On much larger scale maps it is of course possible to read the coordinates of places much more accurately.

THE TROPICS

The earth's axis of rotation is tilted 66.5 degrees from the plane in which it orbits the sun (called the ecliptic) so that in December the South Pole is angled towards the sun and in June it is angled away from the sun. Thus, in Australia, the sun's rays are more vertical in December than in June, making December the hotter month.

Because the earth's rotational axis is tilted, the sun is vertically above the Equator only in late March and again in late September (called the equinoxes) when day lengths are 12 hours world-wide. In late December and late June (called the solstices) the sun is vertically above latitudes 23.5 degrees S and N respectively. These latitudes are called the Tropic of Capricorn (S of the Equator) and the Tropic of Cancer (N of the Equator), and the low latitude (or equatorial) regions between them are called the 'tropics'.

The Tropic of Capricorn (23.5 degrees S latitude line) is depicted on this map as a full line and can be found S of the Equator, running E and W and labelled towards the eastern side of the map. Note that from the E it passes through South America, northern Australia, the island of Madagascar and South Africa.

The Tropic of Cancer (23.5 degree N latitude line) is similarly depicted and labelled, and can be found to the N of the Equator; note where it cuts through central America, Asia, the Arabian Peninsula and northern Africa.

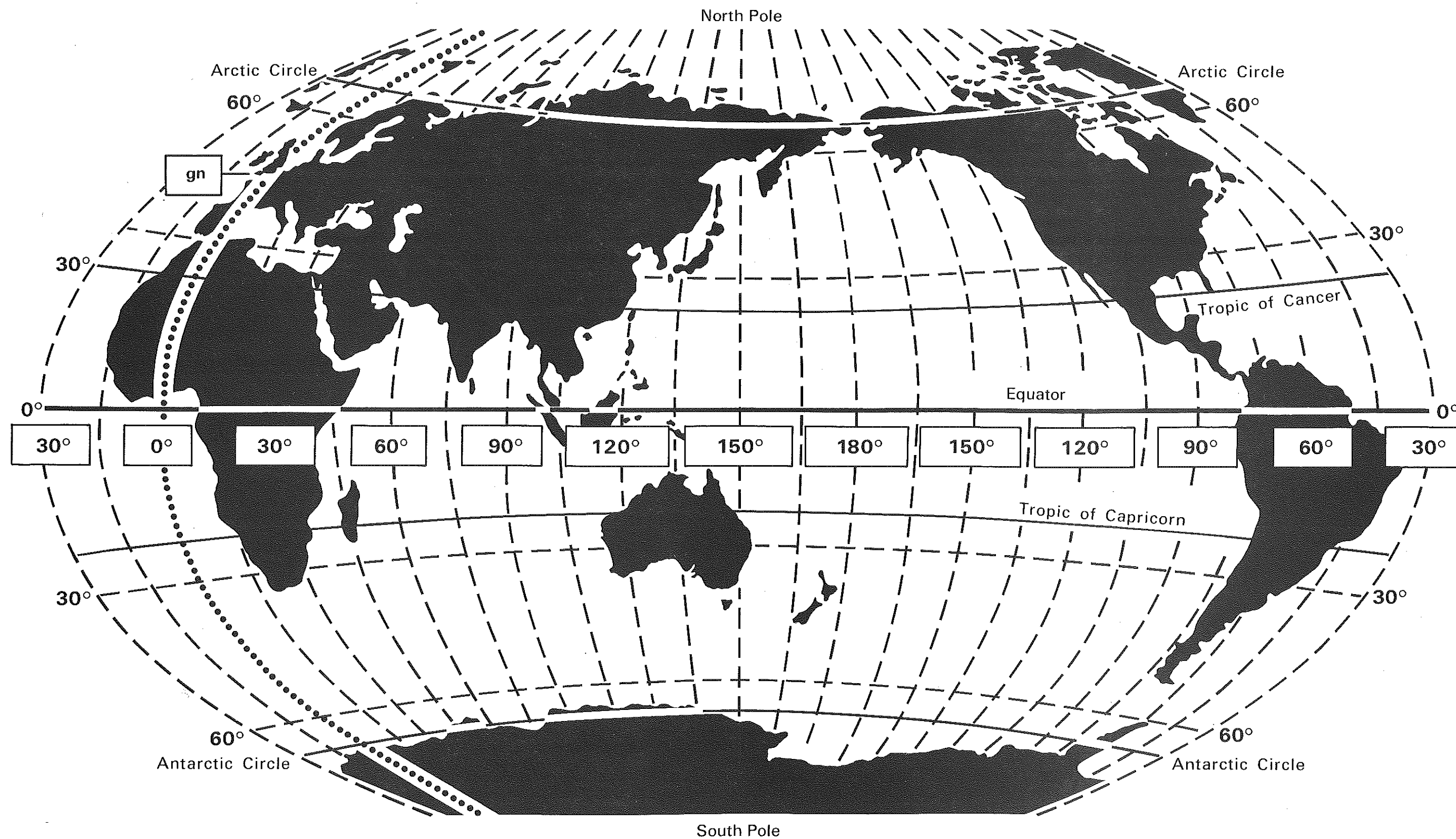
POLAR CIRCLES

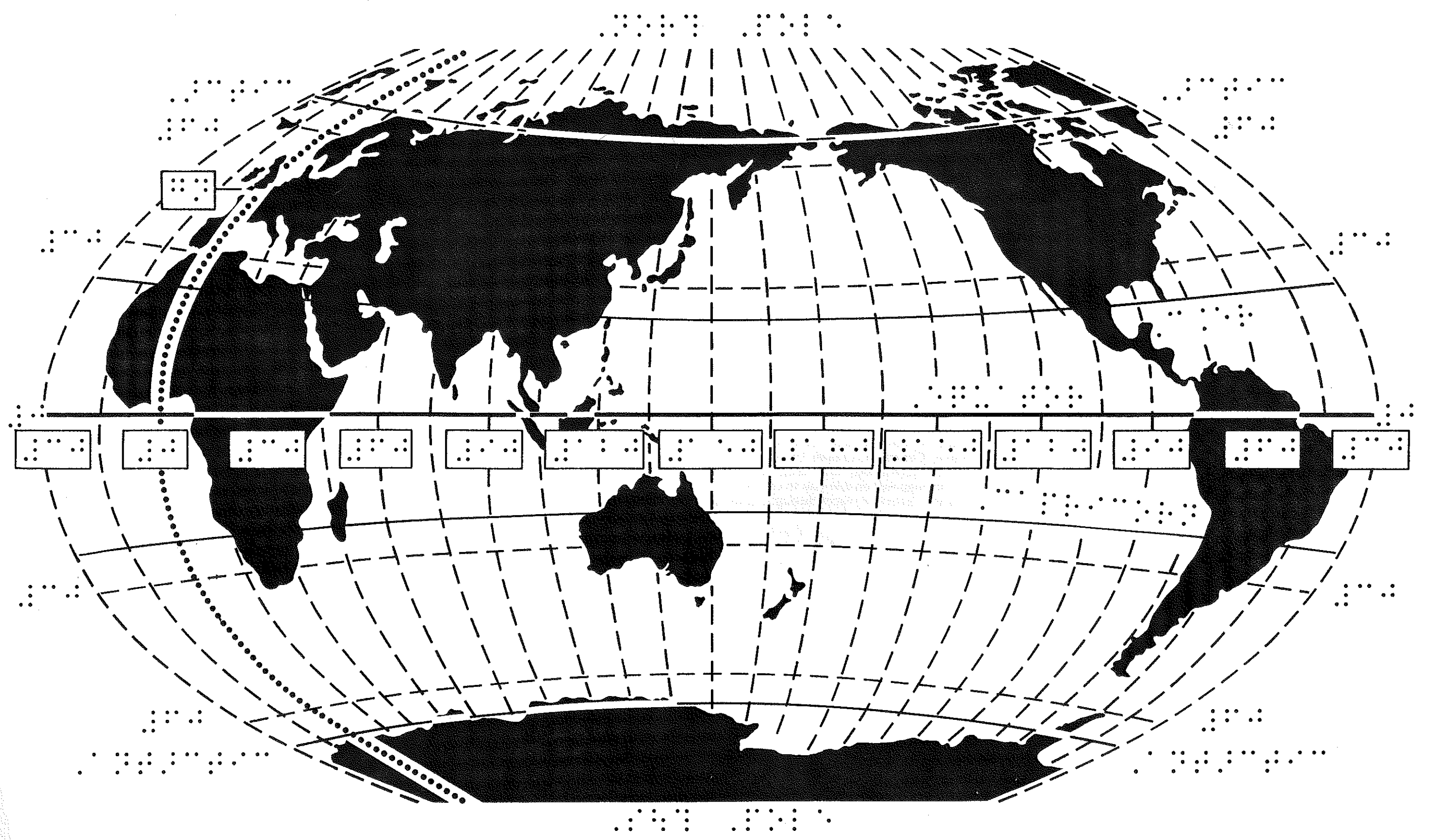
In late December, when the South Pole is maximally tilted towards the sun (which is then vertically above the Tropic of Capricorn at 23.5 degrees S latitude), the sun never sets over the area of the earth poleward of 66.5 degree S latitude. This parallel is called the Antarctic Circle. Similarly, in the Northern Hemisphere, the Arctic Circle is the equivalent parallel at 66.5 degrees N. Both polar circles are shown on this map by full lines in the oceans and by narrow gaps in the raised surface of land areas. They are labelled on both the eastern and western margins of the map.

Locate the Antarctic Circle (66.5 degrees S latitude line) and trace its length noting how almost all of Antarctica lies to the S of it.

Next locate the Arctic Circle (66.5 degrees N latitude line) and trace its length. Note how it touches Scandinavia on the W then cuts through the northern parts of Asia and North America before passing across Greenland in the E. The areas between the Antarctic Circle and the South Pole and the Arctic Circle and the North Pole are known as the high latitude (or polar) regions.

Between the equatorial and the polar regions, that is between the latitudes of 23.5 degrees and 66.5 degrees N and S of the Equator, lie the areas known as the mid latitudes. In the Northern Hemisphere much of North America, Asia and Europe are in the mid latitudes whereas in the Southern Hemisphere the only continental areas which coincide with the mid latitudes are the southern tip of Africa, much of Australia, the southern half of South America and the northernmost tips of Antarctica.





For the purposes of international time, the world is divided into twenty-four time zones. Each zone is 15 degrees of longitude wide.

As the earth rotates once every twenty-four hours, each zone represents a one-hour change in time.

The 0 degree longitude line, which passes through Greenwich (gn) in the United Kingdom, has been adopted as zero time. Therefore, the 15 degree-wide longitude band which has 0 degrees longitude as its centre is the zero time zone.

Scan the whole map, ignoring for the time being the longitude lines and other notations. Note that the map's elliptical shape, the distribution of the continents, and depiction of the Equator and 0 degree longitude line are all identical to Map 8.

Locate the 0 degree longitude line and note how it runs N-S through the centre of the zero time zone which, like all others, converges towards the North and South Poles.

The values in hours for every second time zone are located in boxes just above and parallel to the Equator. The numbers depicted in the time zones are the differences in hours between local standard time and Greenwich time (the international standard time). To the E of Greenwich they are added to Greenwich time while to the W they are subtracted from Greenwich time to give local standard time.

Beginning at zero, read the times E of the Equator, noting that they progressively increase to 12 hours. Reading the times W of zero, note that only the minus 2 hours zone appears on the map W of Greenwich. However, this zone is repeated on the eastern edge of the map and the negative values increase westwards to where they meet the positive values increasing eastwards from Greenwich at the 12 hour time zone.

The centre of the 12 hour time zone is the 180 degree longitude line. The 'plus' and 'minus' symbols in boxes on either side of the 180 degree longitude line and above the hour values for the zones denote that the times are ahead of (plus) or behind (minus) Greenwich time.

Locate the eastern part of Australia and note that it falls in the plus 10 hours time zone. Note also that the western part of Australia falls within the plus 8 hours time zone, which explains why Sydney time is two hours ahead of Perth time.

You may like to choose other locations and note their international time in relation to Greenwich.

INTERNATIONAL DATE LINE

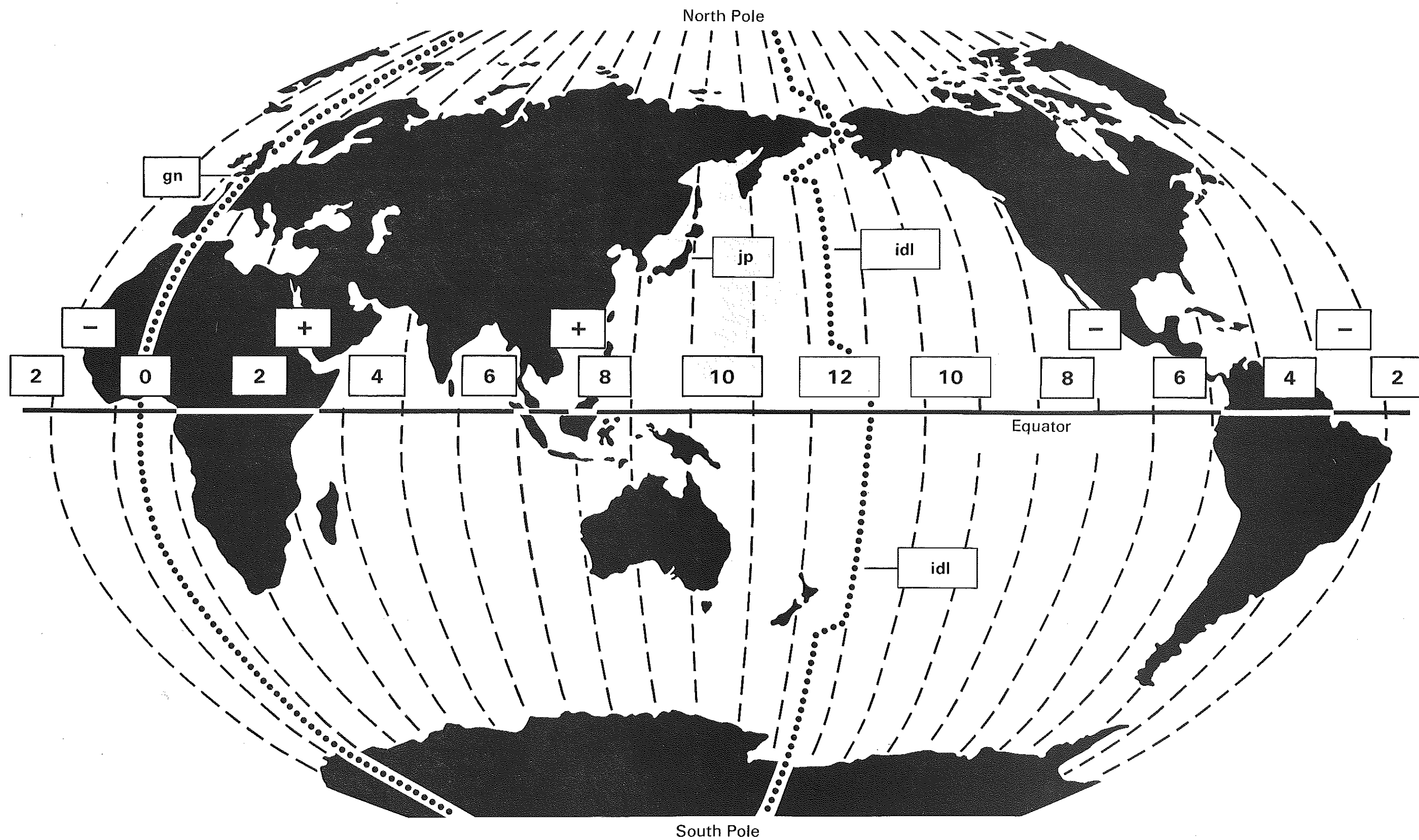
Where the time zones E and W of Greenwich meet in the Pacific Ocean, at 180 degrees longitude, there is an agreed International Date Line (idl). It is depicted on the map by a heavy dotted line running N-S and labelled in the North Pacific and South Pacific Oceans.

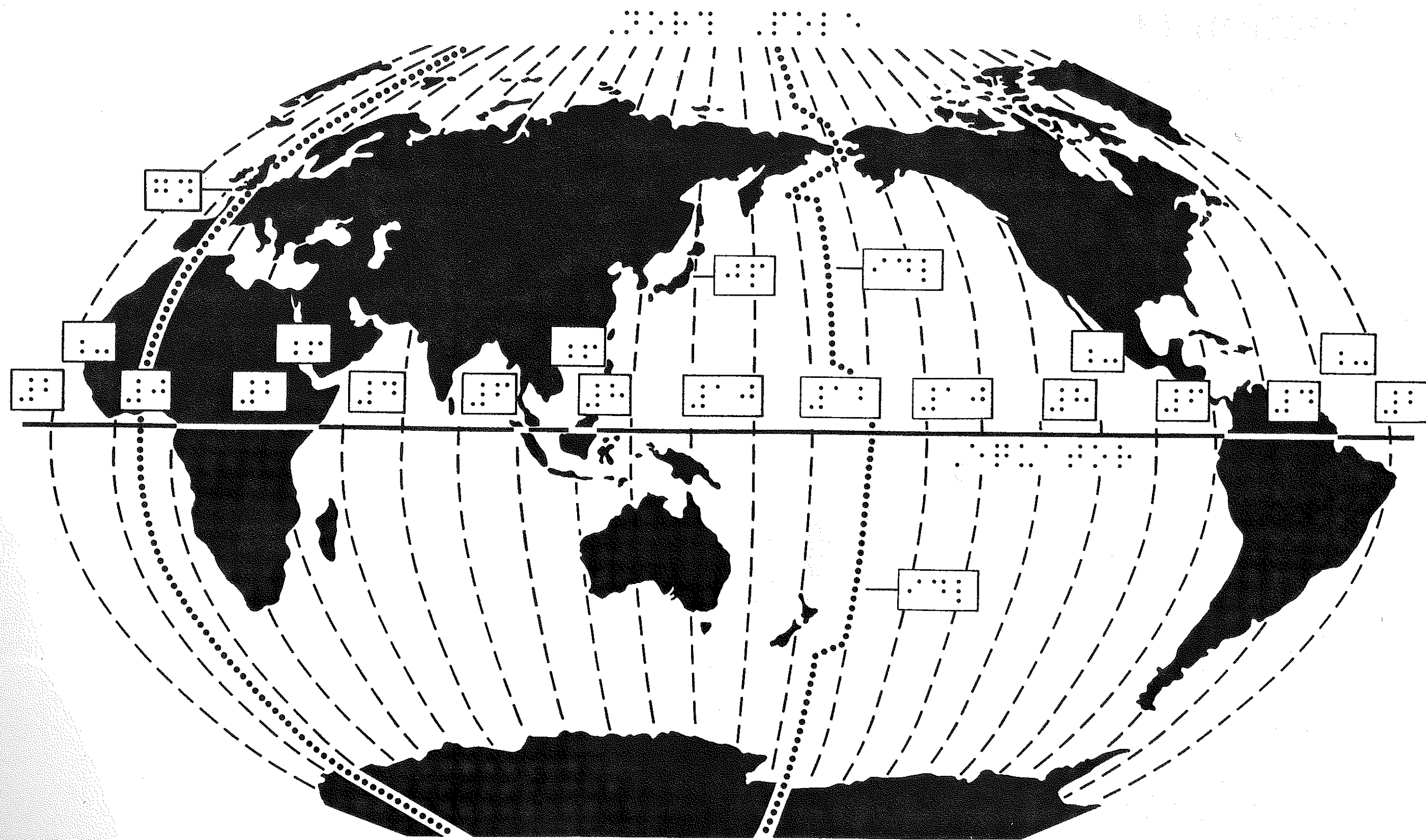
On the eastern side of this line time is for the previous day to that shown on the western side. For example, when it is Sunday on the eastern side it is Monday on the western side.

Locate the idl where it commences at the North Pole and follow it S, noting that it is not a straight line because its location has been deliberately chosen to avoid areas of land. From the N, you will find it passes between the Asian and North American continents, through the North Pacific Ocean and across the Equator into the South Pacific, where it bears to the E to avoid some small island countries and New Zealand before following the 180 degree longitude line through Antarctica to the South Pole.

Directly N of Australia and across the Equator in the Northern Hemisphere locate the islands of Japan (jp) and note that they fall within the plus 9 hours time zone (that is, between the plus 8 and plus 10 hours zones on the map). To the E across the Pacific Ocean, note that the W coast of North America lies within the minus 8 hours time zone. Therefore, when it is 12 midnight at Greenwich, the time in Japan, which is 9 hours ahead of Greenwich, is 9 a.m. At the same time on the W coast of America, which is 8 hours behind Greenwich, it will be 4 p.m. Japan and America are, however, on different sides of the IDL so if it is 9 a.m. on Sunday in Japan it will be 4 p.m. on Saturday on the W coast of America.

For local convenience a few countries adopt irregular times. For example, Central Australian Time differs by 30 minutes from standard international time. With these few exceptions, however, this map will enable you to calculate actual times or time differences between places throughout the world.





Section D

Australia's Capital Cities

Australia is one of the most highly urbanised countries in the world, with about 85 per cent of the population living in urban centres. Of these, some 60 per cent live in the eight capital cities.

The maps and commentaries in Section D are designed to provide you with an overview of Australia's Federal and State capital cities. Two consecutive maps have been included for each of the six largest capitals — the first covers the entire urban area and the second (at a larger scale) is a detailed enlargement of the inner-city area. A legend explaining the standard symbols used on all of the maps follows this introduction.





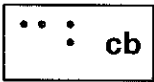



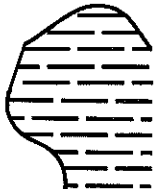


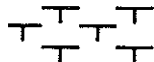


The maps of the entire urban areas show selected important physical features, key suburbs and major highways. A list of the abbreviations used for place and feature names appears on the page following each map. You will find that letter abbreviations are used for all features except highways which are identified with numbers. Accompanying each of these maps is a commentary which briefly outlines the history, site, size and present land use patterns of the city.

Inner-city maps highlight the Central Business District (CBD) and the major features and points of interest in the area around the city centre. Their location and extent is depicted on the smaller scale map of the entire urban area by a rectangle filled with vertical stripes. The inner-city maps are all located on the right-hand side of the page, with the list of associated abbreviations located on the left-hand side of the same page. A separate commentary also accompanies each of the inner-city maps and gives additional information about the well-known features of this area.

The urban area and inner-city maps are very different to the other maps in this Atlas. For this reason you should take special care when reading them. Begin by studying the legend page containing the standard symbols and patterns used on all of the maps. When reading individual maps, carry out preliminary scanning and scale reading as before. Remember that N is to the top of the map in every case. It may be necessary to repeat this scan several times to gain a general picture of the city and the distribution of urban and non-urban land, and water features.

It is essential to read each map in conjunction with its commentary. Reading time will be more than halved and recognition of map detail made easier if you have someone read the text while you read the map. Alternatively, read each paragraph of the text and use a marker while you concentrate on reading the map.

Capital City Map Symbols

	State border		Major road
	Urban area surrounded by non-urban land		Bridge
	Suburb or locality (with identification letters)		Major airport
	Central Business District		Parkland
	Shoreline with water area (lake, sea, bay, harbour)		Mountain range
	River		Mangroves
	Point of interest		Inner-city enlargement

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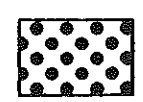
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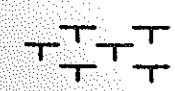
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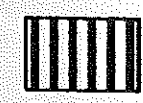
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Canberra, the nation's capital, is Australia's only inland capital city. It is located about 250 km SW of Sydney and 480 km NE of Melbourne. In 1911 Parliament selected this site for Canberra and in 1912 an international competition was held to design the city. The winning design, by Walter Burley Griffin, included at its centre the artificial lake which now bears his name. Canberra has experienced the most rapid population growth of any capital since the Second World War. Canberra (including Queanbeyan) now has a population approaching 300 000 and covers an area of 220 sq km.

Make a preliminary scan of the Canberra map and note the rectangle in the centre showing the area covered by the separate inner-city map. Canberra lies in the NE corner of the ACT and parts of the NSW border can be found surrounding it. The recent growth of Canberra has seen an extension of the urban area to near the NSW–ACT border both to the N and S of the city centre.

Canberra is built on an undulating plain intersected by the Molonglo River (**mr**), a tributary of the Murrumbidgee River (**mm**), which is found to the W of the city. Follow the course of the Molonglo from G5 near Queanbeyan (**qn**) to where it crosses into the ACT. It then flows past Fyshwick (**fy**) and the Canberra Airport (**caa**) to the N, then turns W to the city centre. Here, it flows into Lake Burley Griffin (**lbg**), an artificial lake behind Scrivener Dam. Beyond the city, follow the course of the Molonglo NW to its junction with the Murrumbidgee (**mm**), near the ACT border.

Return to the inner-city area and to the NE side locate Mount Ainslie (**an**) and to the NW Black Mountain (**bl**), with its 200 m high telecommunications tower. Red Hill (**rh**) dominates the inner suburbs S of the lake.

Canberra is a planned city and this is reflected in the layout of its suburbs and road network. In 1958 the National Capital Development Commission was established to plan for the future development of the city. Subsequent suburban growth has been centred around new towns linked to the city centre by broad arterial roadways. These satellite cities have their own large shopping and office complexes, but Civic Centre in inner Canberra has remained the business centre of the city.

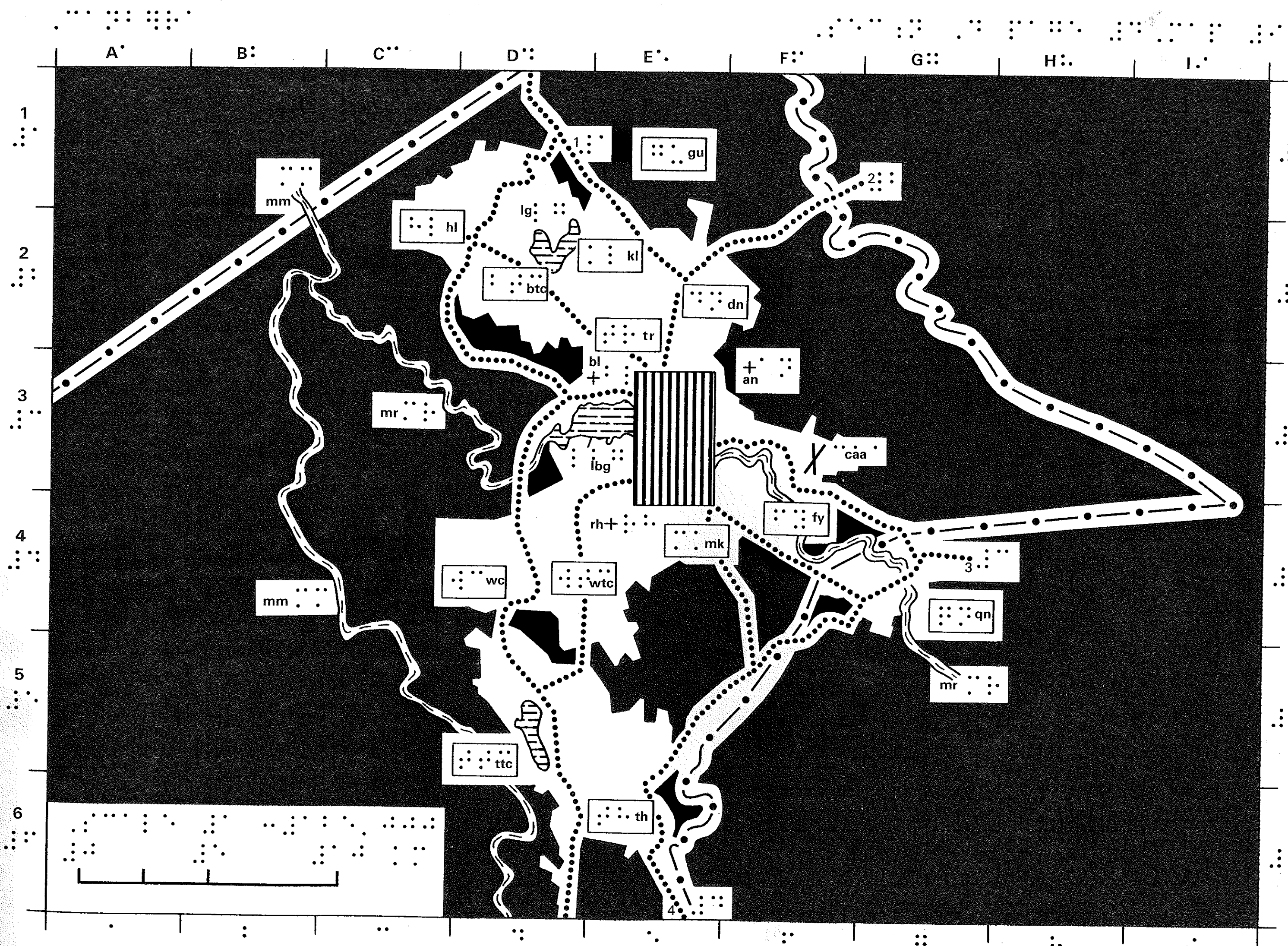
From the inner-city rectangle you can follow the major roads to the new town centres and also find the highways leading to other cities. Beginning at the SW corner of the inner-city rectangle, follow the road that curves S to the Woden Valley Town Centre (**wtc**). Continue S from the Woden Valley and enter the Tuggeranong Valley. Here the new town centre (**ttc**) and an adjacent artificial lake are being constructed. The road continues further S from here to Canberra's current southernmost new suburb, Theodore (**th**), near the bottom edge of the map. Retrace this road N back past the lake and continue to the NW where it becomes the Tuggeranong Parkway before passing to the E of the group of suburbs known as Weston Creek (**wc**). Continue N across the Molonglo River and then NE and E to return to the city centre.

Now follow the road which runs NW from the northern edge of the inner-city rectangle past Turner (**tr**), one of Canberra's oldest suburbs, to the Belconnen Town Centre (**btc**), on the edge of Lake Ginninderra (**lg**). Continue past the town centre to Holt (**hl**), one of the outermost suburbs of Belconnen.

From the N edge of the inner-city area again, follow the road heading N to where it branches near Dickson (**dn**). Dickson is the main shopping centre for North Canberra. The left-hand fork, which runs NW past Kaleen (**kl**) and on into NSW, is the Barton Highway (1) to Yass. The right-hand fork, to the NE, is the Federal Highway (2), which leads to Sydney. Between these two highways is the site of the proposed new town centre of Gungahlin (**gu**).

Two roads lead from the SE corner of the inner-city area. One runs S through Manuka (**mk**) and continues on as Jerrabomberra Avenue and then the Monaro Highway (4), which goes to Cooma. The second is Canberra Avenue which heads SE to Queanbeyan (**qn**), where it becomes the Kings Highway (3) to the coast. Another road runs from the eastern side of the inner-city area past the airport to meet the Kings Highway in NSW.

Canberra is not an industrial city; most of its light industry is located in Fyshwick (**fy**), to the SE of the inner-city, and in neighbouring Queanbeyan in NSW. Much employment in Canberra is dependent upon its role as the national capital and it has a higher percentage of government employees than any other city (over 60 per cent of its workforce).



List of Abbreviations

- an Mount Ainslie
- bl Black Mountain
- btc Belconnen Town Centre
- caa Canberra Airport
- dn Dickson
- fy Fyshwick
- gu Gungahlin
- hl Holt
- kl Kaleen
- lbg Lake Burley Griffin
- lg Lake Ginninderra
- mk Manuka
- mm Murrumbidgee River
- mr Molonglo River
- qn Queanbeyan
- rh Red Hill
- th Theodore
- tr Turner
- ttc Tuggeranong Town Centre
- wc Weston Creek
- wtc Woden Valley Town Centre

- 1 Barton Highway
- 2 Federal Highway
- 3 Kings Highway
- 4 Monaro Highway



The Canberra inner-city map depicts the area around the eastern end of Lake Burley Griffin where the CBD and many major public buildings are located. The layout of this part of the city follows Walter Burley Griffin's original plan.

The original design for Canberra was based around the lake and a central 'Parliamentary Triangle' with its points at Capital Hill, City Hill and Russell Hill. Outside the triangle a system of circular and curved avenues would provide for commercial and residential areas.

Begin reading this map by scanning the mapped area and noting in particular the position of the CBD just N of the lake, which runs generally E-W through the centre of the map.

By following the roads in the central part of the map, the sides of the Parliamentary Triangle can be found. Commencing at City Hill (at G2 and surrounded by the CBD to the NW, N and NE), follow the western arm (Commonwealth Avenue) S across Lake Burley Griffin (**lbg**) to Capital Hill, the site of the new Parliament House (**j**). From here follow the eastern arm of the triangle NE along Kings Avenue, across the lake and on to Russell Hill (**n**). The northern arm of the triangle generally follows Constitution Avenue a little to the N of the lake, back to City Hill.

Return S along the western arm of the triangle to the new Parliament House (**j**) and to the SW, along Adelaide Avenue, find the Prime Minister's Lodge (**l**). Many foreign embassies are located in the area between the Lodge and Lake Burley Griffin.

On the southern shore of the lake within the Parliamentary Triangle, find the National Library (**i**), the High Court (**g**) and the National Gallery (**b**) as you move SE along the shoreline. Then towards Capital Hill, at the bottom of the triangle and surrounded by gardens, find the present Parliament House (**k**).

On the lake within the Parliamentary Triangle, locate the Captain Cook Memorial Water Jet (**e**) close to where Commonwealth Avenue crosses the lake and the Carillon (**f**) on an island near where Kings Avenue crosses the lake. The Australian War Memorial (**d**) is located at the end of a broad avenue (Anzac Parade) which extends NW from the lake foreshore half way between the western and eastern legs of the Parliamentary Triangle and in a direct line through the present Parliament House (**k**) from the new Parliament House.

Return to City Hill (at G2) and locate the main shopping area, Civic Centre, on the northern side, and the Academy of Science (**a**) just to the SW. Further to the SW, the Royal Canberra Hospital (**m**) is at the tip of a long peninsula which juts out into the lake at F3. To the W of Civic Centre is the Australian National University (**c**) and further W, at the foot of Black Mountain, are the National Botanic Gardens (**h**).

List of Abbreviations

- a** Australian Academy of Science
- b** Australian National Gallery
- c** Australian National University
- d** Australian War Memorial
- e** Captain Cook Memorial
- f** Carillon
- g** High Court of Australia
- h** National Botanic Gardens
- i** National Library of Australia
- j** New Parliament House
- k** Present Parliament House
- l** Prime Ministers Lodge
- lbg** Lake Burley Griffin
- m** Royal Canberra Hospital
- n** Russell Hill

Scale 1: 25 000



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A

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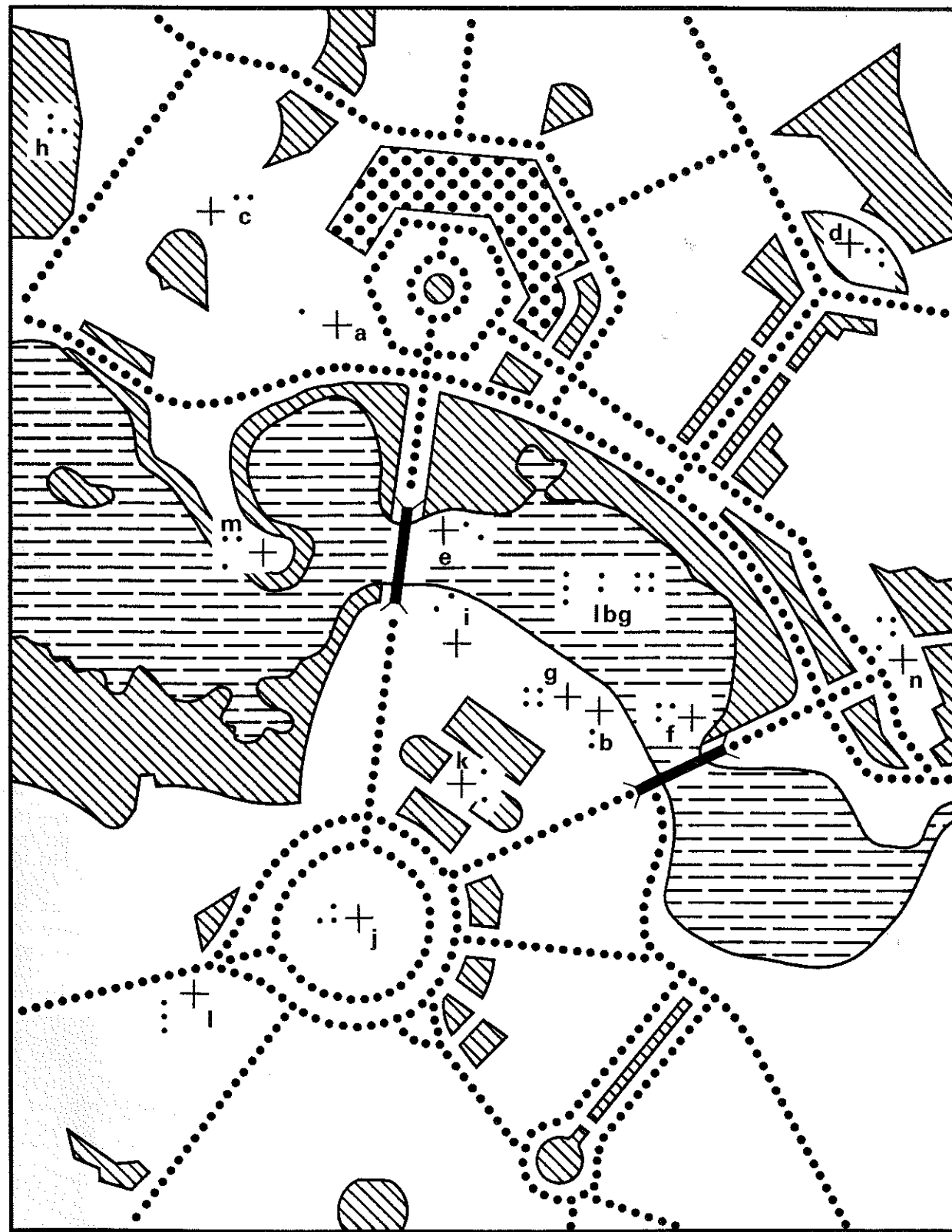
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Sydney, the capital city of NSW, is Australia's oldest and largest city. It has a population of around 3 million. The city has spread across the fertile lowlands of the Cumberland Plain beyond which lies rugged sandstone country — the Hornsby Plateau to the N, the Woronora Plateau to the S and the Blue Mountains to the W. Sydney covers an area of 1500 sq km extending more than 70 kms, from Palm Beach in the N to Campbelltown in the S, and nearly as far W to Springwood in the Blue Mountains.

In 1788 Governor Phillip selected Sydney Cove on Port Jackson as the site for Australia's first settlement. He chose Port Jackson as the site for Sydney in preference to Botany Bay, where Captain Cook had landed 18 years earlier, as it offered excellent anchorage, good flat land and an abundance of fresh water from the nearby Tank Stream.

Initially Sydney grew very slowly and up until the early 1820s it occupied an area of less than 3 sq km. In the 1830s land began to be subdivided in the inner-city (suburbs like Newtown), and in 1855 the opening of the railway between Sydney and Parramatta led to the rapid spread of settlement westward. Extension of the railway and tramway systems in the 1880s prompted further development of new suburbs in the E and S, and in 1890 the opening of the railway from North Sydney to Hornsby led to the rapid growth of settlement on the northern side of Sydney Harbour.

Begin by scanning the whole map and note how the coast runs N-S down the eastern side. The urban area is centred on the coast with corridors of development to the N, W and S. The largest of these extends W to the Blue Mountains (**bm**), which run N-S near the western edge of the map.

Sydney is fortunate to have large areas of natural bushland close to the city. Adjacent to the urban area in the NE, identify Ku-ring-gai National Park (**knp**) surrounding the indented shoreline of Broken Bay. On the coast to the SE of the urban area find The Royal National Park (**rnp**). Much of the surrounding non-urban land to the NW, W and SW is also national park.

Begin exploring the extent of the urban area by locating Palm Beach (**pb**) on a peninsula near the NE corner of the map. Pittwater is on the western side of the peninsula; the Pacific Ocean is on the E. Follow the coastline S past Collaroy (**cy**) and Manly (**my**) to the entrance of Port Jackson (**pj**). Explore Port Jackson and note that it divides into Middle Harbour (not named), which extends to the NW, while Port Jackson itself extends to the SW to the central city area. Find the rectangle representing the area covered by Map 12 *Inner Sydney*. This area straddles the waters of the harbour and includes the Central Business District (CBD), situated on a promontory on the southern shore. The major retail shops, commercial offices and warehouses are located here. Refer to Map 12 for more detail on this area.

Now explore Port Jackson W of the inner-city area, where it is known as the Parramatta River (**pmr**). Continue past the Gladesville Bridge, the second-most important harbour crossing (after the Sydney Harbour Bridge), and on to its source near Parramatta (**pm**).

Returning to the entrance of Port Jackson (**pj**) on the coast, continue to follow the coastline S past Maroubra (**ma**) and discover Botany Bay (**bb**). From the entrance to the bay, trace the shoreline NW and find Sydney's major airport, Kingsford Smith (**ksa**), on its northern shore. This airport is Australia's busiest.

Continue tracing the shoreline of Botany Bay, past the mouth of the Georges River, and back to its entrance. Then, on the coast to the S, locate Cronulla (**cr**) and further S The Royal National Park (**rnp**), which you have already discovered.

Sydney, because of its size, has a complex road and rail system. This map, however, shows only the major highways which radiate out from the inner-city area. The Pacific Highway runs to N, the Great Western to the W, the Hume to the SW and the Princes to the S. The highways are numbered near where they leave the urban area and we will use them to explore the remainder of the city.

Beginning on the northern side of the inner-city area, trace the Pacific Highway (3) NW through Chatswood (**cw**), Pymble (**py**) and Hornsby (**ho**) and then NE along the narrow strip of development to the bridge over the Hawkesbury River, at the northern extremity of the map.

From the W side of the inner-city area, trace the road leading NW across two arms of Port Jackson and then the Gladesville Bridge to Ryde (**ry**), and NE to Hornsby (**ho**). This road, known as Victoria Road for much of its length, provides an alternative route from the city and the southern suburbs to the Pacific Highway.

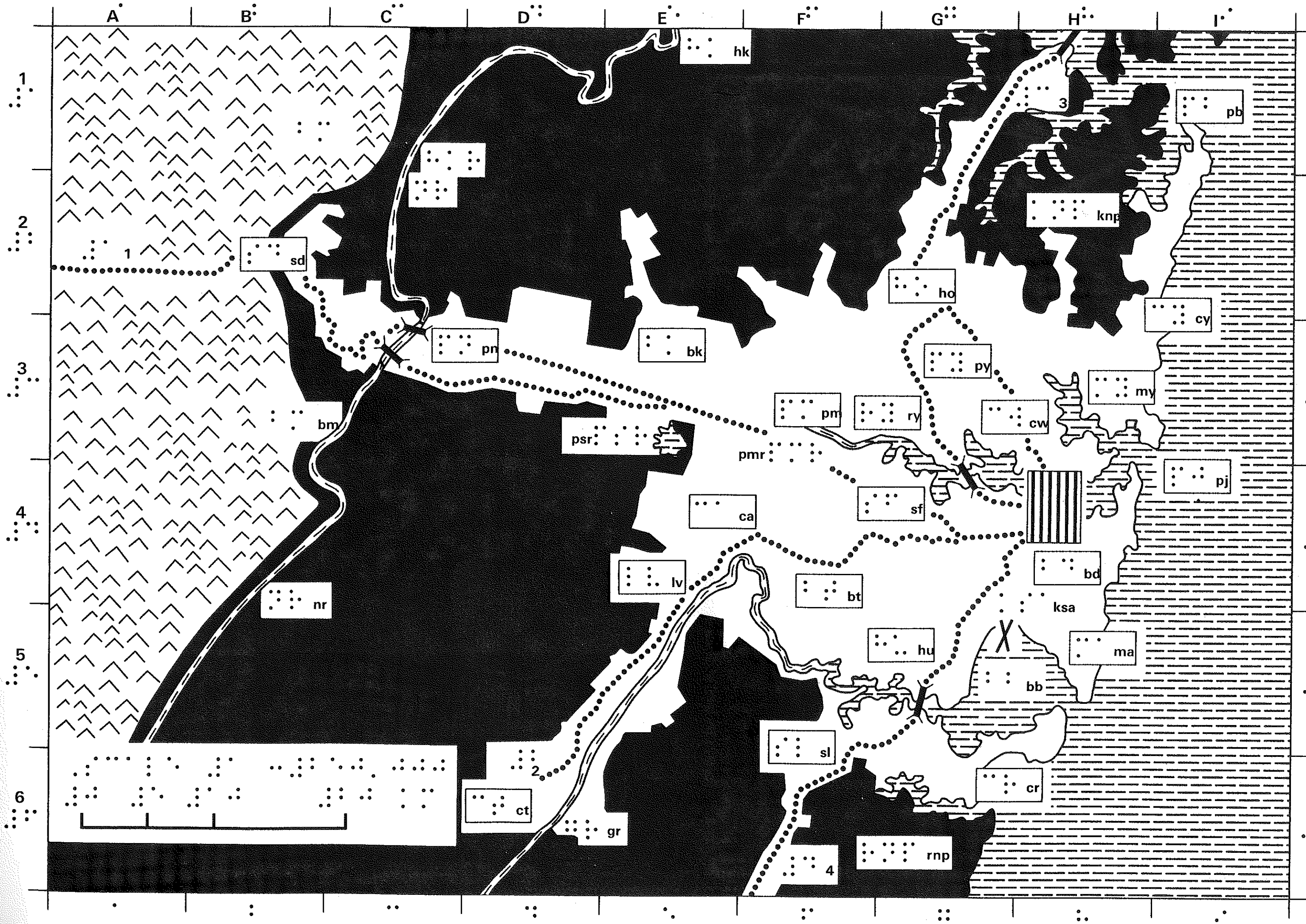
Two roads radiate out from the far SW corner of the inner-city area. The one heading directly W is the Great Western Highway. After only a short distance it divides into the Great Western Highway (1), which then heads NW, and the Hume Highway (2), which runs W then generally SW. Follow the Great Western Highway (1) through Strathfield (**sf**), past Parramatta (**pm**), which is slightly to the N, and on to the point where the Western Freeway branches off on the S near Prospect Reservoir (**psr**). The freeway and the Great Western Highway run parallel to each other and then both cross the Nepean River (**nr**) near Penrith (**pn**) before converging and continuing as the Great Western Highway (1) through Springwood (**sd**) — at the western end of the urban area — and on into the Blue Mountains (**bm**). Note the large strip of development which extends on either side of the highway as far W as Penrith (**pn**).

Return to the junction of the Great Western Highway (1) and the Hume Highway (2) just W of the inner-city area. Trace the Hume Highway W and SW, past Bankstown (**bt**) to the S and Cabramatta (**ca**) to the N, to where it runs parallel to the Georges River (**gr**). Continue SW past Liverpool (**lv**) and on to Campbelltown (**ct**). Again, note how urban development has followed the highway and the river.

Next follow the Princes Highway (4), the most southerly of the roads radiating from the SW corner of the inner-city area. Trace the highway SW past Kingsford Smith Airport (**ksa**) and Botany Bay (**bb**) on the E, to the bridge over the Georges River. The Georges River (**gr**) enters Botany Bay just to the E. Continue to follow the highway SW to the end of the urban area, passing Sutherland (**sl**) to the W and The Royal National Park to the SE.

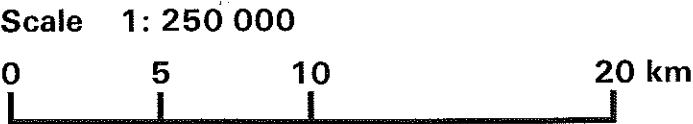
The North Shore, with its hilly, expensive land, includes some of Sydney's most exclusive residential areas, for example suburbs like St Ives and Pymble (**py**), and the waterside areas around Sydney Harbour. The coastal suburbs of Manly (**my**) to the N and Bondi (**bd**) to the E of the city have become areas with many multi-storey flats and units. Urban development in areas around Parramatta (**pm**) and Blacktown (**bk**) to the W and Liverpool (**lv**) to the SW has been particularly rapid in recent years. Directly S of the inner-city and around Botany Bay (**bb**) lies Sydney's oldest and largest industrial zone. As the older industrial area became congested, industrial zones developed well away from the CBD in suburbs such as Bankstown (**bt**) to the SW and between Blacktown (**bk**) and Penrith (**pn**) to the far W.

Sydney has two ports — Port Jackson (**pj**) and Botany Bay (**bb**). Together the Sydney ports handle the largest tonnage of all Australian capital city ports. Port Jackson is the original port and handles a broad range of goods including coal and wheat exports. The port operations at Botany Bay (**bb**) are mainly associated with oil refining and container traffic.



List of Abbreviations

bb	Botany Bay	nr	Nepean River
bd	Bondi	pb	Palm Beach
bk	Blacktown	pj	Port Jackson
bm	Blue Mountains	pm	Parramatta
bt	Bankstown	pmr	Parramatta River
ca	Cabramatta	pn	Penrith
cr	Cronulla	psr	Prospect Reservoir
ct	Campbelltown	py	Pymble
cw	Chatswood	rnp	The Royal National Park
cy	Collaroy	ry	Ryde
gr	Georges River	sd	Springwood
hk	Hawkesbury River	sf	Strathfield
ho	Hornsby	sl	Sutherland
hu	Hurstville		
knp	Ku-ring-gai National Park	1	Great Western Highway
ksa	Kingsford Smith Airport	2	Hume Highway
lv	Liverpool	3	Pacific Highway
ma	Maroubra	4	Princes Highway
my	Manly		



The inner-city area of Sydney is located around the shores of Port Jackson. The Central Business District (CBD) is situated on the southern side of Port Jackson, between Sydney Cove to the E and Darling Harbour to the W. The major retail shops, commercial offices and warehouses are concentrated in this area. Sydney's skyline, particularly in this central area, has changed greatly in recent years — many high-rise buildings have been constructed including Australia Square and the Sydney Tower (at 305 m, the tallest building in Australia).

Begin reading this map by scanning the mapped area to discover how the northern half is mostly covered by the waters of Port Jackson (pj), the shores of which are very indented forming a series of points and bays. You will find the CBD to the W of the map centre.

Only major roads are depicted. Follow the road leading N from the CBD and locate the Sydney Harbour Bridge (s), undoubtedly Sydney's most famous landmark. The bridge links the southern shore of Port Jackson (pj) to North Sydney, which is rapidly becoming an important business centre as the CBD expands and overflows. Follow the road across the bridge and explore the northern shoreline of Port Jackson E and W from the bridge, noting the bays and points including Kirribilli Point (m) to the E.

From the southern end of the bridge, trace the shoreline W and S around Darling Harbour (e). Note the location of the wharves and jetties. Next trace the shoreline E of the bridge around Sydney Cove (q) and note the wharves from which numerous harbour ferry services originate.

On the western shore of Sydney Cove locate The Rocks (t), an area in which much of the atmosphere of old Sydney has been retained. Then find the famous Sydney Opera House (n) on Bennelong Point to the E. With its unique shell-like appearance, spectacular opera theatre and concert hall, the Opera House is one of Sydney's most popular tourist attractions.

From the Opera House follow the shoreline S around Farm Cove, which is surrounded on three sides by the Royal Botanic Gardens (p). The eastern side of the gardens face Woolloomooloo Bay (v), with a long wharf protruding from the S. Garden Island Dockyard and Naval Depot (j) is situated on the point on the eastern side of Woolloomooloo Bay.

From Garden Island trace the shoreline around Elizabeth Bay (g) to Darling Point (f) on the eastern edge of the map.

To the E of the CBD, locate The Domain, in which the Art Gallery (a) is located. Between The Domain and the CBD, find Parliament House (o).

To the S of The Domain, close to the CBD, find Hyde Park (k). Then, to the E of the southern part of Hyde Park, locate the Australian Museum (b) — Australia's oldest and largest natural history museum.

Follow the road leading E from the CBD through Hyde Park (k) and on its northern side find Kings Cross (l), with its many hotels, cinemas, restaurants and nightclubs. On the southern side of this road, surrounded by parkland, locate White City Tennis Courts (u).

From the SE corner of Hyde Park, follow the road heading SE to a road junction. First continue through the junction SE and locate Centennial Park (c) in the SE corner of the map, then follow the road leading S from the junction to where Moore Park surrounds the Sydney Cricket Ground (r).

Near the SW corner of the CBD, locate the Entertainment Centre (h) which is one of Australia's largest and most popular performance halls.

Inner Sydney's public transport system consists of an extensive bus and train network. Central Railway Station (d), directly S of the CBD between two major roads, is Sydney's major rail terminal from which interstate and country trains originate, and through which all suburban trains pass.

List of Abbreviations

- a Art Gallery of New South Wales
- b Australian Museum
- c Centennial Park
- d Central Railway Station
- e Darling Harbour
- f Darling Point
- g Elizabeth Bay
- h Entertainment Centre
- i Farm Cove
- j Garden Island
- k Hyde Park
- l Kings Cross
- m Kirribilli Point
- n Opera House
- o Parliament House
- p Royal Botanic Gardens
- pj Port Jackson
- q Sydney Cove
- r Sydney Cricket Ground
- s Sydney Harbour Bridge
- t The Rocks
- u White City Tennis Courts
- v Woolloomooloo Bay

Scale 1: 25 000



A

B

C

D

E

F

G

H

I

1

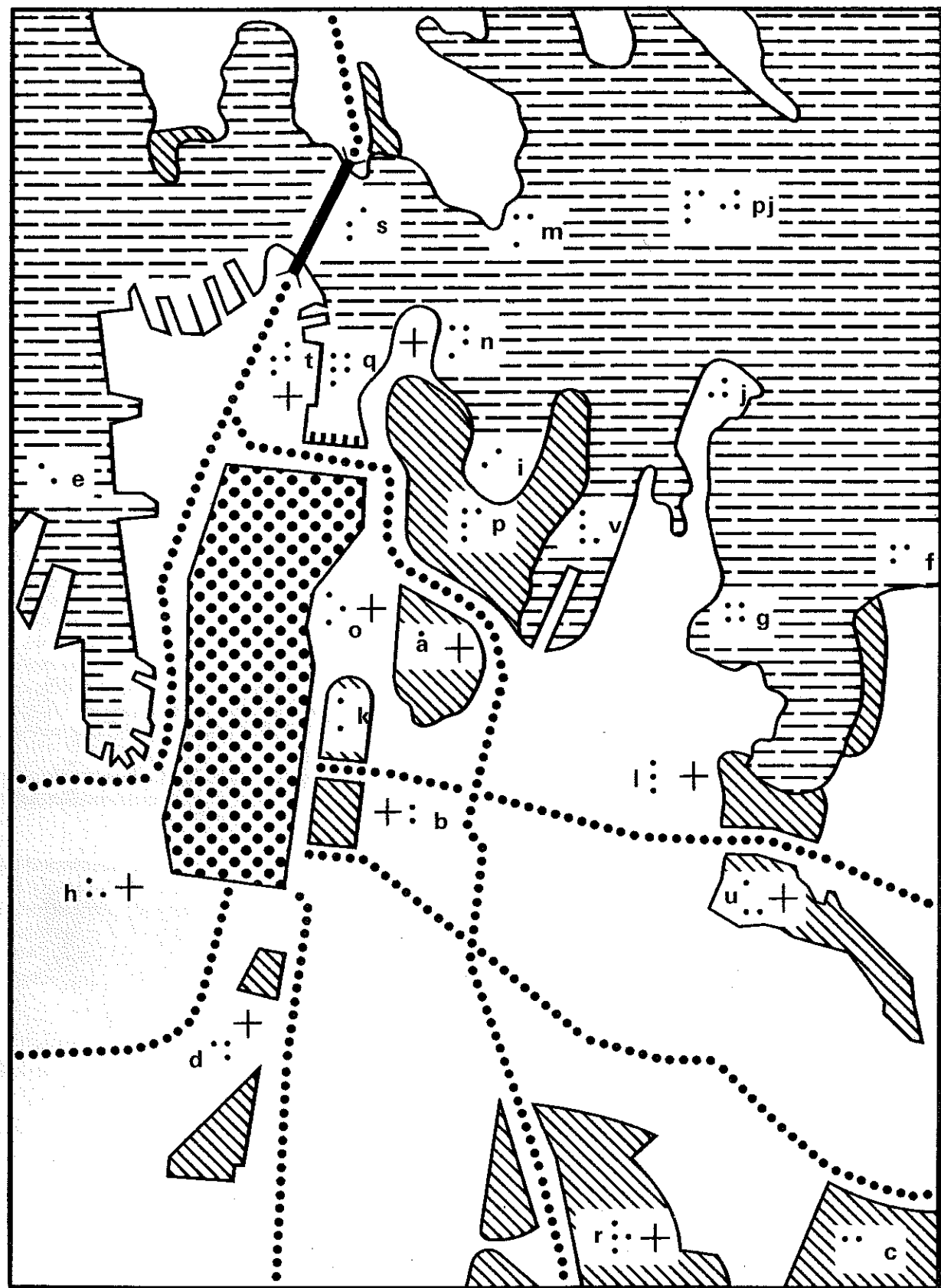
2

3

4

5

6



Melbourne, situated on the Yarra River and the northern shore of Port Phillip Bay, is the capital city of V and Australia's second largest city. It has a population of over 2.5 million and covers an area of 1600 sq km. The urban area extends about 20 km to the W and N on to flat basalt plains, about 25 km to the NE and nearly 40 km to the E, where the land is gently undulating. Arms of development extend further E into the Dandenong Ranges and SE to Berwick. To the S, the urban area continues in a narrow band for 65 km along the flat coastal plains of the Mornington Peninsula. The most southerly part of the urban area, beyond Frankston, is not depicted on the map.

Begin reading by scanning the entire map to gain a general picture of the location of Port Phillip Bay and the distribution of urban and non-urban land.

Then, starting near the SW corner of the map, trace the coastline of Port Phillip Bay northwards. The land changes from non-urban to urban near Altona (al). Continue to trace the shoreline E until you come to the mouth of the Yarra River (ya). Just upstream from the mouth of the river you will discover the Westgate Bridge and then the rectangle representing the inner-city area, covered by the following larger scale map. The Central Business District (CBD) of Melbourne is within this area.

Return to the mouth of the Yarra River. From this point the shoreline of Port Phillip Bay turns S. Continue to follow the shoreline past St Kilda (sk), Brighton (bn) and Mordialloc (md) until you reach Frankston (fk), near the bottom of the map. Did you notice that inner Melbourne is located at the very head of Port Phillip Bay?

Now you can explore the shape of the urban area. From Frankston (fk), which is on the Nepean Highway (4), trace the eastern side of the urban area boundary northwards and then eastwards. In a long corridor of urban development paralleling the Princes Highway (5) you will come to the large regional centre of Dandenong (dg) and then Berwick (bi), at the eastern extremity of the urban area.

Follow the irregular urban boundary back along the Princes Highway to where it turns N and passes to the W of Glen Waverley (gw) before turning generally E and then N around Belgrave (bg).

Some distance further to the N locate Lilydale (ld), on the Maroondah Highway (3). To the E of the urban area between Belgrave and Lilydale, locate the Dandenong Ranges (dgr).

From Lilydale continue to follow the urban boundary generally E past Ringwood (rw) to where the Yarra River (ya) enters from the E. Trace the course of the Yarra W past Heidelberg (hd) on the N bank and Kew (kw) on the S bank to where it enters the inner-city area.

Returning to where the Yarra (ya) enters Melbourne from the E, follow the urban boundary N and W past Greensborough (gb) to the Hume Highway (2) and on past Broadmeadows (bm) to Tullamarine Airport (tua), Melbourne's major airport. To the S locate the Calder Highway (1), the main road to Bendigo, and further to the S again find the Western Highway (6), which connects Melbourne to Ballarat. From the point where the Western Highway leaves the urban area, the boundary turns generally S and W into a corridor of development paralleling the Princes Highway (5) as far as Werribee (wb).

Back along the southern side of the Princes Highway, you will find where the boundary of the urban area meets Port Phillip Bay, near Altona (al). The Princes Highway continues NE, through the inner suburb of Footscray (ft), to where it enters the central city area.

From the northern side of the rectangle representing the inner-city area, trace the Hume Highway (2) N through Coburg (cg) and on to Broadmeadows (bm). Then, from the NW corner of the inner-city rectangle, trace the Calder Highway (1) N and W around Essendon (ed) to where it leaves the urban area, and the Western Highway (6) W above Footscray (ft) to where it leaves the urban area.

From the eastern side of the inner-city rectangle, trace the Maroondah Highway (3) E across the Yarra River, then to the S of Kew (kw) and through Ringwood (rw) to Lilydale (ld) and on to the edge of the urban area.

Two highways are depicted leaving the SE corner of the inner-city rectangle. Firstly, the Princes Highway (5) heads SE through Caulfield (cd) and Oakleigh (ok) to Dandenong (dg) and then Berwick (bi) at the eastern extremity of the urban area. Secondly, the Nepean Highway (4) heads southwards along the bay to Frankston (fk) and on to the Mornington Peninsula, beyond the southern edge of the map.

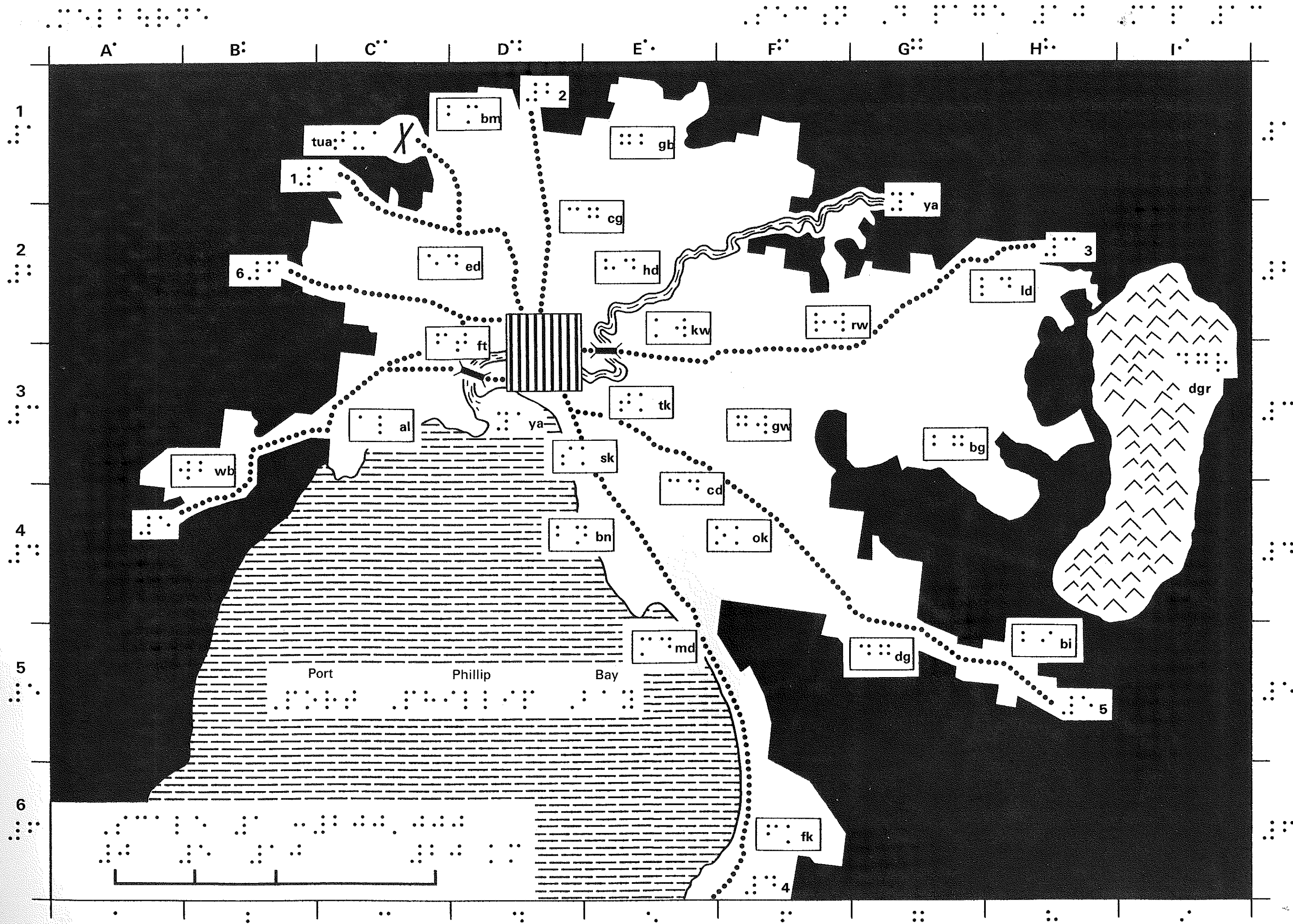
Melbourne's residential areas relate directly to the nature of the land, with residential expansion extending further to the E and S than to the N and W. The gently undulating and fertile land of the E and S is generally more expensive and includes most of the more exclusive residential areas, for example Toorak (tk) and nearby South Yarra, and Kew (kw), all located just to the E of the inner-city area. These suburbs are characterised by expensive homes, specialist shops and restaurants. Further to the E, Glen Waverley (gw) is a rapidly growing area.

To the N and W the dry basalt plains have hindered residential development and ensured that land prices are lower than those to the E and S.

Melbourne has a well developed industrial sector and produces 30 per cent of Australia's factory output. Most of the industry is located in an inner ring of suburbs around the CBD. However, some of the outer suburbs also have substantial industrial development. For example, at Altona (al) to the SW there is an oil refinery and at Broadmeadows (bm) to the N and at Dandenong (dg) to the SE there is automotive manufacturing.

The Port of Melbourne, located on the lower reaches of the Yarra River, is the busiest port in Australia in terms of number of vessels handled.

The extensive rail and road network which radiates from the original urban nucleus of Melbourne, has greatly influenced the shape of the city's urban area. Even though the map shows only the major highways, this pattern is still very evident.



List of Abbreviations

al	Altona	ld	Lilydale
bg	Belgrave	md	Mordialloc
bi	Berwick	ok	Oakleigh
bm	Broadmeadows	rw	Ringwood
bn	Brighton	sk	St Kilda
cd	Caulfield	tk	Toorak
cg	Coburg	tua	Tullamarine Airport
dg	Dandenong	wb	Werribee
dgr	Dandenong Ranges	ya	Yarra River
ed	Essendon		
fk	Frankston	1	Calder Highway
ft	Footscray	2	Hume Highway
gb	Greensborough	3	Maroondah Highway
gw	Glen Waverley	4	Nepean Highway
hd	Heidelberg	5	Princes Highway
kw	Kew	6	Western Highway

Scale 1: 200 000



The Central Business District (CBD) of Melbourne is located on the northern bank of the Yarra River.

Begin reading this map by scanning the mapped area and finding the CBD, which is in the centre. Then trace the Yarra River (ya), firstly to the E from the CBD and then to the W where you will find Victoria Dock (r) on the northern bank. The CBD is linked to the southern bank of the river by four bridges. Identify each in turn. From E to W they are: Princes Bridge, Queens Bridge, Kings Bridge (longer than the others) and Spencer Street Bridge.

Within the CBD the streets are wide and form a rectangular grid which, although it does not appear on this map, characterises Melbourne's city centre. The CBD has many high-rise offices and is the centre of retailing and the dominant place of employment.

The inner-city area of Melbourne is renowned for its magnificent parks and gardens, the largest and best known of which are depicted on the map. From the centre of the NW side of the CBD, follow the road leading NW to where it divides with one road leading directly N. Between these two roads, near the map edge, locate a large park area surrounding the Royal Melbourne Zoo (m), the third oldest in the world. To the E of the zoo is Royal Park (n).

Just N of the most northerly corner of the CBD, find the Exhibition Buildings (d) situated between the Carlton Gardens to the N and S. Adjoining the eastern corner of the CBD, locate the Fitzroy Gardens which include Captain Cooks Cottage (c), the original house of Cook's parents brought from England in 1934. To the SE of the CBD is Yarra Park, which surrounds the Melbourne Cricket Ground (i), the home of Australian cricket. Directly S, between Yarra Park and the Yarra River, are Olympic and Flinders Parks (j).

From Princes Bridge (the most easterly of the four bridges), trace St Kilda Road S and, on the eastern side and S of the Yarra River, discover Melbourne's most extensive area of parkland. It incorporates the Kings Domain (h), the Royal Botanic Gardens (l), Alexandra Gardens (not named) and a number of small parks. Government House (g) and the Shrine of Remembrance (o), Victoria's war memorial, are located in this area of parkland.

To the S adjoining the southern edge of the map-sheet, locate Albert Park (a) which surrounds Albert Park Lake (b). To the E of Albert Park find Fawkner Park (e).

On the southern bank of the Yarra to the W of Princes Bridge, find the Victorian Arts Centre and National Gallery (q). This spectacular arts complex includes Victoria's National Gallery, the Melbourne Concert Hall, the Performing Arts Museum and three auditoriums topped by a 115 m spire.

On the northern bank of the Yarra, close to Spencer Street Bridge (the most westerly of the four bridges), discover the World Trade Centre (s), and extensive information centre comprising five modern buildings.

Inner Melbourne's public transport system consists of a network of trams, buses and trains, though only the major roads radiating out from the CBD are depicted on the map. Close to the SW corner of the CBD, locate Spencer Street Station (p), the main country and interstate railway station. Then find Flinders Street Station (f), the main city railway station, between the southern edge of the CBD and the river immediately W of Princes Bridge.

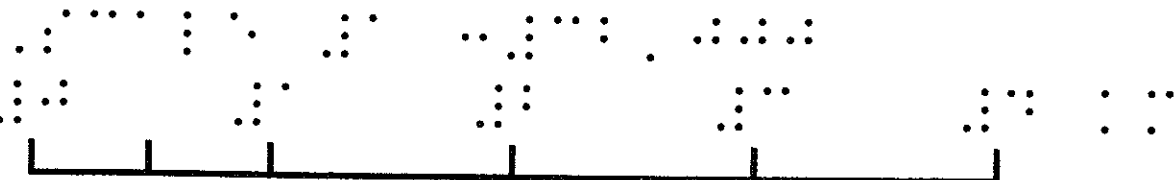
A road leading from the southern part of the CBD across Queens Bridge and under Kings Bridge (the longest of the four bridges) runs SW to Port Phillip Bay where, in the SW corner of the map you will discover Port Melbourne (k), and Melbourne's passenger ship terminal jutting into the bay.

List of Abbreviations

- a Albert Park
- b Albert Park Lake
- c Captain Cooks Cottage
- d Exhibition Buildings
- e Fawkner Park
- f Flinders Street Railway Station
- g Government House
- h Kings Domain
- i Melbourne Cricket Ground
- j Olympic and Flinders Parks
- k Port Melbourne
- l Royal Botanic Gardens
- m Royal Melbourne Zoo
- n Royal Park
- o Shrine of Remembrance
- p Spencer Street Railway Station
- q Victorian Arts Centre and National Gallery
- r Victoria Dock
- s World Trade Centre
- ya Yarra River

Scale 1: 32 000





Brisbane, the capital city of Q and Australia's third largest city with a population of 1 million, is located in the SE corner of the State. Because of its off-centre position in Q, it contains only 41 per cent of the State's population (a much lower percentage than for most other State capitals).

Situated on lowlands that are bounded to the E by Moreton Bay, to the NW by the D'Aguilar Range and to the far W by the Main Range, the urban area covers 885 sq km. Draining these lowlands is the Brisbane River, which meanders its way through the urban area.

John Oxley discovered the Brisbane River in 1823 while searching for a suitable site to establish a penal colony. The first settlement was located on the bay at Redcliffe, on the northern edge of the map. This site was later found to be unsuitable and abandoned. The settlement was then relocated to North Quay, on the banks of the Brisbane River in the western corner of the present Central Business District.

Brisbane remained essentially a closed penal settlement until 1842 when the whole of the Moreton Bay area (including Brisbane) was declared open for free settlement. The growth of Brisbane accelerated from this time, with the population concentrated around the present city centre and at Ipswich, then known as Limestone, to the W. In 1859 Q became a separate colony and Brisbane officially became the State's capital city.

Rapid population growth in Brisbane since 1945 has led to extensive spread of settlement. The main growth areas have been to the N and S, and W along the Brisbane River valley.

Traditionally Brisbane has not been an industrial city, with only 16 per cent of its labour force in manufacturing. The main industrial area lies along both banks of the Brisbane River near its mouth and includes two oil refineries and a fertiliser plant.

Begin reading by scanning the whole map and noting that much of the eastern half is covered by the waters of Moreton Bay. Arms of urban development extend N and SE along the shoreline of Moreton Bay, with a further two major areas of development extending away from the coast to the S and SW.

Locate the mouth of the Brisbane River (**br**) on the central coast of Moreton Bay. Then trace the coastline northwards past a quite large area of non-urban land (mainly swampland) to Sandgate (**sg**) and on across the long Hornibrook Highway bridge, near the mouth of the North Pine River (**npr**), to Redcliffe (**rc**), the site of the original settlement and now the northernmost suburb of Brisbane.

Return to the mouth of the Brisbane River (**br**) and then head SE along the coast past Wynnum (**wy**) to Cleveland (**cv**) at the southern end of the urban area.

Return again to the mouth of the Brisbane River (**br**). Trace the course of the river SE through Brisbane's main industrial area and past the recently completed Gateway Bridge to where it enters the rectangle denoting the inner-city area (covered by Map 16 *Inner Brisbane*). The Gateway Bridge provides a link between the northern and southern suburbs without the need to pass through the inner-city area. Note that Brisbane Airport (**bra**) is located just to the N of the river.

Continue to trace the meandering course of the river generally SW from the inner-city area past the suburb of Kenmore (**ke**) on its northern side to where it leaves the urban area (E of Ipswich).

Despite extensive new residential development in outlying areas of the city, some older, more established inner-western suburbs such as Kenmore (**ke**) and nearby Indooroopilly, and suburbs just to the E of the CBD such as Ascot and Hamilton have remained high status residential areas. This is due mainly to their positions on the high northern bank of the river and their close proximity to the CBD.

Having now established the general shape of the city, return to the rectangle representing the inner-city area. From here we will follow the major roads out to the extremities of the urban area to become more familiar with the locations of various suburbs and features.

Two roads are depicted leading N from the inner-city area. Follow the most easterly of these roads N past Northgate (**ng**) to Sandgate (**sg**) on the coast, and then over the Hornibrook Highway bridge to Redcliffe (**rc**), which you previously located.

From the inner-city area, the more westerly of the two roads heading N is the Bruce Highway (**1**), the coastal highway to Cairns. Follow this road N through Chermside (**cs**) — named to the W — and on to where it leaves the urban area. To the NW of this point, locate the rapidly growing Strathpine (**sn**) and Petrie (**pt**) areas on either side of the North Pine River (**npr**).

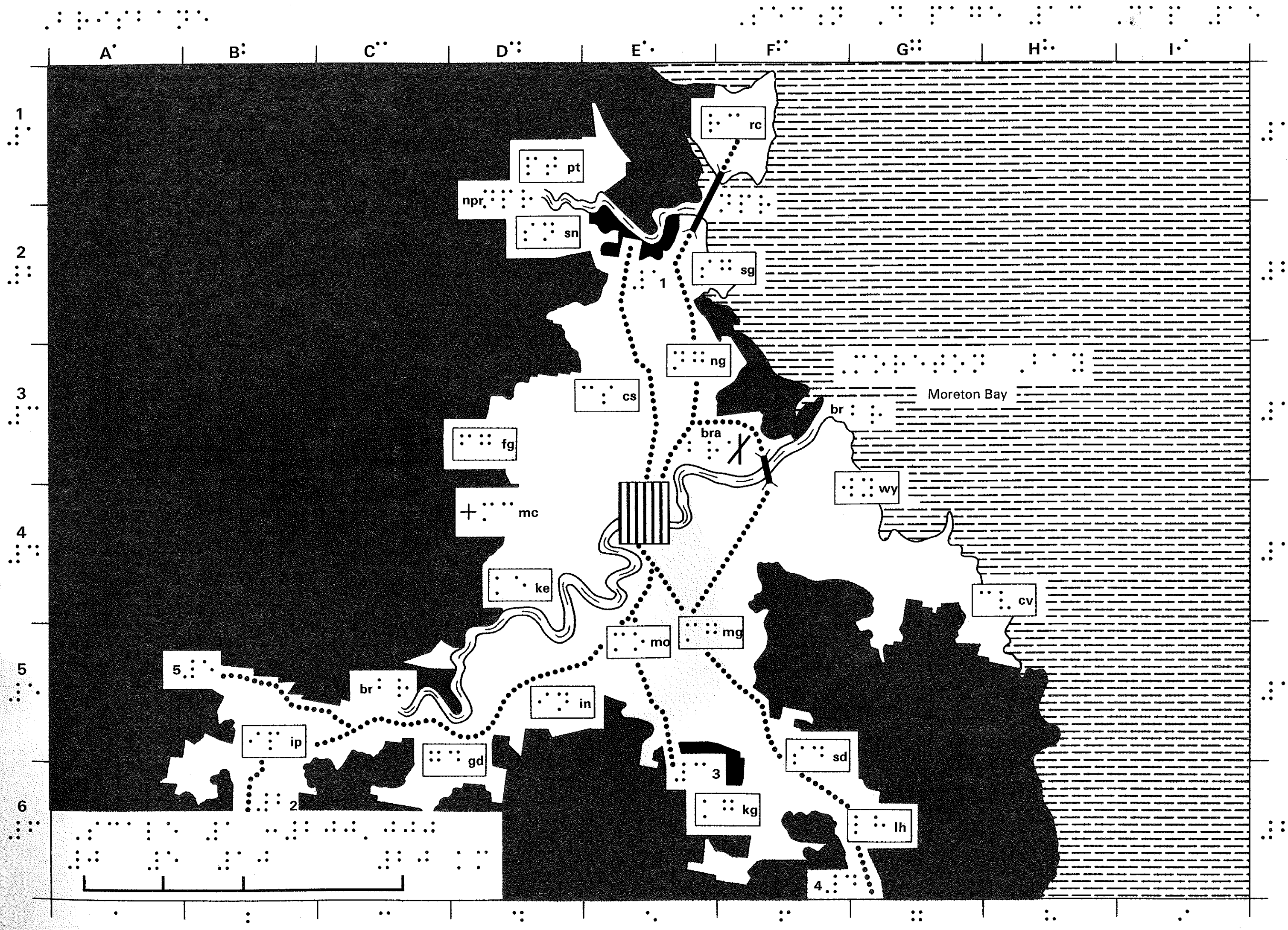
To the NW of the inner-city area locate Ferny Grove (**fg**) and then Mount Coot-tha (**mc**) on the western edge of the urban area directly W of the inner-city. Mount Coot-tha is a prominent landmark and includes the transmitting towers for all four Brisbane TV stations.

A single road is depicted heading SE from the inner-city area. This is the South-eastern Freeway which leads into the Pacific Highway (**4**), the main road to the Gold Coast. A short distance along the freeway a road branches off to the SW. Follow this road, the Cunningham Highway, past a road branching to the S at Moorooka (**mo**) then to the N of Inala (**in**) and on through Goodna (**gd**) to Ipswich (**ip**), at the end of the urban development. Just to the E of Ipswich the road divides, with the Warrego Highway (**5**) heading NW while the Cunningham Highway (**2**) continues through Ipswich and on to the S.

Return along the road to Moorooka (**mo**) and note that urban development parallels the road and the Brisbane River, which is to the N.

From Moorooka (**mo**) follow the Mount Lindesay Highway (**3**) S to the edge of the urban area. Return to Moorooka and further to the NE find the South-eastern Freeway–Pacific Highway (**4**) which you should then follow SE through the large regional centre of Mount Gravatt (**mg**) and past Springwood (**sd**) to Loganholme (**lh**) in the SE corner of the urban area. To the W of Loganholme, locate Kingston (**kg**) near the end of a separate branch of urban development.

Return along the Pacific Highway to Mount Gravatt (**mg**). Now follow the boundary of the urban area N then generally E to the shore of Moreton Bay where you will come across Cleveland (**cv**), the southernmost part of the urban area along the coast.

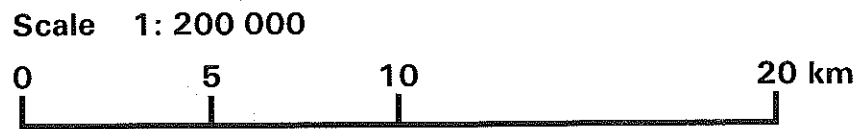


List of Abbreviations

br Brisbane River
bra Brisbane Airport
cs Chermside
cv Cleveland
fg Ferny Grove
gd Goodna
in Inala
ip Ipswich
ke Kenmore
kg Kingston
lh Loganholme
mc Mount Coot-tha
mg Mount Gravatt
mo Moorooka

ng Northgate
npr North Pine River
pt Petrie
rc Redcliffe
sd Springwood
sg Sandgate
sn Strathpine
wy Wynnum

1 Bruce Highway
2 Cunningham Highway
3 Mount Lindesay Highway
4 Pacific Highway
5 Warrego Highway



Brisbane's Central Business District (CBD) is located on the northern side of the river, enclosed by a large meander. In terms of retailing, location of employment and entertainment, the CBD is the dominant area of the city. Many new buildings have been constructed in recent years, for example the SGIO Building and the new Supreme Court.

Begin reading the map by tracing the meandering course of the Brisbane River (**br**) from the eastern edge of the map. The course of the river is first westerly then northerly to the first of four road bridges which link the CBD to the southern side of the river. This first bridge is the Storey Bridge, and from here the river turns S to the Captain Cook Bridge, which is located on another bend in the river.

Continue to trace the course of the river NW to the Victoria Bridge and note that this bridge leads directly from the CBD, on the northern side of the river.

Find the William Jolly Bridge a little further to the NW and then follow the course of the river SW to the map edge. Various other bridges cross the Brisbane River, the newest and by far the largest being the Gateway Bridge near the mouth of the river.

Returning along the river to the Victoria Bridge and the CBD, note that the CBD is bounded by reaches of the river on both the SW and the E. In the bend of the river to the S of the CBD, find Parliament House (**f**) and the Botanic Gardens (**a**).

On the NW side of the CBD locate Central Railway Station (**d**). Further to the NW, on the southern side of an area of parkland, is the new Brisbane Transit Centre (**c**) which incorporates Roma Street Railway Station. From here, all country and interstate rail and coach services originate.

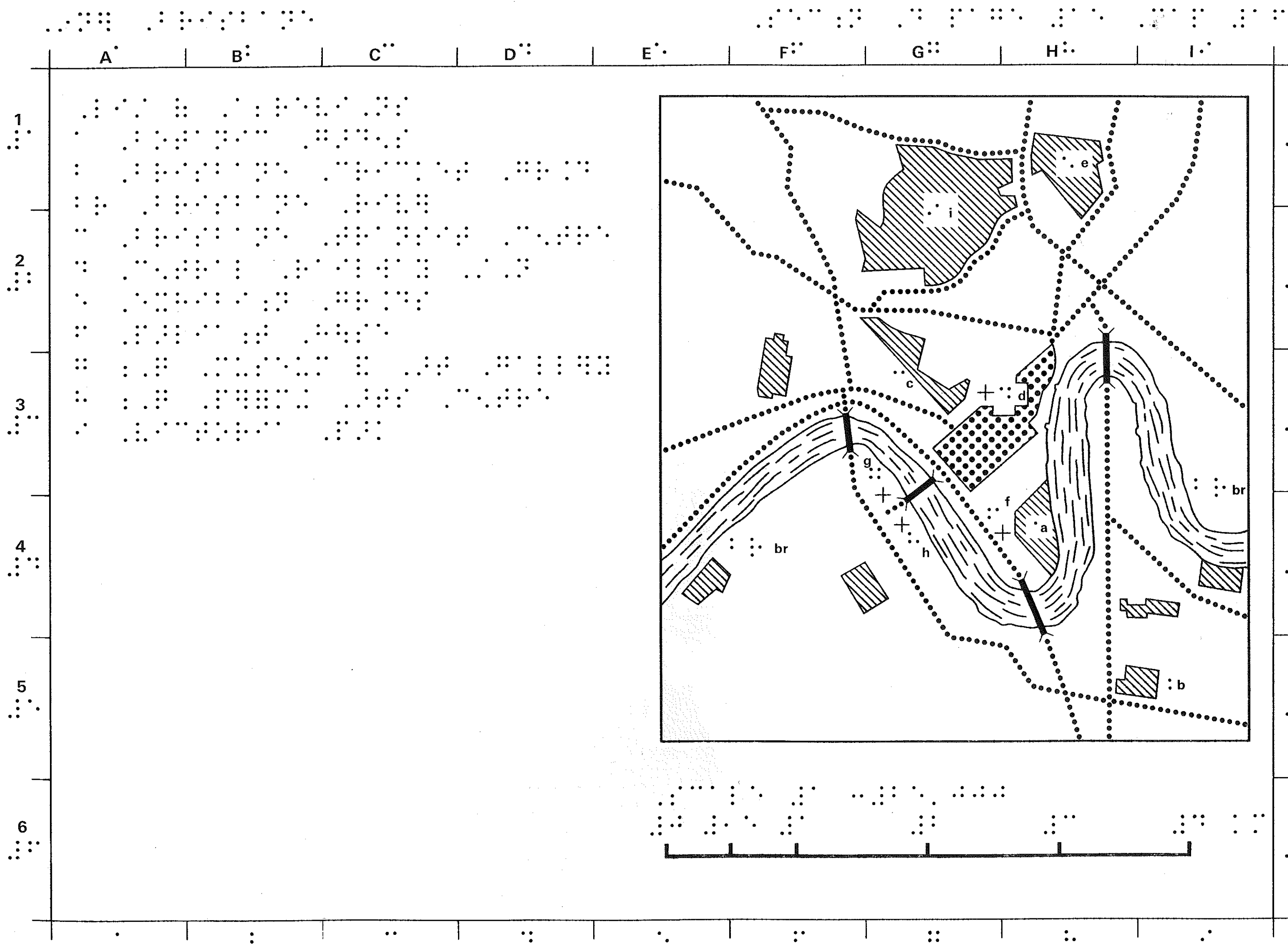
Three roads lead from the northern tip of the CBD. Follow the centre road N then NW and discover Brisbane's largest park, Victoria Park (**i**), to the W and the Exhibition Grounds (**e**) to the E.

As Brisbane's CBD expands, development is spreading across the river. South Brisbane, until recently one of the oldest residential areas, now houses the Cultural and Performing Arts Centre, a spectacular complex on the banks of the river. Adjoining this is the site for the forthcoming Expo '88. Discover these complexes by crossing the Victoria Bridge to the SE of the CBD and then locating the Museum and Art Gallery (**g**) and to the S the Performing Arts Centre (**h**) between the road and river to the N.

List of Abbreviations

- a** Botanic Gardens
- b** Brisbane Cricket Ground
- br** Brisbane River
- c** Brisbane Transit Centre
- d** Central Railway Station
- e** Exhibition Grounds
- f** Parliament House
- g** Queensland Museum and Art Gallery
- h** Queensland Performing Arts Centre
- i** Victoria Park





Perth, the capital of Australia's largest State, WA, has a population of nearly 1 million and is one of the country's fastest growing capital cities. Perth lies in a coastal plain along the lower reaches of the Swan River, bounded to the W by the Indian Ocean and to the E by the Darling Range. The urban area, which covers 790 sq km, extends about 65 km from N to S and 40 km from E to W.

The site of Perth was discovered in 1697 by the Dutch navigator de Vlamingh, who named the Swan River but made no attempt at settlement. However, in 1829 Captain Fremantle landed at the Swan River and founded a new colony. People were encouraged to take advantage of cheap land grants, for it was feared that France would settle this part of Australia if Britain didn't. Confusion with land grants and trouble with the local natives added to the initial struggle of the first settlement, and by 1871 Perth had a population of only 5000.

During the 1890s Perth experienced an influx of population due to the discovery of gold at Coolgardie and Kalgoorlie, and by 1901 the population had increased to over 27 000. Inner-city suburbs like Mount Lawley grew rapidly, as did Fremantle on the coast. The opening of the railway between Perth and Fremantle in the 1880s soon resulted in the development of Subiaco, just to the W of the inner-city area. Subsequently, the opening of railways to Midland to the NE and Armadale to the SE ensured further development in the surrounding areas. The expansion of the 1890s was followed by the continued growth of Perth, although at a lower rate, until the mining boom of the 1960s, when its population increased rapidly from 420 000 in 1961 to 642 000 in 1971.

To familiarise yourself with Perth, scan the whole map and note that much of the urban area faces the Indian Ocean to the W. Locate the Darling Range (dl) to the E of the urban area and observe that fingers of development extend NE, along the Swan River (sr), E to the foothills of the Darling Range and SE along the Canning River (cr).

Locate where the Swan River (sr) enters the Indian Ocean in the SW quarter of the map and trace the coastline S to Coogee (ce) at the southern end of the urban area. The road which follows the coast S from Fremantle continues on to Kwinana and the nearby large urban centre of Rockingham.

Return to the mouth of the Swan River (sr) at Fremantle (fm) and then trace the coastline N past Cottesloe (co), City Beach (cb), Scarborough (sc) and Mullaoo (mu) to the northern limit of the urban area. In this vicinity much of the urban development lies between the coast and the Great Northern Highway (3). Wanneroo (wn) is situated on the highway near the end of the urban area.

Follow the highway S from Wanneroo (wn) past Girrawheen (gi) to the E and on to the rectangle denoting the area covered by Map 18 *Inner Perth*. Immediately to the N of the inner-city area is Mount Lawley (ml) and to the W is Subiaco (su).

The Swan River flows through the inner-city area from NE to SW, where it opens into wide basins before reaching the ocean. Nedlands (nd) can be found on the N bank; Fremantle (fm) is on the S bank near its mouth.

Being less industrialised than most other capital cities, Perth has only small pockets of industry; the Welshpool-Kewdale area (wp) to the SE of the inner-city and the Subiaco-Jolimont area (su) to the W are examples.

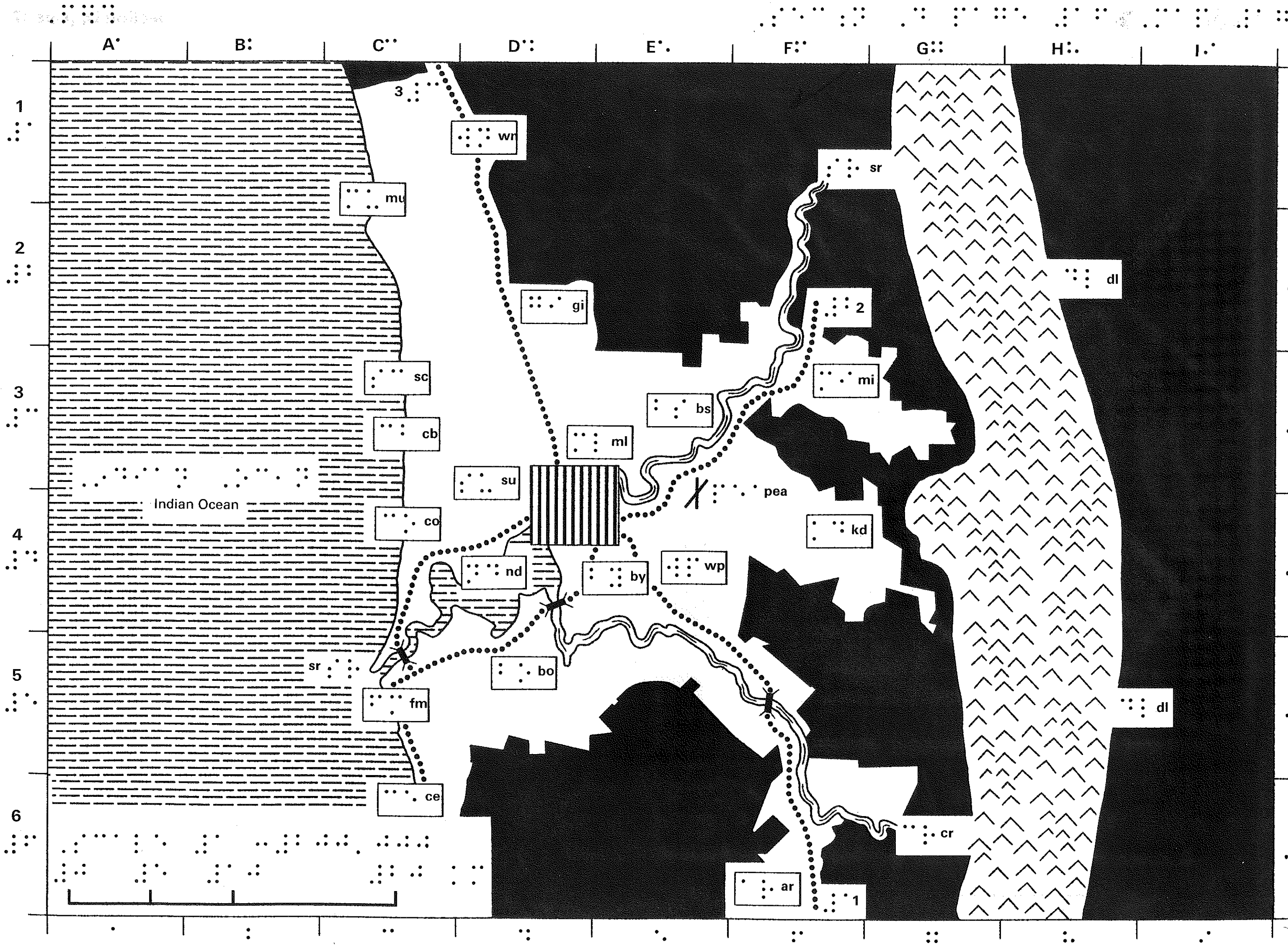
Kwinana, Western Australia's major industrial area, is situated on the coast some 20 km S of Fremantle (fm) and beyond the southern edge of the map-sheet. It includes large oil, alumina and nickel refineries, a fertiliser plant and a steel mill. A major naval base is situated on nearby Garden Island.

Most of Perth's high status residential areas are located close to the Swan River; for example suburbs such as Dalkeith and Karakatta near Nedlands (nd), and Applecross and nearby Booragoon (bo) to the S. Cottesloe (co) and City Beach (cb), because of their coastal position, are also favoured residential areas.

Perth's rapid population increase has caused extensive spread of settlement in recent years, the main growth areas being concentrated along the beach front to the N of Fremantle as well as along the major highways radiating from Perth to Armadale and Midland.

To discover the major areas of settlement E of the city centre, commence at the NE corner of the inner-city area and follow the Swan River (sr) and Great Eastern Highway (2) NE past Perth Airport (pea) to the S and Bassendean (bs) to the N. Note that urban development continues N along the river and E in the vicinity of Midland (mi).

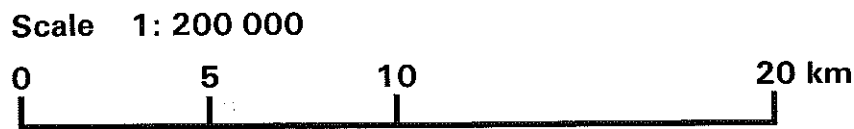
To the E of the inner-city area past Perth Airport (pea), discover the urban extension beyond Kalamunda (kd). From the SE corner of the inner-city area follow the Albany Highway (1) SE past Bentley (by) on the W and Welshpool (wp) on the E to where development extends along the highway and the Canning River (cr) to Armadale (ar).



List of Abbreviations

- ar Armadale
- bo Booragoon
- bs Bassendean
- by Bently
- cb City Beach
- ce Coogee
- co Cottesloe
- cr Canning River
- dl Darling Range
- fm Fremantle
- gi Girrawheen
- kd Kalamunda
- mi Midland
- ml Mount Lawley
- mu Mullaloo
- nd Nedlands
- pea Perth Airport
- sc Scarborough
- sr Swan River
- su Subiaco
- wn Wanneroo
- wp Welshpool

- 1 Albany Highway
- 2 Great Eastern Highway
- 3 Great Northern Highway



The inner-city area of Perth is situated on both sides of the Swan River — at Perth Water. The Central Business District (CBD) is on the N bank of the river about 20 km upstream from its mouth. It forms a rectangle between the river and the railway and is connected to the S bank by two major bridges. Growth of the CBD has been restricted by the river to the S and by freeways and railways to the N and W; this has resulted in much high-rise development. Most of Perth's retail and commercial businesses are located here.

Locate the CBD in the centre of the map and on the northern side of Perth Water (l). Next, find the Causeway Bridge which crosses the Swan River over Heirisson Island (h) to the SE of the CBD and then the Narrows Bridge to the SW.

Kings Park (j), located on the northern bank to the W of the CBD, is Perth's largest and best known park. It is over 400 ha in area and a dominant feature of the inner-city area. Within Kings Park locate the Botanic Gardens (c) to the far S. The War Memorial is nearby to the NE.

Parkland continues E along the N bank of the river to the Causeway. This area is made up of a number of parks and gardens including The Esplanade, the Supreme Court Gardens and Langley Park. To the N of the Supreme Court Gardens is the Tudor-like 19th century Government House (g). N of Heirisson Island (h) is the WA Cricket Association Ground (p), the test cricket ground commonly known as the WACA. Just N of the cricket ground find Gloucester Park (f), one of the best-equipped trotting complexes in Australia. To the far NE across the Swan River (sr) is Belmont Park Racecourse (b).

To the N of the CBD there are a number of buildings of interest. These include the Perth Entertainment Centre (e), a huge multi-purpose auditorium; the Art Gallery (a), one of Perth's most interesting buildings; and the Western Australian Museum (k).

A bus and rail system makes up Perth's public transport network. Directly to the N of the CBD locate the City Railway Station (d) and then the Interstate Railway Station (i), at Claisebrook to the NE. Major roads radiating out from the CBD are depicted on the map.

On the southern side of the river near the Narrows Bridge is another extensive area of parkland, incorporating South Perth Esplanade (o), Sir James Mitchell Park (n) and Perth Zoo (m).

List of Abbreviations

- a Art Gallery of Western Australia
- b Belmont Park Racecourse
- c Botanic Gardens
- d City Railway Station
- e Entertainment Centre
- f Gloucester Park
- g Government House
- h Heirisson Island
- i Interstate Railway Station
- j Kings Park
- k Museum of Western Australia
- l Perth Water
- m Perth Zoo
- n Sir James Mitchell Park
- o South Perth Esplanade
- p WA Cricket Association Ground
- q War Memorial
- sr Swan River

Scale 1: 25 000



A B C D E F G H I

1

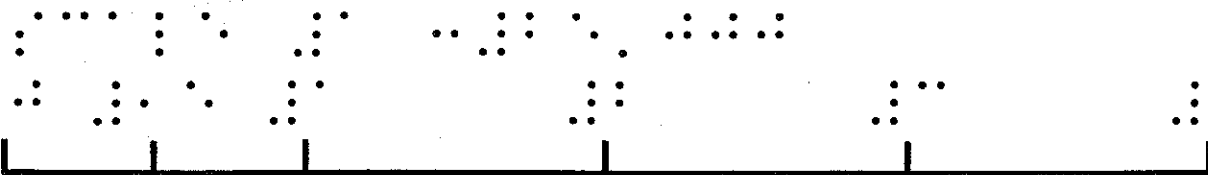
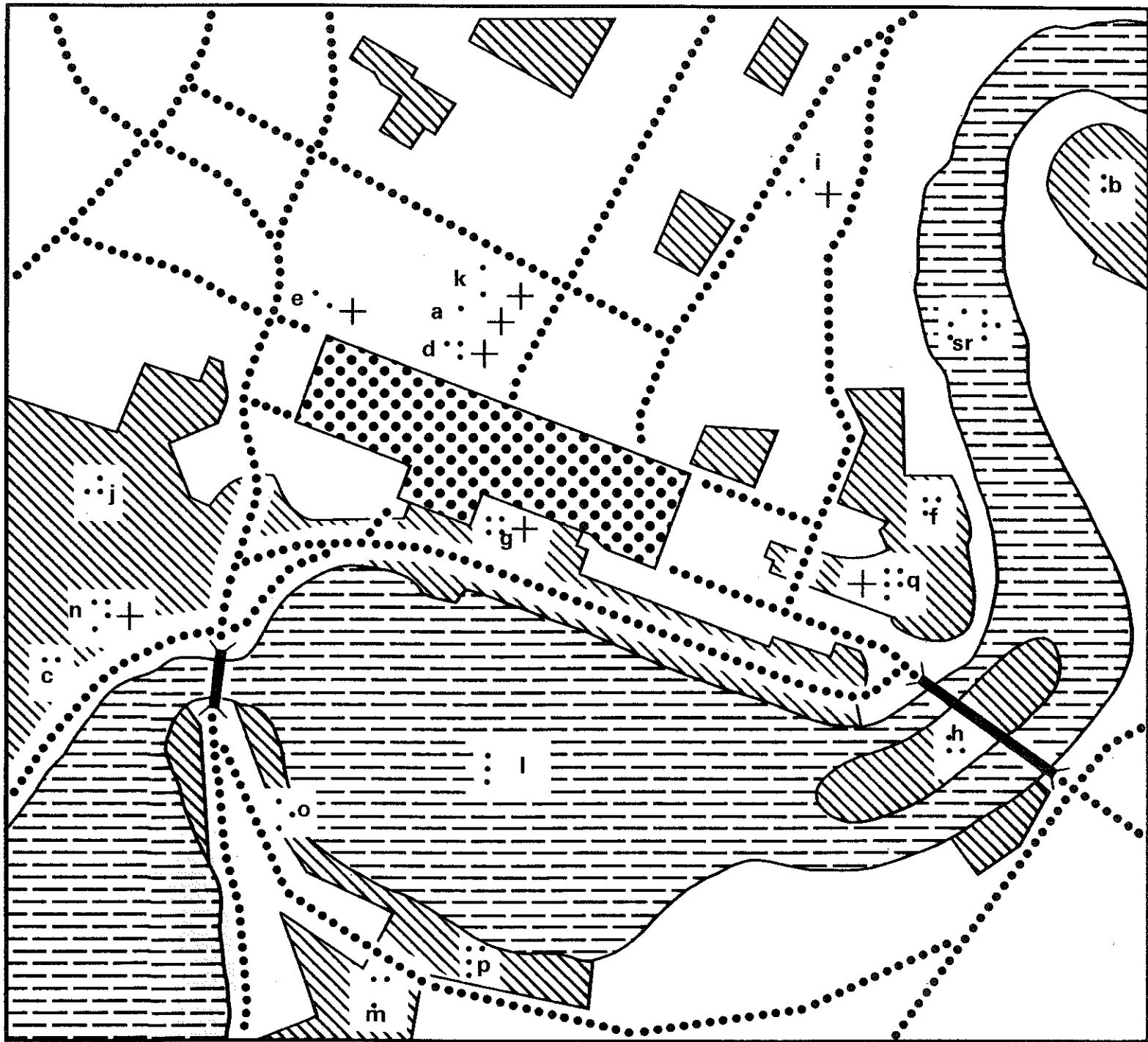
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Adelaide

Adelaide, the capital city of SA, has a population of over 900 000 and covers an area of 650 sq km. The city is bounded by the Mount Lofty Ranges to the E and SE and the sand dune coast of Gulf St Vincent to the W. It lies on a mainly alluvial plain through which flows the Torrens River. Over 70 per cent of the population of SA lives in Adelaide (a much higher percentage than for other State capitals).

The first settlers in the new colony of SA arrived in 1836 and in that same year Colonel William Light selected the site for the town of Adelaide. Within a decade Adelaide became a flourishing town, with prosperous wheat and sheep farms in the hinterland. By 1856 Adelaide was connected by rail to Port Adelaide and by 1880 nearly half the farming land taken up in Australia was in the colony. By the turn of the century, Adelaide had become the commercial and service centre of extensive grain, wool, fruit and wine producing regions.

Adelaide continued to grow rapidly during the first half of the 20th century, expanding W to the Gulf and E to the foothills of the Mount Lofty Ranges. In the 1960s the satellite towns of Elizabeth (el) and Salisbury (sy) to the N, and Noarlunga (nl) to the S were set up. These towns were designed to accommodate over 30 000 people each, to be self-contained and an alternative to urban sprawl. However, because of continued growth, they became absorbed by the main urban area. During the 1970s, population growth decreased and some suburbs even experienced a population decline.

Begin reading by scanning the whole map-sheet and noting that the coast runs N-S along Gulf St Vincent and that the mouth of the Torrens River (to) is about half way down the coast, near the centre of the map. The Central Business District (CBD) is located inland along the Torrens River.

From the mouth of the Torrens, follow the shoreline of Gulf St Vincent S through the coastal suburbs of Glenelg (gg), Brighton (bn) and Hallett Cove (hc) to Noarlunga (nl) at the southern edge of the urban area.

Return to the mouth of the Torrens River (to) and follow the coastline northwards past Grange (gn) and Semaphore (sm) and on to Outer Harbour (oh), the northern extremity of the urban area along the coast.

From the mouth of the Torrens River (to) again, trace the course of the river NE and find the rectangle denoting the area covered by Map 20 *Inner Adelaide*. Note how the river continues NE from the inner-city area towards its source in the Mount Lofty Ranges (mlf).

A series of major roads radiate from the inner-city area. On the northern side a road leads NW to Port Adelaide (pa) then crosses the Port River and continues on to Outer Harbour (oh), which you have already discovered. A second major road leads directly N through Walkerville (wl) and, in the vicinity of Enfield (ef), divides into the Princes Highway (1), which continues N, and Sturt Highway (2), which leads NE.

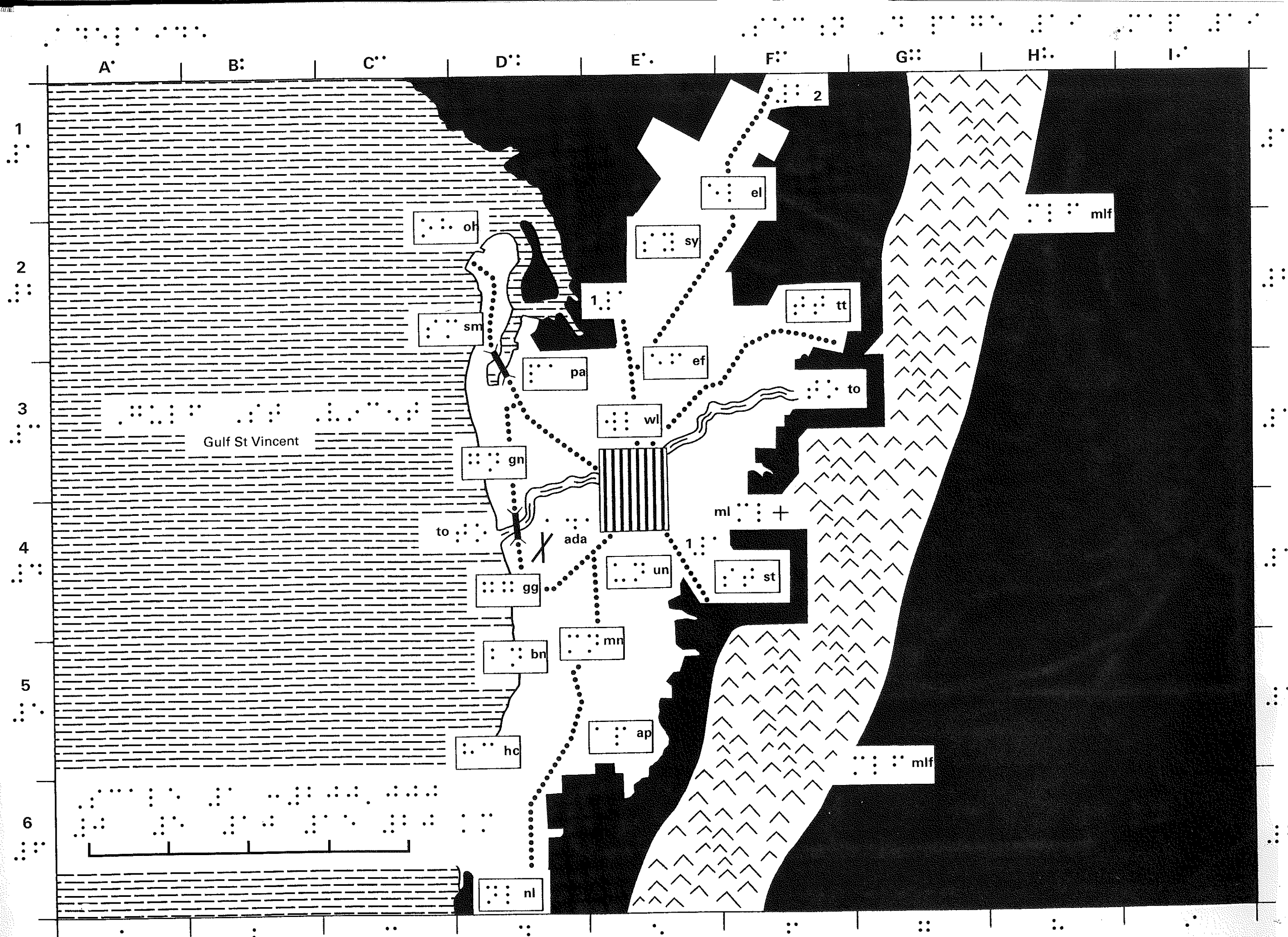
Follow the Sturt Highway (2) NE past Salisbury (sy) to the W and then through Elizabeth (el) to where it leaves the urban area before reaching Gawler.

The road leading NE from the inner-city area leaves the urban area at Tea Tree Gully (tt), on the edge of the Mount Lofty Ranges. Two major roads are depicted leading out from the southern side of the inner-city area. The road heading SE is the Princes Highway (1), which passes to the E of Unley (un) and on through Stirling (st) in the Mount Lofty Ranges (mlr), a little to the S of Mount Lofty (ml) the highest point.

The road leading SW from the inner-city area is the Anzac Highway, which links Glenelg (gg) to the CBD and passes to the S of Adelaide Airport (ada). Between the city and Glenelg, a branch road (Main South Road) to the S passes through Marion (mn) and W of Aberfoyle Park (ap) on the way to the rapidly growing Noarlunga (nl) area on the southern edge of the map-sheet.

North Adelaide (on the north bank of the Torrens River in the inner-city area) is one of Adelaide's oldest residential areas. Because of its elevated land and close proximity to the CBD, property values are high. To the NE, E and SE there are also high-status areas, for example suburbs like Walkerville (wl) and nearby Medindie. Settlements which lie outside the urban area, like Stirling (st) to the SE, are commuter suburbs.

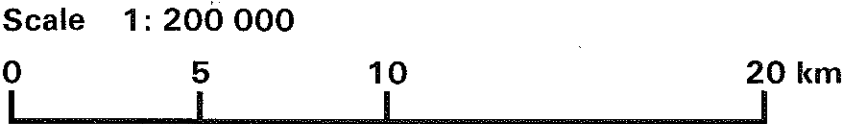
Industrialisation of Adelaide has occurred rapidly over the last 25 years, the most notable developments being the establishment of large automobile manufacturing plants at Elizabeth (el) and Tonsley Park, near Marion (mn). Other specialist industries include manufacture of electrical equipment, automotive parts and accessories, industrial chemicals, textiles and plastics. Indeed, 30 per cent of the workforce is involved in manufacturing. Much of the heavy industry, manufacturing and warehousing is concentrated in the Port Adelaide (pa) area to the NW of the city.



List of Abbreviations

- ada** Adelaide Airport
- ap** Aberfoyle Park
- bn** Brighton
- ef** Enfield
- el** Elizabeth
- gg** Glenelg
- gn** Grange
- hc** Hallett Cove
- ml** Mount Lofty
- mlf** Mount Lofty Ranges
- mn** Marion
- nl** Noarlunga
- oh** Outer Harbour
- pa** Port Adelaide
- sm** Semaphore
- st** Stirling
- sy** Salisbury
- to** Torrens River
- tt** Tea Tree Gully
- un** Unley
- wl** Walkerville

- 1** Princes Highway
- 2** Sturt Highway



Adelaide, because of Colonel Light's foresight, is the best planned of Australia's original cities. It was laid out on a grid pattern with a green belt of 7000 ha separating the inner-city area from the suburbs. The extensive parkland surrounding the Central Business District (CBD) gives Adelaide a unique character.

Inner Adelaide straddles the N and S banks of the Torrens River. The CBD is on the southern side and is characterised by the uniform street pattern and a central square (Victoria Square) surrounded by four smaller squares. It contains the usual retail, commercial and administrative areas and has some well recognised buildings including the Festival Theatre (the venue for the famous Adelaide Festival of Arts).

Begin reading the map by scanning the whole area and discovering the CBD just below the centre of the map. Trace the Torrens River (**to**) from where it enters the map in the NE corner generally SW, W and NW to the western map edge, noting that it passes to the N of the CBD. Note also how the central city area, to the S of the river, is surrounded by parkland as is North Adelaide (**i**) on the northern side of the river.

Now locate the road leading N from the centre of the CBD and over the Torrens River to North Adelaide (**i**). Just to the W of this road (King William Road), between the CBD and the Torrens River, you will find two buildings labelled (**f**). The more northerly one is Adelaide's well-known Festival Theatre and the one to the S is Parliament House. Slightly further to the W is Adelaide Railway Station (**b**), the terminus for all suburban train services. The Adelaide Casino occupies part of the station building.

To the N of Adelaide Station, immediately across the Torrens River, locate the Adelaide Oval (**a**). Lights Vision Lookout (**h**), a popular place from which to view the city, is a little further N.

To the E of King William Road and just N of the CBD, find the South Australian Museum (**j**) and Art Gallery (**d**). Then, to the NE, locate the Botanic Gardens (**e**) and the Adelaide Zoo (**c**), to the N in a bend of the Torrens.

Near the SW corner of the map, at Keswick, is the railway station for country and interstate services (**g**). Near the SW corner, surrounded by parkland, is Victoria Park Racecourse (**k**).

List of Abbreviations

- a** Adelaide Oval
- b** Adelaide Railway Station and Casino
- c** Adelaide Zoo
- d** Art Gallery of South Australia
- e** Botanic Gardens
- f** Festival Theatre and Parliament House
- g** Interstate Railway Station
- h** Lights Vision Lookout
- i** North Adelaide
- j** South Australian Museum
- k** Victoria Park Racecourse
- to** Torrens River

Scale 1: 25 000



A

B

C

D

E

F

G

H

I

1

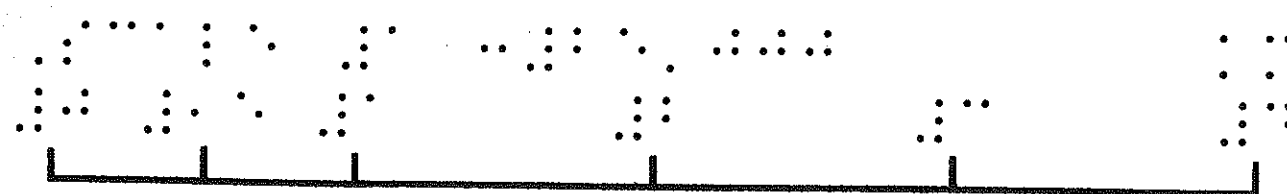
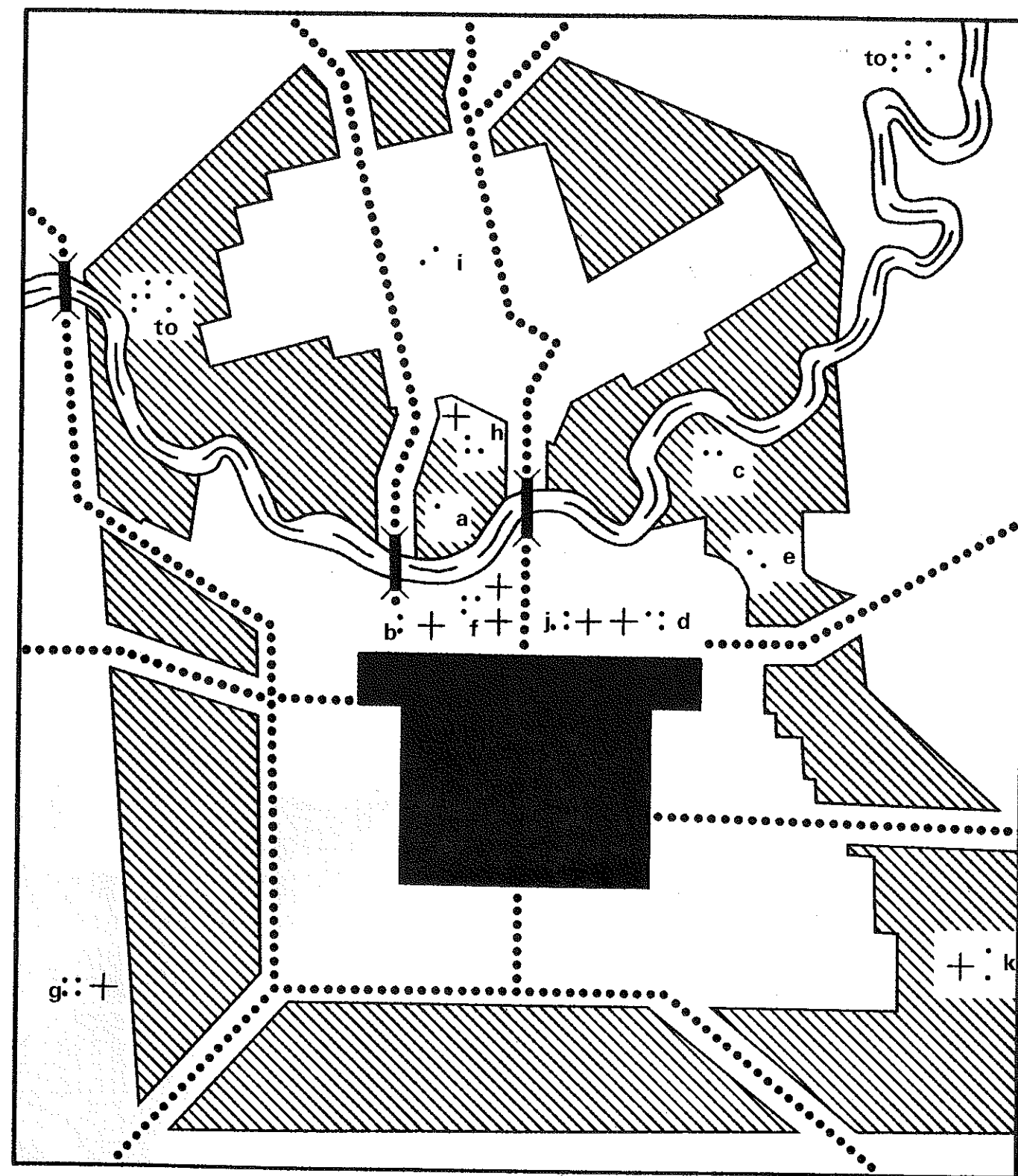
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Hobart, with a population of about 135 000, is the smallest of the State capitals. It is also the most southerly of Australia's capital cities, occupying an area of 117 sq km along the estuary of the Derwent River, one of the finest natural harbours in the world. Hobart accounted for only 31 per cent of the Tasmanian population in 1981 whereas Melbourne, for example, had 67 per cent of the Victorian population and Adelaide had 69 per cent of the South Australian population.

Hobart was founded in 1802 as a penal colony and is Australia's second oldest capital city, after Sydney. The site of the first settlement was on the eastern bank of the Derwent River at Risdon but was later abandoned in favour of a site at Sullivan's Cove on the western side, close to the current Central Business District (CBD).

Today the urban area extends N-S along both sides of the Derwent River. It is long and narrow and in some places less than 1 km wide. Land rises steeply on either side of the river, acting as a barrier to the spread of the urban area in an E-W direction. Initially most of Hobart's population was concentrated on the western side but the development of ferry services and the opening of the first bridge across the Derwent contributed to growth on the eastern bank.

Scan the whole map and note how the largest part of the urban area extends N-S along the western bank of the Derwent River (**dw**). Next, explore the course of the Derwent River from the southern edge of the map to where it leaves the map near the NW corner. Three bridges span the river; the principal connection between the eastern and western parts of the city is the Tasman Bridge, the most southerly of these bridges.

Locate the CBD on the W bank of the Derwent to the S of the Tasman Bridge. This is the retail and commercial centre of Hobart and many buildings of historical interest like those of Salamanca Place and Arthurs Circus are located here. The Queens Park Domain (**qp**), a large area of parkland just to the N of the CBD, incorporates Government House, the Botanical Gardens and the Cricket Ground. Mount Wellington (**mw**), a very prominent feature of the Hobart landscape, lies in the mountains to the W of the CBD. It is usually snow-capped during winter.

To the S of the CBD, along the western bank of the Derwent River, find Sandy Bay (**sb**) where the famous Wrest Point Casino, one of Hobart's major tourist attractions, is situated. Continue to follow the Channel Highway (1) S from Sandy Bay around Mount Nelson (the symbol for the peak is unnamed but located just to the W of the highway) and on to Taroona (**ta**) at the southern end of the urban area.

These southern suburbs contain some of Hobart's more exclusive residential areas. Rosny (**ro**), directly across the river from the CBD, is another of Hobart's high status suburbs. All have easy access to the city and views across the Derwent.

A road leads S from the southern tip of the CBD and to the W of the suburb of Mount Nelson (**mn**). This is the Southerly Expressway, which joins the Channel Highway at Kingston, just beyond the southern edge of the map. The Huon Highway (3) heads SW from the southern tip of the CBD.

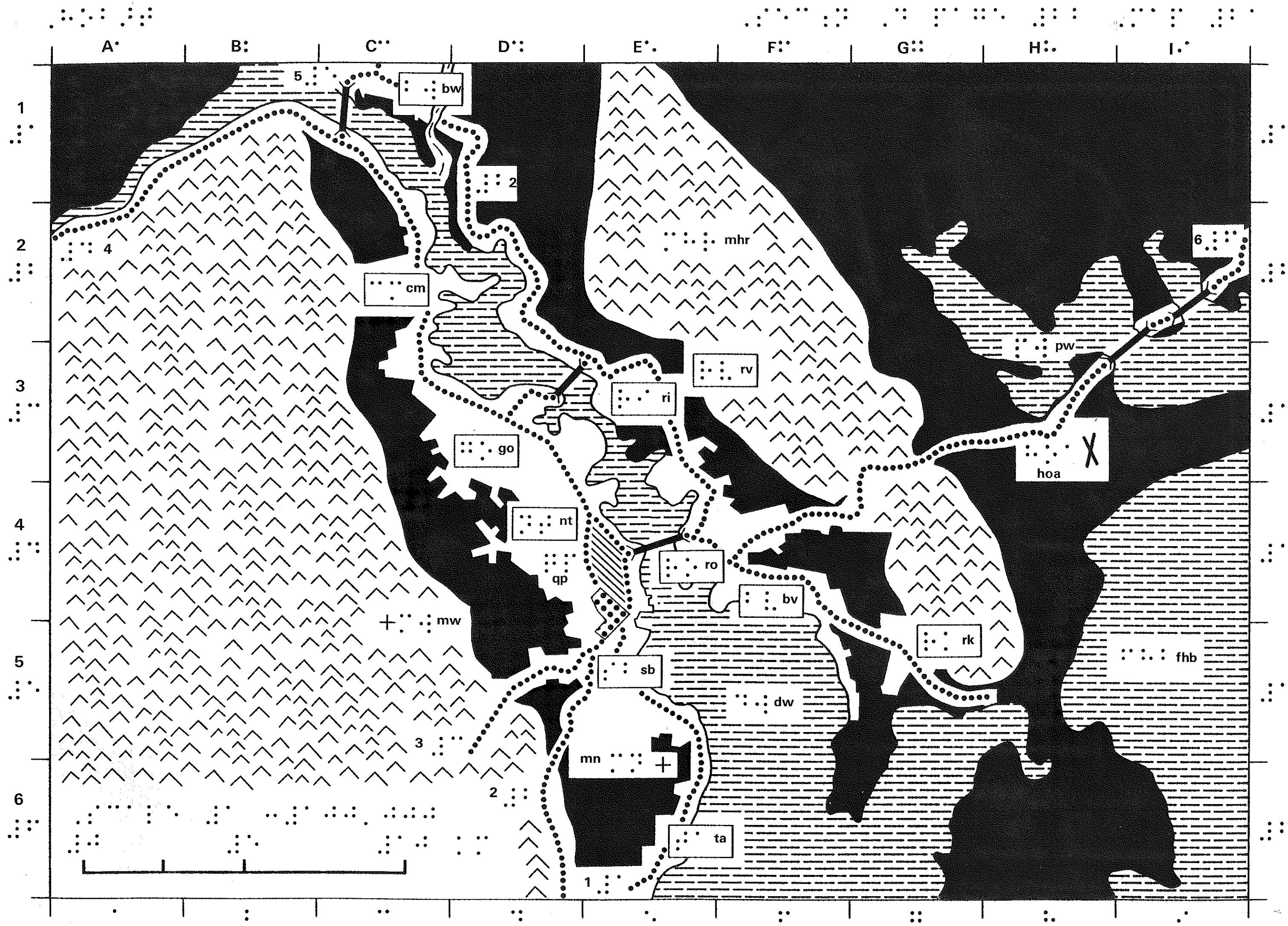
A little to the W of the road running N from the CBD (the Midland Highway), locate New Town (**nt**) then Glenorchy (**go**) and Claremont (**cm**). Most of Hobart's industry is situated in this area, including a large zinc refinery adjacent to the river at Lutana, E of Glenorchy (**go**), and a confectionery factory at Claremont (**cm**).

Continue following the Midland Highway (5) NW to where it divides into two roads. The Midland Highway continues N over the bridge to Bridgewater (**bw**) and on to Launceston in the N of the State. From the southern side of the bridge, the road heading westward is the Lyell Highway (4) to New Norfolk and Queenstown.

From the eastern end of the Tasman Bridge, roads radiate out to the NW, E and SE. Firstly, follow the road heading NW — the Derwent Highway (2) — to Risdon (**ri**), Hobart's oldest settled area. Risdon Vale (**rv**) is just to the E. Continue heading NW along the eastern bank of the Derwent until the road reaches Bridgewater (**bw**), where it joins the Midland Highway which you explored earlier.

Return to the Tasman Bridge and follow the road heading generally E. This is the Tasman Highway (6) which, after crossing the Meehan Range (**mhr**), passes just to the N of Hobart Airport (**hoa**). The airport is situated on low lying land between Pitt Water (**pw**) and Frederick Henry Bay (**fhb**), some 28 kms from the city.

Return again to the Tasman Bridge then follow the road branching off the Tasman Highway at Rosny (**ro**) and heading SE past Bellerive (**bv**) and on to Rokeby (**rk**) at the south-eastern end of the urban area.



List of Abbreviations

bv	Bellerive
bw	Bridgewater
cm	Claremont
dw	Derwent River
fhb	Frederick Henry Bay
go	Glenorchy
hoa	Hobart Airport
mhr	Meehan Range
mn	Mount Nelson
mw	Mount Wellington
nt	New Town
pw	Pitt Water
qp	Queens Park Domain
ri	Risdon
rk	Rokeby
ro	Rosny
rv	Risdon Vale
sb	Sandy Bay
ta	Taroona

1	Channel Highway
2	Derwent Highway
3	Huon Highway
4	Lyell Highway
5	Midland Highway
6	Tasman Highway

Scale 1:100 000



Darwin, the administrative capital of the NT, is a modern, multicultural city of nearly 70 000 people situated on the northern coast of Australia. It is built along the eastern shores of Port Darwin, a deep inlet in Beagle Gulf. Darwin is located halfway between the Equator and the Tropic of Capricorn, and is nearly equidistant from Jakarta, Sydney, Melbourne, Brisbane, Adelaide and Perth.

Darwin Harbour was discovered by Lieutenant John Stokes of HMS Beagle in 1839. However, a settlement was not established until 1869 and the new town was originally known as Palmerston. In 1911, when the Commonwealth took over the administration of the NT from SA, the settlement was officially named Darwin in honour of Charles Darwin who had been the naturalist on an earlier expedition of the Beagle.

Darwin's initial progress was slow and it might have failed except that it became the landfall for the cable link between Britain and Australia and, in 1872, the terminus for the Overland Telegraph Line from Adelaide. In 1873 the discovery of gold at Pine Creek triggered off a rush and for a time Darwin's population reached 10 000.

A second boom occurred in the early 1900s as pastoralists set up huge cattle stations based on exploitation of cheap labour, but optimism petered out and the city's growth slowed again. Stagnation occurred until the Second World War, when Darwin was turned into an important military and airforce base. Darwin suffered a post-war slump but during the 1960s expanded rapidly and became Australia's fastest growing city at that time. Then, on 25 December 1974 Darwin was hit by Cyclone 'Tracy', the most devastating such disaster that has yet struck Australia. Some 50 people were killed and in the ensuing eight days 30 000 people or over half of the population were airlifted from the city.

Today Darwin is again a rapidly expanding city, with the main area of suburban growth being to the NE — in Karama and Leanyer.

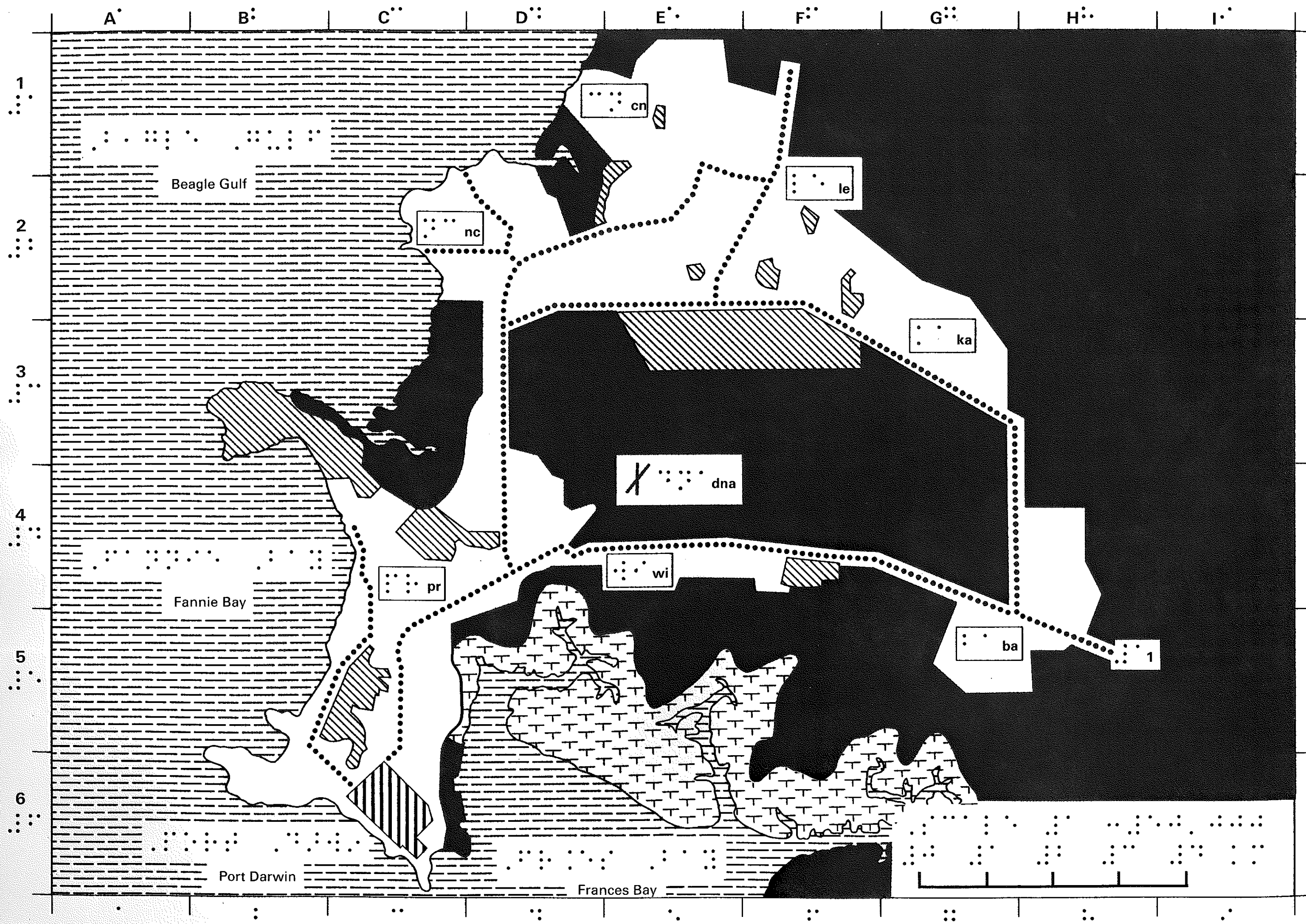
Begin exploring Darwin by scanning the whole map and noting that much of the city faces Beagle Gulf and Fannie Bay on the W, and Port Darwin on the S.

Locate the Central Business District (CBD) on the southern tip of a peninsula between Port Darwin and Frances Bay near the southern edge of the map. This is Darwin's commercial centre and major place of employment. Almost all of the peninsula is urban land.

From just E of Parap (pr) to the N of the CBD roads lead N and E. The road heading E is the Stuart Highway (1) which follows a strip of development past Winnellie (wi) to the S and Darwin Airport (dna) to the N before reaching a separate area of urban development around Berrimah (ba). Winnellie (wi) and Berrimah (ba) are the main areas of industry, though on the whole Darwin has little industrial development.

The road heading N from near Parap (pr) passes through a narrow strip of urban development before opening up into a very much larger area extending E and W. Firstly find Nightcliff (nc) and then Casuarina (cn), where a large retail development has recently been completed, on the shores of Beagle Bay. To the E locate Leanyer (le) and Karama (ka) which, as already mentioned, are both areas of rapid urban growth.

Even though Darwin is the smallest of Australia's capital cities, it has a number of distinct features, including the large expanse of water that surrounds much of the city, the vast area of mangrove swamps immediately to the S, and the central location and large area occupied by Darwin Airport and the associated RAAF Base.

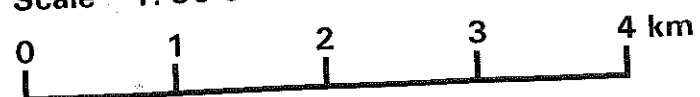


Darwin

List of Abbreviations

- ba** Berrimah
- cn** Casuarina
- dna** Darwin Airport
- ka** Karama
- le** Leanyer
- nc** Nightcliff
- pr** Parap
- wi** Winnellie
- 1** Stuart Highway

Scale 1: 50 000



Section E

The Physical Environment

Australia has a unique and varied physical landscape which has greatly influenced the way in which the country has developed. The maps in this section will give you an idea of the distribution of some of the components of Australia's physical environment including landforms, geology, soil, water, vegetation and climate. The accompanying commentaries expand on the map information and, where necessary, guide you around the map.

The maps are of two scales: 1:17 million (single map of Australia per page) and 1:31 million (two and sometimes three maps of Australia per page). In most cases each map has a separate legend, which is positioned on the left-hand side of the page. Some of the climate maps at 1:31 million scale share a common legend to allow easy comparison between maps. When abbreviations are used on the maps for place and feature names, a list of abbreviations will appear on the map page whenever possible. However, if this list is too large to fit on the map, it will be found on the following page.

When using the maps in this section you will need to draw on your knowledge of Australia's coastline, State borders and major geographical features, gained from Section B, to help you to locate and identify features mentioned in the text.

As you read the text you will find many alphanumeric references to mapped features. These references are a further aid to quickly locating mapped information. Each time you come across an alphanumeric reference, you should go to the map and find the location of the feature referred to.

As the topics mapped in Section E are interrelated, the commentaries often include suggested cross-references to other maps. Cross-references between maps can best be made by placing the maps one over the other, even though there may be other pages in between. Read the lower map with your right hand and the upper map with your left hand, and you should be able to make a direct comparison between the detail on each of the two maps.

Elevation

With an average elevation (height above sea-level) of 330 m, only about half the world average, Australia can be regarded as mostly low and flat. The highest point, Mount Kosciusko (**ko**) in the Snowy Mountains (**sm** on Map 24 *Relief*) in southern NSW, is only 2228 m above sea-level. The highest mountain in each State is included on this map.

Try to find the following mountains:

Bartle Frere (**bf**), 1622 m, in N Q (H2)
Mount Kosciusko (**ko**), 2228 m, in SE NSW (H5)
Mount Bogong (**bg**), 1986 m, in NE V (H5)
Mount Woodroffe (**wd**), 1440 m, in NW SA (F3)
Mount Meharry (**mh**), 1251 m, in central WA (D3)
Mount Liebig (**li**), 1524 m, in SW NT (F3)

A small part of Australia lies below sea-level. This includes Lake Eyre (G4) and its surrounds, and part of nearby Lake Frome in eastern SA. Both are now salt lakes but were part of a much larger lake during wetter times in the geological past. Lake Eyre, 16 m below sea-level, is slightly lower than the shallowest part of Torres Strait, off the northern tip of Q (G1).

Approximately 60 per cent of Australia lies between sea-level and 300 m. The extent of this lowland throughout much of central Australia is the dominant feature of this map. It consists mostly of river basins and includes those draining into the Gulf of Carpentaria (G2), inland to Lake Eyre and the Murray–Darling system in the SE (refer to Map 26 *Drainage Systems* and Map 27 *Rivers*). However, it also includes areas popularly considered to be uplands but which are, in fact, of no great elevation such as the Barkly Tableland (G2) and Arnhem Land (F1), and the most northerly part of the Great Dividing Range on Cape York Peninsula (H1). True coastal lowlands, at elevations only slightly above sea-level, are generally narrow or non-existent in Australia.

Land between 300 m and 600 m falls into two basic types. In the E it mostly forms the lower slopes of high ranges; while in the W it generally forms the top of the extensive plateau of rocks. Explore the extent of these two areas.

Only about 5 per cent of Australia lies above 600 m, and this includes the Pilbara (D3), the central Australian ranges, the Tasmanian highlands and parts of the Great Dividing Range. Land over 1000 m occurs in all States but in areas too small to be mapped at this scale separately. In the Snowy Mountains of NSW–V (H5) a small area rises above 2000 m.

High elevation does not necessarily lead to rugged land. The crest of the Great Dividing Range, for example, wanders for much of its length across flat or gently undulating ground. Conversely, some rugged areas occur at lower elevations (see Map 24 *Relief*).

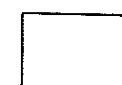
Metres



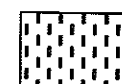
Over 600



300–600



0–300



Below sea-level



Highest mountain in each State

- | | |
|-----------|-----------------|
| bf | Bartle Frere |
| bg | Mount Bogong |
| ko | Mount Kosciusko |
| li | Mount Liebig |
| mh | Mount Meharry |
| os | Mount Ossa |
| wd | Mount Woodroffe |

A

B

C

D

E

F

G

H

I

1



Braille symbol: dots 1-2, 3-4, 5-6, 1-2, 3-4, 5-6

2



Braille symbol: dots 1-2, 3-4, 5-6, 1-2, 3-4, 5-6



Braille symbol: dots 1-2, 3-4, 5-6, 1-2, 3-4, 5-6

3



Braille symbol: dots 1-2, 3-4, 5-6, 1-2, 3-4, 5-6

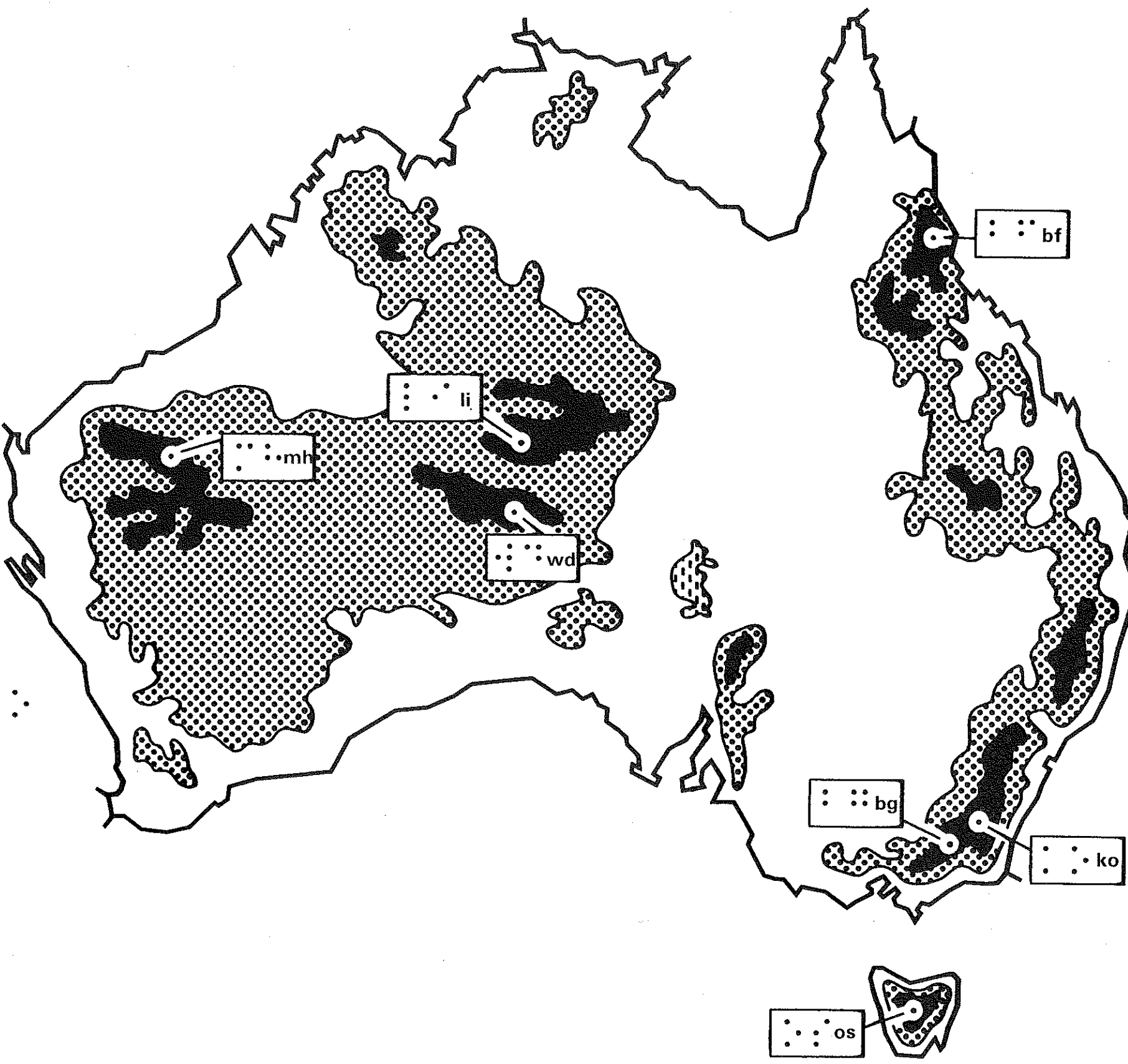
4



Braille symbol: dots 1-2, 3-4, 5-6, 1-2, 3-4, 5-6

5

6



Relief

While Map 23 *Elevation* gives a broad indication of the shape of the Australian landmass, local ruggedness (or flatness) is best indicated by a map of relief. The method used here maps differences in relative relief, that is the differences in height between ridge crests and adjacent valley floors.

A notable feature of this map is the high proportion (about 80 per cent) of the Australian landmass in the lowest relief class. This class (less than 30 m relative relief) consists of flat or gently undulating country and occurs at all elevations. It includes the lowlands of central Australia, southern WA, the Kimberleys (E2) and the Barkly Tableland (G2), the coastal plains of eastern Australia and the high plains of the Snowy Mountains (sm at H5), which are mostly too small to show on this map, and the Nullarbor Plain (E4).

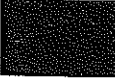

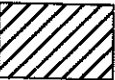

In much of central Australia, where the relief is very low indeed, local areas with some relief (but still less than 30 m) are called ranges. These are not identified on the map.

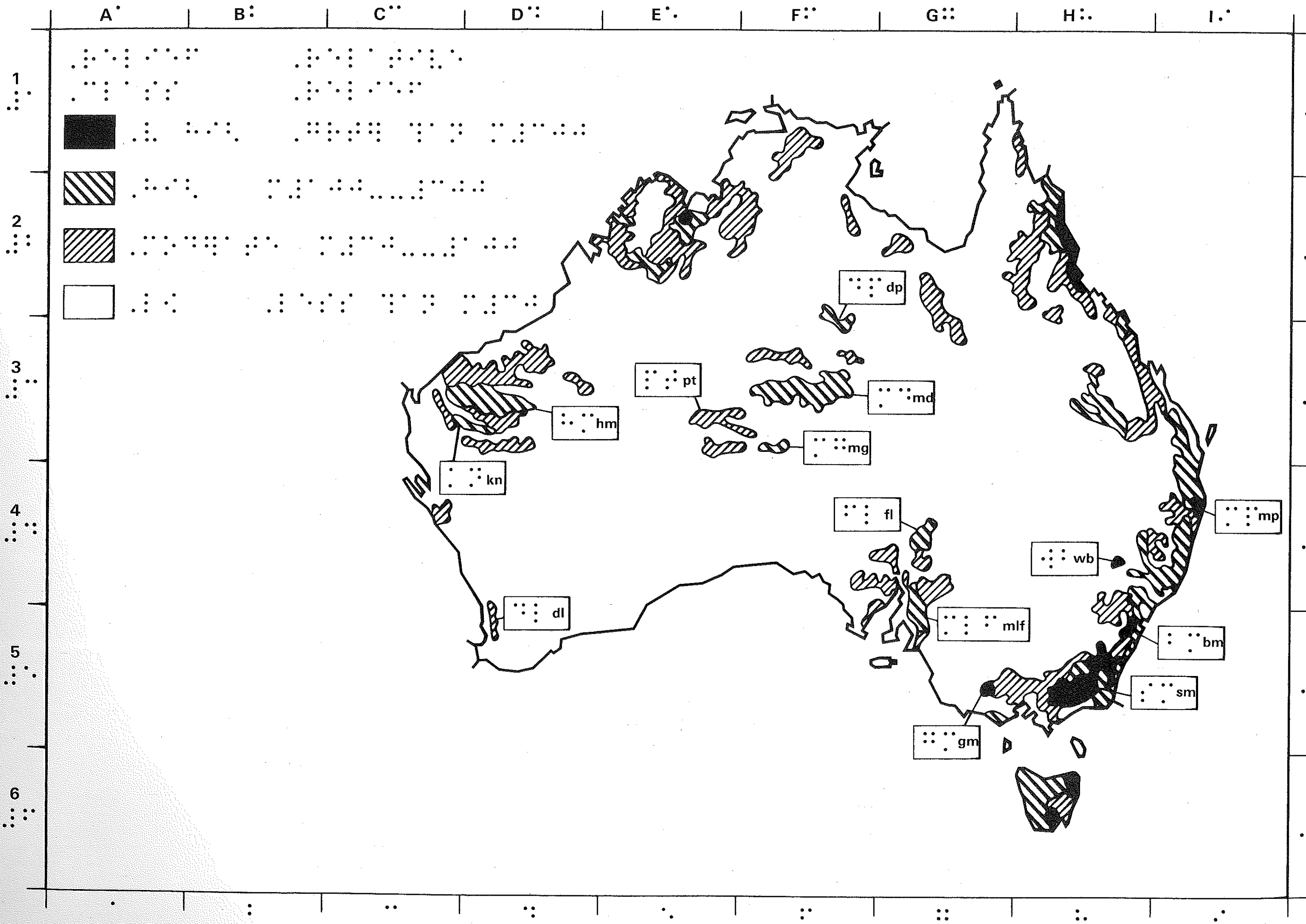
Areas of moderate relief (30–100 m) are generally foothill zones adjoining higher areas, or significant topographic features within regions of low relief. In WA this includes the Darling Range (dl at D5) E of Perth, much of the Pilbara (D3) and steeper land surrounding the Kimberley plateau. SW of the Gulf of Carpentaria (G2), the northern escarpment of the Barkly Tableland is highlighted by three areas of moderate relief. In the eastern highlands, and T this relief class usually forms a landscape of hills and valleys. Several of the ranges of central Australia, including the Petermann Ranges (pt at E3), are of moderate relief.

The main ranges of central Australia — the Musgrave (mg at F3), Macdonnell (md at F3), and Davenport (dp at F2) — have high relief (100–300 m). Elsewhere, land with high relief occurs in the Hamersley Range (hm) of the Pilbara region, the Flinders (fl at G4) and Mount Lofty (mlf at G5) Ranges of SA, the W and N coasts of T, and in a number of areas throughout the Great Dividing Range.

All areas of very high relief (greater than 300 m) occur close to the E coast. Here, geologically-recent uplift and volcanic activity created the eastern highlands, and subsequent water erosion has deeply incised the landscape. Ranges near Cairns in N Q (H2), the McPherson Range (mp at I4) on the Q–NSW border, the Warrumbungle Range (wb at H4) of northern NSW, the Blue Mountains (bm at H5) W of Sydney, the Snowy Mountains (sm at H5) on the NSW–V border, The Grampians (gm at G5) of western V, and southern T are Australia's areas of highest relief.

Only land with high or very high relief can truly be considered as mountain ranges. As only 10 per cent of the continent falls within these classes, it is not surprising that Australia is not considered to be a rugged land. Even our Great Dividing Range in places is not very great, as in many areas the crest runs through virtually flat country, even though it is at moderate or a high elevation.

Relief class	Relative relief
 Very high	Greater than 300 m
 High	100–300 m
 Moderate	30–100 m
 Low	Less than 30 m



List of Abbreviations

bm	Blue Mountains	H5
dl	Darling Range	D5
dp	Davenport Range	F2
fl	Flinders Range	G4
gm	The Grampians	G5
hm	Hamersley Range	D3
kn	Kenneth Range	C3
md	Macdonnell Ranges	F3
mg	Musgrave Ranges	F3
mlf	Mount Lofty Ranges	G5
mp	McPherson Range	I4
pt	Petermann Range	E3
sm	Snowy Mountains (Australian Alps)	H5
wb	Warrumbungle Range	H4

Deserts

Deserts cover about one-quarter of Australia. They form the central core of the arid zone, a vast area of nearly three-quarters of the continent where rainfall is insufficient for crop production or pasture improvement.

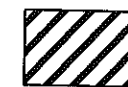
There are seven main deserts—the most northerly are the Tanami (ta at F3) in the NT and the Great Sandy (gs at E3) in WA. Below the Great Sandy is the Gibson Desert (gb at E3) and then the Great Victoria Desert (gv at E4) to the SE across the WA-SA border. To the NE, the Simpson Desert (si at G3) straddles the NT-SA border and the Sturt Stony Desert (ss at G4) and the Strzelecki Desert (which is not shown on this map) lie in the NE corner of SA.

Australia's deserts consist mainly of sand dunes or sand plains although in the E there are some large areas of stony deserts, for example the Sturt Stony Desert. The dunes, commonly up to 15 m high and regularly spaced (about 200 to 600 m apart), are generally parallel, trending E-W in the Great Victoria Desert, N-S in the Simpson and NW-SE in the Great Sandy and parts of the Tanami.

There is no permanent surface water in Australia's deserts. Unlike some large desert areas in other continents, there are no desert mountains high enough to significantly increase the rainfall or to store precipitation as snow, and there are no rivers entering the deserts from neighbouring humid areas.

Except on the mobile sand dune crests, the deserts are vegetated, though sparsely. Characteristically, mulga is the tallest species and spinifex the ground cover. Maps 47 and 48 depict major vegetation types.

The deserts are mainly unused and unpopulated. However, some marginal areas are grazed by beef cattle at very low stocking rates and there is now some mining activity, for example the oil and gas developments in the Cooper-Eromanga Basin of north-eastern SA and south-western Q (G4). All such human activity is dependent on underground water for its continued existence.



Arid zone



Desert land (within arid zone)



Non-arid land



Sand dune alignment

- gb Gibson Desert
- gs Great Sandy Desert
- gv Great Victoria Desert
- si Simpson Desert
- ss Sturt Stony Desert
- ta Tanami Desert

A

B

C

D

E

F

G

H

I

1



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2



Braille text for white box



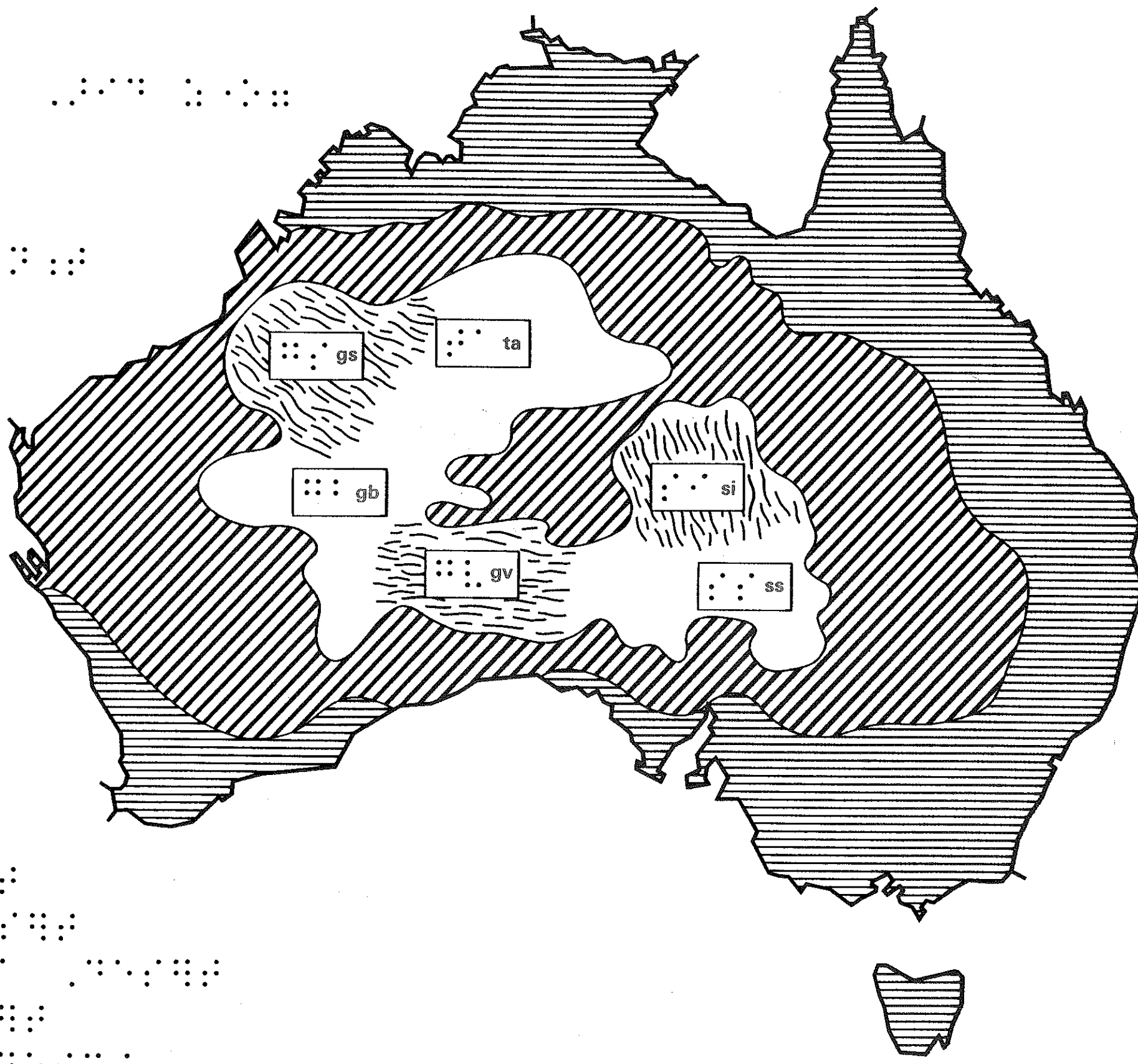
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3



Braille text for wavy lines pattern

4



5

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6

This map depicts the areas covered by the major drainage systems and indicates the typical stream type within each system by the use of a letter. Where a drainage system contains a mixture of stream types, for example seasonal and ephemeral or seasonal and perennial, letters for both types are included. Read the map legend carefully to become familiar with the patterns used to depict the area of each system and the letters denoting stream types.

When reading the *Drainage Systems* map, you will find it beneficial to refer regularly to the next map, *Rivers*, which depicts the major rivers making up each drainage system. To compare the maps, it is recommended that you read the top map with your left hand while reading the map underneath with your right hand.

Because you will be referring to both maps, before attempting to read either you should:

- scan Map 26 *Drainage Systems* to become aware of the general distribution of patterns denoting drainage areas and the location and extent of the Great Dividing Range; and
- scan Map 27 *Rivers* and note that most rivers are to be found in the eastern half of the continent and along the N and W coasts.

Australia is generally flat, hot and dry. Indeed, over 35 per cent (2.7 million sq km) of the land is not even drained by rivers—the area of uncoordinated drainage on the map. In a further 15 per cent (1.2 million sq km) the rivers drain into the large, normally dry, salt lakes of the interior, in particular Lake Eyre—the area of internal drainage on the map. The remaining 50 per cent (3.9 million sq km) contains most of Australia's rivers including the major inland rivers of the Murray–Darling system and the many coastal rivers.

In the arid zone (refer to Map 25 *Deserts*) high levels of evaporation, particularly in desert areas, coupled with low, erratic rainfall, result in streams which flow only after heavy rain—ephemeral streams (e).

Elsewhere the flow characteristics of streams usually reflect rainfall patterns. Where there are distinct wet and dry months, streams only flow during wet months—seasonal streams (s). However, where the rainfall is more evenly spread, streams flow all year—perennial streams (p).

UNCOORDINATED DRAINAGE

Locate and explore the extent of the area of uncoordinated drainage. Note that it extends W from near Spencer Gulf in SA across the Great Australian Bight, northwards to the NW coast of WA and E into the NT.

In this huge area of uncoordinated drainage, covering much of eastern WA, southern NT and western SA, the few streams that do exist are very short and ephemeral, and disappear into flat land and shallow lakes. (Because they are so short, they are not shown on the *Rivers* map.) These streams often follow the course of rivers which existed during the past when Australia was much wetter. Today, particularly in the western area, the course of these former rivers is marked by ribbon-like chains of salt lakes.

When you compare the area of uncoordinated drainage with the same area on the *Rivers* map you will find that there are no rivers within the boundary of uncoordinated drainage.

Identify the area of internal drainage and explore its extent. Compare the area with the same area on Map 27 and note that all of the rivers drain towards Lake Eyre.

In the area of internal drainage, mainly N and E of Lake Eyre only a few rivers, such as the Diamantina and Cooper Creek actually reach Lake Eyre, and then only in exceptionally wet years. Most, like the Finke and the Todd, lose their water long before. For much of the time rivers are dry with water only occurring in isolated water-holes. Rivers are generally long with a complex system of tributaries. The area is mostly flat, particularly in The Channel Country of SW Q. As a result most rivers are heavily braided; a large number of channels split from and rejoin the main stream.

MURRAY–DARLING SYSTEM

The Murray–Darling drainage area in the SE of the continent contains some of the longest rivers in Australia. The average gradient across the system is very low and the water in the meandering rivers takes several months to flow from their headwaters to the sea. In the far SE most of the rivers, including the Murray and the Murrumbidgee and their tributaries, are perennial. Further N, however, only the main rivers, such as the Namoi, the Macquarie and the Lachlan, are perennial, and then not for their entire length. The remaining rivers usually flow only during the wet months, hence the mixture of seasonal and perennial (sp) streams in the Murray–Darling system as indicated on the map.

Identify and explore the extent of the Murray–Darling system and note that it is bounded on the E and S by the Great Dividing Range. Compare the same areas on both maps and you will find that most streams rise in the E along the Great Dividing Range.

COASTAL RIVERS

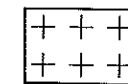
Except in the large area of uncoordinated drainage which extends to the coast across the Great Australian Bight and along part of the NW coast of WA, areas of coastal drainage extend around the whole of the continent including all of T. Examine the areas of coastal drainage and note that they are extensive in the SW of WA and across the N of the continent but narrow where they occur between the Great Dividing Range and the coast on the E and SE.

The coastal rivers of eastern and south-eastern Australia and of the south-western corner of WA are short—for example the Hawkesbury is 470 km long, the Brisbane 340 km, the Yarra 240 km, the Derwent 180 km and the Swan–Avon 410 km. They have steep gradients and are faster flowing than most other Australian rivers. As a result of fairly reliable rainfall distributed more or less evenly throughout the year, these rivers and their tributaries are usually perennial. The main exceptions are in SA where, because of very small catchments (for example the Torrens is only 60 km long), the rivers stop flowing during the dry summer months and in north-eastern Australia where most of the rivers are seasonal.

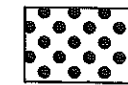
Coastal rivers of the N and W are generally longer than those elsewhere in Australia. Gradients range from very low for rivers draining into the Gulf of Carpentaria from the S, to low for rivers in the Kimberleys and Pilbara. High and intense rainfall associated with the summer monsoons results in very high flood peaks, even by world standards.



Coastal rivers



Internal drainage



Murray–Darling system



Uncoordinated drainage

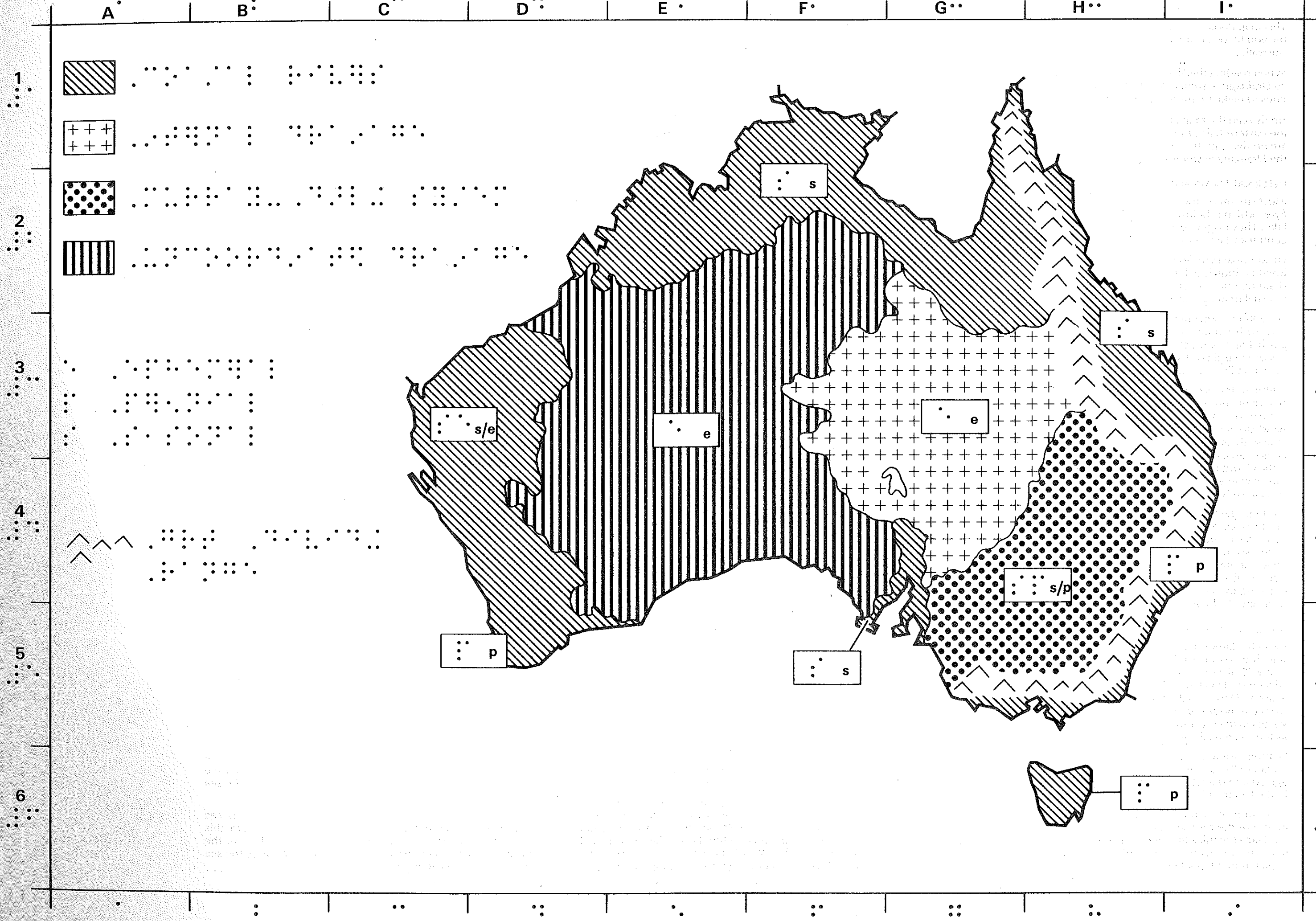
e Ephemeral

p Perennial

s Seasonal

^ ^ ^ Great Dividing Range

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.



This map depicts selected rivers and State borders and will enable you to locate and determine the extent of the major rivers in Australia.

When reading this map it will be helpful if you also refer to Map 26 *Drainage Systems*. As a further aid, some rivers have thicker lines to make identification easier.

Firstly scan the map and note that most rivers are to be found in the eastern half of the continent and along the W coast. There are no rivers in the area of uncoordinated drainage depicted on the *Drainage Systems* map.

INTERNAL DRAINAGE

Most streams in the area of internal drainage head towards Lake Eyre, which is below sea-level, but only a few actually reach the lake. They originate mainly in central SA, south-eastern NT, and central and western Q.

Locate Lake Eyre (**le**) in the NE part of SA. Without attempting to identify individual rivers, compare the network of streams draining into the lake from the NW, N and NE with the area of internal drainage on Map 26.

To identify individual rivers, begin on the eastern side of Lake Eyre with Cooper Creek—Thomson River (**ct**) which is distinguishable by a much thicker line. Trace its course NE along the eastern margin of The Channel Country of SW Q to its source in the Great Dividing Range SW of Townsville.

A little to the N of where Cooper Creek enters Lake Eyre, a second river enters the lake. This is the Diamantina River. Follow its course NE to where it forks near the NE corner of SA. The right-hand branch is the continuation of the Diamantina. Trace its course through The Channel Country to where it is named (**dm**) at its source near Cloncurry in western Q. The left-hand branch is the Georgina River. Trace it from its junction with the Diamantina to where it is named (**ga**) at its source in the Barkly Tableland of eastern NT.

Starting again at the northern end of Lake Eyre, trace the course of the Macumba River westward to where it is named (**mc**) near its source in the Musgrave Ranges in NW SA. In the NT, to the NE of the source of the Macumba (**mc**), locate the Finke (**fk**) and Todd (**td**) Rivers and note how they flow SE towards Lake Eyre but are absorbed in the sands of the Simpson Desert before reaching the lake. These rivers rise in the Macdonnell Ranges near Alice Springs.

MURRAY-DARLING SYSTEM

By far the largest river system in Australia is the Murray-Darling. It includes some of the longest rivers in Australia — the Murray being 2520 km in length, the Darling 1390 km, the Barwon-Macintyre 1140 km and the Murrumbidgee 1580 km. In fact, the Murray-Darling is the sixth longest river in the world. Its length from the mouth of the Murray in SA up the Darling to the headwaters of the Macintyre on the Q-NSW border is 3720 km — half as long as the Nile River.

Without attempting to identify individual rivers in the system, compare the pattern of streams with the Murray-Darling drainage system depicted on Map 26. Note how the major rivers rise in the E in the Great Dividing Range.

To identify individual rivers within the system commence at the mouth of the Murray (**my**) just E of Gulf St Vincent in the SE of SA. Trace the thick line depicting the Murray N then E to its junction with the Darling (**dl**), which joins from the N and is also depicted by a thick line.

Follow the Murray for a short distance to where the Murrumbidgee River (**mm**) joins from the NE then continue generally SE to its source in the Snowy Mountains. From where it crosses the SA border to its source, the Murray River forms the border between NSW and V.

Follow the Murray River back downstream to its junction with the Murrumbidgee (**mm**), which flows in from the NE. The Murrumbidgee (**mm**) and its major tributary the Lachlan (**la**) drain much of central NSW including the Riverina area. Trace these two rivers NE and E to where they rise in the Great Dividing Range. (The name of each river appears on the northern side of the stream.)

Return to the junction of the Murray and Darling (**dl**) Rivers (both thick lines) and follow the Darling northwards to where it is joined on the left-hand side by the Warrego River (thin line) near Bourke. Trace the Warrego N across the NSW-Q border to where it is named (**wg**) near its source in the Great Dividing Range SW of Rockhampton.

Return to the Darling and trace it NE again to where it divides into two thin lines. The left fork is the Culgoa River, known further upstream as the Balonne River and in turn the Condamine River. Trace its length NE to where it is named (**cbc**) and on to where it rises in the Great Dividing Range near Toowoomba.

The right fork is the Barwon River. Follow the Barwon eastwards past the junctions of two streams from the S and upstream to where it rises N of Armidale on the New England Plateau. Along its upper reaches this river is known as the Macintyre hence the abbreviation (**bm**).

Did you notice where the NSW-Q border joined the Barwon River from the W and subsequently diverged to the E? Between these two points the Barwon-Macintyre forms the border. To the E the border continues along the Dumaresq River, a tributary of the Macintyre, to near Tenterfield, S of Warwick.

Return to where the two streams joined the Barwon from the S. The stream furthest W and flowing from the S is the Macquarie (**mq**), the one flowing in from the E is the Namoi (**nm**). These are two of the largest rivers which drain central and northern NSW W of the Great Dividing Range. They flow into the Barwon River near Walgett.

COASTAL RIVERS

There are many coastal rivers, particularly in the N, E, SE and SW of the continent. A representative selection of these rivers has been included on the map. Generally the abbreviation for the name of the river is positioned out to sea near its mouth.

To help you read the map the following description of the coastal rivers has been subdivided into States, commencing with T and then V before moving clockwise around the continent. Find each river mentioned in the text and trace it back to its source.

Tasmania

Two major rivers are depicted — the Tamar (**tm**) which drains NE T as it flows into Bass Strait near Launceston and the Derwent (**dw**) which enters the sea in the SE near Hobart.

Victoria

Three main rivers are depicted along the coast of V. Commencing in the E of the State, locate the Snowy (**sn**), which rises in the Snowy Mountains of southern NSW and flows into Bass Strait. Next, find the Yarra (**ya**) which enters Port Phillip Bay at Melbourne, and then, in the W of V near the V-SA border, the Glenelg (**gg**), which commences in The Grampians and flows into the sea.

South Australia

SA has very few coastal rivers. The only ones depicted on the map are the Torrens (**to**), which originates in the Mount Lofty Ranges and enters the nearby Gulf St Vincent at Adelaide, and the Murray, the mouth of which is in SE SA.

As you travel westwards around the Great Australian Bight there are no coastal rivers until you reach the SW corner of WA.

Western Australia

Both the Blackwood River (**bk**) in the far SW corner and the Swan River (**sr**), which enters the sea at Fremantle, drain the nearby Darling Range. In its upper reaches the Swan River is known as the Avon River.

Further N you will come across the Murchison River (**mu**) and then the Gascoyne (**gc**), Ashburton (**ab**) and Fortescue (**ft**) Rivers, which drain the ranges of the Pilbara region.

Continue N along the coast and locate the Fitzroy River (**fz**) in the far N of WA, and finally the Ord River (**or**), which flows into the Timor Sea. Both of these rivers drain the Kimberley region.

Northern Territory

Soon after crossing the WA-NT border you will find the Victoria River (**vc**). Further N is the Daly River (**da**), then around the coast of Arnhem Land and entering the Gulf of Carpentaria are the Roper (**ro**) and McArthur (**mc**) River... Both the Daly River to the W and the Roper River to the E drain large parts of Arnhem Land whereas the McArthur drains northward from the Barkly Tableland.

Queensland

In the SE corner of the Gulf of Carpentaria you will find the mouth of the Flinders (**fl**) River then, to the N along the western side of Cape York Peninsula, the Mitchell (**mt**) and Archer (**ac**) Rivers. These three rivers all drain westwards from the most northerly part of the Great Dividing Range.

As you move down the eastern coast of Q from Cape York, the Normanby River (**no**) flows from the S into Princess Charlotte Bay but the first major river you will come across is the Burdekin (**bd**), which enters the sea just S of Townsville and is depicted by a thicker line. A large tributary enters the Burdekin River from the S. This is the Suttor River and its offshoot the Belyando River (neither of which are named on the map).

Further S, entering the sea near Rockhampton, is the Fitzroy River (**fz**), also depicted by a thicker line. Three of its main tributaries have been included on the map (though not named) — the Isaac (from the N), the Mackenzie (from the SW) and the Dawson (from the S).

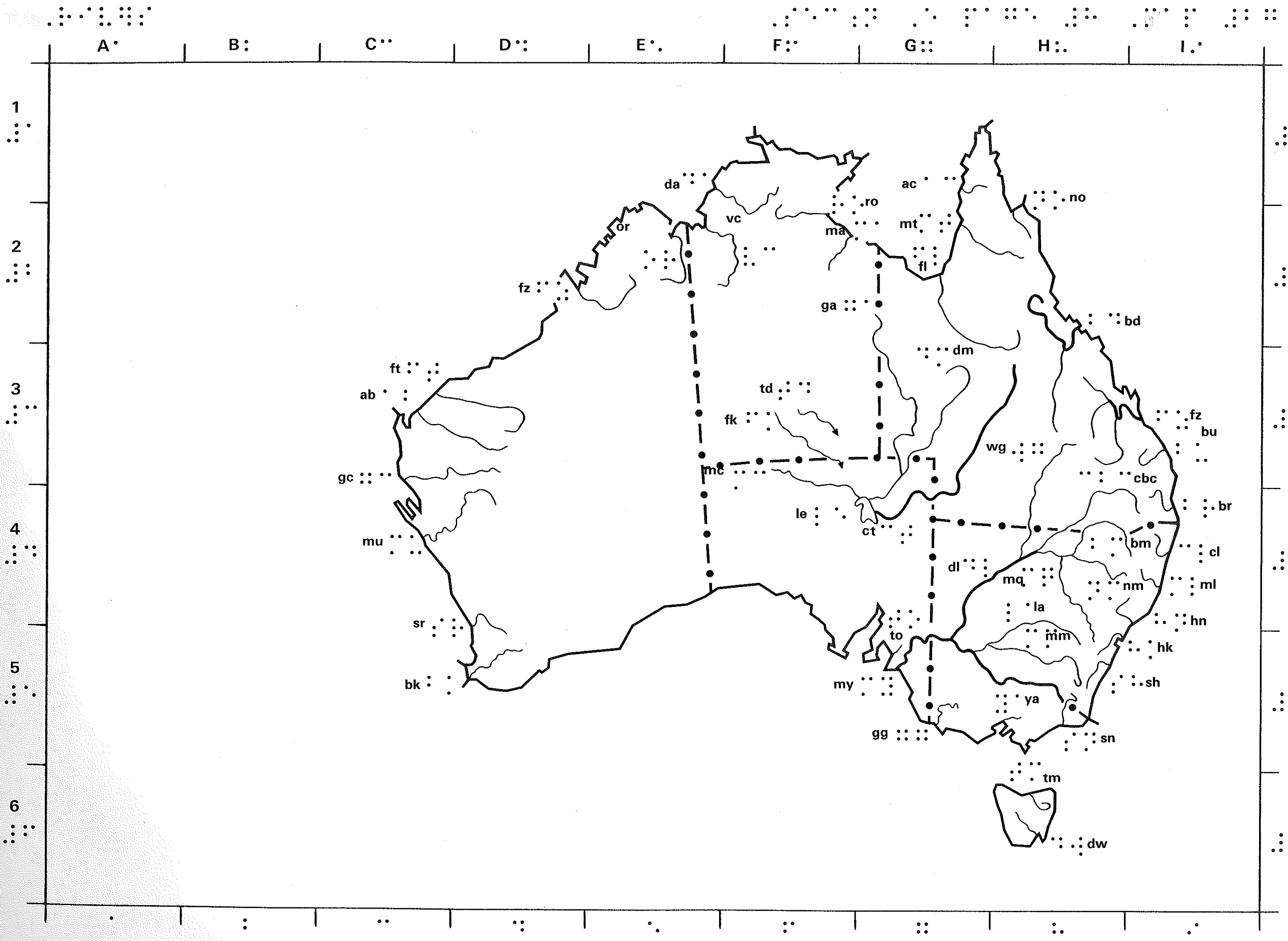
Did you notice that this is the second Fitzroy River depicted on the map. The other Fitzroy River is in the NW of WA.

Then, along the SE coast of Q, you will find the Burnett River (**bu**), which enters the sea near Bundaberg and the Brisbane River (**br**), the most southerly of the Q coastal rivers on the map.

New South Wales

Five main rivers are depicted along the NSW coast. The northernmost is the Clarence River (**cl**), which enters the sea E of Grafton. To the S you will find the Macleay (**ml**) and then the Hunter (**hn**), which passes through Maitland and enters the sea at Newcastle.

Further S is the Hawkesbury River (**hk**), which enters the sea through Broken Bay just N of Sydney. For much of its length, this river is known as the Nepean. The remaining river is the Shoalhaven (**sh**), which rises SE of Canberra and enters the sea near Nowra, S of Wollongong.



List of Abbreviations

| | | | |
|------------|--------------------------------|-----------|--------------------|
| ab | Ashburton River | le | Lake Eyre |
| ac | Archer River | ma | Mc Arthur River |
| bd | Burdekin River | mc | Macumba River |
| bk | Blackwood River | ml | Macleay River |
| bm | Barwon–Macintyre River | mm | Murrumbidgee River |
| br | Brisbane River | mq | Macquarie River |
| bu | Burnett River | mt | Mitchell River |
| cbc | Culgoa–Balonne–Condamine River | mu | Murchison River |
| cl | Clarence River | my | Murray River |
| ct | Cooper Creek–Thomson River | nm | Namoi River |
| da | Daly River | no | Normanby River |
| dl | Darling River | or | Ord River |
| dm | Diamantina River | ro | Roper River |
| dw | Derwent River | sh | Shoalhaven River |
| fk | Finke River | sn | Snowy River |
| fl | Flinders River | sr | Swan–Avon River |
| ft | Fortescue River | td | Todd River |
| fz | Fitzroy River | tm | Tamar River |
| ga | Georgina River | to | Torrens River |
| gc | Gascoyne River | vc | Victoria River |
| gg | Glenelg River | wg | Warrego River |
| hk | Hawkesbury River | ya | Yarra River |
| hn | Hunter River | | |
| la | Lachlan River | | |

Landform Types

While Map 24 *Relief* gives a broad indication of the local ruggedness of the country and Map 23 *Elevation* indicates its height, this map describes Australia in terms of its shape. Yet again, the general flatness of Australia is highlighted.

Definitions of terms used to describe landforms can vary greatly. For instance some usage suggests that only flat land at low elevation can be called a plain, while other usage includes terms such as 'coastal plain' and 'high plain'. On this map a plain is regarded as flat or gently rolling land at any elevation and a dunefield is a plain covered with sand dunes. However, where an elevated plain is bounded by a steep escarpment between it and lower land, it is called a plateau. A tableland is similar but with a less sharp boundary between it and lower land.

It is therefore not surprising that there is often confusion as to whether a landform is a plain, a plateau or a tableland. For instance, using these definitions the most famous plain in Australia the Nullarbor Plain (E4) is in fact a plateau. The early explorers crossing the middle of the Nullarbor could be forgiven for assuming they were on a plain. However, on its southern margin are the famous limestone cliffs of the Nullarbor and it is this steep escarpment which makes the Nullarbor Plain a plateau.

Plains and dunefields cover about 40 per cent of Australia. The most extensive area of plains occurs in association with the Murray-Darling river system (refer to Map 26 *Drainage Systems*), extending from southern SA, through V and NSW to southern Q. Elsewhere, extensive plains are found on the W and NW coast of WA, surrounding the Gulf of Carpentaria (G2) and along rivers in The Channel Country (G3) of SW Q.

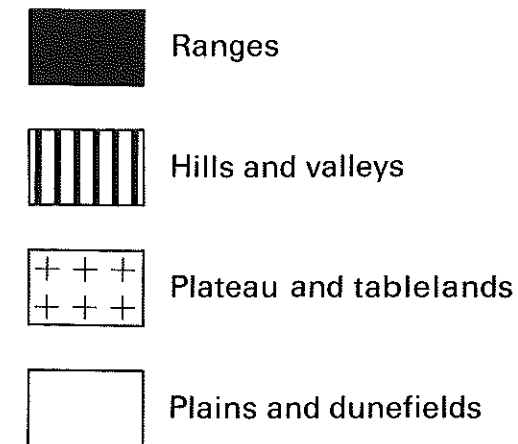
Dunefields occur throughout central Australia, where sandy deserts have formed in an arid climate (Map 25 *Deserts*). However, where the climate is more favourable, these dunefields can be agriculturally productive. For example, the Eyre Peninsula (E5) and the area around the NSW-V-SA borders (G5) are used for the cultivation of grain crops, especially wheat.

Plateau and tablelands occupy about 30 per cent of Australia's land surface. The Barkly Tableland (G2) at the northern end of the Q-NT border, the Nullarbor Plain and much of southern WA are all plateaux with similar shapes—they have very flat, extensive upland surfaces, with steep escarpments (cliffs or rugged hills) on their seaward margins while inland they grade gently into plains or dunefields.

Plateau areas in the SE also have the same general shape, but are called tablelands because they usually grade into a landscape of hills and valleys. It is also somewhat surprising to discover that such well-known features as the Hamersley Range (D3), the Kimberleys (E2), Arnhem Land (F1), much of the uplands of the Great Dividing Range and eastern T are in reality plateaux which have been heavily dissected by water erosion.

Landscapes composed of hills and valleys cover only 15 per cent of Australia. They mostly form foothill zones between higher and lower land, as in eastern NSW and the northern edges of the Pilbara (D3) and the Barkly Tableland; or they stand out dramatically as rugged land on plains. In this situation, as in SE Q, they are commonly called ranges.

Ranges, which are areas where high ridge crests and deep valleys are found, also cover only 15 per cent of Australia. However, they are widely scattered and include the Darling Range (D5) E of Perth, the southern part of the Pilbara, the ranges surrounding the Kimberley plateau, the central Australian ranges (F3), the Flinders (G4) and Mount Lofty Ranges (G5) in SA and the ranges of eastern Australia in V, NSW and Q.



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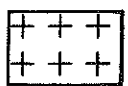
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At any stage in geological time, and on every landmass, exposed surface rock is worn away by the forces of erosion (wind and moving water, including ice), weathering (climate-induced changes caused by such phenomena as temperature variation and chemical reaction) and gravity-induced mass movement (avalanches, etc.). The particles thus created are usually transported away, mainly by water and wind, and deposited over lower lying areas (either on land or out to sea). Over time these loose sediments, known as surficial deposits, become deeper and eventually they may be consolidated into rock.

On land both bedrock and surficial deposits are usually covered by a layer of soil. Indeed, soil is the top layer of surficial deposits but differs through having been changed by biological, physical and chemical processes into a medium in which plants can live (refer to Map 32 *Soils*).

Australia is an old continent and erosion has generally planed the surface to such an extent that today, even by world standards, it is very flat and low lying. However, over one-half of Australia is covered by a blanket of geologically-recent deposits of sand, silt and clay. Of these, quartz sand derived from the erosion of older rocks covers about one-third of the continent. Over much of this area the sand has been formed into dunefields by wind action in the current arid climate.

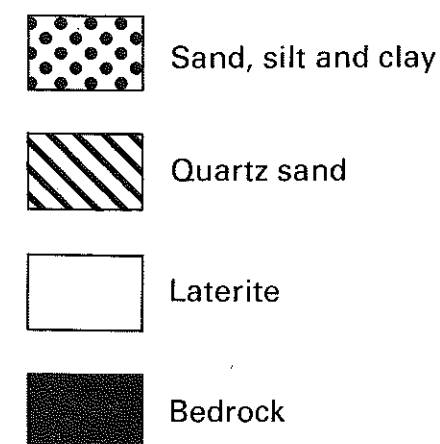
In generally less arid areas the surficial deposits have a greater proportion of finer materials that form silts and clays. These finer sediments are often associated with present day river systems, such as those of The Channel Country (G3), the upper Darling River (H4) and the Riverina (H5). The mix of clay, silt and sand varies greatly from place to place; in areas such as the Gulf of Carpentaria (G2) it is almost pure clay, whereas in The Channel Country it is mostly sand with some silt and clay.

Much of Australia is covered by laterite, a hard iron or aluminium-oxide rich rock. Laterite forms as the result of a complex weathering process under tropical monsoonal conditions. These conditions have been experienced by a considerable portion of northern and western Australia in the recent geological past. Instead of particles of rock being removed, soluble material percolates down and solidifies to form a hard surface layer and a lower layer of small rounded pebbles.

Depending on the type of bedrock, the lower layer may be rich in aluminium (forming bauxite, the ore from which aluminium is obtained), nickel, iron or manganese. In Australia all bauxite is mined from laterite at Gove (G1) on the NE tip of NT, Weipa (G1) on the NW coast of Cape York Peninsula and the Darling Ranges (D5) E of Perth. There are also significant deposits of lateritic nickel, notably at Greenvale (H2) W of Townsville and near Kalgoorlie (D4) in southern WA (these areas are too small to show on this map).

Less than one-half of Australia has bedrock exposed at the surface or below just a thin layer of soil. Such areas are generally uplands, for example the Great Dividing Range, the Pilbara (D3), the Kimberleys (E2) and the ranges of central Australia (F3). However, such notable features as the Nullarbor Plain (E4) and the escarpment on the northern edge of the Barkly Tableland (G2) are also areas where bedrock can be found at or near the surface.

As their name suggests, the following two geology maps (*Bedrock Type* and *Bedrock Age*) are not concerned with what occurs at the surface, but rather with the underlying bedrock—regardless of how deep it is buried.



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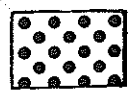
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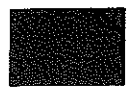
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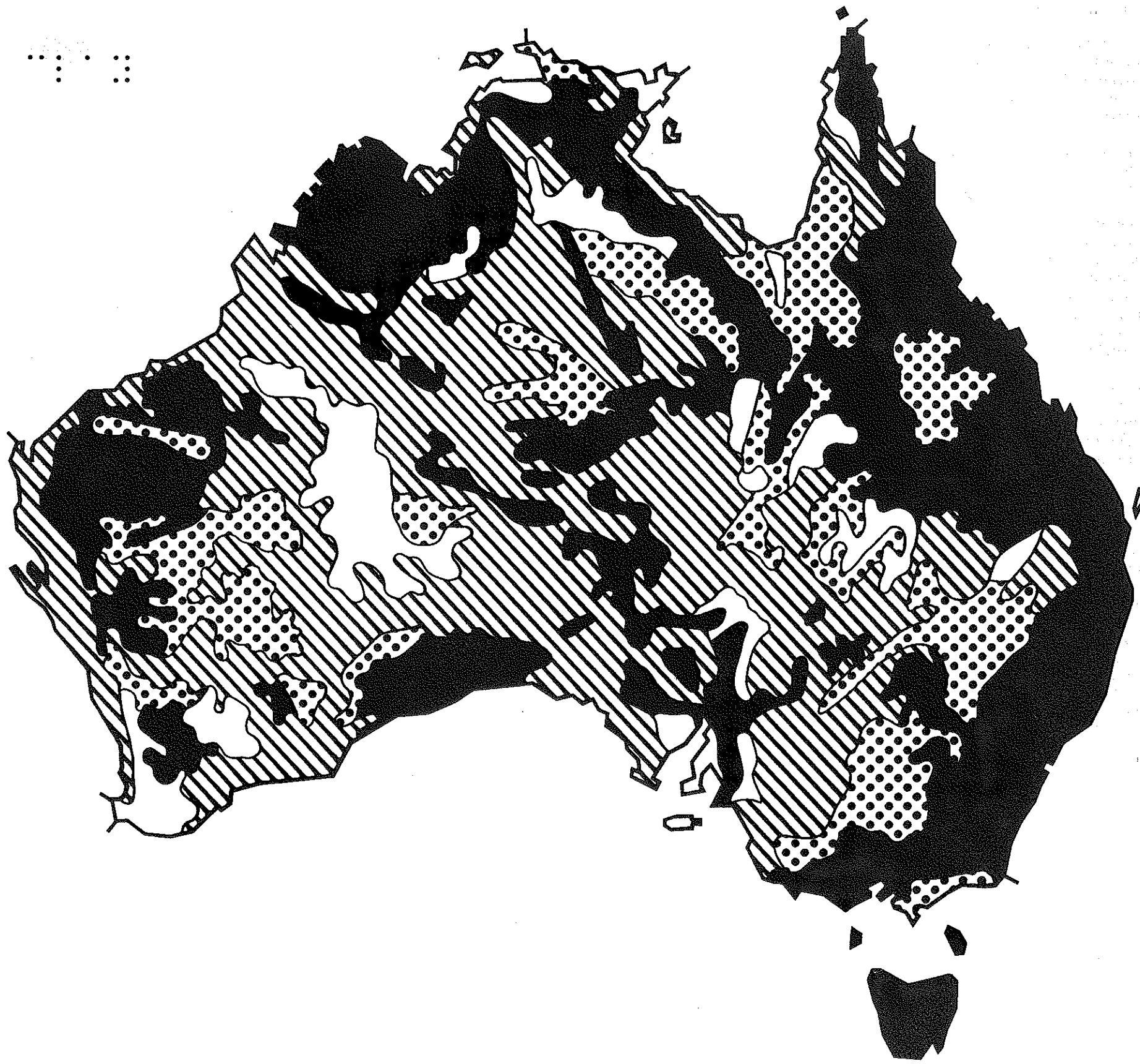
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Geology - Bedrock Types

Bedrock is the uppermost layer of hard consolidated rock which either outcrops at the earth's surface, or underlies unconsolidated newer sediments or soil. There are three fundamental classes of bedrock: igneous, sedimentary and metamorphic.

Igneous rock originates as molten material in the earth's interior. It can either be intrusive, resulting from the injection of molten material into the rock above where it solidifies without reaching the surface, or volcanic, resulting from the extrusion of molten lava which solidifies at the surface.

Sedimentary rocks have a variety of origins but most commonly result from the deposition of erosion products from older rocks, both igneous and sedimentary. These, over geological time, became consolidated into rock, usually by pressure resulting from burial deep beneath subsequent sedimentary layers. Sedimentary rocks are usually classified according to grain size; conglomerate, for example, is made up of large pebbles held together by finer material; in sandstone the grains are sand; and in siltstone the grains are fine silt. Some sedimentary rocks are of biological origin. Coal, for example, was formed by the deep burial of thick mats of dead vegetation and some limestones by the burial of coral reefs.

Metamorphic rock is formed when pre-existing hard rock is changed by very high temperature and/or pressure, usually caused by nearby igneous activity or crustal movement. As temperature and/or pressure increases, so too does the degree of metamorphism.

In low-grade metamorphic rock (such as slate) the amount of change is so low that the altered rock is not always recognisably different from the original rock. Hence, low-grade metamorphic rock has been combined with sedimentary rock on this map. In medium-grade metamorphic rock (such as schist) and high-grade metamorphic rock (such as marble) the change is much greater.

The largest expanse of igneous and associated metamorphic rocks occurs in SW WA, where they form an extensive plateau. Elsewhere, they generally form upland areas, for example the ranges of central Australia and scattered throughout the Great Dividing Range. In general, the igneous and metamorphic rocks of W and central Australia are very old, while those in E are relatively young.

Much of Australia's mineral wealth is found in metamorphic and igneous rocks since they contain concentrations of metallic ores such as gold, nickel, tin, copper, lead and zinc. Kalgoorlie (D4), Mount Isa (G2) and Broken Hill (G4) are major mining towns which have developed around such deposits. Though too small to map at this scale, areas of igneous and metamorphic rocks containing rich deposits of minerals also occur in western T — notably near Rosebery (with the world's largest underground tin mine) and Queenstown.

Most of Australia is underlain by sedimentary and low-grade metamorphic rocks and, as they are usually softer and more easily eroded than either igneous or medium and high-grade metamorphic rocks, they generally form gently undulating or flat land. A few notable exceptions are parts of the Pilbara (D3) and Arnhem Land (F1), where rivers have cut deep gorges. In the E much of the Great Dividing Range is composed of sedimentary and low-grade metamorphic rocks and in places, such as the spectacular sandstone plateau/gorge areas of the Blue Mountains (H5), rugged landscapes have developed.

Though few metallic minerals occur in sedimentary and low-grade metamorphic rocks, they do contain significant deposits of iron ore and all of our coal, oil and gas resources. Though iron is widespread throughout sedimentary and low-grade metamorphic rocks, it is only economically mined where the ore has been concentrated by a variety of chemical and physical processes into extensive, rich 'banded iron' formations such as those found in the Pilbara area of NW WA.

Vast deposits of black coal occur in central Q, especially in the Bowen Basin (H3) W of Rockhampton and Mackay and in NSW, in the Newcastle-Lithgow-Wollongong area (H5). Very large brown coal deposits occur in the younger sediments of the Gippsland (H5) area of eastern V.

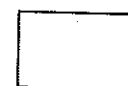
Valuable oil and gas reserves are trapped in underground pockets in sedimentary rock. These occur in Bass Strait (off the SE coast of V), the Cooper and Eromanga Basins of north-eastern SA and south-western Q (G4), and the North West Shelf off the northern coast of WA.



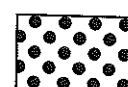
Igneous—intrusive



Igneous—volcanic



Sedimentary and low-grade metamorphic



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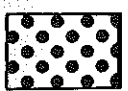
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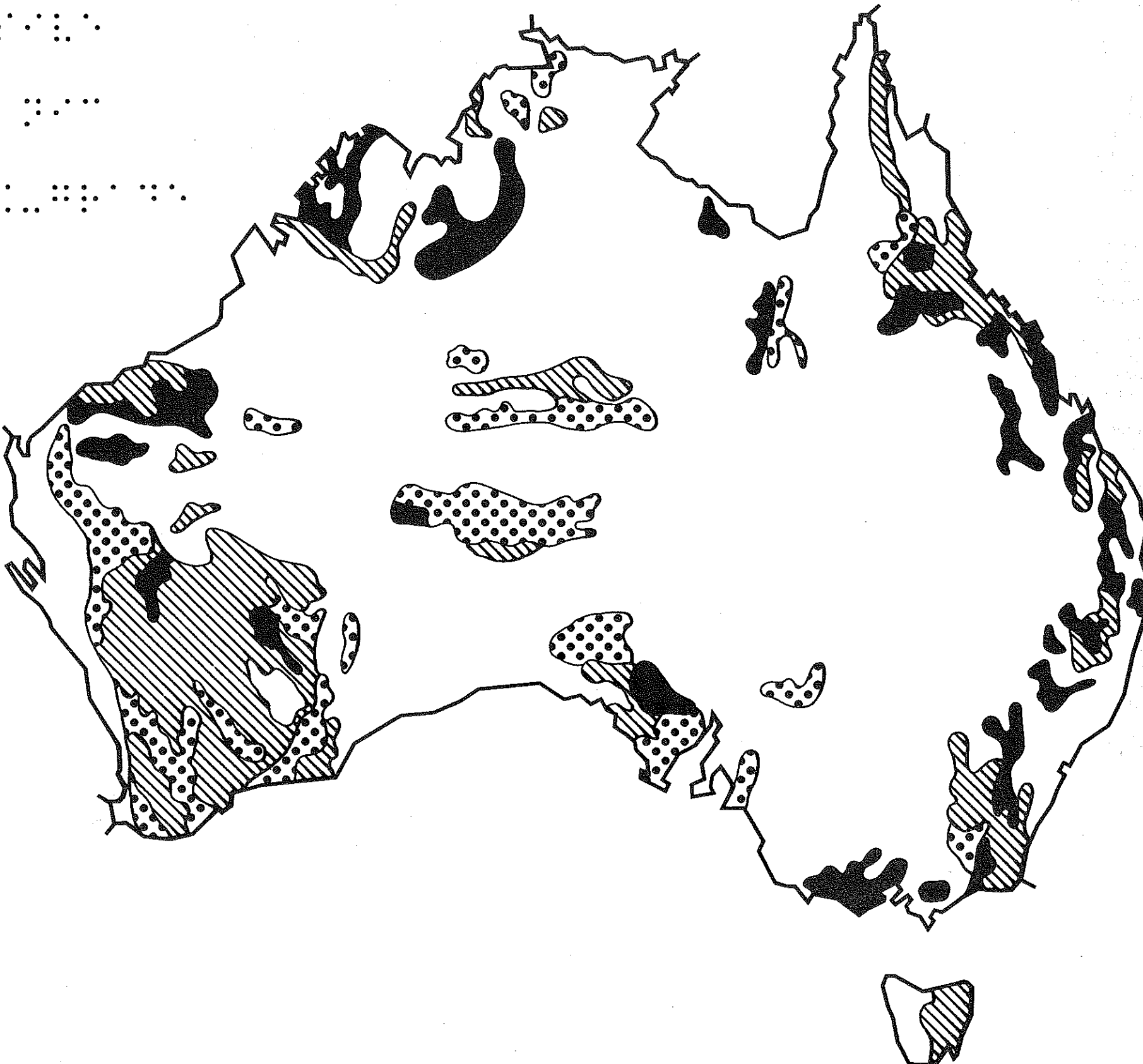
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The latest estimate of the age of the oldest rocks forming the earth's crust is about 4000 million years. This immensely long time is conventionally divided into five eras—the Archaean (more than 2500 million years ago), the Proterozoic (570–2500 million years ago), the Palaeozoic (230–570 million years ago), the Mesozoic (70–230 million years ago) and the Cainozoic (less than 70 million years ago). This map shows bedrock age in relation to these eras.

The legend on this map is divided into two parts. On the right-hand side are the names of the geological eras and the patterns used to depict them on the map, while on the left-hand side is a simple time-scale illustrating the age of the eras in millions of years. Today the age of rocks can be estimated from the measured proportions of certain radioactive elements present.

The earth's surface is continually changing—new rock is formed and deposited on top of older rock, and existing rock is worn away. The accompanying map indicates the age of the top layer of rock which now makes up Australia regardless of how deep it is buried beneath unconsolidated surficial material.

The oldest rocks in Australia were formed in the Archaean and they are amongst the oldest rocks so far found anywhere in the world. These mainly igneous rocks make up a large portion of SW WA, where they form a gently undulating plateau.

Later, in the Proterozoic, rocks were formed which now underlie the rest of WA and most of the NT, SA and T. Where these ancient rocks outcrop at the surface, they generally form more rugged land than the older Archaean rocks. In areas such as the Pilbara (D3), the Kimberleys (E2) and Arnhem Land (F1) they consist of sedimentary rocks, while in the ranges of central Australia and in the Mount Isa (G2) and Broken Hill (G4) regions they consist of igneous and associated metamorphic rocks.

Despite their considerable age, Archaean and Proterozoic rocks still cover approximately 35 per cent of the surface of Australia and contain some of our richest mineral deposits. By the end of the Proterozoic, life-forms had begun to evolve but were either soft-bodied or very small marine organisms and left little fossil evidence. Also, at this stage, Australia was part of a much larger continental landmass—now commonly called Gondwanaland.

In the Palaeozoic, sedimentary rocks were laid down over much of eastern Australia and large areas of central and western Australia. However, in the E igneous activity was quite widespread over the area which now comprises the eastern highlands. The map indicates those areas of Palaeozoic rocks which have not been subsequently overlain by younger rocks—notably in the NE and SE, much of the NT and in eastern WA. In eastern Australia Palaeozoic rocks were later pushed up to form part of what are now the eastern highlands—in particular the Snowy Mountains (H5), the New England (I4) area of NE NSW and the ranges of eastern Q.

Towards the end of the Palaeozoic, most of southern Australia was briefly covered by glaciers, which, in the W, extended as far N as the Kimberleys. In the warmer climate which followed the retreat of these glaciers, extensive forests developed. Over time these forests were consolidated into the enormous black coal deposits of Q and NSW. By the end of this era, shell-fish, fish, amphibians, insects and land plants had evolved. Australia was still part of a much larger continent.

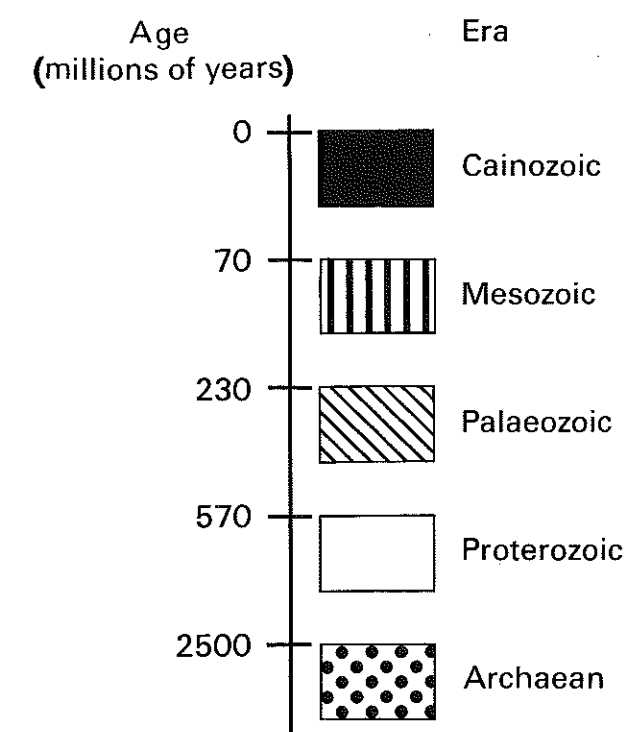
During the Mesozoic much of Australia was covered by water, and the sediments deposited at this time have consolidated into rock which now overlies large areas of the older rock over most of the lowlands of inland Australia. The larger continental landmass was beginning to break up but Australia was still connected to Antarctica. Mammals and birds had begun to evolve but dinosaurs, which developed rapidly during the Mesozoic, had become extinct by its end.

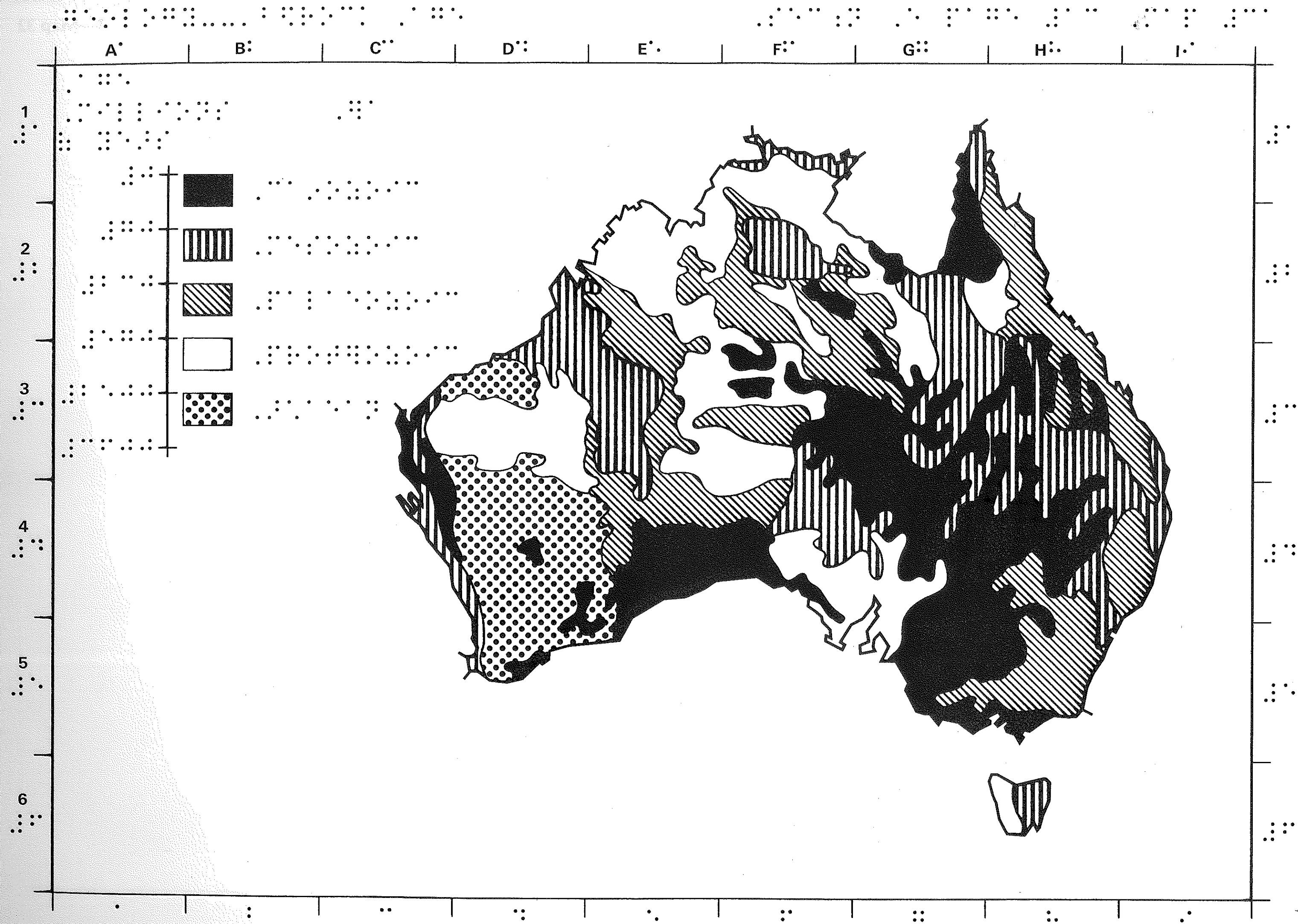
Early in the Cainozoic, the most recent geological era, Australia finally split from Antarctica to become a continental landmass in its own right. Geological processes continued to produce new rock, which covered considerable areas of older rock (especially Mesozoic). The extensive deposits of brown coal found in V and the Bass Strait oil and gas fields were formed at this time.

The 'Ice Age' glaciation which so dramatically affected the Northern Hemisphere only 25 000 years ago had hardly any impact in Australia—only a few very small glaciers formed in T and the Snowy Mountains. However, when the Northern Hemisphere ice-cap melted about 20 000 years ago, sea-levels rose world-wide, cutting off New Guinea and T from the rest of Australia:

Two very significant evolutionary events occurred in the Cainozoic—the evolution of grass (upon which most land-based life forms depend, either directly or indirectly), followed by the evolution of man.

Even today rock formation continues. Sediments, which with time will consolidate into rocks, are still being deposited and parts of Australia are still, geologically speaking, volcanically and tectonically active—the last volcanic eruption was a mere 3000 years ago at Mount Gambier, and Australia continues to move northward at about 6 cm per year.





This map shows the distribution of the main types of soil in Australia classified according to their suitability for agriculture. Soil consists of rock particles, created by the chemical, physical and biological processes of weathering and erosion, together with dead organic matter (humus). It is the medium in which plants grow.

Good soils, that is soils with few or no physical or nutrient limitations to plant growth, cover only 12 per cent of Australia and of these a mere 1 per cent can be classified as very good.

VERY GOOD SOILS

Generally, very good soils have no physical or nutrient limitations and are therefore suitable for a wide range of agricultural uses. These soils are deep (allowing plant roots to penetrate) and have a good water-holding capacity. They occur in relatively small areas in eastern and southern Australia, and in parts of WA. The largest areas of very good soils occur around Adelaide (G5), in southern and eastern V, and in the Parkes-Wellington and Tamworth-Moree areas of central-western and northern NSW (H4). Other areas of very fertile soils are scattered throughout Australia, usually on river flood plains, but the aerial extent of these deep alluvial soils is too small to show on the map.

GOOD SOILS

Good soils have few physical or nutrient limitations. Though highly suitable for cereal production, their generally high clay content may adversely affect cultivation and trafficability. During dry periods these soils develop cracks ranging from 6 mm to about 30 cm in width (hence they are commonly called 'cracking' clays). These cracks penetrate to at least 30 cm in depth, and often to 1-2 m or more, but when rain falls and infiltrates the cracks the clay swells and the cracks close. It is not surprising therefore that most areas with cracking clays are natural grasslands as this continual, often deep soil movement is enough to disturb and eventually destroy the root structure of any tree. Even power and fence poles are often twisted, and in extreme cases building foundations collapse.

Good soils occur in a dissected arc extending from the Gulf of Carpentaria and the Barkly Tableland in the N (G2) to SW V in the S. Such well-known regions as the Darling Downs (I4) in southern Q, the black soil plains of central northern NSW (H4) and the Riverina area (H5) of southern NSW have cracking clay soils. Smaller areas occur in an arc around the Kimberleys (E2) and near Darwin (F1). Where rainfall is sufficient, large areas are cultivated for wheat, other grain and feed crops, and improved pastures. Also, where water is available for irrigation (for example the Darling Downs and the Riverina), increasing areas are being used for rice, cotton, sown pastures and fodder crops.

POOR SOILS

Soils classified as poor cover almost one-third of the country and can be subdivided into three main types:

(a) Soils naturally low in nutrients

Deficiency in all or many of the important nutrient elements is the main characteristic of these widespread soils which cover nearly one-quarter of Australia. They occur throughout the country with the most extensive areas found on Cape York Peninsula, in central and SW Q, and in central and NW NSW. Other large areas occur around Sydney (H5), in the NT and northern SA, and in SW WA and T. The physical properties of these soils are often very good but much improvement is needed in their chemical properties to make them agriculturally productive.

(b) Hard soils with clay subsoils

These soils have thin topsoil with a hard clay subsoil which restricts plant roots and limits permeability. Where steep slopes are not a limitation, these soils can be improved and made suitable for agriculture — gypsum is commonly added as it helps breakdown the clay and increase the depth of the topsoil. They are widely distributed throughout eastern Q and NSW, V and T, and western WA. Much of the wheat belt of Q, NSW, V and WA consists of this soil type.

(c) Deep structured soils with high initial fertility

These soils are characterised by excellent physical properties but their high initial fertility declines rapidly with agricultural use. Areas with this soil and suitable topography have been in great demand and intensively developed for a wide range of crops and pastures. However, to achieve continuing productivity they require constant application of fertiliser and maintenance of soil organic matter. They occur in NW T, and in small patches scattered throughout eastern and northern Australia mainly in wetter coastal areas.

VERY POOR SOILS

Very poor soils cover over half of Australia. As with the poor soils, there are a number of different soil types:

(a) Shallow soils

More than a quarter of Australia is covered with shallow soils. As these soils are generally less than 60 cm in depth and have a low water storage capacity, they are limited to pastoral use. They are found throughout the continent — the largest areas being in central and western Australia, where they cover much of the arid interior of the continent. However, shallow soils are also associated with areas of dissected plateaux and steep slopes, for example the Flinders Ranges (G4) in SA, the Macdonnell Ranges (F3) near Alice Springs, the Darling Ranges (D5) E of Perth, and the Kimberleys (E2) and Arnhem Land (F1).

(b) Coarse textured soils

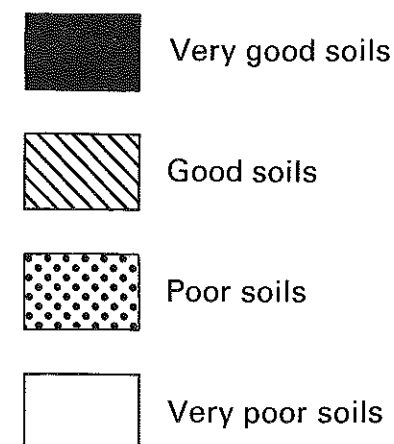
These sandy soils are coarse-grained and loose, and liable to severe wind and water erosion. They have a low water-storage capacity and low fertility, and occur mainly in the sandy deserts such as the Great Victoria, Gibson, Great Sandy and Simpson (refer to Map 25 *Deserts*).

(c) Saline soils

The presence of salt in these soils severely limits their usefulness for agricultural purposes. Generally, they can only be used for grazing — providing salt-tolerant native herbage for sheep and cattle. The most extensive areas of saline soils are found around Lake Eyre (G4), in NE SA and The Channel Country of SW Q (G3), and in western NSW around Broken Hill (G4). Saline soils are also associated with the salt lake systems of WA and NT, and coastal lowlands in various parts of northern Australia.

(d) Calcareous soils

The presence of calcium carbonate is the main feature of these soils, which vary greatly in structure. Natural fertility levels are generally low to moderate. In areas where rainfall exceeds 250 mm per year cereals are grown, and in more arid areas the grazing of sheep and cattle on natural herbage occurs. Calcareous soils are found mainly in the semi-arid to arid lands of southern Australia, with the largest areas extending from around the Nullarbor Plain (E4) E to the Murray-Darling region of western NSW and V.



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Australia is generally thought of as dry, hot and sunny 'a sun-burnt country'. While it is the second driest continent (Antarctica is the driest), Australia is also subjected to a wide variety of climates ranging from those of the hot and steamy tropical rain-forests to those of cold alpine areas with winter snowfields.

Climate is a summary of the day-to-day weather a place receives over a number of years. The climate of the place where you live is affected by a number of factors including its latitude, altitude, proximity to the sea and the topography of the surrounding area. In particular, quite small variations in altitude may result in large variations in the climate of places only a short distance apart. Therefore, the accompanying map and those on the next ten map-pages (which deal with various aspects of climate) give a very broad idea of the climate of Australia rather than details of the prevailing conditions at any particular place.

Like many of the topics mapped in this Atlas, climatic types form a pattern of concentric rings. The first four climatic types listed in the legend cover areas close to the coast.

The moist tropical climate covers the far N of Q, NT and WA. These areas have hot, wet summers and warm, dry winters. Rainfall is high to very high (over 800 mm a year) though it falls mostly in summer. As a consequence, summer is humid and uncomfortable.

To the S of the moist tropical climate in eastern Australia, a zone of moist temperate climate extends from coastal N Q to western V and T.

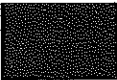

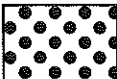



The northern half of the moist temperate zone, which extends from near Mackay in N Q (H3) to S of Sydney, is characterised by hot summers, mild winters and, particularly in coastal and high-land areas, high rainfall. Over most of this area rain falls mainly in summer and autumn, but in the S it tends to be distributed more evenly throughout the year.

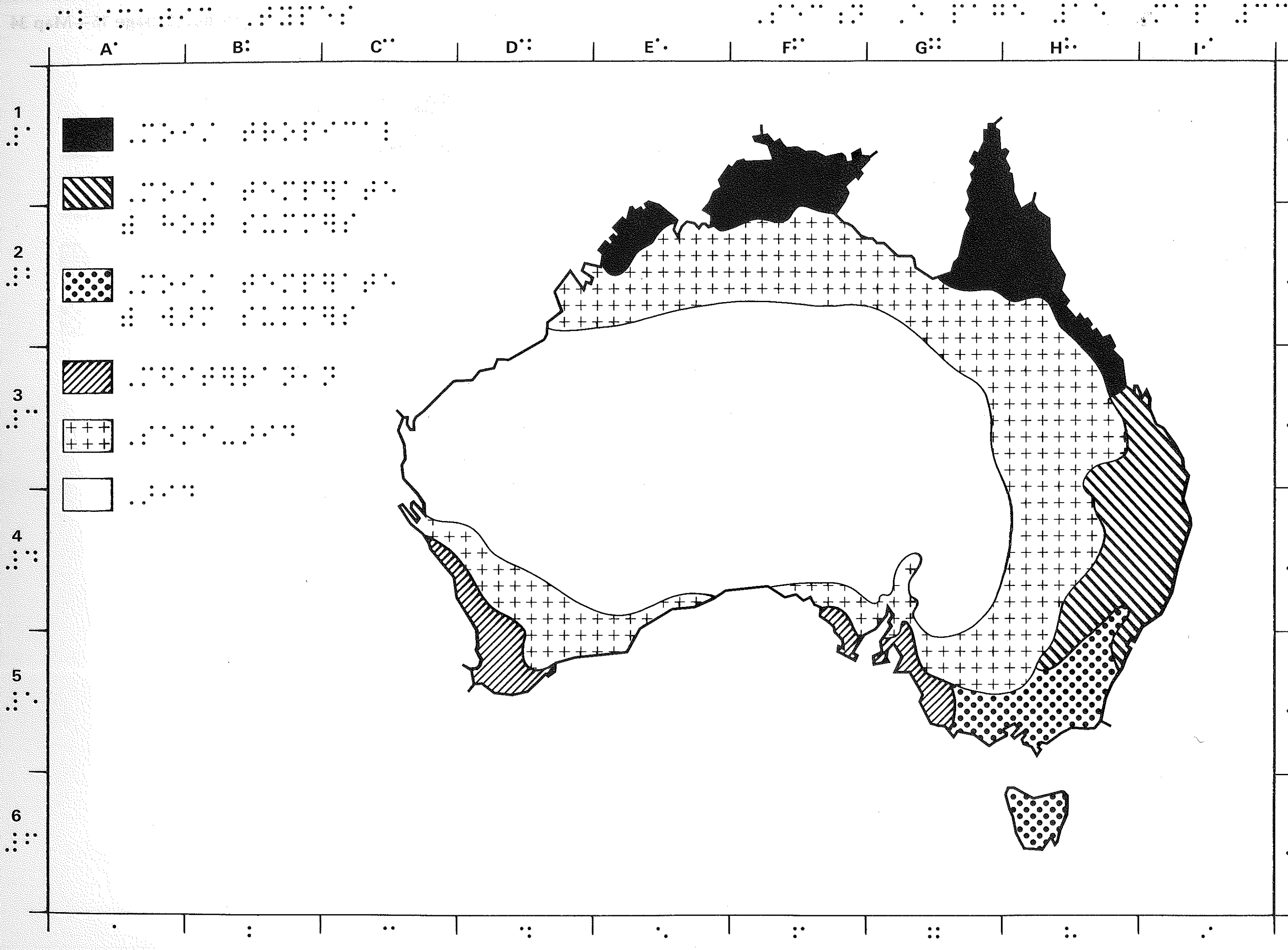
The southern half of the moist temperate zone, which covers southern NSW, much of V and all of T, has warm to mild summers and cool to cold winters. Rainfall is distributed evenly throughout the year.

'Mediterranean' is the term used to describe climates similar to those of Spain and Italy. Typically these climates have dry, hot summers and wet, mild winters. In Australia, southern SA (including Adelaide) and south-western WA (including Perth) experience mediterranean climates.

An extensive arc of semi-arid climate extends from S of the moist tropical zone in northern Australia through western NSW, north-western V and southern SA to N of the area of mediterranean climate in southern WA. There is a short break around the Great Australian Bight. Rainfall is lower and less reliable than that of the types already discussed. Summers are generally hotter than at places of similar latitude in the four coastal climatic types and throughout the year there is a wider variation between day-time maximum and night-time minimum temperatures.

Arid climates have very low rainfall and cover the remainder of the continent (central and much of western Australia). The amount of rain received at individual locations varies greatly from year to year, and for much of this zone the total rainfall for the year may fall in a single storm. Maximum temperatures are very hot in summer and warm in winter. However, temperatures at night fall quickly and in winter nights are cold.

-  Moist tropical
-  Moist temperate with hot summers
-  Moist temperate with warm summers
-  Mediterranean
-  Semi-arid
-  Arid



Annual Rainfall

Australia has an average annual rainfall of 520 mm compared to the world land-surface average of 660 mm. Nearly two-thirds of the continent averages less than 400 mm and nearly one-third less than 200 mm; only one-tenth receives over 800 mm. SA is the driest State with three-quarters of its area receiving less than 200 mm per year. T, with nearly three-quarters of its area receiving more than 800 mm per year, is the wettest State.

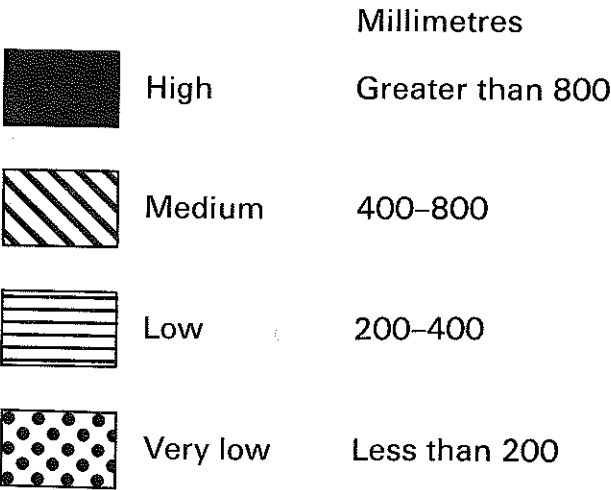
Because rainfall can vary so much from year to year, the most meaningful statistical measure for mapping its distribution from long term records is the 'median', the value exceeded by half of the amounts recorded and not exceeded by the other half. This technique overcomes the effect of extreme values and has been used in preparing the accompanying *Annual Rainfall* map.

Much of inland Australia, extending from the W coast near Carnarvon (C3) across the interior of WA and SA, to SE NT, SW Q and NW NSW has a very low median annual rainfall of less than 200 mm. Rain falls very infrequently, averaging less than 1 or 2 days per month. However, sometimes heavy downpours can occur; up to 400 mm of rain may be recorded in a few days causing much flooding. The lowest median annual rainfall, less than 100 mm, occurs in an area E of Lake Eyre (G4) and N across the Simpson Desert.

Rainfall generally increases from the dry interior out towards the coastal margins. However, local differences in factors like elevation can cause anomalies in this pattern. For example, the areas of higher elevation around the Hamersley Range (D3) in WA, the Flinders Ranges (G4) in SA and the Macdonnell Ranges (F3) in the NT receive 200–400 mm of rain in contrast to the adjacent areas of very low rainfall.

An area of low annual rainfall (200–400 mm) surrounds the very dry interior. This area is, in turn, surrounded by a band of medium annual rainfall (400–800 mm) which extends in an arc from northern WA, across the NT, down through eastern Australia to the SE of SA. Small areas of medium rainfall occur in SW WA and on the E coast of T.

High median annual rainfall (greater than 800 mm) is confined to coastal areas of the far N, E and SE, the W and N coasts of T and the far SW corner of WA. The coastal strip between Cairns and Ingham in N Q (H2) receives the highest median annual rainfall. Tully, just S of Innisfail, has a median annual rainfall of 4200 mm while Bellenden Ker, just S of Cairns, has the highest annual rainfall ever recorded in Australia (11 251 mm or over 11 metres in 1979). The mountainous and coastal areas of SE NSW and NE V receive rainfall in excess of 800 mm per year. Some small areas in the Snowy Mountains (H5) have a median annual rainfall of over 2400 mm. Western T has a particularly high median rainfall — Lake Margaret near Queenstown (H6) receives 3580 mm per year.



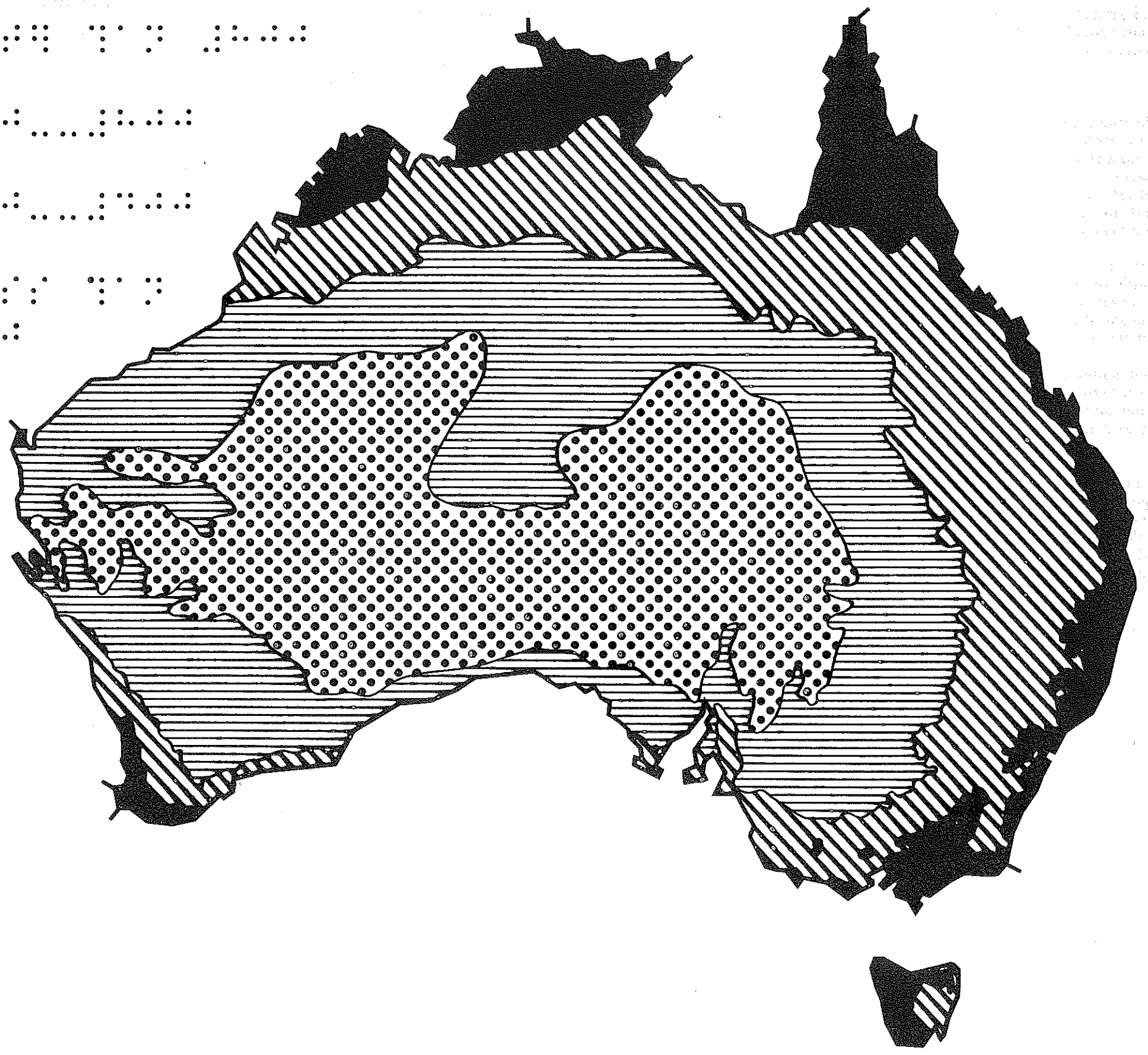
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Monthly Rainfall

The accompanying two maps show median monthly rainfall for January (summer) and July (winter). They share a single legend to make comparisons between them easier. If you quickly scan the two maps you will notice that the general pattern from N to S on the January map is reversed on the July map. In summer the highest median rainfall is along the N coast; in winter the highest rainfall is in the S.

JANUARY

This map illustrates the wet summer of northern Australia, associated with the moist tropical monsoonal climate. The highest January median rainfall occurs on the mountainous NE coast, with Bellenden Ker just S of Cairns receiving 600 mm. This coastal area together with the rest of Cape York Peninsula, the top end of the NT and a small nearby coastal area in NW WA all experience median January rainfall in excess of 200 mm.

The low rainfall over so much of southern Australia is caused by the more southerly path of high pressure systems in summer which results in a generally dry easterly circulation over this area with little chance of rain. In SA and southern WA the median monthly rainfall is less than 10 mm.

A band of high summer rainfall (75–200 mm) occurs to the S of the area of very high rainfall, from the Kimberleys in WA to the E coast and then along a narrow coastal strip to just S of Sydney. Western T also experiences high median monthly rainfall in January.

Between the high rainfall areas of northern and eastern Australia and the large area of low summer rainfall (0–25 mm) which extends over much of central and southern Australia is a band of medium rainfall (25–75 mm) stretching in an arc from around Port Hedland in northern-western WA to southern V and across Bass Strait into eastern T.

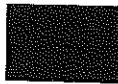


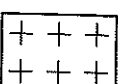
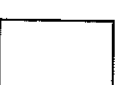
JULY

Because of the lower moisture content of the prevailing SE trade winds in July most of the northern half of the continent remains generally rainless with large areas having no rain at all. It is the middle of the 'dry season'.

The eastern side of Cape York Peninsula has low median rainfall (0–25 mm) for July as does a wide band stretching from the central Q coast across the southern inland to the W coast near Port Hedland.

About one-quarter of Australia has a median monthly rainfall for July of more than 25 mm. This area is also the most densely settled, containing some 95 per cent of Australia's population. A band which has a median monthly rainfall of 25–75 mm extends from just S of Rockhampton (in central Q) through NSW, southern SA and up the W coast of WA to just N of Carnarvon. The E coast of T also has a medium monthly rainfall for July.

During winter, westerly winds and the frequent passage of cold fronts result in much of southern Australia receiving the highest rainfall. Southern V, the Australian Alps, south-western WA and western T all have a median monthly rainfall for July in excess of 75 mm. The highest rainfall occurs in the far SW of WA and in western T where the median monthly rainfall exceeds 200 mm. Snow falls in the Australian Alps and in the higher parts of T.

| Millimetres | | |
|---|-----------|------------------|
|  | Very high | Greater than 200 |
|  | High | 75–200 |
|  | Medium | 25–75 |
|  | Low | 0–25 |
|  | No rain | 0 |

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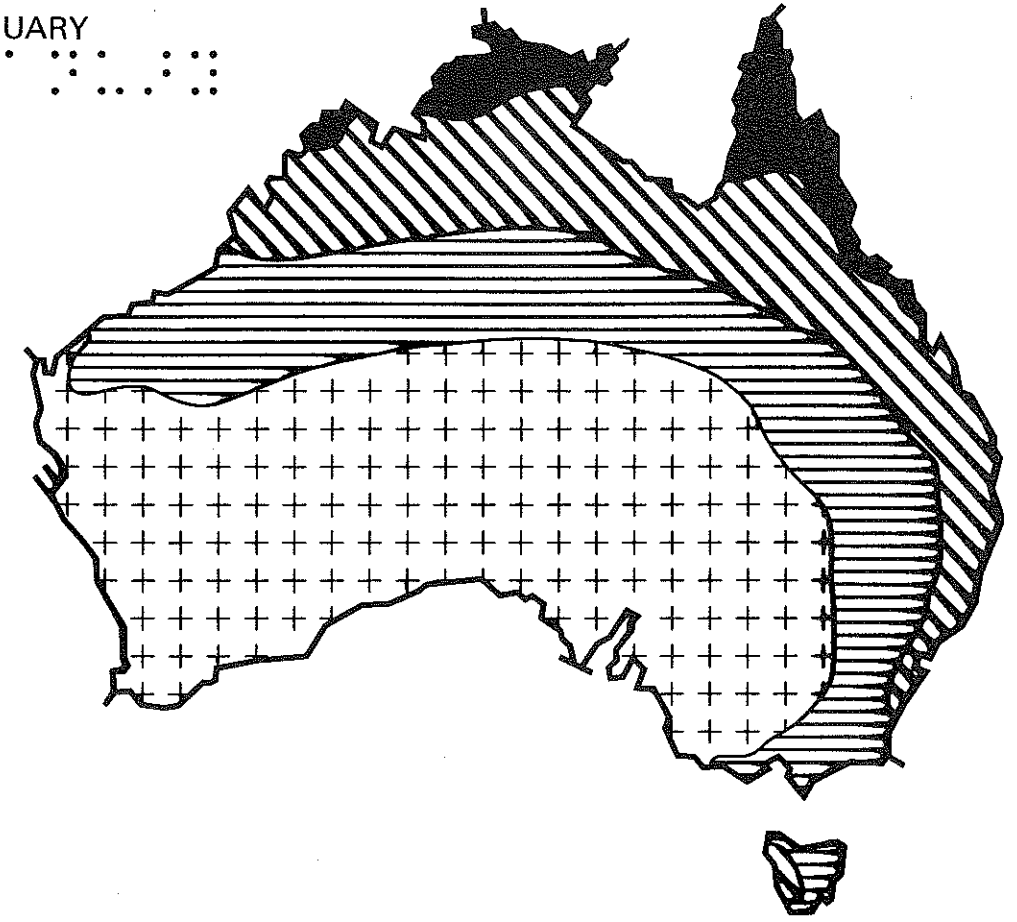
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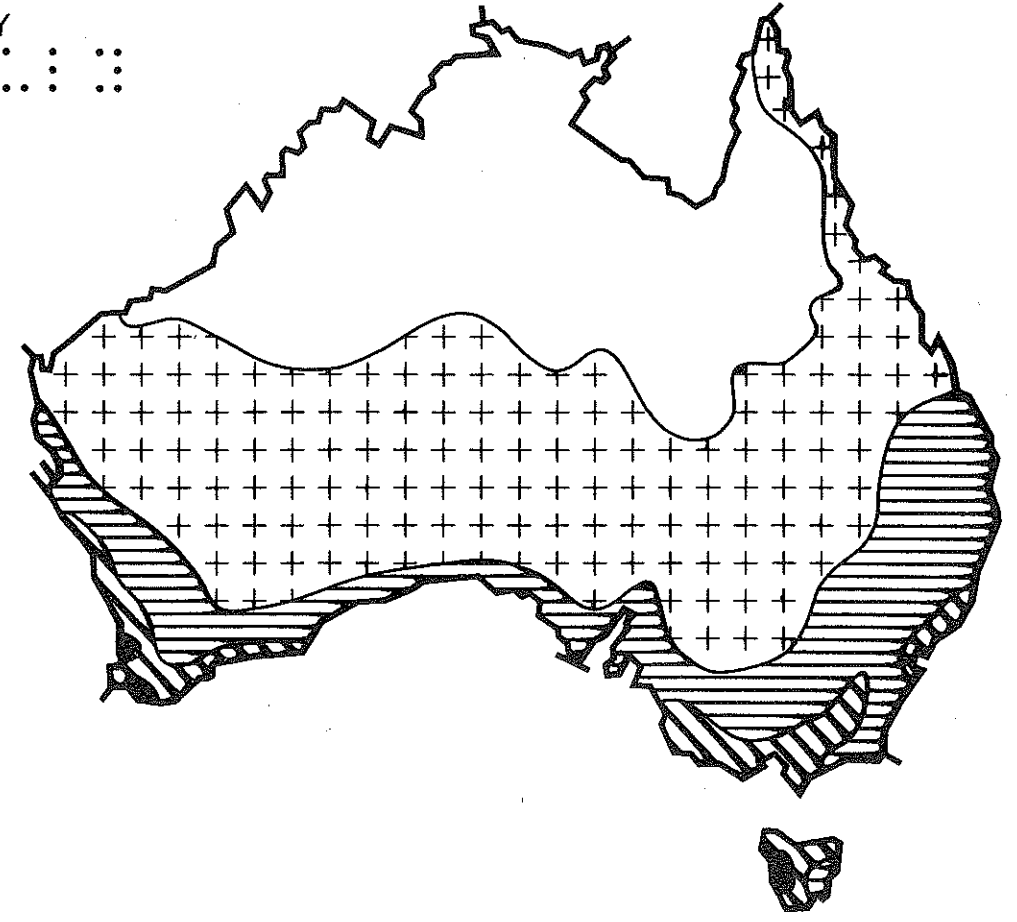
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JANUARY



JULY



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WET DAYS

This map is on the lower left-hand corner of the page with its legend located directly above. It shows the average number of wet days per year, a wet day being any day which receives more than 0.25 mm of rain.

As you would expect, the number of wet days is closely related to the median annual rainfall, so the large area in the centre of the continent with low and very low median annual rainfall (refer to Map 34 *Annual Rainfall*) averages few wet days in a year (less than 40). The pattern of the wet days map varies from that of median annual rainfall due to differences in seasonality of rainfall and the type of rainfall received. In general the number of wet days tends to be higher in the S than in the N.

In the N the rain mainly falls in high intensity showers and thunderstorms in summer so the number of wet days is lower than for places in the S with the same or lower median annual rainfall. In the S rain is more evenly distributed throughout the year and falls in lighter showers and drizzle.

The coast around Cairns (an area too small to show on the map), the SW corner of WA, southern V and all of T average more than 120 wet days per year (around 1 day in 3). In fact, the W coast of T averages over 240 wet days per year or more than 9 wet days every fortnight.

The area around Darwin, the E coast and highlands, southern SA and parts of south-western WA receive 80 to 120 wet days per year. Inland the average number of wet days per year declines through a band of 40 to 80 days into the arid zone, which averages less than 40 wet days per year or around 3 days per month.

SEASONAL RAINFALL

This map is on the top right-hand corner of the page with its legend located to the left. As you discovered from the January and July median monthly rainfall maps the distribution of rainfall throughout the year varies markedly from place to place. In the N the wet season is in summer, whereas in the S rainfall is distributed uniformly throughout the year or falls mainly in winter.

As well as showing the seasonality of rainfall, this map also includes the boundary of the 'arid zone', which covers so much of Australia. Within this zone, rainfall is so low that seasonality is not significant. All the rain for a year may fall in a single storm regardless of the season although, on average over a number of years, most rain falls in the season shown on the map.

Northern Australia, from N of Broome (NW WA) across to Cape York Peninsula, has such contrasting seasons that summer is known as the 'Big Wet' and winter as the 'Dry'. To the S, in Q and northern NSW, there is still a marked summer maximum but the winters are not as dry.

Gradually the summer maximum lessens as you move further S; most of NSW and SE V have uniform rainfall throughout the year. However, the rest of southern Australia experiences its maximum rainfall in winter. SW WA in particular has very high winter rainfall and very dry summers.

RAINFALL VARIABILITY

This map is on the bottom right-hand corner of the page with its legend located to the left. It shows the degree to which annual rainfall varies around the median from year to year. The higher the variability the greater the risk that farmers will not get enough rain for their crops or pastures. In general rainfall is extremely variable over most of the continent. Parts of Australia have a higher variability than other areas of the world which receive similar median annual rainfall.

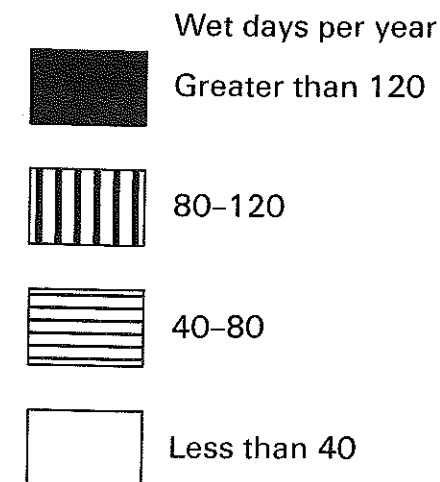
Because of the erratic nature of the rainfall, droughts and floods are quite common. (Droughts are covered in more detail on Map 43 *Climatic Hazards*.)

The pattern of rainfall variability shown on this map is generally concentric; the highest variability is in the centre of the continent and lowest variability occurs around the coast, particularly in the S.

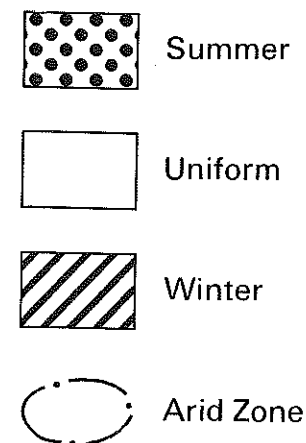
A small area of very high rainfall variability extends from Lake Eyre in SA E through the Simpson Desert to The Channel Country of SW Q. (As mentioned in the commentary for Map 34 *Annual Rainfall*, this area has the lowest median annual rainfall.) It is surrounded by a very large area of high variability which extends from the coast of WA between Broome to the N and around Carnarvon to the S, across the interior of the continent to the coast of Q around Townsville and S into western NSW.

There are three distinct areas with medium rainfall variability — northern Australia; a band extending down much of the E coast and across the Great Australian Bight to the W coast of WA; and eastern T. Relatively low variability is only experienced in SW WA, southern V and SW T.

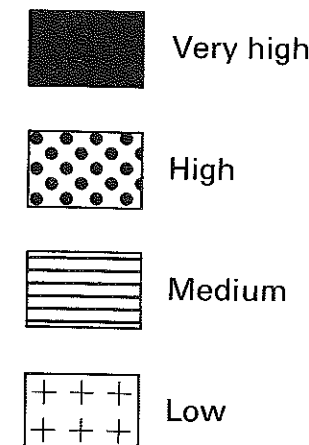
WET DAYS



SEASONAL RAINFALL



RAINFALL VARIABILITY



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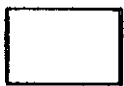
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SEASONAL RAINFALL

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WET DAYS

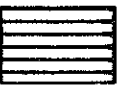
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RAINFALL VARIABILITY

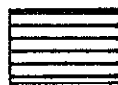
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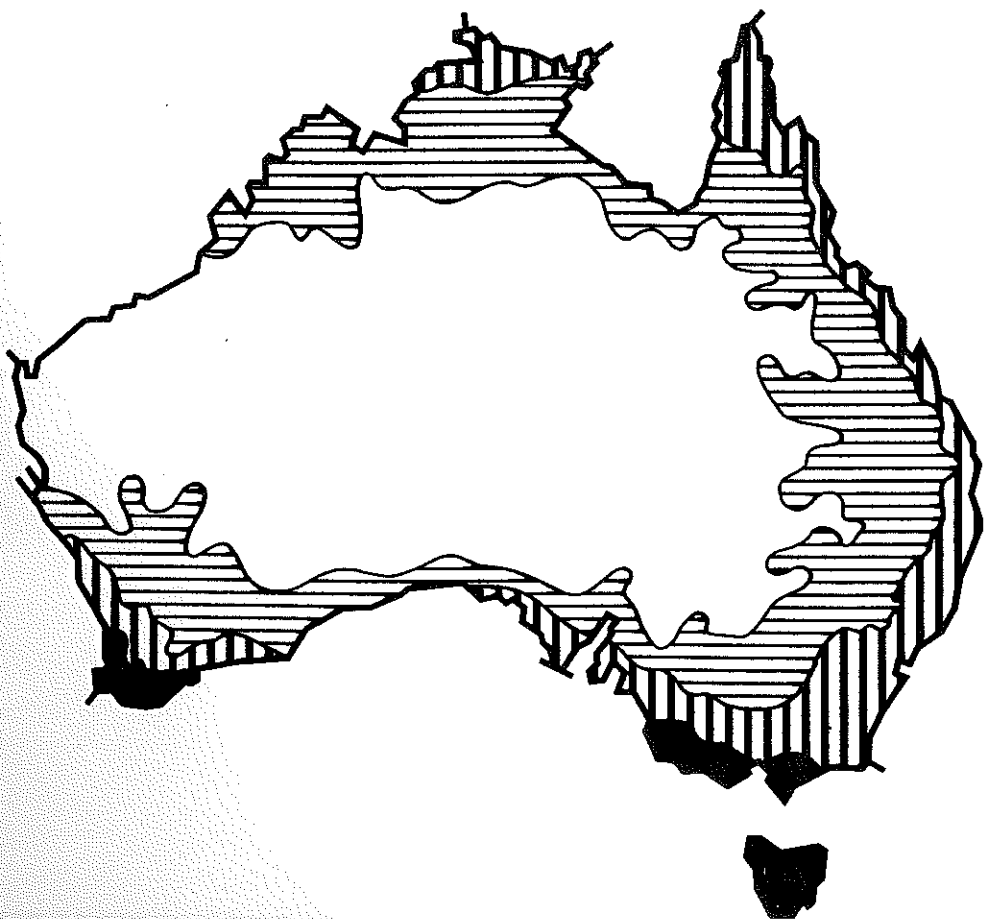
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ANNUAL TEMPERATURE

Australia's location in the subtropical high pressure belt results in most of the continent having clear, dry air and plentiful sunshine for most of the year. This, along with Australia's low altitude and its greatest E-W extent near the Tropic of Capricorn, makes it the hottest continent in terms of duration and intensity of heat. However, frosts are common in the cooler months but are rarely severe or prolonged. Only a very small proportion of Australia is cool enough to receive significant snowfalls.

Unlike Northern Hemisphere continents, the vast oceans surrounding the small continent of Australia insulate it from severe temperature extremes — although summer days are hot, winter nights are rarely very cold. For example, al-Aziziyah (33 degrees N) near the coast in Libya (northern Africa) has recorded the hottest ever air temperature of 57.7 degrees C; the highest for the equivalent latitude in Australia is 50.7 degrees C at Eucla, also near the coast, in southern WA. On the other hand, Australia's lowest temperature yet is -22.2 degrees C recorded at Charlotte Pass in the Snowy Mountains, compared to the world's lowest recorded temperature of -88.3 degrees C at Vostok in Antarctica.

The map on the top right-hand corner of this page shows average annual temperature. It gives a very general indication of temperatures, but to really understand temperature you need to know how much it varies throughout the year and the maximum and minimum daily temperatures. The next five maps cover these aspects of temperature.

Scanning this map you will notice that in general average annual temperature decreases from N to S, although this pattern is modified by altitude, prevailing winds, cloud cover and distance from the sea. The highest average annual temperatures (greater than 27 degrees C) are found along the NW coast of the continent from Port Hedland to E of Darwin, and in a smaller area in N Q at the base of Cape York Peninsula. The area N of a line between Geraldton in WA and across the Q coast just N of Brisbane averages more than 21 degrees C.

The remainder of Australia experiences annual temperatures of less than 21 degrees C, with the eastern highlands of southern Q and northern NSW, the southern highlands of NSW, much of V, T, and a small pocket in SW WA averaging less than 15 degrees C.

TEMPERATURE RANGE

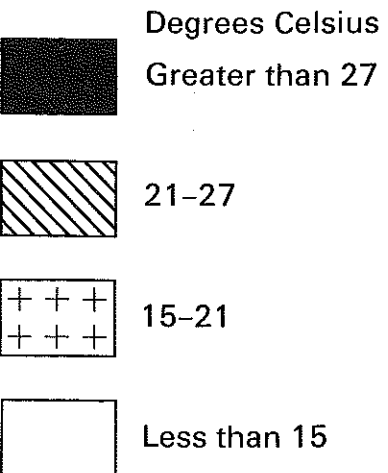
The map on the bottom right-hand corner of the page indicates the difference between the hottest average monthly maximum temperature and the coldest average monthly minimum temperature.

Inland areas have a high temperature range. Temperatures rise rapidly during the day and over much of the continent are high to very high on summer afternoons due to intense heating of the land by the sun. At night, clear calm conditions and dry air allow maximum loss of heat from the land surface, resulting in frequent cold nights and even frosts in winter. Hence large daily and annual temperature ranges are typical of inland areas.

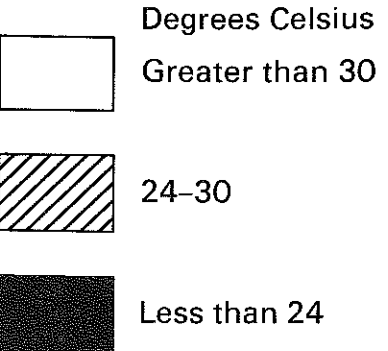
The sea warms up and cools down more slowly than the land and as a result the climate of coastal areas is moderated. In summer, cooling sea breezes often decrease afternoon temperatures. In winter, onshore winds may bring warm air or cool moist air and associated cloudy conditions which help to keep temperatures higher by reducing heat loss at night.

The lowest temperature range in Australia is less than 12 degrees C along small parts of the far northern coastline (too small to indicate separately on this map). A narrow band around the coast of the mainland has a temperature range of less than 24 degrees C as does all of T. Moving inland temperature ranges increase until they exceed 30 degrees C for a broad band running E-W across central Australia. The highest temperature range, exceeding 33 degrees C, is experienced in the Gibson Desert area of central WA.

ANNUAL TEMPERATURE



TEMPERATURE RANGE



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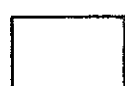
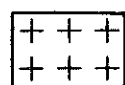
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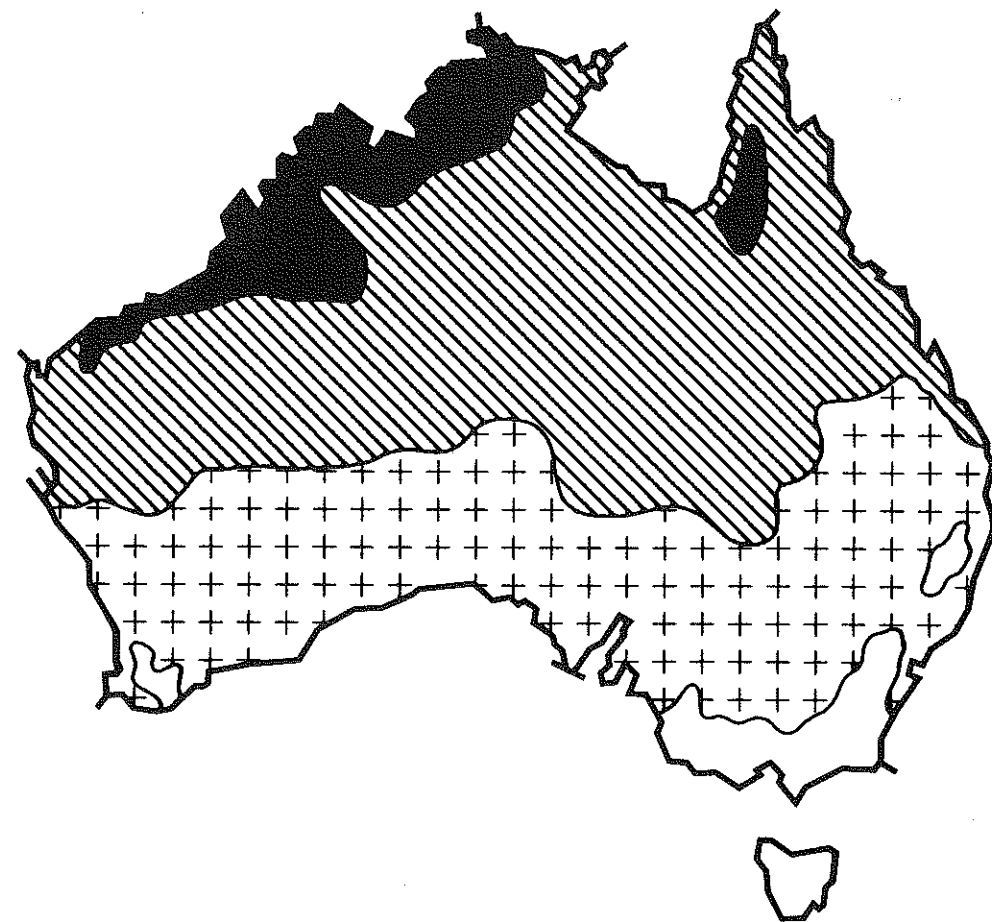
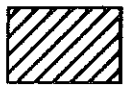
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ANNUAL TEMPERATURE



TEMPERATURE RANGE



Monthly Temperatures

These four maps show the average monthly maximum and minimum temperatures for January and July. All four of these maps share the same legend to make comparisons between them easier. The legend is in the middle of the page, with the January maps on the left-hand side and the July maps on the right-hand side. The maximum maps are at the top whereas the minimum temperature maps are at the bottom.

JANUARY MAXIMUM

With the exception of the coastal and highland areas of southern Australia, average January maximum temperatures are very hot. Most of the country averages over 30 degrees C and nearly half has an average of over 36 degrees C. The area around Marble Bar, inland from Port Hedland in the NW of WA, is consistently the hottest part of Australia throughout the year, with an average daily maximum of 41 degrees C in January.

Much of northern and central Australia averages 36 degrees C or more. However, the moderating influence of the sea and higher altitudes is reflected in the coastal band of lower average maximums around most of northern Australia and in the two slightly cooler areas centred on the Macdonnell Ranges (southern NT) and the Musgrave Ranges (northern SA).

Average maximum temperatures in the coastal areas of southern and SE Australia below about Brisbane are mild (24–30 degrees C). The higher land of eastern NSW and V is also in this category. T and the mountainous areas of SE NSW and NE V experience average daily maximum temperatures of less than 24 degrees C. Some areas too small to show separately on the map have an average maximum for the month of only 15 degrees C.

JANUARY MINIMUM

More than two-thirds of Australia averages daily minimum temperatures in excess of 18 degrees C in January. In fact, average minimum temperatures are higher than 24 degrees C along much of the northern coast and adjacent inland areas, especially in the NW and around the Gulf of Carpentaria.

Over southern Australia, average daily minimum temperatures for January are less than 18 degrees C. In the SE and on parts of the New England Plateau of north-eastern NSW, minimum temperatures fall below 12 degrees C with areas of the Australian Alps and SE T (too small to map) experiencing even lower minimum temperatures of about 6 degrees C.

JULY MAXIMUM

As you would expect, average daily maximum temperatures for July are lower than for January. Only in the far N, where the average daily maximum exceeds 30 degrees C, are the temperatures in the same class on both the January and July maximum temperature maps.

In general, progressively lower temperatures are experienced as you move from N to S. The lowest July maximum temperatures occur in the highlands of the SE and throughout T, which average between 6 degrees C and 12 degrees C; some small parts (which are too small to show on the map) are very cold, with average daily maximum temperatures for the whole month of only 0 degrees C.

JULY MINIMUM

The comparatively simple pattern of decreasing temperatures from N to S as depicted on the July average maximum temperature map is modified around much of the coast by the relative warmth of the sea for this map. Commonly there is a narrow band of near-coastal land which is in a higher category than adjacent inland areas.

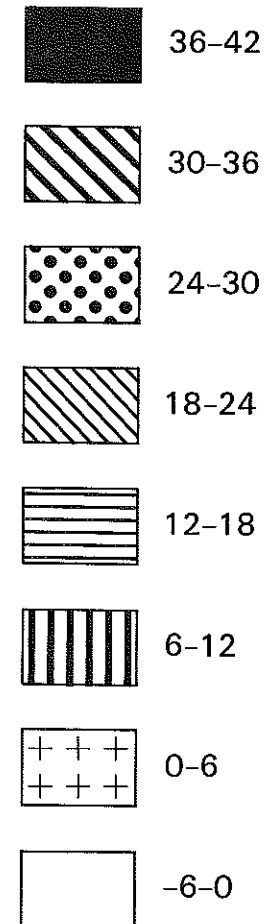
The northernmost parts of Australia, in a more or less continuous strip from around Broome to Cairns, experience minimum average temperatures in excess of 12 degrees C. Very narrow areas along the top of the NT and Cape York Peninsula (too small to distinguish on the map) have average minimum temperatures for July in excess of 18 degrees C.

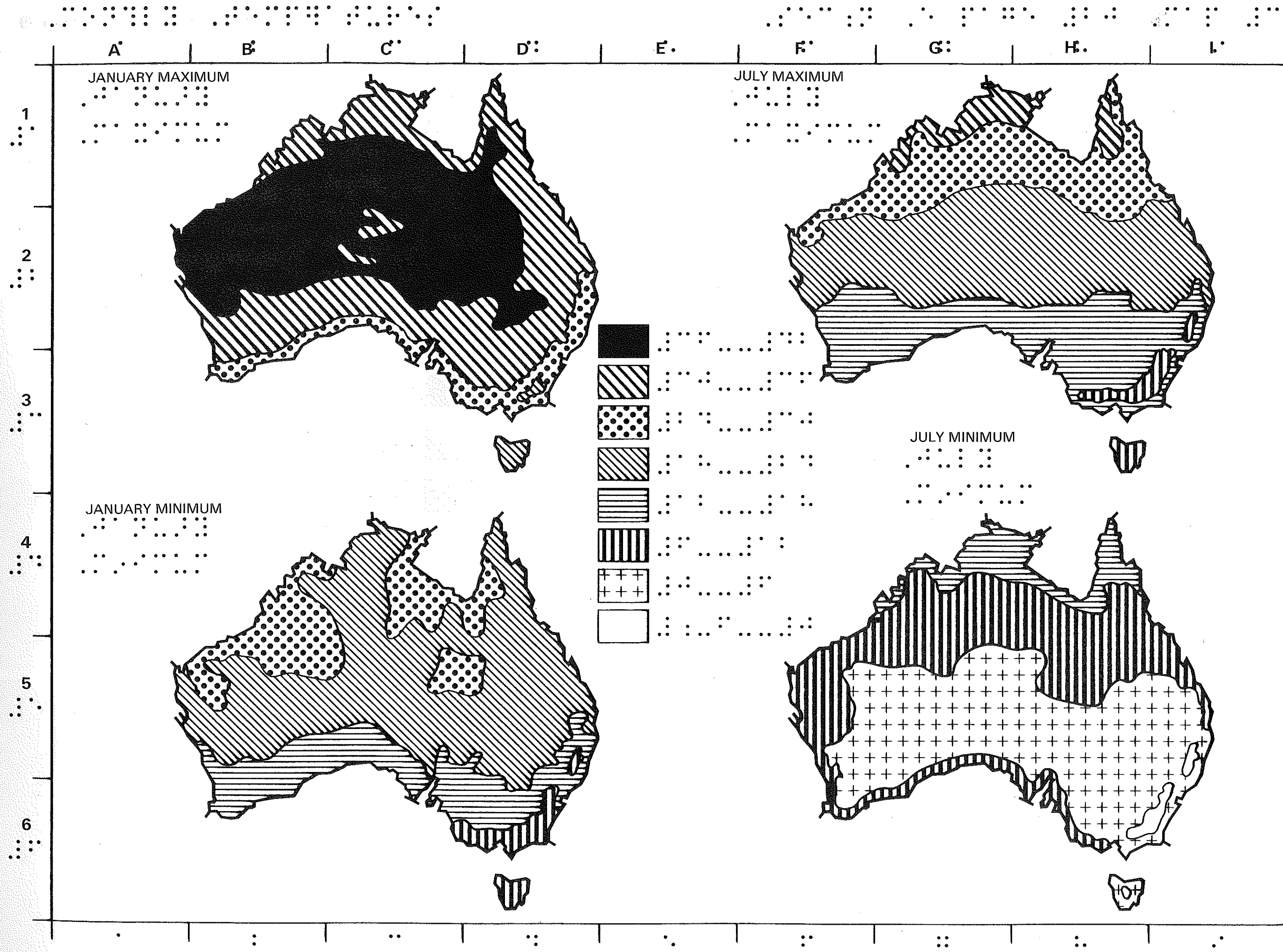
To the S is an extensive band across the continent averaging 6 to 12 degrees C. Narrow extensions run down the E coast as far as Brisbane and down the W coast and across the S coast to Melbourne.

Almost half of Australia has an average minimum temperature for July of less than 6 degrees C. Most of this area falls in the 0–6 degrees class with much averaging above 3 degrees C.

The highlands and T have the lowest average minimum temperatures for July. With increasing altitude minimum temperatures decline rapidly—the New England area, a band of highlands stretching from the Blue Mountains into the Victorian Alps, and central T all have minimum average temperatures for the month of less than 0 degrees C. The area around Mt Kosciusko is consistently the coldest part of Australia throughout the year; in July its minimum temperature averages less than –6 degrees C.

Degrees Celsius





HOT DAYS

The map in the top right-hand corner of the page indicates the average number of 'hot' days per year, that is days when the maximum temperature exceeds 28 degrees C. (However, 28 degrees C would not be considered hot during summer in many areas of Australia.) Two areas in northern Australia experience more than 300 such days per year. The first, in north-western Australia, results from a combination of low latitude and prevailing hot easterly winds which have been heated by their long passage over the hot, dry interior. The second, in northern Q, is also a response to the low latitude but combined with the rain-shadow effect created by the Great Dividing Range.

Surrounding these areas and generally extending to S of the Tropic of Capricorn is a large area which has between 200 and 300 hot days annually. The rest of the country experiences less than 200 hot days annually though only small areas in southern Australia have less than 50: the coast and uplands of the SE and all of T, (where intrusions of cooler southerly air are frequent all year round), and a small area on the Yorke and Eyre Peninsulas of SA and along the southern coast of WA (where cooling onshore easterly breezes keep temperatures down).

In general the amount of solar radiation reaching the ground diminishes southward and causes about a 0.5 degree C temperature decrease with each increasing degree of latitude.

COLD DAYS

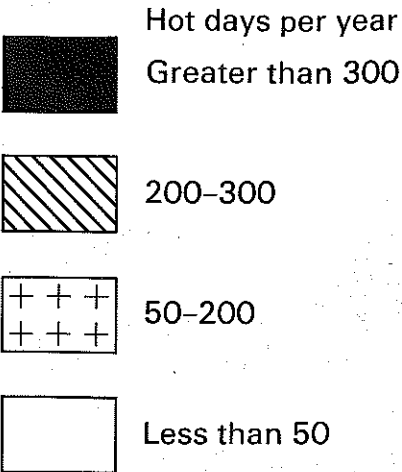
The map in the lower right-hand corner indicates the average number of 'cold' days per year, that is days with a maximum temperature of less than 15 degrees C.

Because Australia is such a hot continent, over three-quarters of it averages less than 20 cold days per year. In fact, as the map shows, the top third of the continent does not have any cold days at all.

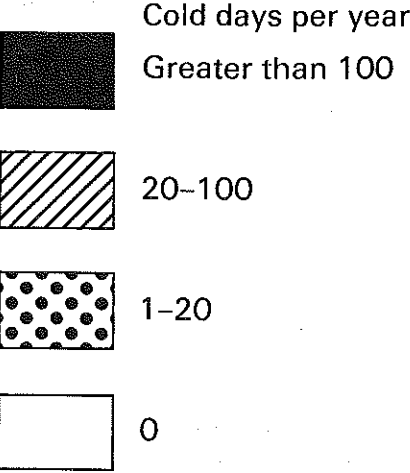
Only in the SE and SW are there substantial areas having more than 20 cold days per year though in the E a finger-like extension along the Great Dividing Range continues as far N as Toowoomba.

Within the SE there is a small area which experiences more than 100 cold days per year due to a combination of factors such as the high latitude, the predominantly higher altitude and the common occurrence of cold fronts associated with Southern Ocean depressions. It includes all of T, and part of V and the adjoining southern highlands of SE NSW.

HOT DAYS



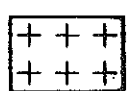
COLD DAYS



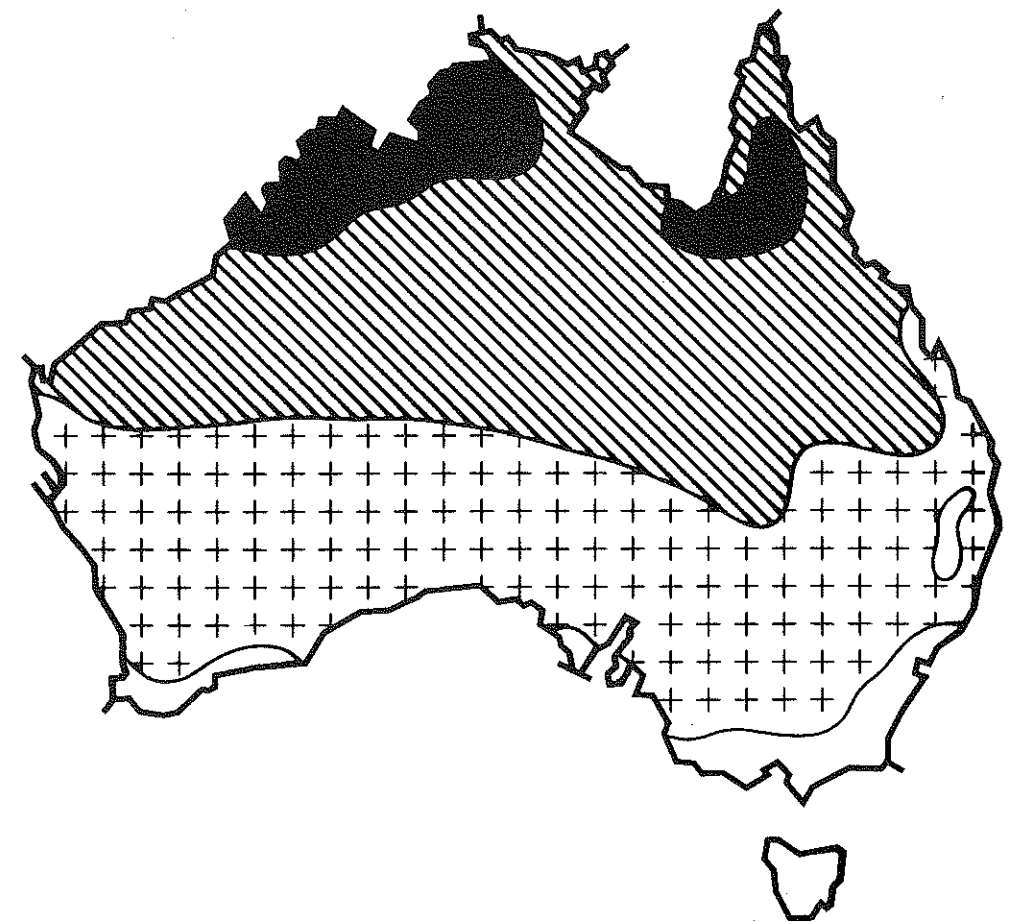
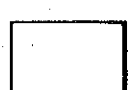
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HOT DAYS



COLD DAYS



Temperature Characteristics - II

WARM MONTHS

This map is on the top right-hand side of the page. It shows the number of warm months per year, a warm month being defined as one with an average temperature of 18 degrees C or more.

As the map shows, the northern half of the continent averages 7 or more warm months per year. Northern Australia, from near Carnarvon on the W coast around to near Townsville on the E coast averages between 11 and 12 warm months per year.

Most of the southern half of the continent, S from about Geraldton on the W coast and Brisbane on the E coast, averages between 3 and 7 warm months per year. A small area encompassing the highlands of central Australia also falls within this category.

Only the SW corner of WA, parts of SE Australia and all of T average less than 3 warm months per year.

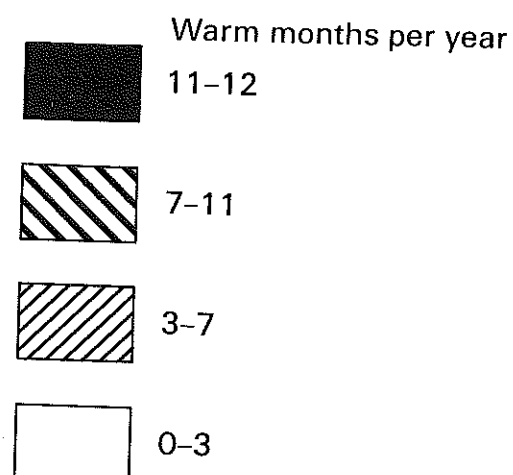
FROST PERIOD

Frosts occur on nights when the grass temperature falls to -1 degrees C or less, or the air temperature falls to 2 degrees C or less. They occur mainly on clear, calm nights between late autumn and spring.

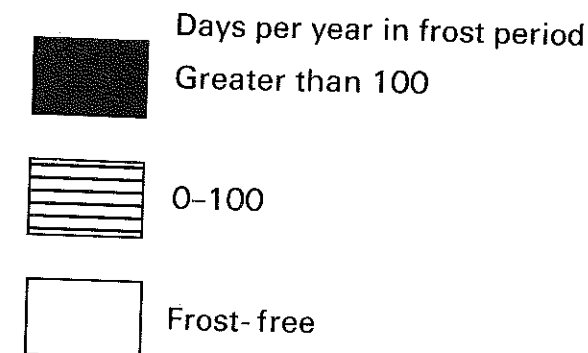
This map, on the bottom right-hand corner of the page, shows the average number of days per year between the first and last recording of an air temperature of 2 degrees C or less. Frost-free areas occur in northern Australia and S along the coastal lowlands to near Port Macquarie in the E and Geraldton in the W. Coastal areas have a much shorter frost period than inland areas due to the modifying effect of onshore winds, moist surface air and greater cloudiness.

Over much of southern inland Australia the frost period is more than 100 days, increasing to over 200 days in the SE highlands. The most prolonged frost period, over 300 days per year, occurs in the Australian Alps and in central T.

WARM MONTHS



FROST PERIOD



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WARM MONTHS



FROST PERIOD



Globally, the areas of highest sunshine coincide with the sub-tropical high pressure belts of the Northern and Southern Hemispheres. Australia, much of which lies within the southern high pressure belt, receives a high amount of sunshine compared to most other countries. The large comparably sunny areas in the Northern Hemisphere are from the Sahara across the Arabian Peninsula to the Persian Gulf and the SW United States of America. Other areas receiving high amounts of sunshine in the Southern Hemisphere include the Atacama Desert in northern Chile and the Kalahari Desert in southern Africa.

The three maps on this page show the average daily hours of bright sunshine for the whole year (bottom left-hand corner), for mid-summer (January — top right-hand corner) and mid-winter (July — bottom right-hand corner). Bright sunshine is recorded when there is no cloud between the sun and the recording instrument. The main factors affecting the duration of bright sunshine are the period between sunrise and sunset, and the occurrence of cloud.

ANNUAL

As this map shows, more than three-quarters of Australia averages at least 8 hours of bright sunshine a day. Only in western T and along a discontinuous narrow coastal strip of the southern mainland are there less than 6 hours of daily sunshine on average. The Channel Country in SW Q and an area in the N of WA running from Port Hedland to the NT border, receive over 10 hours sunshine a day.

JANUARY

There are marked seasonal differences in the duration of sunshine hours across the country as the maps for January and July demonstrate.

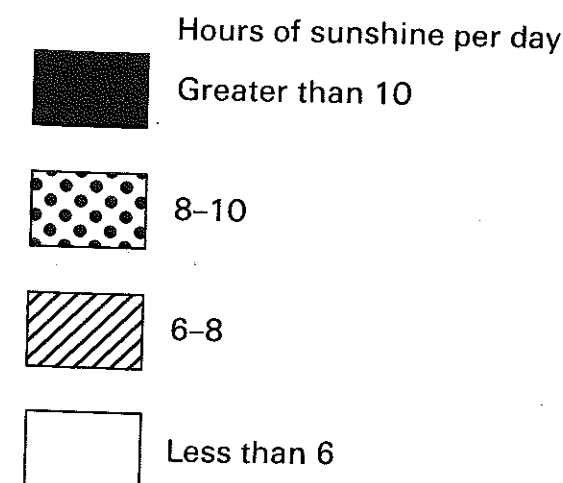
In January the greatest duration of bright sunshine occurs in southern WA and in SA. Lake Eyre, for example, has 80 per cent of the maximum possible duration of sunshine.

Across northern Australia the duration of sunshine is reduced by the daily monsoonal cloud build-up. In T and the far S of the mainland the cloudiness accompanying cool changes reduces the amount of sunshine received despite the maximum possible of nearly 15 hours.

JULY

The map for July shows a shift in the areas receiving over 10 hours of daily sunshine from southern to northern Australia, where the cloudless days of the dry season result in an area from the Kimberleys in the NW of WA, to the NT-Q border receiving close to the maximum possible: about 11 hours a day.

Much of the southern mainland and all of T receive less than 6 hours of sunshine per day in July because of the dominance of mid-latitude depressions and fronts with their associated cloud masses. The duration of sunshine is still further reduced by the short mid-winter days. In western T sunshine hours are reduced to less than 3 a day, only a third of the maximum possible.



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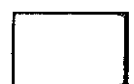
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JANUARY



ANNUAL

JULY



The four most serious climatic hazards experienced in Australia are tropical cyclones, bushfires, floods and drought. Each can be severe enough to cause major economic disruption, destruction of property and loss of life. This map-sheet and the one following depict the distribution of tropical cyclones, bushfires and drought.

Though floods are a common occurrence in many parts of the country, they cannot be meaningfully mapped at the scale of these climatic hazard maps because of their often very localised nature. Other climatic hazards which affect Australia include thunderstorms, gales, tornadoes, hail, lightning and heatwaves.

TROPICAL CYCLONES

Tropical cyclones are very intense low pressure systems accompanied by extremely strong winds and torrential rain. They form over the warm tropical oceans to the N of Australia and, in the 'cyclone season', between November and April, some of them move in over coastal areas of northern Australia.

On average Australia experiences 5 or 6 cyclones per year, though in 1980 3 cyclones crossed the coast in 5 weeks near Port Hedland in WA. Like all weather systems, cyclones move; their track and speed are unpredictable, making preparation for cyclones difficult.

Tropical cyclones have a calm centre (the eye) which is usually 20–30 km in diameter; winds in excess of 120 km per hour generally extend outward for 50–100 km, and winds over 60 km per hour extend to 300 km or more. During Cyclone 'Tracy' which virtually destroyed Darwin in 1974, winds of 217 km per hour were recorded before the recording instrument failed.

The map on the top right-hand corner of the page shows which parts of Australia are most likely to be influenced by tropical cyclones. A coastal band from Geraldton (on the W coast) N around to Coffs Harbour on the E coast can be affected. The most cyclone-prone areas, averaging at least 1 cyclone per year, are along the NW coast of WA, around the Gulf of Carpentaria and the central Q coast.

BUSHFIRES

Australia's hot, dry summers, coupled with strong winds and thunderstorms, make bushfires a major hazard. Of the climatic hazards that affect Australia, bushfires cause the greatest loss of life. The infamous 'Ash Wednesday' fires of February 1983 in V and SA claimed the lives of 70 people and caused damage estimated at \$400 million.

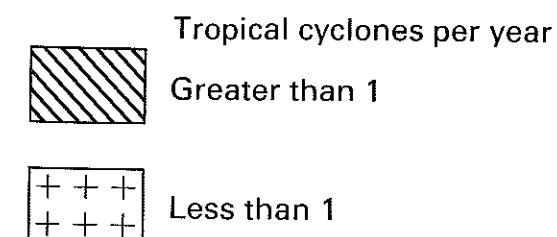
The map on the bottom right-hand corner of the page shows the average number of years between large bushfires. (A large bushfire is defined as one which cannot be controlled at an initial attempt and burns for more than one day.)

Over two-thirds of Australia averages more than 20 years between large fires. However, this figure may be underestimated because of low reporting rates and the extensive use of fire as a management tool. The desert areas of central Australia have the longest period between fires, as it is only after heavy rain that there is sufficient vegetation to support a fire.

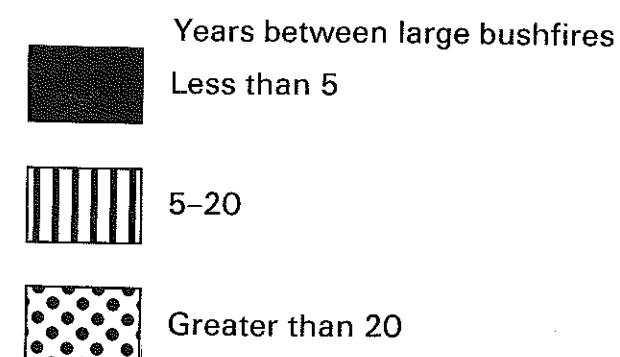
Fires are moderately frequent (5–20 years between large fires) in areas around Darwin, Alice Springs, Perth, Adelaide, Hobart and in a band extending from the Q coast near Fraser Island through central NSW and into western V.

The area most prone to large bushfires is the coastal zone of NSW extending into the highlands of V, where large fires occur on average at least every 5 years. Other areas most prone to large fires (but too small to map) also occur on the outskirts of Perth, Adelaide and Hobart. Climate and relief make fires difficult to control and more fires are lit in such areas, largely because of the high population. These are also areas where fires can cause much damage and loss of life.

TROPICAL CYCLONES



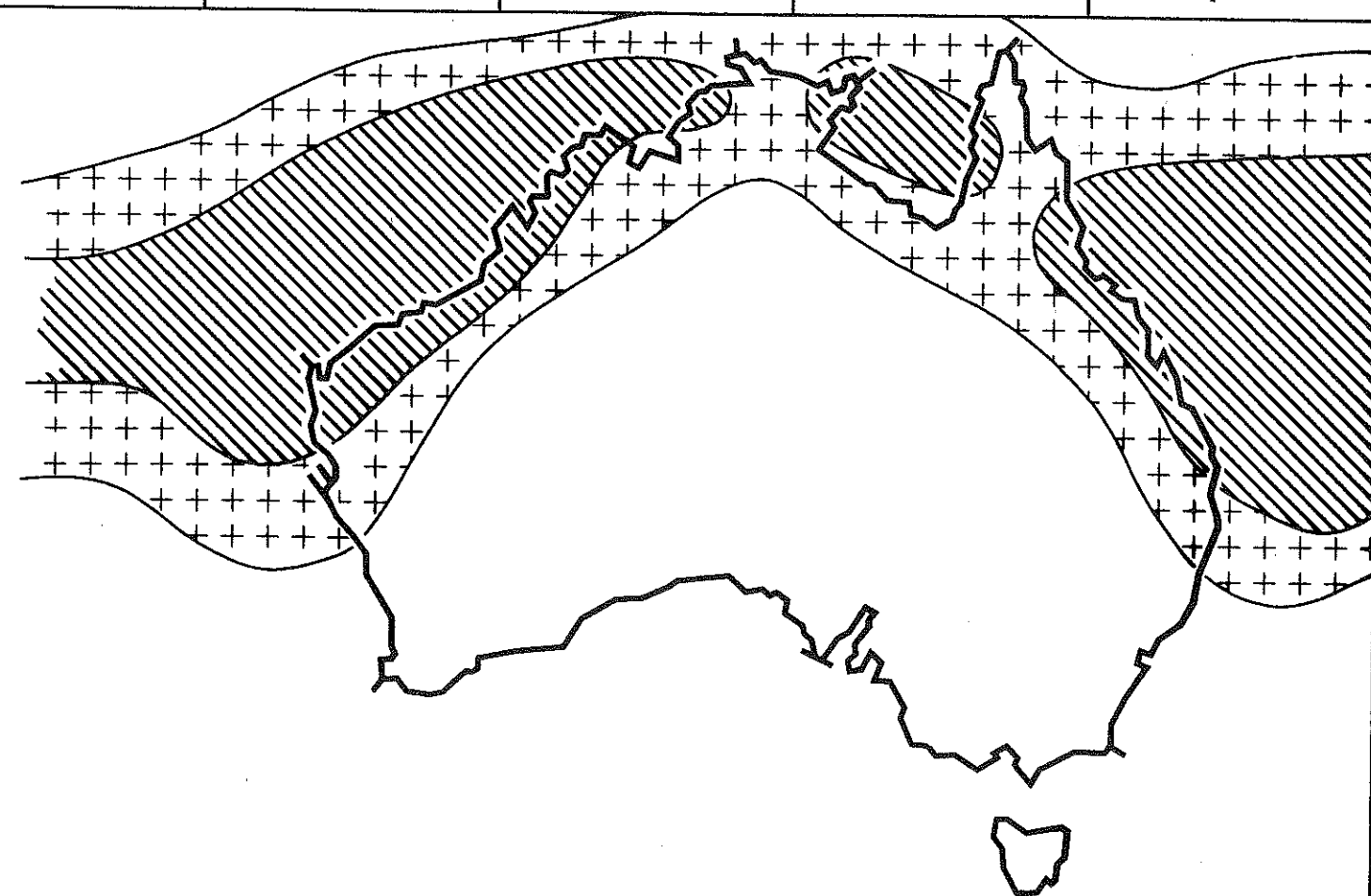
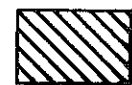
BUSHFIRES



A B C D E F G H I

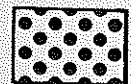
TROPICAL CYCLONES

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BUSHFIRES

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Highly variable rainfall and high evaporation rates lead to frequent droughts in Australia. Of the climatic hazards affecting Australia, droughts have the greatest economic impact. However, because of the length of time they take to develop and the large areas they cover, it is very difficult to define the extent and frequency of droughts.

Drought is associated with a time of lower than normal rainfall rather than with areas of low rainfall. Like all climatic hazards, the climatic event itself does not constitute a hazard, it is the effect of the event on people which creates the hazard. As so much of the country is close to the lower limit of useful rainfall, the erratic and unpredictable nature of droughts makes them so critical. Since 1984 there have been at least 10 major droughts affecting more than 20 per cent of Australia.

DROUGHT INCIDENCE 1965–80

The first map, on the top right-hand corner of the page, shows the percentage of time from 1965 to 1980 when markedly lower than average rainfall was experienced.

A low incidence of drought occurred on the northern tip of Cape York Peninsula and in two areas around Port Hedland and Wyndham in the NW of WA. However, the low incidence recorded in these parts of WA is partly due to the several normally rainless months in the dry season during which the rainfall deficiency cannot be measured.

Between 1965 and 1980 a large area in southern WA, The Channel Country of SW Q, a band from just W of Adelaide extending into southern Q and SE NSW all experienced a serious rainfall deficiency. With the exception of SE NSW, these areas all experience low and highly variable rainfall (refer to Map 36 *Rainfall Variability*).

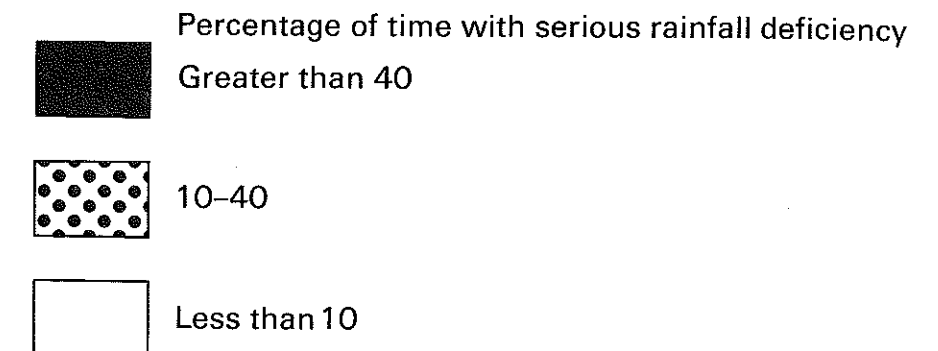
DROUGHT 1982–83

The second map, on the bottom right-hand side of the page, shows the extend of drought-affected areas in 1982–83. By comparing this map with the one above, the unpredictability of drought becomes apparent.

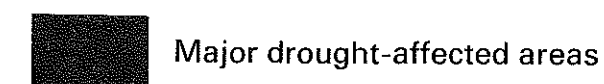
During 1982–83, the northern part of the NT, the SW corner of WA, north-eastern T and much of eastern Australia experienced drought. This drought even included Cape York Peninsula, an area with a normally very reliable rainfall. However, its greatest effect was felt in areas with a moderate incidence of rainfall deficiency. It was the worst drought on record in eastern and south-eastern Australia. In NSW, for example, 95 per cent of all farms were affected.

It is estimated that the drought cost Australia between \$2000 million and \$3000 million. But while eastern Australia was in the grip of the drought, much of the agricultural area of WA experienced better than average rainfall and productivity.

DROUGHT INCIDENCE 1965–80



DROUGHT 1982–83



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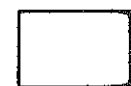
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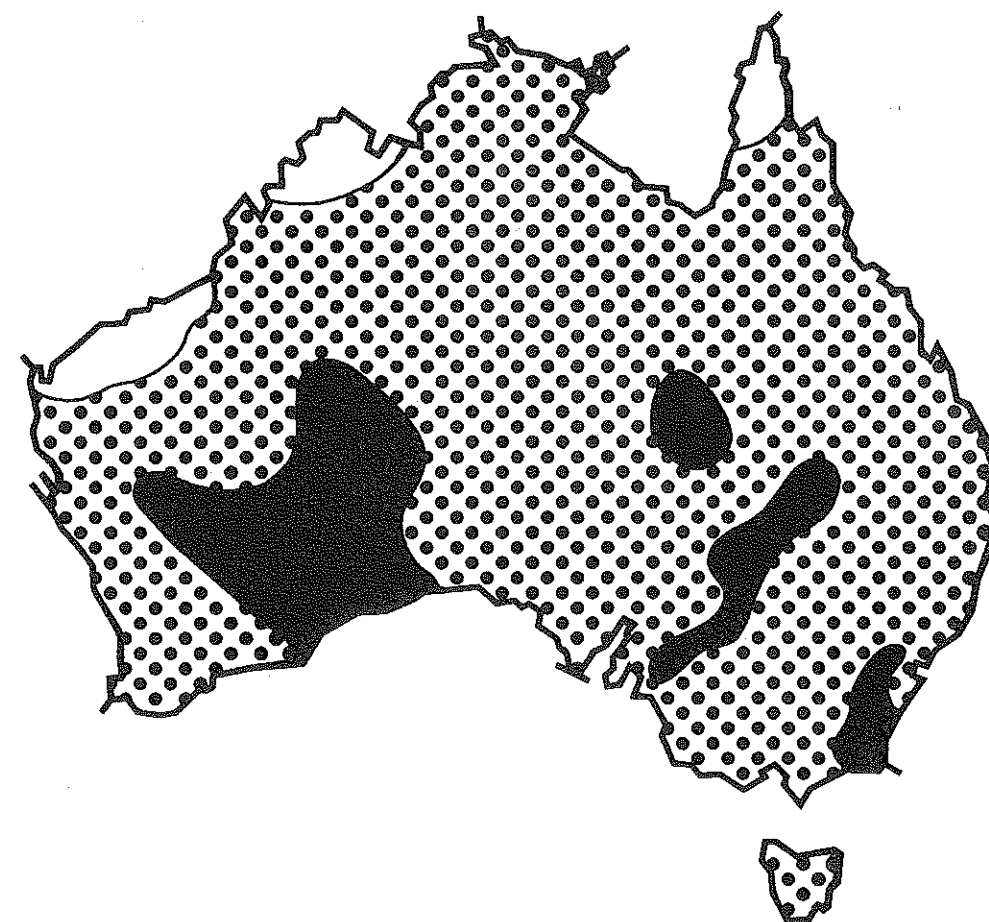
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DROUGHT INCIDENCE 1965-80



1982-83 DROUGHT



Low rainfall and high evaporation over much of Australia limit the availability of surface water. Only a small proportion of the low rainfall — about 12 per cent on average — actually runs off the land surface into streams. The remainder either evaporates or is absorbed into the soil.

The accompanying map shows average annual runoff. Annual runoff is the estimated depth of all the water to flow off an area in a year. Australia's total annual runoff is estimated to be some 400 000 000 million litres (L). This would cover an area of 400 sq km to a depth of 1 km, but this is equivalent to a depth of just 57 mm across the whole country. By comparison, the next wettest non-polar continent, Europe, has about 6 times Australia's total annual runoff.

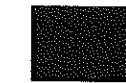
Comparing this map to Map 34 *Annual Rainfall*, the patterns are similar although there is much less runoff than rainfall. Differences between the two maps result from variations from place to place in evaporation rates and in the amount of rain absorbed into the soil. There are also differences due to the runoff map showing averages whereas the rainfall map shows median values.

The main feature of this map is the enormous area of central Australia that has little or no runoff (that is, less than 10 mm a year). In fact, over two-thirds of Australia accounts for less than 5 per cent of the total runoff. Runoff of between 10 and 100 mm is received by a band running from the NW of WA roughly parallel with the coast through the NT, Q, NSW and V and back to the coast in SA. Another area with 10 to 100 mm extends from around Perth across the SW of WA and there are small areas in the Pilbara (D4) and around Alice Springs (F3).

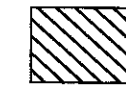
The coastal areas of northern and eastern Australia, T and the SW corner of WA all average more than 100 mm a year. Pockets along the coast and in the Snowy Mountains, as well as western T all enjoy an average runoff of over 500 mm per year. The highest runoff, over 1000 mm, occurs in small coastal areas around Cairns (H2) and near the tip of Cape York (H1) in northern Q.

The close linkage between rainfall and runoff means that runoff is subject to the variations over time described in the rainfall commentaries. Even though northern Australia has high runoff, it is concentrated in the summer wet season and so, as Map 26 *Drainage Systems* shows, streams in the N are seasonal.

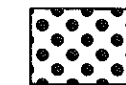
Runoff (millimetres)



Greater than 500



100-500

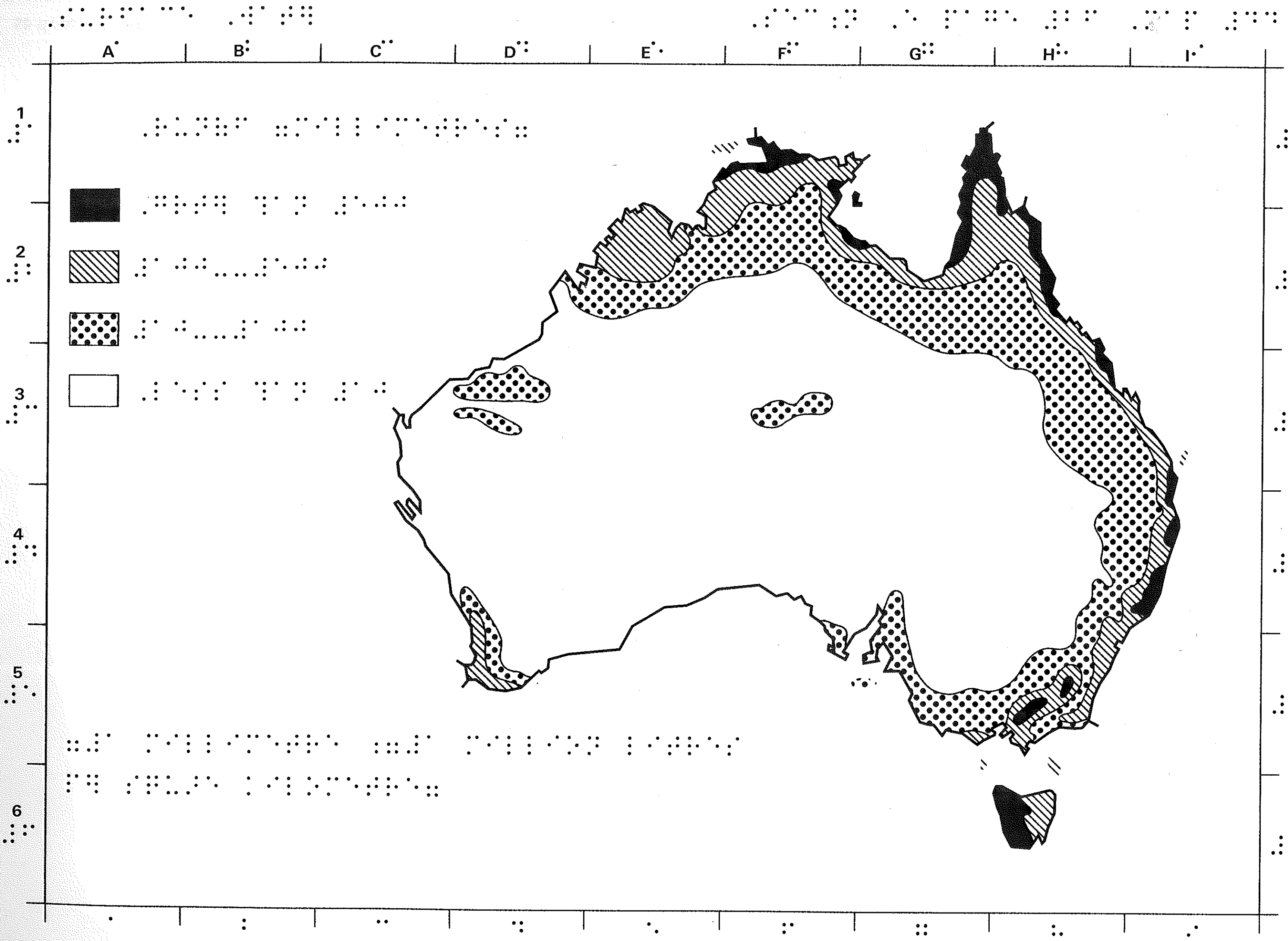


10-100



Less than 10

(1 millimetre = 1 million litres per square kilometre)



This map shows the possible annual yield of fresh and marginal quality groundwater. In a dry country such as Australia, groundwater is an important source of water for irrigation, stock, domestic and industrial use. The inland pastoral industry and many important mining settlements rely on the presence of groundwater. Although useful supplies cannot be tapped everywhere, groundwater is a reliable substitute for surface water across at least two-thirds of Australia. Even where surface water is available, groundwater is often used to supplement supplies.

Groundwater is mainly derived from rainfall or from streamflow which seeps through the soil. It is eventually trapped and stored in an underlying geological structure called an aquifer. Water may be stored underground for thousands and even millions of years. After long periods underground water quality may suffer; most often it becomes salty and much groundwater is too salty for use.

Fresh and marginal water, as depicted on the map, are considered suitable for human consumption and irrigation. Poorer quality water occurs in many areas and is used by the pastoral industry of the interior, where fresh or marginal quality water is not available. Stock can tolerate much higher salinity; sheep are most tolerant and can survive on water 10 times more saline than humans. Such water is still only half as salty as the sea!

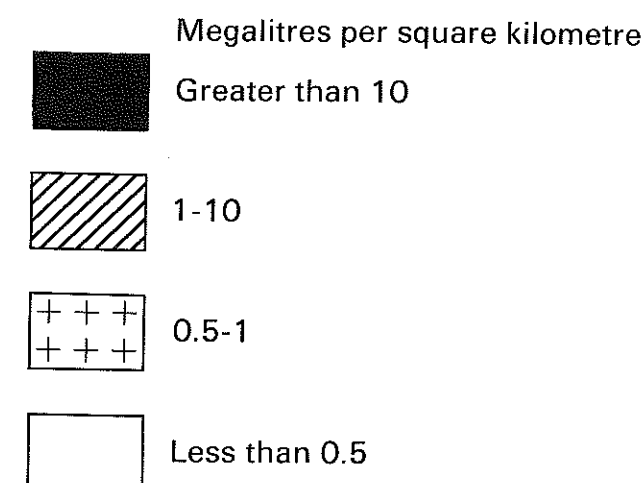
The map shows the total possible amounts of water that can be drawn from the aquifers for sustained use in a year. Greater amounts could be withdrawn but would exceed the amount of water entering the aquifer so that it would eventually dry out or the water quality would suffer.

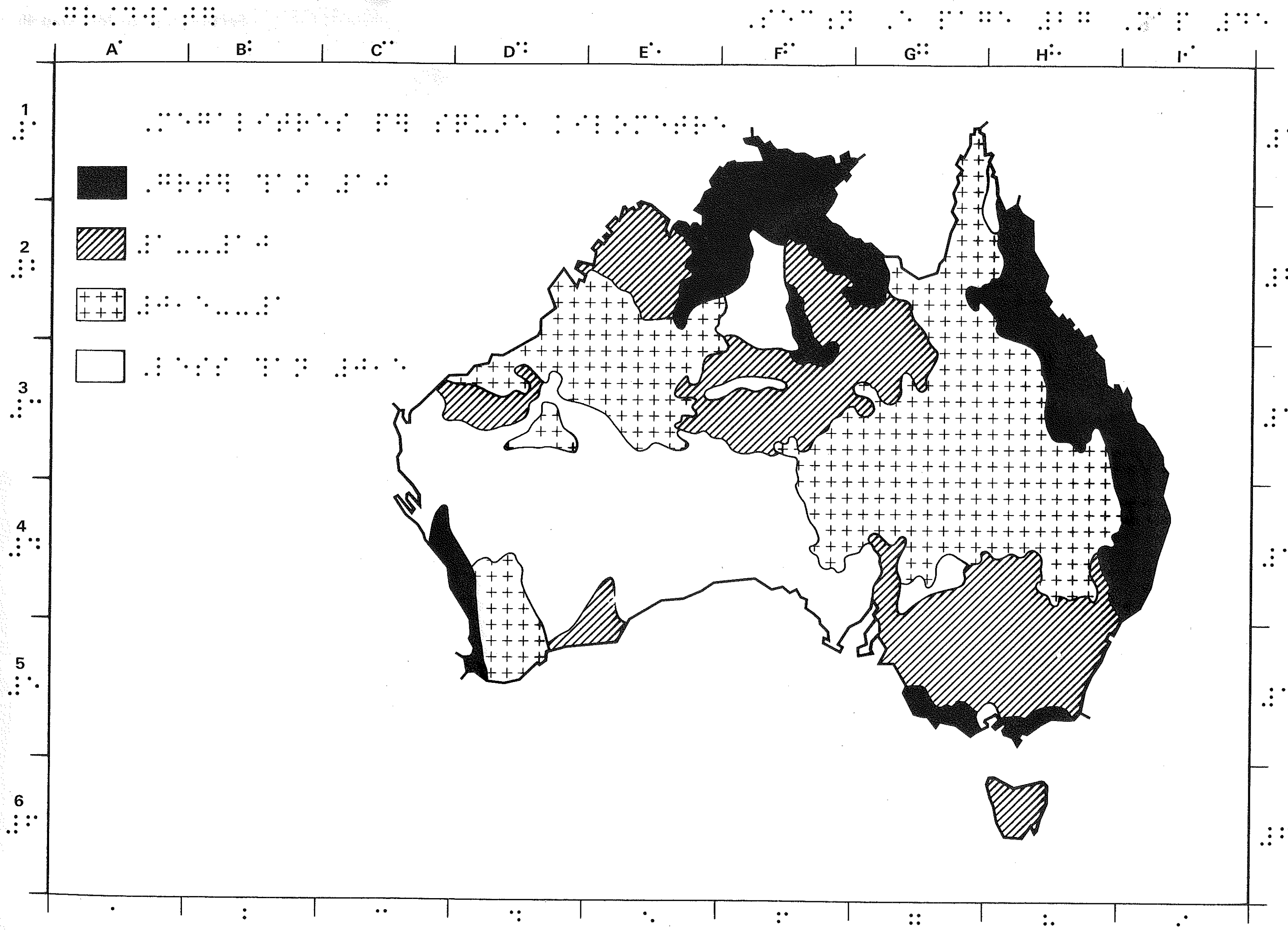
A number of areas of high yield, greater than 10 megalitres (ML) per sq km, are depicted on the map. A large area in the northern NT serves the cattle industry through the dry season. High yielding aquifers occur along much of the E coast of Australia where rainfall is high. Smaller high yield areas include two basins on the southern coast of V and the important aquifers along the SW coast of WA which provide important industrial and domestic supplies.

Areas of slightly lower yield (1–10 ML per sq km) are found in the Kimberleys (E2) and the Hamersley Ranges (D3) in WA and a large area of the NT including important aquifers around Alice Springs. In the SE an extensive area covering much of NSW, V and eastern SA has a yield of between 1 and 10 ML per sq km. All of T and an area around Esperance (E5) in southern WA are also within this yield class.

Elsewhere, groundwater yields are generally low. However, a large area yielding between 0.5 and 1 ML per sq km extends from eastern Q into north-western NSW and north-eastern SA. This is the famous 'Great Artesian Basin', one of the world's largest groundwater basins, which underlies a total area of 1.7 million sq km. Even though this area falls into the second lowest class of groundwater yield, it provides large amounts of water for stock purposes and is very important to the pastoral industry of Australia.

Yields are lower than 0.5 ML per sq km over much of SA and the southern half of WA, and in an area in the centre of the NT.





This map depicts the natural vegetation of Australia, whereas the next two map-sheets (*Major Vegetation Types I and II*) give the distribution of some of the important vegetation groups — for example, eucalyptus and acacia (wattles). Natural vegetation is the vegetation found in Australia before European settlement began and before any modification from clearing and grazing occurred.

In the higher rainfall areas of northern and eastern Australia and the SW corner of WA, the natural vegetation was dominated by trees. A tree is defined as a woody plant with a single stem, usually more than 8 m high. The distinctive tree of Australia is the eucalyptus of which there are over 500 kinds. Other important trees include various kinds of acacias (wattles) and trees of the rainforests.

In the E and the SW much of the land which was dominated by trees before European settlement has now been cleared for crops and grazing, in particular for wheat and sheep. It represents the most productive agricultural land in Australia, and the most densely settled area. Needless to say the natural tree vegetation survives mainly in areas too rugged to farm (areas that the early settlers did not consider worth clearing). Many of these areas are now part of national parks and forestry reserves.

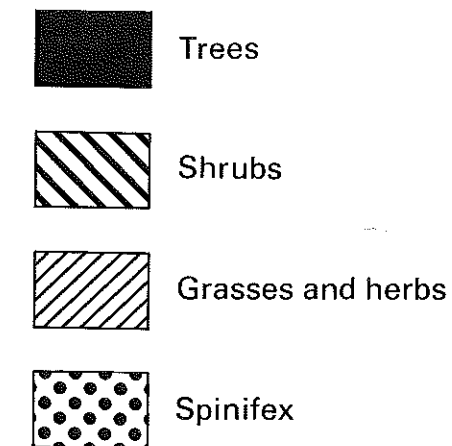
In the lower rainfall areas of southern Australia, the natural vegetation is dominated by shrubs. A shrub is defined as a woody plant with several stems, usually less than 8 m high. The distinctive shrubs of Australia include many kinds of eucalyptus (mallee) and acacias, as well as saltbush and bluebush. Some areas originally covered with this vegetation have been cleared for cropping (particularly in the SE of SA), while the remainder is grazed by cattle and sheep.

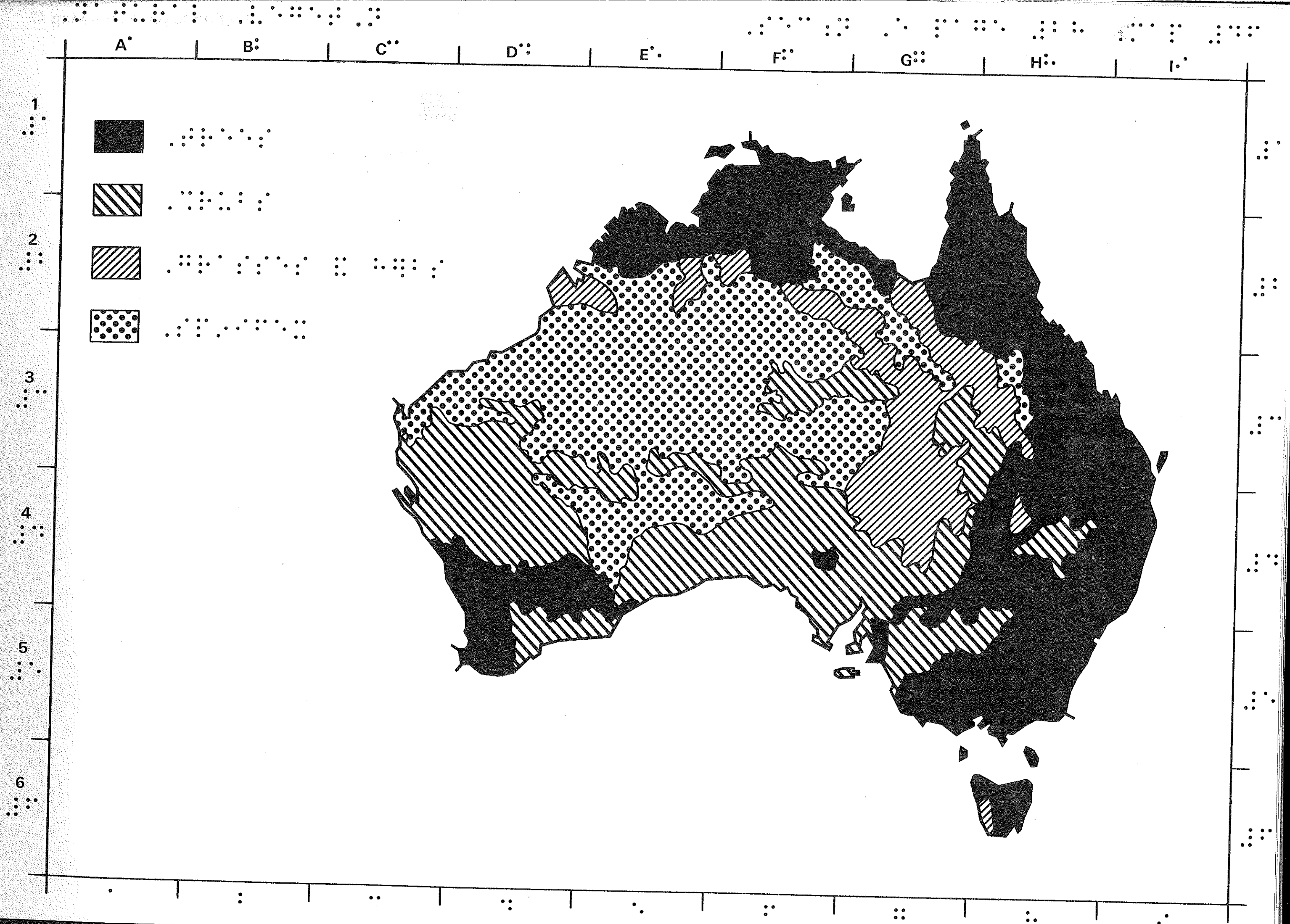
In the interior of eastern Australia, in lower rainfall areas or on heavy clay soils, the natural vegetation is dominated by grasses and other herbaceous plants. Mitchell grass is one of the most prominent of these grasses while the distinctive herbaceous plants include small relatives of the saltbush.

In much of central and western Australia where the rainfall is both low and unreliable, the vegetation is dominated by spinifex, especially on sandy or rocky ground. This is an unusual kind of grass which forms dense circular mounds up to 1 m high. It has densely branched stems and long leaves rolled into spines, hence its common name.

Many factors influence the vegetation of an area. The most important are probably climate (in particular rainfall and temperature), and soils and man. The generally hot and dry climate of Australia, coupled with poor soils, has greatly influenced the distribution of natural vegetation as discussed above.

It is interesting to note that the natural vegetation types shown on this map are not mutually exclusive; they only indicate the dominant vegetation. For instance, in a forest it is common to find shrubs and grasses, while in areas dominated by grasses and herbs occasional trees can be found. Similarly, on the next two map-sheets, an area which is dominated by say eucalyptus forest will contain trees and shrubs of other species as well as grasses and herbs.





RAINFOREST AND SPINIFEX

Rainforest occurs in areas of very high rainfall, often on good soils, along parts of the E coast and T. In addition to the areas mapped, many other patches of rainforest too small to depict at this scale occur in moist gullies along the fringing mountains. Rainforest is a very dense forest which, in the tropical N, consists of many different trees and shrubs. In the temperate S, particularly in T, the southern beech is the predominant tree in many areas.

Many of the larger trees produce high quality furniture-making timber, thus creating a conflict with conservation. It used to be thought that the plants of the Australian rainforests had originated in the tropical countries to the N. However, they are now regarded rather as the descendants of a very ancient Australian flora.

At the other extreme spinifex occurs throughout the extensive areas of very low rainfall and poor soils in central and north-western Australia. It is described in the previous commentary. Most of the area covered by spinifex is unused, it is not suitable for agriculture and it has very limited grazing value. The Aborigines had a tradition of burning the spinifex to encourage the growth of more useful herbs which would then attract game for them to hunt.

SALTBUSH, BLUEBUSH AND GRASSLANDS

Saltbush and bluebush provide most of the better grazing land for domestic livestock in the lower rainfall areas. They are low shrubs which usually occur on salty or limey soils. They have small leaves which are often quite fleshy and palatable to sheep. In some areas they have been thinned out by the effects of grazing, drought, fire and rabbits.


The major grasslands of Australia occur on the Barkly Tableland area of north-eastern NT and in the NW of Q. They consist mainly of Mitchell grass and occur largely on clay soils. This grass is quite tall and dense in wet years and recovers quickly after drought. Mitchell grass is used for grazing both by cattle and sheep. In fact sheep found N of the Tropic are grazed on the Mitchell grasslands.


RAINFOREST AND SPINIFEX

 Rainforest

 Spinifex

SALTBUSH, BLUEBUSH AND GRASSLANDS

 Saltbush and bluebush

 Grasslands (mainly Mitchell grass)

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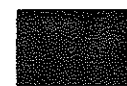
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RAINFOREST AND SPINIFEX



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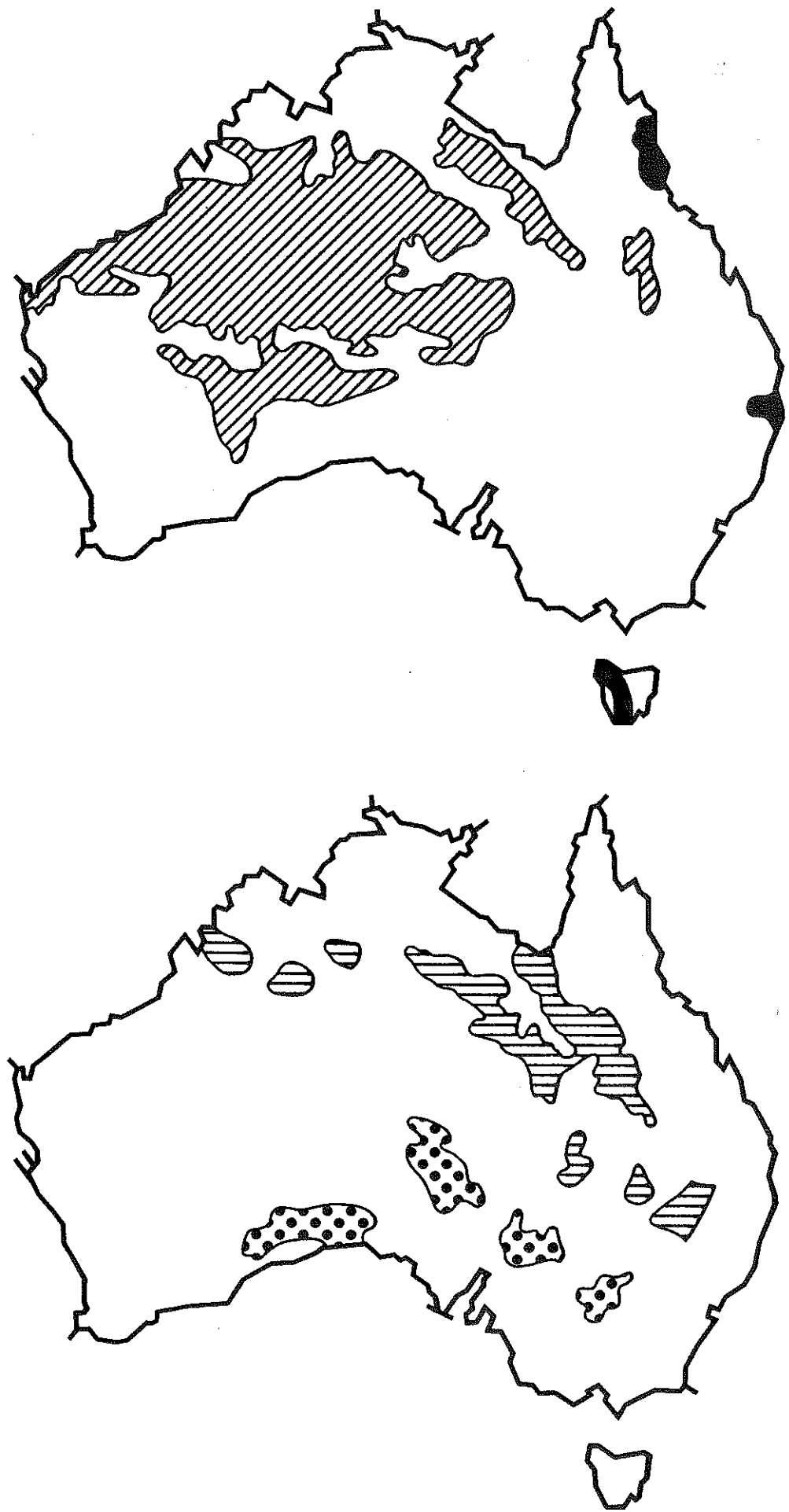
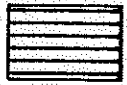
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SALTBUSH, BLUEBUSH AND GRASSLANDS

5



6



Major Vegetation Types - II

EUCALYPTUS

Eucalyptus trees and shrubs are a characteristic component of the vegetation of Australia. They all have leathery leaves that give off a distinctive aromatic odour when crushed. There are hundreds of different kinds of eucalyptus, ranging in size from trees nearly 100 m high down to shrubs. In V and T, in the past, some examples of mountain ash (*Eucalyptus regnans*) exceeding 100 m in height were found, making it the tallest flowering plant in the world.

Vegetation dominated by trees is described as forest if the trees grow closely together and their canopy (the highest part of the forest) shades at least 30 per cent of the ground, or described as woodland if the trees are widely spaced and their canopy shades between 10 and 30 per cent of the ground.

Eucalyptus forests occur in wetter coastal and upland areas. Woodlands occur in somewhat drier, adjoining inland areas. Eucalyptus shrubland (commonly called mallee — its Aboriginal name) is restricted to drier areas in the S, from western V to southern WA. Much of the forest has been cleared for sown pastures, whereas woodland and mallee have been extensively cleared for wheat cropping.

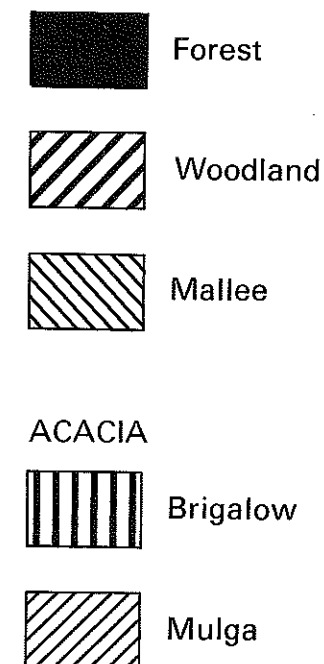
The remaining eucalyptus forests are a major source of hardwood timber. Eucalyptus is so valued for forestry purposes that these Australian trees are now grown throughout the world.

ACACIA

Acacia (commonly known as wattle) is another characteristic component of Australian vegetation. There are hundreds of different kinds of acacia. Most are shrubs but some are trees up to 15 m or more in height. Some are even large enough to be useful timber trees (for example the blackwood, which can grow to 30 m and is valued for furniture making).

Brigalow and mulga are two of the best known types of acacia. Brigalow is a tree that grows on heavy soils in central Q, though considerable clearance for agriculture has occurred and little now remains. Mulga is a small tree or a tall shrub that is widespread in drier areas, where it provides useful browsing for sheep and cattle.

EUCALYPTUS



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EUCALYPTUS

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ACACIA



Section F

Gazetteer

This gazetteer lists all features named on the maps in Volume 1 of the Atlas. It also gives you details of where to locate them on the maps.

Names are listed alphabetically and each is followed in turn by its abbreviation as used on the map, the number of the map on which it can be found, and then its alphanumeric location on the map-sheet. Most map features are indexed to the largest scale map on which they appear.

The following notes will help you to more easily locate the names you are interested in:

- In general, alphanumeric codes refer to the centre of areal features, to the position of the name or abbreviation in the case of linear features, and to the actual location of point features.
- Features which appear on the capital city maps are indexed twice if they also occur on another map. The reference to the capital city map is distinguished by the abbreviation 'c' after the feature name.
- Names appearing on the inner-city maps are grouped together and listed in alphabetical order immediately after their city name.
- Abbreviations are replaced by the symbol '—' in cases where the name appears in full on the map being referenced.

| Name | Abbreviation | Map Number | Alphanumeric Code |
|---------------------------------------|--------------|------------|-------------------|
| Aberfoyle Park | ap | 19 | E5 |
| Adelaide | A | 3 | G5 |
| Adelaide Airport | ada | 19 | D4 |
| Adelaide Inner-city: | | | |
| Adelaide Oval | a | 20 | G3 |
| Adelaide Railway Station and Casino | b | 20 | G3 |
| Adelaide Zoo | c | 20 | H2 |
| Art Gallery of South Australia | d | 20 | H3 |
| Botanic Gardens | e | 20 | H3 |
| Festival Theatre and Parliament House | f | 20 | G3 |
| Interstate Railway Station | g | 20 | E5 |
| Lights Vision Lookout | h | 20 | G2 |
| North Adelaide | i | 20 | G2 |
| South Australian Museum | j | 20 | G3 |
| Torrens River | to | 20 | I4 |
| Victoria Park Racecourse | k | 20 | E2, I1 |
| Africa | — | 7 | B3 |
| Alaska | ak | 7 | F1 |
| Albany | ay | 4 | D5 |
| Albany Highway [Perth] | 1 | 17 | F6 |
| Albury–Wodonga | aw | 4 | H5 |
| Alice Springs | as | 4 | F3 |
| Altona | al | 13 | C3 |
| American Samoa | as | 6 | I3 |
| Antarctic [Circle] | — | 8 | B5, H5 |
| Antarctica | aa | 7 | E6 |
| Arafura Sea | aa | 5 | G1 |
| Archer River | ac | 27 | G1 |
| Arctic [Circle] | — | 8 | B1, H1 |
| Armadale | ar | 17 | F6 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|------------------------------|--------------|---------------|----------------------|
| Arnhem Land | al | 5 | F1 |
| Ashburton River | ab | 27 | C3 |
| Asia | — | 7 | D2 |
| Australia | aus | 7 | E4 |
| Australian Capital Territory | ACT | 3 | H5 |
| Ayers Rock | ar | 5 | F3 |
| Ballarat | ba | 4 | G5 |
| Bankstown | bt | 11 | F4 |
| Barkly Tableland | bk | 5 | G2 |
| Barrow Island | 18 | 3 | C3 |
| Bartle Frere | bf | 23 | H2 |
| Barton Highway [Canberra] | 1 | 9 | D1 |
| Barwon—Macintyre River | bm | 27 | H4 |
| Bass Strait | bs | 5 | H5 |
| Bassendean | bs | 17 | E3 |
| Bathurst | bt | 4 | H4 |
| Beagle Gulf | — | 22 | B1 |
| Belconnen Town Centre | btc | 9 | D2 |
| Belgrave | bg | 13 | G3 |
| Bellerive | bv | 21 | F4 |
| Bentley | by | 17 | E4 |
| Bering Strait | bs | 7 | F1 |
| Berrimah | ba | 22 | G5 |
| Berwick | bi | 13 | H5 |
| Birdsville | bv | 4 | G3 |
| Black Mountain | bl | 9 | E3 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|-----------------------------------|--------------|---------------|----------------------|
| Blacktown | bk | 11 | E3 |
| Blackwood River | bk | 27 | D5 |
| Blue Mountains | bm | 24 | H5 |
| Blue Mountains [c] | bm | 11 | A3 |
| Bondi | bd | 11 | H4 |
| Booragoon | bo | 17 | D5 |
| Botany Bay | bb | 11 | G5 |
| Bourke | bo | 4 | H4 |
| Bridgewater | bw | 21 | C1 |
| Brighton [SA] | bn | 19 | D5 |
| Brighton [V] | bn | 13 | E4 |
| Brisbane | B | 3 | I4 |
| Brisbane Airport | bra | 15 | F3 |
| Brisbane Inner-city: | | | |
| Botanic Gardens | a | 16 | H4 |
| Brisbane Cricket Ground | b | 16 | I5 |
| Brisbane River | br | 16 | E4, I4 |
| Brisbane Transit Centre | c | 16 | G3 |
| Central Railway Station | d | 16 | G3 |
| Exhibition Grounds | e | 16 | H1 |
| Parliament House | f | 16 | G4 |
| Queensland Museum and Art Gallery | g | 16 | G4 |
| Queensland Performing Arts Centre | h | 16 | G4 |
| Victoria Park | i | 16 | G1 |
| Brisbane River | br | 27 | I4 |
| Brisbane River [c] | br | 15 | C5, F3 |
| Broadmeadows | bm | 13 | D1 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|--------------------------------|--------------|---------------|----------------------|
| Brcken Hill | bh | 4 | G4 |
| Broome | br | 4 | D2 |
| Bruce Highway [Brisbane] | 1 | 15 | E2 |
| Brunei | bn | 6 | C2 |
| Bunbury | by | 4 | D5 |
| Bundaberg | bg | 4 | I3 |
| Burdekin River | bd | 27 | H2 |
| Burnett River | bu | 27 | I3 |
| Cabramatta | ca | 11 | E4 |
| Cairns | cn | 4 | H2 |
| Calder Highway [Melbourne] | 1 | 13 | C1 |
| Campbelltown | ct | 11 | D6 |
| Canada | cd | 7 | G2 |
| Canberra | C | 3 | H5 |
| Canberra Airport | caa | 9 | F3 |
| Canberra Inner-city: | | | |
| Australian Academy of Science | a | 10 | G2 |
| Australian National Gallery | b | 10 | H4 |
| Australian National University | c | 10 | F2 |
| Australian War Memorial | d | 10 | I2 |
| Captain Cook Memorial | e | 10 | G3 |
| Carillon | f | 10 | H4 |
| High Court of Australia | g | 10 | H4 |
| Lake Burley Griffin | lbg | 10 | H3 |
| National Botanic Gardens | h | 10 | E1 |
| National Library of Australia | i | 10 | G3 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|--------------------------|--------------|---------------|----------------------|
| New Parliament House | j | 10 | G4 |
| Present Parliament House | k | 10 | G4 |
| Prime Ministers Lodge | l | 10 | F5 |
| Royal Canberra Hospital | m | 10 | F3 |
| Russell Hill | n | 10 | I3 |
| Cancer, Tropic of | — | 8 | H3 |
| Canning River | cr | 17 | G6 |
| Cape Horn | ch | 7 | H5 |
| Cape Howe | 3 | 3 | H5 |
| Cape Leeuwin | 22 | 3 | D5 |
| Cape Melville | 8 | 3 | H8 |
| Cape Naturaliste | 21 | 3 | D5 |
| Cape York | 9 | 3 | G1 |
| Cape York Peninsula | cy | 5 | H1 |
| Cape of Good Hope | gh | 7 | B4 |
| Capricorn [Tropic of] | — | 8 | G4 |
| Carnarvon | cr | 4 | C3 |
| Casuarina | cn | 22 | E1 |
| Caulfield | cd | 13 | E4 |
| Ceduna | cd | 4 | F4 |
| Central Highlands [Q] | ce | 5 | H3 |
| Channel Country, The | cc | 5 | G3 |
| Channel Highway [Hobart] | 1 | 21 | E6 |
| Charleville | cv | 4 | H3 |
| Chatswood | cw | 11 | G3 |
| Chermside | cs | 15 | E3 |
| China | cn | 7 | D3 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|--------------------------------|--------------|---------------|----------------------|
| Christmas Island | cr | 6 | B3 |
| City Beach | cb | 17 | C3 |
| Claremont | cm | 21 | C2 |
| Clarence River | cl | 27 | I4 |
| Cleveland | cv | 15 | H4 |
| Cobourg Peninsula | 14 | 3 | F1 |
| Coburg | cg | 13 | E2 |
| Cocos [Keeling] Islands | co | 6 | A3 |
| Coffs Harbour | ch | 4 | I4 |
| Collaroy | cy | 11 | I2 |
| Cooper Pedy | cp | 4 | F4 |
| Coogee | ce | 17 | C6 |
| Cook Islands | ci | 6 | I4 |
| Cooper Creek—Thomson River | ct | 27 | G4 |
| Coral Sea | cs | 5 | I2 |
| Cottesloe | co | 17 | C4 |
| Cronulla | cr | 11 | G6 |
| Culgoa—Balonne—Condamine River | cbc | 27 | H4 |
| Cunningham Highway [Brisbane] | 2 | 15 | B6 |
| Daly River | da | 27 | F1 |
| Dandenong | dg | 13 | G5 |
| Dandenong Ranges | dgr | 13 | I3 |
| Darling Downs | dd | 5 | I4 |
| Darling Range | dl | 24 | D5 |
| Darling Range [c] | dl | 17 | H4 |
| Darling River | dl | 27 | H4 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|--------------------------------|--------------|---------------|----------------------|
| Darwin | D | 3 | F1 |
| Darwin Airport | dna | 22 | E4 |
| Davenport Range | dp | 24 | F2 |
| Derby | dy | 4 | E2 |
| Derwent Highway [Hobart] | 2 | 21 | D1, D6 |
| Derwent River | dw | 27 | H6 |
| Derwent River [c] | dw | 21 | F5 |
| Devonport | dp | 4 | H6 |
| Diamantina River | dm | 27 | G3 |
| Dickson | dn | 9 | E2 |
| Dubbo | du | 4 | H4 |
| Eden | ed | 4 | H5 |
| Elizabeth | el | 19 | F1 |
| Enfield | ef | 19 | E3 |
| Equator | — | 8 | G3 |
| Esperance | es | 4 | E5 |
| Essendon | ed | 13 | D2 |
| Europe | eur | 7 | B2 |
| Eyre Peninsula | ep | 5 | F4 |
| Fannie Bay | — | 22 | B4 |
| Federal Highway [Canberra] | 2 | 9 | G1 |
| Federated States of Micronesia | fsm | 6 | E2 |
| Ferny Grove | fg | 15 | D3 |
| Fiji | fj | 6 | H4 |
| Finke River | fk | 27 | F3 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|---------------------|--------------|---------------|----------------------|
| Fitzroy River [Q] | fz | 27 | I3 |
| Fitzroy River [WA] | fz | 27 | D4 |
| Flinders Island | 2 | 3 | H5 |
| Flinders Ranges | fl | 24 | G4 |
| Flinders River | fl | 27 | G2 |
| Footscray | ft | 13 | D3 |
| Fortescue River | ft | 27 | C3 |
| Frankston | fk | 13 | F6 |
| Fraser Island | 6 | 3 | I3 |
| Frederick Henry Bay | fhb | 21 | I5 |
| Fremantle | fm | 17 | C5 |
| Fyshwick | fy | 9 | F4 |
| Gascoyne River | gc | 27 | C3 |
| Geelong | ge | 4 | H5 |
| Georges River | gr | 11 | D6 |
| Georgina River | ga | 27 | G2 |
| Geraldton | gr | 4 | C4 |
| Gibson Desert | gb | 25 | E3 |
| Gippsland | gi | 5 | H5 |
| Girrawheen | gi | 17 | D2 |
| Glen Waverley | gw | 13 | F3 |
| Glenelg | gg | 19 | D4 |
| Glenelg River | gg | 27 | G2 |
| Glenorchy | go | 21 | D3 |
| Gold Coast | gd | 5 | I4 |
| Goldfields [WA] | go | 5 | D4 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|--------------------------------|--------------|---------------|----------------------|
| Goodna | gd | 15 | D6 |
| Gove Peninsula | 13 | 3 | G1 |
| Grampians, The | gm | 24 | G5 |
| Grange | gn | 19 | D3 |
| Great Australian Bight | gb | 5 | F4 |
| Great Barrier Reef | gbr | 5 | H2 |
| Great Eastern Highway [Perth] | 2 | 17 | F2 |
| Great Northern Highway [Perth] | 3 | 17 | C1 |
| Great Sandy Desert | gs | 25 | E3 |
| Great Victoria Desert | gv | 25 | E4 |
| Great Western Highway [Sydney] | 1 | 11 | A2 |
| Greenland | gl | 7 | H1 |
| Greensborough | gb | 13 | E1 |
| Greenwich, Meridian of | gn | 8 | B2 |
| Groote Eylandt | 12 | 3 | G1 |
| Guam | gm | 6 | E1 |
| Gulf St Vincent | 25 | 3 | G5 |
| Gulf St Vincent [c] | — | 19 | B3 |
| Gulf of Carpentaria | gc | 5 | G2 |
| Gungahlin | gu | 9 | E1 |
| Hallett Cove | hc | 19 | D5 |
| Hamersley Range | hm | 24 | D3 |
| Hawkesbury River | hk | 27 | H5 |
| Hawkesbury River [c] | hk | 11 | C2, E1 |
| Heidelberg | hd | 13 | E2 |
| Hobart | H | 3 | F6 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|--------------------------|--------------|---------------|----------------------|
| Hobart Airport | hoa | 21 | H3 |
| Holt | hl | 9 | C2 |
| Hornsby | ho | 11 | G2 |
| Hume Highway [Melbourne] | 2 | 13 | D1 |
| Hume Highway [Sydney] | 2 | 11 | D6 |
| Hunter River | hn | 27 | I4 |
| Hunter Valley [Hobart] | hv | 5 | I4 |
| Huon Highway | 3 | 21 | D5 |
| Hurstville | hu | 11 | G5 |
| Iceland | ic | 7 | I1 |
| Inala | in | 15 | D5 |
| India | ia | 7 | C3 |
| Indian Ocean | — | 7 | C4 |
| Indian Ocean [c] | — | 17 | B4 |
| Indonesia | in | 6 | C3 |
| International Date Line | idl | 8a | F2, F4 |
| Ipswich | ip | 15 | B5 |
| Japan | jp | 7 | E2 |
| Java | jv | 6 | B3 |
| Joseph Bonaparte Gulf | 16 | 3 | E1 |
| Kalamunda | kd | 17 | F4 |
| Kaleen | kl | 9 | E2 |
| Kalgoorlie | kg | 4 | E4 |
| Kangaroo Island | 26 | 3 | G5 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|---------------------------|--------------|---------------|----------------------|
| Karama | ka | 22 | G3 |
| Katherine | kt | 4 | F2 |
| Kenmore | ke | 15 | D4 |
| Kenneth Range | kn | 24 | C3 |
| Kew | kw | 13 | E2 |
| Kimberley | ki | 5 | E2 |
| King Island | 27 | 3 | G5 |
| Kings Highway [Canberra] | 3 | 9 | G4 |
| Kingsford Smith Airport | ksa | 11 | G5 |
| Kingston | kg | 15 | F6 |
| Kiribati | kb | 6 | H2 |
| Ku-ring-gai National Park | knp | 11 | H2 |
| Lachlan River | la | 27 | H4 |
| Lake Burley Griffin | lbg | 9 | E3 |
| Lake Eyre | le | 5 | G4 |
| Lake Ginninderra | lg | 9 | D2 |
| Launceston | la | 4 | H6 |
| Leanyer | le | 22 | F2 |
| Lilydale | ld | 13 | H2 |
| Liverpool | lv | 11 | E4 |
| Loganholme | lh | 15 | G6 |
| Longreach | lr | 4 | H3 |
| Lord Howe Island | lh | 6 | F5 |
| Lyell Highway [Hobart] | 4 | 21 | A2 |
| Macdonnell Ranges | md | 24 | F3 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|---------------------------------|--------------|---------------|----------------------|
| Mackay | mk | 4 | H3 |
| Macleay River | ml | 27 | I4 |
| Macquarie River | mq | 27 | H4 |
| Macumba River | mc | 27 | F3 |
| Madagascar | ma | 7 | B4 |
| Malay Peninsula | mp | 6 | A2 |
| Maningrida | mn | 4 | F1 |
| Manly | my | 11 | H3 |
| Manuka | mk | 9 | E4 |
| Marion | mn | 19 | D5 |
| Maroondah Highway [Melbourne] | 3 | 13 | H2 |
| Maroubra | ma | 11 | H5 |
| Marshall Islands | ms | 6 | G1 |
| McArthur River | ma | 27 | F2 |
| McPherson Range | mp | 24 | I4 |
| Meehan Range | mhr | 21 | E2 |
| Melbourne | M | 3 | H5 |
| Melbourne Inner-city: | | | |
| Albert Park | a | 14 | H5 |
| Albert Park Lake | b | 14 | H5 |
| Captain Cooks Cottage | c | 14 | H3 |
| Exhibition Buildings | d | 14 | H2 |
| Fawkner Park | e | 14 | I5 |
| Flinders Street Railway Station | f | 14 | H3 |
| Government House | g | 14 | H4 |
| Kings Domain | h | 14 | H4 |
| Melbourne Cricket Ground | i | 14 | I3 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|--|--------------|---------------|----------------------|
| Olympic and Flinders Parks | j | 14 | I4 |
| Port Melbourne | k | 14 | F5 |
| Royal Botanic Gardens | l | 14 | I4 |
| Royal Melbourne Zoo | m | 14 | F1 |
| Royal Park | n | 14 | G1 |
| Shrine of Remembrance | o | 14 | H4 |
| Spencer Street Railway Station | p | 14 | G4 |
| Victorian Arts Centre and National Gallery | q | 14 | H4 |
| Victoria Dock | r | 14 | F3 |
| World Trade Centre | s | 14 | F4 |
| Yarra River | ya | 14 | E4, I4 |
| Melville and Bathurst Islands | 15 | 3 | E1 |
| Midland | mi | 17 | F3 |
| Midland Highway [Hobart] | 5 | 21 | C1 |
| Mildura | ma | 4 | G5 |
| Mitchell River | mt | 27 | G2 |
| Molonglo River | mr | 9 | C3, G4 |
| Monaro Highway [Canberra] | 4 | 9 | E6 |
| Moorooka | mo | 15 | E5 |
| Mordialloc | md | 13 | E5 |
| Moreton Bay | - | 15 | G3 |
| Mount Ainslie | an | 9 | F3 |
| Mount Bogong | bg | 23 | H5 |
| Mount Coot-tha | mc | 15 | D4 |
| Mount Gambier | mg | 4 | G5 |
| Mount Gravatt | mg | 15 | E5 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|-----------------------------------|--------------|---------------|----------------------|
| Mount Isa | mi | 4 | G3 |
| Mount Kosciusko | ko | 23 | H5 |
| Mount Lawley | ml | 17 | D3 |
| Mount Liebig | li | 23 | F3 |
| Mount Lindesay Highway [Brisbane] | 3 | 15 | E6 |
| Mount Lofty | ml | 19 | F4 |
| Mount Lofty Ranges | mlf | 24 | G5 |
| Mount Lofty Ranges [c] | mlf | 19 | F5, H2 |
| Mount Meharry | mh | 23 | D3 |
| Mount Nelson | mn | 21 | E6 |
| Mount Ossa | os | 23 | H6 |
| Mount Wellington | mw | 21 | D5 |
| Mount Woodroffe | wd | 23 | F3 |
| Mullaloo | mu | 17 | C1 |
| Murchison River | mu | 27 | C4 |
| Murray River | my | 27 | G5 |
| Murray-Mallee | mm | 5 | G5 |
| Murrumbidgee River | mm | 27 | H5 |
| Murrumbidgee River [c] | mm | 9 | C4 |
| Musgrave Ranges | mg | 24 | F3 |
| Namoi River | nm | 27 | H4 |
| Nauru | nr | 6 | G2 |
| Nedlands | nd | 17 | D4 |
| Nepean Highway [Melbourne] | 4 | 13 | F6 |
| Nepean River | nr | 11 | B4, C2 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|--------------------------|--------------|---------------|----------------------|
| New Caledonia | nc | 6 | F4 |
| New England | ne | 5 | I4 |
| New South Wales | NSW | 3 | H4 |
| New Town | nt | 21 | D4 |
| New Zealand | nz | 6 | G6 |
| Newcastle | nc | 4 | I4 |
| Newman | nm | 4 | D3 |
| Nhulunbuy | ny | 4 | G1 |
| Nightcliff | nc | 22 | C2 |
| Niue | nu | 6 | I4 |
| Noarlunga | nl | 19 | D6 |
| Norfolk Island | nf | 6 | G4 |
| Normanby River | no | 27 | H2 |
| Normanton | no | 4 | G2 |
| North America | na | 7 | G2 |
| North Atlantic Ocean | — | 7 | A1, I2 |
| North Pacific Ocean | — | 7 | F3 |
| North Pine River | npr | 15 | D1 |
| North Pole | — | 8 | E1 |
| North West Cape | 19 | 3 | C3 |
| North West Shelf | ns | 5 | C3 |
| Northern Mariana Islands | nmi | 6 | E1 |
| Northern Territory | NT | 3 | F2 |
| Northgate | ng | 15 | E3 |
| Nullarbor Plain | np | 5 | E4 |
| Oakleigh | ok | 13 | F4 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|----------------------------------|--------------|---------------|----------------------|
| Oodnadatta | od | 4 | F4 |
| Ord River | or | 27 | E2 |
| Outer Harbour | oh | 19 | D2 |
| Pacific Highway [Brisbane] | 4 | 15 | G6 |
| Pacific Highway [Sydney] | 3 | 11 | G1 |
| Pacific Ocean | — | 6 | I5, H1 |
| Palau | pu | 6 | D2 |
| Palm Beach | pb | 11 | I1 |
| Panama Canal | pc | 7 | H3 |
| Papua New Guinea | png | 6 | F2 |
| Parap | pr | 22 | C4 |
| Parramatta | pm | 11 | F3 |
| Parramatta River | pmr | 11 | F3 |
| Penrith | pn | 11 | C3 |
| Perth | P | 3 | D4 |
| Perth Airport | pea | 17 | E4 |
| Perth Inner-city: | | | |
| Art Gallery of Western Australia | a | 18 | G2 |
| Belmont Park Racecourse | b | 18 | I1 |
| Botanic Gardens | c | 18 | E3 |
| City Railway Station | d | 18 | F2 |
| Entertainment Centre | e | 18 | F2 |
| Gloucester Park | f | 18 | H3 |
| Government House | g | 18 | G3 |
| Heirisson Island | h | 18 | I4 |
| Interstate Railway Station | i | 18 | H1 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|-------------------------------|--------------|---------------|----------------------|
| Kings Park | j | 18 | E3 |
| Museum of Western Australia | k | 18 | G2 |
| Perth Water | l | 18 | G4 |
| Perth Zoo | m | 18 | F5 |
| Sir James Mitchell Park | n | 18 | E3 |
| South Perth Esplanade | o | 18 | F4 |
| Swan River | sr | 18 | F5 |
| WA Cricket Association Ground | p | 18 | H3 |
| War Memorial | q | 18 | I2 |
| Petermann Range | pt | 24 | E3 |
| Petrie | pt | 15 | D1 |
| Philippines | ph | 6 | C1 |
| Pilbara | pi | 5 | D3 |
| Pitt Water | pw | 21 | H3 |
| Port Adelaide | pa | 19 | D3 |
| Port Darwin | — | 22 | B6 |
| Port Hedland | ph | 4 | D3 |
| Port Jackson | 4 | 3 | I5 |
| Port Jackson [c] | pj | 11 | H4 |
| Port Lincoln | pl | 4 | F5 |
| Port Phillip Bay | 28 | 3 | H5 |
| Port Phillip Bay [c] | — | 13 | D5 |
| Princes Highway [Adelaide] | 1 | 19 | E4 |
| Princes Highway [Melbourne] | 5 | 13 | B4, H6 |
| Princes Highway [Sydney] | 4 | 11 | F6 |
| Prospect Reservoir | psr | 11 | E3 |
| Pymble | py | 11 | G3 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|--------------------------|--------------|---------------|----------------------|
| Queanbeyan | qn | 9 | G4 |
| Queens Park Domain | qp | 21 | D4 |
| Queensland | Q | 3 | H3 |
| Red Hill | rh | 9 | E4 |
| Redcliffe | rc | 15 | F1 |
| Ringwood | rw | 13 | F2 |
| Risdon | ri | 21 | E3 |
| Risdon Vale | rv | 21 | E3 |
| Riverina | ri | 5 | H5 |
| Rockhampton | rk | 4 | I3 |
| Rokeby | rk | 21 | G5 |
| Roper River | ro | 27 | F2 |
| Rosny | ro | 21 | E4 |
| Royal National Park, The | rnp | 11 | G3 |
| Ryde | ry | 11 | F3 |
| Sale | sl | 4 | H5 |
| Salisbury | sy | 19 | E2 |
| Sandgate | sg | 15 | F2 |
| Sandy Bay | sb | 21 | E5 |
| Sarawak | sk | 6 | C2 |
| Scandinavia | sc | 7 | B1 |
| Scarborough | sc | 17 | C3 |
| Semaphore | sm | 19 | D3 |
| Shark Bay | 20 | 3 | C4 |
| Shoalhaven River | sh | 27 | H5 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|--------------------------------|--------------|---------------|----------------------|
| Simpson Desert | si | 25 | G3 |
| Singapore | sg | 6 | B2 |
| Snowy Mountains | sm | 5 | H5 |
| Snowy River | sn | 27 | H5 |
| Solomon Islands | sm | 6 | G3 |
| South America | sa | 7 | I4 |
| South Atlantic Ocean | — | 7 | A5, I6 |
| South Australia | SA | 3 | F4 |
| South East Cape | 1 | 3 | H6 |
| South Pacific Ocean | — | 7 | G5 |
| South Pole | — | 8 | E6 |
| South-west [T] | st | 5 | H6 |
| South-west [WA] | sw | 5 | D5 |
| Southern Ocean | — | 7 | D5 |
| Spain-Portugal | sp | 7 | A2 |
| Spencer Gulf | 24 | 3 | F5 |
| Springwood [NSW] | sd | 11 | B2 |
| Springwood [Q] | sd | 15 | F5 |
| St Kilda | sk | 13 | E3 |
| Stirling | st | 19 | F4 |
| Stradbroke and Moreton Islands | 5 | 3 | I4 |
| Strait of Gibraltar | gb | 7 | A2 |
| Strathfield | sf | 11 | F4 |
| Strathpine | sn | 15 | D2 |
| Stuart Highway [Darwin] | 1 | 22 | H5 |
| Sturt Highway [Adelaide] | 2 | 19 | F1 |
| Sturt Stony Desert | ss | 25 | G4 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|--------------------------------|--------------|---------------|----------------------|
| Subiaco | su | 17 | D3 |
| Sumatra | su | 6 | B2 |
| Sutherland | sl | 11 | F5 |
| Swan River | sr | 17 | C5, F1 |
| Swan-Avon River | sr | 27 | D4 |
| Sydney | S | 3 | H4 |
| Sydney Inner-city: | | | |
| Art Gallery of New South Wales | a | 12 | G3 |
| Australian Museum | b | 12 | G4 |
| Centennial Park | c | 12 | I6 |
| Central Railway Station | d | 12 | F5 |
| Darling Harbour | e | 12 | F3 |
| Darling Point | f | 12 | I3 |
| Elizabeth Bay | g | 12 | H3 |
| Entertainment Centre | h | 12 | F4 |
| Farm Cove | i | 12 | G3 |
| Garden Island | j | 12 | H2 |
| Hyde Park | k | 12 | G4 |
| Kings Cross | l | 12 | H4 |
| Kirribilli Point | m | 12 | G2 |
| Opera House | n | 12 | G2 |
| Parliament House | o | 12 | G3 |
| Port Jackson | pj | 12 | G3 |
| Royal Botanic Gardens | p | 12 | H2 |
| Sydney Cove | q | 12 | G2 |
| Sydney Cricket Ground | r | 12 | H6 |
| Sydney Harbour Bridge | s | 12 | H2 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|--------------------------|--------------|---------------|----------------------|
| The Rocks | t | 12 | G2 |
| White City Tennis Courts | u | 12 | I4 |
| Woolloomooloo Bay | v | 12 | H3 |
| Tamar River | tm | 27 | H6 |
| Tanami Desert | ta | 25 | F3 |
| Taroona | ta | 21 | E6 |
| Tasman Highway [Hobart] | 6 | 21 | I2 |
| Tasman Sea | — | 6 | F5 |
| Tasmania | T | 3 | H6 |
| Tea Tree Gully | tt | 19 | F2 |
| Tennant Creek | tc | 4 | F2 |
| Theodore | th | 9 | E6 |
| Thursday Island | 10 | 3 | G1 |
| Timor | tm | 6 | C3 |
| Timor Sea | ts | 5 | E1 |
| Todd River | td | 27 | F3 |
| Tokelau | tk | 6 | I3 |
| Tonga | tg | 6 | H4 |
| Toorak | tk | 13 | E3 |
| Toowoomba | to | 4 | I4 |
| Torrens River | to | 27 | G5 |
| Torrens River [c] | to | 19 | D4, F3 |
| Torres Strait | tr | 5 | G1 |
| Townsville | tv | 4 | H2 |
| Tropic of Cancer | — | 8 | H3 |
| Tropic of Capricorn | — | 8 | G4 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|-------------------------------------|--------------|---------------|----------------------|
| Tuggeranong Town Centre | ttc | 9 | D2 |
| Tullamarine Airport | tua | 13 | C1 |
| Turner | tr | 9 | E2 |
| Tuvalu | tv | 6 | H3 |
| Union of Soviet Socialist Republics | ussr | 7 | D1 |
| United Kingdom | uk | 7 | A2 |
| United States of America | usa | 7 | G2 |
| Unley | un | 19 | E4 |
| Vanuatu | va | 6 | G3 |
| Victoria | V | 3 | H5 |
| Victoria River | vc | 27 | F2 |
| Walkerville | wl | 19 | E3 |
| Wanneroo | wn | 17 | D1 |
| Warburton | wb | 4 | E3 |
| Warrego Highway [Brisbane] | 5 | 15 | B5 |
| Warrego River | wg | 27 | H3 |
| Warrumbungle Range | wb | 24 | H4 |
| Weipa | wp | 4 | G1 |
| Welshpool | wp | 17 | E4 |
| Werribee | wb | 13 | B3 |
| West Indies | wi | 7 | H3 |
| Western Australia | WA | 3 | D4 |
| Western Highway [Melbourne] | 6 | 13 | B2 |

| Name | Abbreviation | Map
Number | Alphanumeric
Code |
|--------------------------|--------------|---------------|----------------------|
| Weston Creek | wc | 9 | D4 |
| Whitsunday Island | 7 | 3 | H2 |
| Whyalla | wy | 4 | G4 |
| Wimmera | wi | 5 | G5 |
| Winnellie | wi | 22 | E4 |
| Woden Valley Town Centre | wtc | 9 | D4 |
| Wollongong | wl | 4 | H5 |
| Wyndham | wm | 15 | E2 |
| Wynnum | wy | 15 | G4 |
| Yampi Sound | 17 | 3 | D2 |
| Yarra River | ya | 27 | H5 |
| Yarra River [c] | ya | 13 | D3, G2 |
| Yorke Peninsula | yp | 5 | G5 |