CHAPTER 2

# PHYSICAL GEOGRAPHY AND CLIMATE

## General description of Australia

### Geographical position

The Australian Commonwealth, which includes the island continent of Australia and the island of Tasmania, is situated in the Southern Hemisphere, and comprises an area of 2,967,909 square miles, the mainland alone containing 2,941,526 square miles. Bounded on the west and east by the Indian and Pacific Oceans respectively, it lies between longitudes 113° 9′ E. and 153° 39′ E., while its northern and southern limits are the parallels of latitude 10° 41′ S. and 43° 39′ S., or, excluding Tasmania, 39° 8′ S. On its north are the Timor and Arafura Seas and Torres Strait, on its south the Southern Ocean*. The extreme points are Steep Point on the West, Cape Byron on the east, Cape York on the north, and South-East Cape or, if Tasmania be excluded, Wilson's Promontory, on the south. The difference in latitude between Cape York and Wilson's Promontory is 1,959 miles, and in longitude between Steep Point and Cape Byron 2,489 miles.

### Tropical and temperate regions

Of the total area of Australia, nearly 39 per cent lies within the tropics. Taking the latitude of the Tropic of Capricorn as 23° 30′ S., the areas within the tropical and temperate zones are approximately as follows.

AREAS OF TROPICAL AND TEMPERATE REGIONS: STATES AND TERRITORIES
(Square miles)

| *Area* | *N.S.W. (a)* | *Vic.* | *Qld* | *S.A.* | *W.A.* | *Tas.* | *N.T.* | *Total* |
|---|---|---|---|---|---|---|---|---|
| Within tropical zone . | .. | .. | 360,642 | .. | 364,000 | .. | 422,980 | 1,147,622 |
| „ temperate zone | 310,372 | 87,884 | 306,358 | 380,070 | 611,920 | 26,383 | 97,300 | 1,820,287 |
| **Total area .** | **310,372** | **87,884** | **667,000** | **380,070** | **975,920** | **26,383** | **520,280** | **2,967,909** |

(a) Includes Australian Capital Territory (939 square miles).

Fifty-four per cent of Queensland lies within the tropical zone and 46 per cent in the temperate zone; 37 per cent of Western Australia is tropical and 63 per cent temperate; while 81 per cent of the Northern Territory is tropical and 19 per cent temperate. All the remaining States lie within the temperate zone.

### Area of Australia compared with areas of other countries

The area of Australia is almost as great as that of the United States of America excluding Alaska, four-fifths of that of Canada, more than half as large again as Europe excluding the U.S.S.R., and about twenty-five times that of Great Britain and Ireland. The areas of Australia and of certain other countries are shown in the table on the following page. The areas shown are in the main obtained from the *Statistical Yearbook* 1971, published by the Statistical Office of the United Nations, and the countries have been arranged in accordance with the continental groups used therein.

* The Southern Ocean is a local designation for the part of the Indian Ocean lying between the southern shores of Australia and Antarctica.

## AREA OF AUSTRALIA AND OF OTHER COUNTRIES, *circa* 1968

(*Source:* United Nations Statistical *Yearbook*, 1971)

**('000 square miles)**

| Country | Area |
|---|---|
| Continental divisions— | |
| Europe(*a*) | 1,903 |
| Asia(*a*) | 10,629 |
| U.S.S.R. (Europe and Asia) | 8,649 |
| Africa | 11,704 |
| North and Central America and West Indies | 9,362 |
| South America | 6,889 |
| Oceania | 3,286 |
| **Total, World, excluding Arctic and Antarctic regions** | **52,420** |
| Europe(*a*)— | |
| France | 211 |
| Spain (including possessions) | 195 |
| Sweden | 174 |
| Finland | 130 |
| Norway | 125 |
| Poland | 121 |
| Italy | 116 |
| Yugoslavia | 99 |
| Germany, Federal Republic of | 96 |
| United Kingdom | 94 |
| Romania | 92 |
| Other | 451 |
| *Total, Europe(a)* | *1,903* |
| Asia(*a*)— | |
| China, People's Republic of | 3,692 |
| India | 1,176 |
| Saudi Arabia | 830 |
| Iran | 636 |
| Mongolia | 604 |
| Indonesia | 576 |
| Pakistan | 366 |
| Trucial Oman | 301 |
| Turkey | 301 |
| Burma | 262 |
| Afghanistan | 250 |
| Thailand | 198 |
| Iraq | 168 |
| Other | 1,269 |
| *Total, Asia(a)* | *10,629* |
| U.S.S.R.— | |
| *Total, U.S.S.R.* | *8,649* |
| Africa— | |
| Sudan | 967 |
| Algeria | 920 |
| Congo, Democratic Republic of | 906 |
| Libya | 679 |
| Chad | 496 |

| Country | Area |
|---|---|
| Africa—*continued* | |
| Niger | 489 |
| Angola | 481 |
| Mali | 479 |
| Ethiopia | 472 |
| South Africa, Republic of | 471 |
| Mauritania | 398 |
| United Arab Republic | 386 |
| Tanzania, United Republic of | 363 |
| Nigeria | 357 |
| Namibia | 318 |
| Mozambique | 302 |
| Zambia | 291 |
| Somalia | 246 |
| Central African Republic | 241 |
| Madagascar | 227 |
| Kenya | 225 |
| Other | 1,990 |
| *Total, Africa* | *11,704* |
| North and Central America— | |
| Canada | 3,852 |
| United States of America(*b*) | 3,615 |
| Greenland | 840 |
| Mexico | 762 |
| Nicaragua | 50 |
| Cuba | 44 |
| Honduras | 43 |
| Other | 155 |
| *Total, North and Central America* | *9,362* |
| South America— | |
| Brazil | 3,286 |
| Argentina | 1,072 |
| Peru | 496 |
| Colombia (excluding Panama) | 440 |
| Bolivia | 424 |
| Venezuela | 352 |
| Chile | 292 |
| Paraguay | 157 |
| Ecuador | 109 |
| Other | 260 |
| *Total, South America* | *6,889* |
| Oceania— | |
| Australia | 2,968 |
| Papua<br>New Guinea(*c*) | 178 |
| New Zealand | 104 |
| Other | 36 |
| *Total, Oceania* | *3,286* |

(*a*) Excludes U.S.S.R. shown below. (*b*) Includes Hawaii. (*c*) Western New Guinea (West Irian) is included in Other Asia.

AREAS OF STATES AND TERRITORIES, AND STANDARD TIMES

| State or Territory | Area | Percentage of total area | Standard times: Meridian selected | Standard times: Ahead of G.M.T.(a) |
|---|---|---|---|---|
| | sq miles | | | hours |
| New South Wales . . . | 309,433 | 10.43 | 150° E. | 10 |
| Victoria . . . . | 87,884 | 2.96 | 150° E. | 10 |
| Queensland . . . . | 667,000 | 22.47 | 150° E. | 10 |
| South Australia . . . | 380,070 | 12.81 | 142° 30′ E. | 9½ |
| Western Australia . . . | 975,920 | 32.88 | 120° E. | 8 |
| Northern Territory . . | 520,280 | 17.53 | 142° 30′ E. | 9½ |
| Australian Capital Territory . | 939 | 0.03 | 150° E. | 10 |
| *Mainland* . . . | *2,941,526* | *99.11* | .. | .. |
| Tasmania . . . . | 26,383 | 0.89 | 150° E. | 10 |
| **Australia** . . . | **2,967,909** | **100.00** | .. | .. |

(a) Greenwich Mean Time is one hour behind British Standard Time.

The coastline of Australia is approximately 12,000 miles long—New South Wales, 700 miles; Victoria, 700 miles; Queensland, 3,200 miles; South Australia, 1,500 miles; Western Australia, 4,000 miles; Northern Territory, 1,000 miles; Australian Capital Territory, Jervis Bay area included in New South Wales; Tasmania 900 miles. These measurements are broadly on a 'direct' basis, but even so they must be regarded as approximate only.

**Geographical features of Australia**

The following description is a broad summary of the main physical characteristics of the Australian continent.

A section through the Australian continent from east to west, at the point of its greatest breadth, shows first a narrow belt of coastal plain. This plain, extending north and south along the whole east coast, is well watered by rivers. It is of variable width, seldom more than sixty or seventy miles, and occasionally only a few miles, the average being roughly about forty to fifty miles. Bordering this plain is the Great Dividing Range, which extends from the North of Queensland to the south of New South Wales, and thence one branch sweeps westward towards the boundary of Victoria and South Australia, and the other, the main branch, terminates in Tasmania. This range, which rises, often abruptly, from the plain, frequently presents bold escarpments on its eastern face, but the descent on its western slopes is gradual, until, in the country to the north of Spencers Gulf, the plain is not above sea-level and occasionally even below it. Thence there is another almost imperceptible rise until the mountain ranges of Western Australia are reached, and beyond these lies another coastal plain. The mountains of Australia are relatively low, the highest peak, Mount Kosciusko, in New South Wales, being only about 7,300 feet. Three-quarters of the land-mass of Australia lies between the 600 and 1,500 feet contours in the form of a huge plateau, constituting the most distinctive feature of the Australian continent, to which the peculiarities of Australia's climate can probably be largely ascribed.

The rivers of Australia may be divided into two major classes, those of the coastal plains with moderate rates of fall and those of the central plains with very slight fall. Of the former not many are navigable for any distance from their mouths, and bars make many of them difficult of access or inaccessible from the sea.

The longest two rivers of the northern part of the east coast are the Burdekin and the Fitzroy in Queensland. The Hunter is the largest coastal river of New South Wales, and the Murray River, with its great tributary the Darling, drains part of Queensland, the major part of New South Wales, and a large part of Victoria, finally flowing into the arm of the sea known as Lake Alexandrina, on the eastern side of the South Australian coast. The total length of the Murray is about 1,600 miles, 400 being in South Australia and 1,200 constituting the boundary between New South Wales and Victoria. The total length of the Murray-Darling from the source of the Darling to the mouth of the Murray is about 2,300 miles. The rivers of the north-west coast of Australia (Western Australia), e.g. the Murchison, Gascoyne, Ashburton, Fortesque, De Grey, Fitzroy, Drysdale, and Ord are of considerable size. So also are those in the Northern Territory, e.g. the Victoria and Daly, and those on the Queensland side of the Gulf of Carpentaria, such as the Gregory, Leichhardt, Cloncurry, Gilbert, and Mitchell. The rivers of Tasmania have short and rapid courses, as might be expected from the configuration of the country.

The 'lakes' of Australia may be divided into three classes: true permanent lakes; lakes which, being very shallow, become mere morasses in dry seasons or even dry up, and finally present a cracked surface of salt and dry mud; and lakes which are really inlets of the ocean, opening out into a lake-like expanse. The second class is the only one which seems to demand special mention. These are a characteristic of the great central plain of Australia. Some of them, such as Lakes Torrens, Gairdner, Eyre, and Frome, are of considerable extent.

For further information on the geographical features of Australia earlier issues of the Year Book should be consulted. The list of special articles, etc., at the end of this volume indicates the nature of the information available and its position in the various issues.

## Weather and climate of Australia

This section has been prepared by the Director of the Commonwealth Bureau of Meteorology, and the various States and Territories have been arranged in the standard order adopted by that Bureau. The section concludes with a brief summary of the weather of 1972.

### Introduction

Australia extends from about latitude 10° S. to latitude 44° S., but owing largely to the moderating effects of the surrounding oceans and the absence of very pronounced and extensive mountain masses it is less subject to extremes of climate than are regions of similar size in other parts of the world. The average elevation of the land surface is low—probably close to 900 feet above the sea; while the maximum altitude is just above 7,300 feet. Latitude for latitude the Australian climate is generally more temperate than that of the other large land masses of the earth, although it varies considerably from the tropical to the alpine.

The Australian meteorological seasons are: Summer—December, January, February; Autumn—March, April, May; Winter—June, July, August; Spring—September, October, November.

The following general discussion of the climate of Australia is necessarily brief. However, extensive records of Australian climatic data are held and published in various forms by the Bureau of Meteorology. A programme of regional climatic survey has been in progress for some years, and a large number of studies have been published by the Bureau of Meteorology, by the Department of Minerals and Energy, and by State Development Authorities. The Bureau of Meteorology welcomes inquiries for climatic information, which may be made at its Central Office in Melbourne or through the Regional Offices which are situated in each of the State capital cities and in Canberra and Darwin. Reference may also be made to various bulletins and research papers mentioned in this text for more detailed information on particular topics.

### Precipitation

Precipitation of moisture from the atmosphere may take various forms depending chiefly on the thermal conditions existing at the time. Within the Australian region precipitation occurs chiefly as rain because of the generally mild temperatures, but may also occur as snow or hail. Broadly, the immediate physical cause of rainfall may be said to be the lifting of moist air with resultant cooling, condensation into cloud, and eventual precipitation of the heavy water droplets as rain. This process may be achieved by three different means each of which may be combined with either or both of the others:

(*a*) Orographic lifting caused by winds blowing onto rising terrain;
(*b*) Convectional lifting resulting in the development of individual rain clouds of the cumulus or cumulonimbus type producing showers and thunderstorms;
(*c*) lifting of a warm air mass as it rises over cooler air—known as a 'frontal' process.

*Annual Rainfall.* The median annual rainfall over Australia is shown in plate 2, page 30 while plate 3, page 31, shows the distribution in 1972. The median is the value equalled or exceeded by half of the occurrences, and usually gives a better indication of the rainfall most frequently occurring.

While Australia is a continent of comparatively low relief, the orographic processes in rain production are very marked in the chain of the Great Dividing Range bordering the whole east coast of the continent, in the ranges of the south-western corner of Western Australia, and in Tasmania. Thus on the east coast the higher rainfall areas lie between the ranges and the Pacific Ocean in the region of prevailing south-east wind circulation. In Tasmania and the south-west of Western Australia the region of high rainfall lies between the ranges and the ocean to the west, these areas lying in a region of predominantly westerly wind flow.

The north-western part of the continent and to some extent the whole region of the Northern Territory and inland north Queensland comes under the influence of the Australian-Asian monsoon. This results in high rainfalls in a summer wet season with the inflow of moist air from the north-west, and a winter dry season with predominantly south-east winds blowing across the dry regions of the interior and producing little rainfall. Tropical cyclones affect the waters adjacent to the north-east and north-west of Australia between December and April. Their frequency varies greatly from season to season, but on the average about three of these disturbances occur in the Coral Sea each season and about two in the eastern Indian Ocean adjacent to the west coast of the continent. When tropical cyclones move close to the tropical coast of the continent they cause very heavy rainfalls over the coastal regions. On occasions these cyclones move over the land and lose intensity, but many still continue to be accompanied by heavy rainfall along their path.

Southern Australia lies in the region of the mid-latitude westerlies for the winter half of the year and is subject to the rain-producing influences of the great depressions of the Southern Ocean and their associated frontal systems. The combined effects of these systems and the topography lead to high winter rainfalls in south-western and south-eastern Australia and in Tasmania, with the highest falls occurring on the windward side of the mountains. The rainfall generally decreases inland with distance from the coast, although the 300 mm isohyet reaches the shore of the Great Australian Bight and the north-western coast of Western Australia in regions which are of very flat relief and which, because of their position and the orientation of the coastline, are only rarely exposed to moist winds.

**AREA DISTRIBUTION OF AVERAGE ANNUAL RAINFALL: STATES AND TERRITORIES**

(Per cent)

| *Average annual rainfall* | *W.A.* | *N.T.* | *S.A.* | *Qld* | *N.S.W. (a)* | *Vic.* | *Tas.* | *Total* |
|---|---|---|---|---|---|---|---|---|
| Under 250 mm . . . . | 58.0 | 24.7 | 82.8 | 13.0 | 19.7 | Nil | Nil | 39.0 |
| 250 mm and under 380 mm . | 22.4 | 32.4 | 9.4 | 14.4 | 23.5 | 22.4 | Nil | 20.6 |
| 380 „ „ „ 510 „ . | 6.8 | 9.7 | 4.5 | 19.7 | 17.5 | 15.2 | 0.7 | 11.2 |
| 510 „ „ „ 635 „ . | 3.7 | 6.6 | 2.2 | 18.8 | 14.2 | 17.9 | 11.0 | 9.0 |
| 635 „ „ „ 760 „ . | 3.7 | 9.3 | 0.8 | 11.6 | 9.1 | 18.0 | 11.4 | 7.2 |
| 760 „ „ „ 1015 „ . | 3.3 | 4.7 | 0.3 | 11.1 | 9.9 | 16.1 | 20.4 | 6.1 |
| 1015 mm and over . . . | 2.1 | 12.6 | Nil | 11.4 | 6.1 | 10.4 | 56.5 | 6.9 |
| **Total . . . .** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** |

(*a*) Includes Australian Capital Territory.

The region with the highest annual rainfall is the east coast of Queensland between Port Douglas and Cardwell, where Tully has an annual average of 4,500 mm. A further very high rainfall region is the mountainous west coast of Tasmania, where Lake Margaret has the highest annual average of 3,700 mm. The area of lowest average annual rainfalls is that of some 180,000 square miles surrounding Lake Eyre in South Australia, where on the average only 100 to 150 mm are received annually. The lowest average over a long period of record is at Troudaninna—105 mm. Rain occurs very irregularly, averaging only about one or two days a month in this region.

Of all the continents (excluding Antarctica), Australia receives the least depth of rainfall and and has the least run-off from its rivers into the oceans. Only in relatively small areas of the continent could the rainfall be described as abundant.

*Seasonal distribution of rainfall.* The average monthly distribution of rainfall in the various Australian rainfall districts is shown by the histograms of plate 4, page 32.

The following are the most marked features.

(*a*) The clearly defined wet summer and dry winter of the monsoon region of northern Australia.

(*b*) The more regular distribution of rainfall throughout the year in south-eastern Australia. In the region to the south and west of the Great Dividing Range a less pronounced maximum of rainfall is noticeable in the winter or early spring. On the Gippsland (eastern Victoria) coast the rainfall is fairly evenly distributed throughout the year, but further along the east coast of the continent the rainfall minimum in late winter and early spring begins to appear and becomes more marked as the tropical regions are approached.

(*c*) The marked rainfall maximum in the south-western districts of Western Australia in winter—the period of the most active southern depressions and frontal systems in this region.

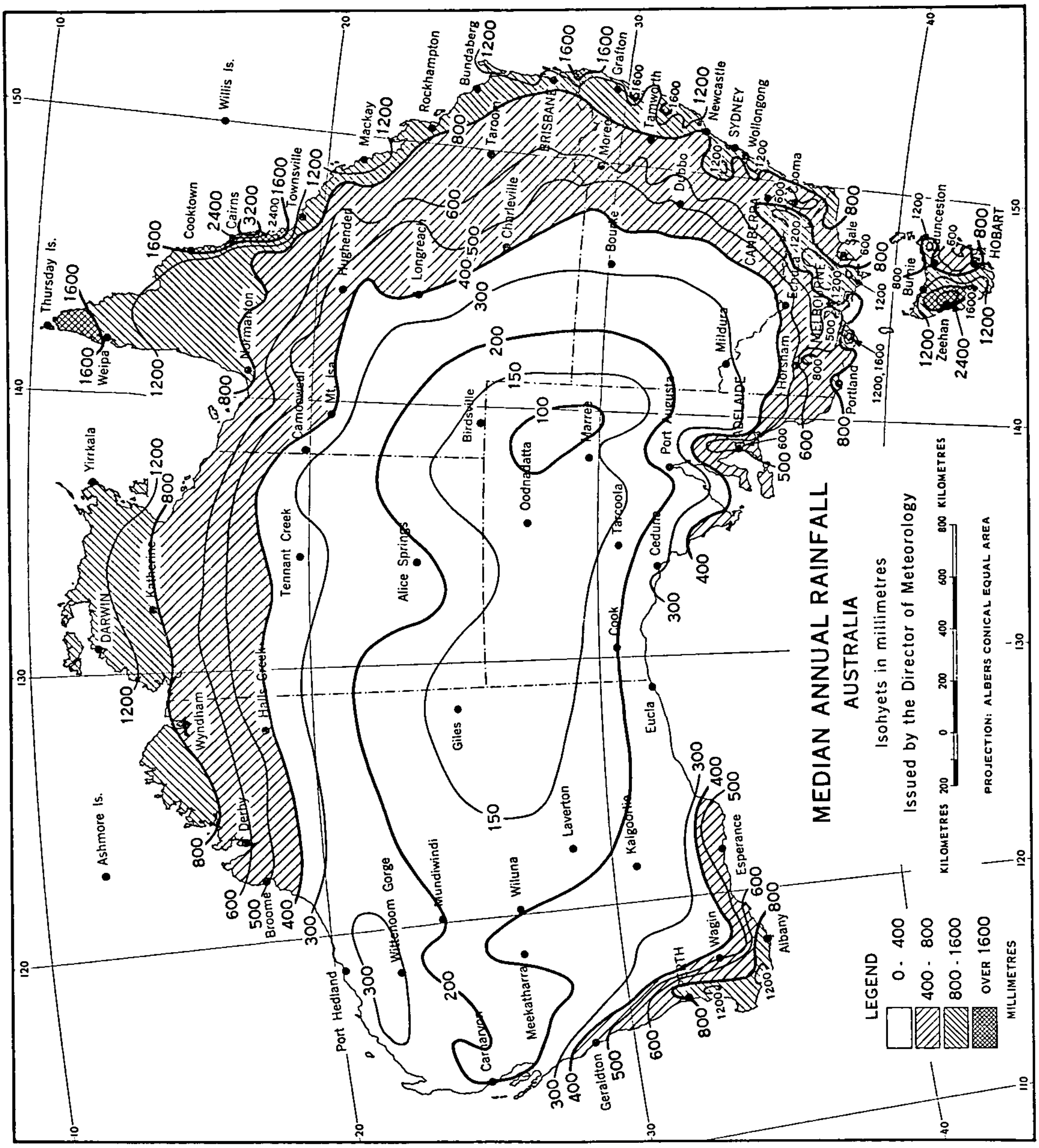
MEDIAN ANNUAL RAINFALL
AUSTRALIA
Isohyets in millimetres
Issued by the Director of Meteorology
LEGEND
0 - 400
400 - 800
800 - 1600
OVER 1600
MILLIMETRES
KILOMETRES 200 0 200 400 600 800 KILOMETRES
PROJECTION: ALBERS CONICAL EQUAL AREA

PLATE 2

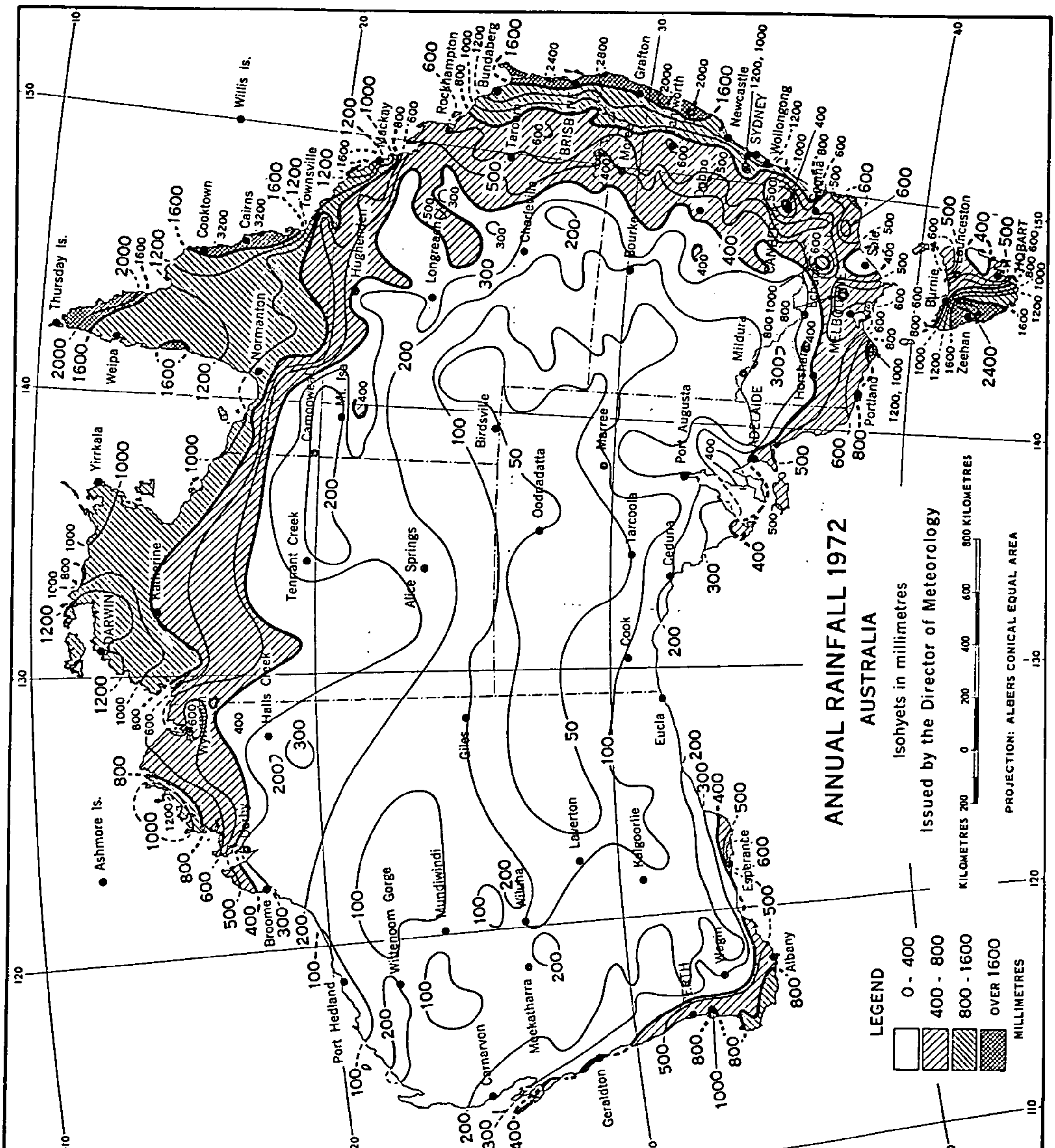
ANNUAL RAINFALL 1972
AUSTRALIA
Isohyets in millimetres
Issued by the Director of Meteorology
LEGEND
0 - 400
400 - 800
800 - 1600
OVER 1600
MILLIMETRES
KILOMETRES 200 0 200 400 600 800 KILOMETRES
PROJECTION: ALBERS CONICAL EQUAL AREA
Thursday Is.
Willis Is.
Ashmore Is.
Weipa
Cooktown
Cairns
Townsville
Normanton
Mackay
Rockhampton
Bundaberg
BRISBANE
Grafton
Newcastle
SYDNEY
Wollongong
Yirrkala
DARWIN
Katherine
Halls Creek
Broome
Port Hedland
Wittenoom Gorge
Carnarvon
Geraldton
Meekatharra
Wiluna
Mundiwindi
Giles
Tennant Creek
Alice Springs
Camooweal
Mt. Isa
Hughenden
Longreach
Charleville
Birdsville
Oodnadatta
Marree
Bourke
Port Augusta
ADELAIDE
Mildura
Horsham
MELBOURNE
Portland
Sale
Tarcoola
Ceduna
Cook
Eucla
Laverton
Kalgoorlie
Esperance
Albany
Wagin
Burnie
Launceston
Zeehan
HOBART

PLATE 3

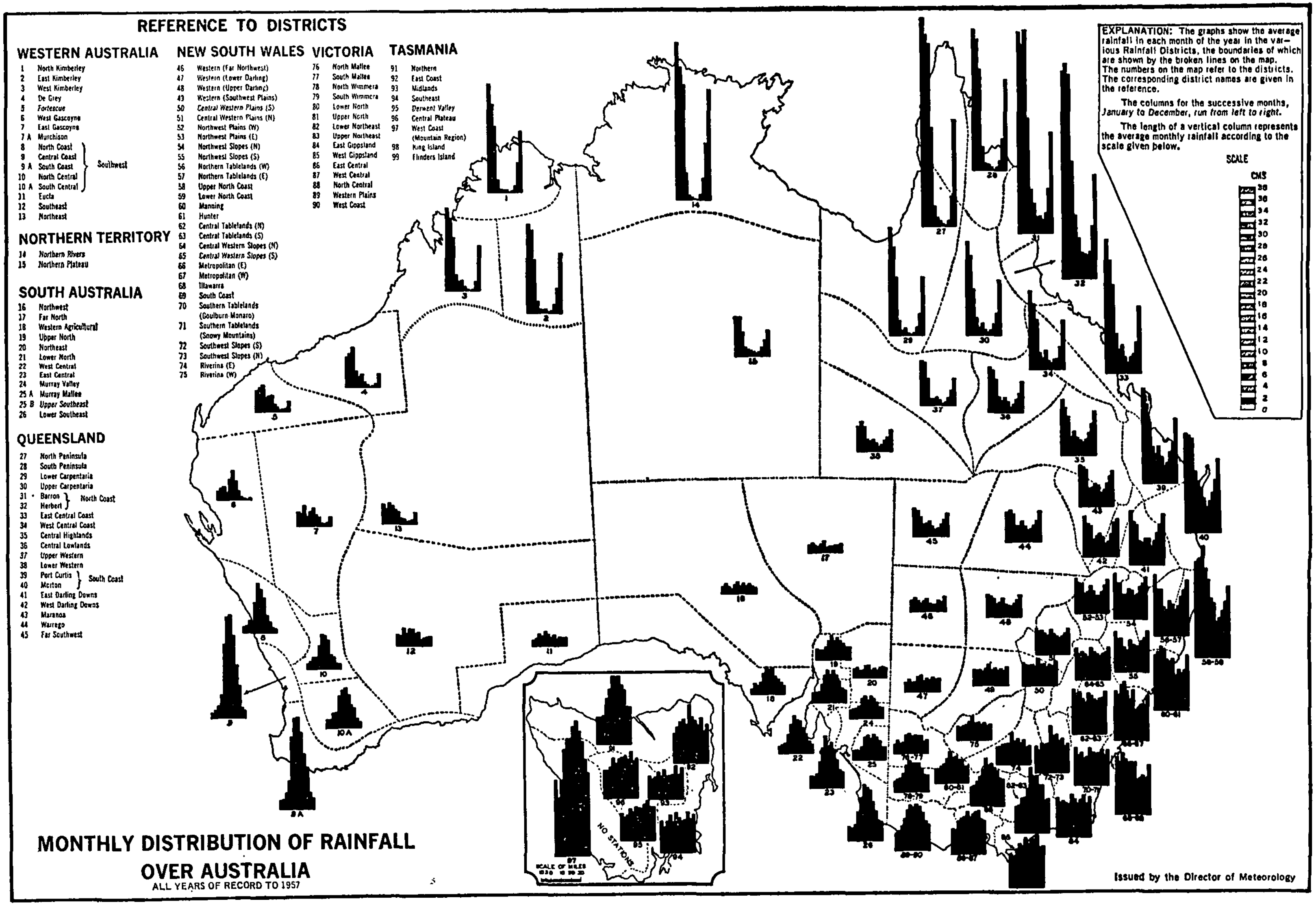
REFERENCE TO DISTRICTS
WESTERN AUSTRALIA
1 North Kimberley
2 East Kimberley
3 West Kimberley
4 De Grey
5 Fortescue
6 West Gascoyne
7 East Gascoyne
7 A Murchison
8 North Coast
9 Central Coast
9 A South Coast
10 North Central
10 A South Central
Southwest
11 Eucla
12 Southeast
13 Northeast
NORTHERN TERRITORY
14 Northern Rivers
15 Northern Plateau
SOUTH AUSTRALIA
16 Northwest
17 Far North
18 Western Agricultural
19 Upper North
20 Northeast
21 Lower North
22 West Central
23 East Central
24 Murray Valley
25 A Murray Mallee
25 B Upper Southeast
26 Lower Southeast
QUEENSLAND
27 North Peninsula
28 South Peninsula
29 Lower Carpentaria
30 Upper Carpentaria
31 Barron
32 Herbert
North Coast
33 East Central Coast
34 West Central Coast
35 Central Highlands
36 Central Lowlands
37 Upper Western
38 Lower Western
39 Port Curtis
40 Moreton
South Coast
41 East Darling Downs
42 West Darling Downs
43 Maranoa
44 Warrego
45 Far Southwest
NEW SOUTH WALES
46 Western (Far Northwest)
47 Western (Lower Darling)
48 Western (Upper Darling)
49 Western (Southwest Plains)
50 Central Western Plains (S)
51 Central Western Plains (N)
52 Northwest Plains (W)
53 Northwest Plains (E)
54 Northwest Slopes (N)
55 Northwest Slopes (S)
56 Northern Tablelands (W)
57 Northern Tablelands (E)
58 Upper North Coast
59 Lower North Coast
60 Manning
61 Hunter
62 Central Tablelands (N)
63 Central Tablelands (S)
64 Central Western Slopes (N)
65 Central Western Slopes (S)
66 Metropolitan (E)
67 Metropolitan (W)
68 Illawarra
69 South Coast
70 Southern Tablelands (Goulburn-Monaro)
71 Southern Tablelands (Snowy Mountains)
72 Southwest Slopes (S)
73 Southwest Slopes (N)
74 Riverina (E)
75 Riverina (W)
VICTORIA
76 North Mallee
77 South Mallee
78 North Wimmera
79 South Wimmera
80 Lower North
81 Upper North
82 Lower Northeast
83 Upper Northeast
84 East Gippsland
85 West Gippsland
86 East Central
87 West Central
88 North Central
89 Western Plains
90 West Coast
TASMANIA
91 Northern
92 East Coast
93 Midlands
94 Southeast
95 Derwent Valley
96 Central Plateau
97 West Coast (Mountain Region)
98 King Island
99 Flinders Island
EXPLANATION: The graphs show the average rainfall in each month of the year in the various Rainfall Districts, the boundaries of which are shown by the broken lines on the map. The numbers on the map refer to the districts. The corresponding district names are given in the reference.
The columns for the successive months, January to December, run from left to right.
The length of a vertical column represents the average monthly rainfall according to the scale given below.
SCALE
CMS
38
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
NO STATIONS
MONTHLY DISTRIBUTION OF RAINFALL
OVER AUSTRALIA
ALL YEARS OF RECORD TO 1957
Issued by the Director of Meteorology

PLATE 4

For further information on monthly rainfalls reference may be made to the various Australian rainfall bulletins, to the Climatological Surveys of particular districts, and to the annual rain maps and books of normals (standard 30 year periods), all published by the Bureau of Meteorology.

*Variability of rainfall.* For most agricultural pursuits a more important criterion of the value of rainfall is its variability or reliability. The adequate description of rainfall variability over an extensive geographical area is a matter of some difficulty. Probably the best available measures are to be found in the tables which have been calculated for a number of individual stations in some of the Climatological Survey districts. These tables show the percentage chances of receiving specified amounts of rainfall in monthly seasonal or annual time spans. Statistical indexes of rainfall variation based on a number of different techniques have been used to produce maps which show the main features of the variability of annual rainfall over Australia.

In general it may be stated that the regions of most reliable rainfall are the south-west of Western Australia, western Tasmania, and western and southern Victoria south of the divide. These areas have one of the most reliable rainfalls in the world. Elsewhere in Australia the degree of variability, in general, increases inland, but the region of the highest variability for low average annual rainfalls extends across the central part of the continent from south-western Queensland to the central coast of Western Australia. Some outstanding examples of the numerous instances of high rainfall variability throughout Australia are given below.

At Onslow (Western Australia) annual totals vary from 14 mm to 1,073 mm, and in the four consecutive years 1921 to 1924 the annual totals were 565, 69, 681, and 55 mm respectively. At Whim Creek, where 747 mm have been recorded in a single day, only 4 mm were received in the whole of 1924. Great variability can also occur in the heavy rainfall areas, e.g. at Tully the annual rainfalls have varied from 7,909 mm in 1950 to 2,487 mm in 1943.

The following table of annual rainfall for the Australian capital cities for the past thirty years indicates the variation in rainfall at these sites.

RAINFALL: AUSTRALIAN CAPITAL CITIES, 1943 TO 1972

| Year | *Perth* | | *Adelaide* | | *Brisbane* | | *Sydney* | | *Canberra(a)* | | *Melbourne* | | *Hobart* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Amount* | *No. of days* | *Amount* | *No. of days* | *Amount* | *No. of days* | *Amount* | *No. of days* | *Amount* | *No. of days* | *Amount* | *No. of days* | *Amount* | *No. of days* |
| | mm | | mm | | mm | | mm | | mm | | mm | | mm | |
| 1943 . . . | 799 | 117 | 453 | 135 | 1,287 | 126 | 1,289 | 136 | 580 | 141 | 478 | 150 | 529 | 149 |
| 1944 . . . | 696 | 123 | 435 | 114 | 707 | 100 | 788 | 115 | 304 | 82 | 542 | 143 | 666 | 151 |
| 1945 . . . | 1,338 | 137 | 453 | 105 | 1,223 | 130 | 1,180 | 136 | 604 | 92 | 488 | 152 | 430 | 157 |
| 1946 . . . | 1,053 | 122 | 574 | 135 | 982 | 83 | 916 | 111 | 521 | 102 | 757 | 177 | 1,002 | 193 |
| 1947 . . . | 1,103 | 137 | 556 | 146 | 1,532 | 146 | 1,053 | 137 | 668 | 121 | 774 | 163 | 981 | 181 |
| 1948 . . . | 883 | 126 | 540 | 122 | 1,055 | 106 | 986 | 131 | 800 | 104 | 533 | 155 | 595 | 178 |
| 1949 . . . | 690 | 126 | 463 | 119 | 1,198 | 121 | 1,683 | 149 | 646 | 115 | 798 | 163 | 580 | 157 |
| 1950 . . . | 820 | 122 | 408 | 91 | 1,624 | 152 | 2,200 | 183 | 1,061 | 124 | 665 | 147 | 489 | 131 |
| 1951 . . . | 867 | 127 | 646 | 135 | 861 | 87 | 1,350 | 143 | 482 | 95 | 758 | 155 | 624 | 163 |
| 1952 . . . | 998 | 123 | 508 | 128 | 851 | 122 | 1,503 | 130 | 965 | 143 | 874 | 177 | 771 | 165 |
| 1953 . . . | 943 | 119 | 508 | 121 | 1,107 | 101 | 1,038 | 110 | 493 | 110 | 721 | 148 | 713 | 162 |
| 1954 . . . | 712 | 112 | 425 | 109 | 1,559 | 142 | 1,049 | 134 | 457 | 80 | 852 | 139 | 691 | 143 |
| 1955 . . . | 1,182 | 138 | 624 | 134 | 1,280 | 136 | 1,846 | 160 | 735 | 128 | 780 | 160 | 567 | 168 |
| 1956 . . . | 949 | 107 | 692 | 154 | 1,503 | 120 | 1,710 | 155 | 886 | 159 | 786 | 188 | 930 | 175 |
| 1957 . . . | 848 | 117 | 424 | 110 | 523 | 80 | 689 | 110 | 340 | 78 | 525 | 146 | 728 | 129 |
| 1958 . . . | 815 | 107 | 446 | 121 | 1,184 | 115 | 1,503 | 144 | 597 | 106 | 685 | 155 | 928 | 166 |
| 1959 . . . | 615 | 114 | 288 | 88 | 1,164 | 146 | 1,516 | 164 | 891 | 106 | 656 | 131 | 490 | 136 |
| 1960 . . . | 717 | 112 | 586 | 129 | 699 | 103 | 1,296 | 152 | 812 | 128 | 851 | 162 | 745 | 140 |
| 1961 . . . | 820 | 133 | 379 | 122 | 1,076 | 134 | 1,450 | 161 | 773 | 109 | 560 | 129 | 458 | 156 |
| 1962 . . . | 730 | 123 | 456 | 125 | 1,051 | 131 | 1,140 | 137 | 653 | 122 | 586 | 140 | 645 | 161 |
| 1963 . . . | 994 | 140 | 621 | 118 | 1,247 | 134 | 2,035 | 169 | 618 | 126 | 738 | 149 | 394 | 129 |
| 1964 . . . | 975 | 127 | 556 | 135 | 1,224 | 112 | 1,100 | 99 | 642 | 106 | 706 | 166 | 713 | 169 |
| 1965 . . . | 1,041 | 128 | 339 | 111 | 1,042 | 113 | 915 | 118 | 399 | 87 | 590 | 122 | 533 | 158 |
| 1966 . . . | 773 | 116 | 495 | 123 | 1,113 | 111 | 1,240 | 130 | 691 | 117 | 681 | 156 | 699 | 145 |
| 1967 . . . | 1,048 | 104 | 257 | 89 | 1,798 | 137 | 1,341 | 141 | 352 | 72 | 332 | 106 | 488 | 130 |
| 1968 . . . | 930 | 136 | 653 | 141 | 851 | 93 | 624 | 113 | 515 | 103 | 532 | 141 | 473 | 152 |
| 1969 . . . | 574 | 87 | 525 | 112 | 1,045 | 115 | 1,446 | 140 | 758 | 121 | 625 | 137 | 720 | 156 |
| 1970 . . . | 908 | 127 | 483 | 149 | 1,440 | 118 | 1,103 | 127 | 721 | 121 | 803 | 153 | 782 | 157 |
| 1971 . . . | 799 | 124 | 672 | 147 | 1,373 | 124 | 1,108 | 141 | 456 | 116 | 779 | 164 | 752 | 165 |
| 1972 . . . | 611 | 102 | 446 | 106 | 1,888 | 121 | 1,280 | 167 | 394 | 95 | 566 | 123 | 451 | 135 |
| Average . . | 874 | 121 | 497 | 119 | 1,183 | 119 | 1,279 | 138 | 630 | 110 | 667 | 150 | 651 | 155 |

(a) Fairbairn Aerodrome.

Prolonged dry spells are fairly common in much of Australia, particularly in inland areas. A discussion of droughts in Australia may be found in Gibbs W. J. and Maher J. V. *Rainfall Deciles as Drought Indicators*, Bureau of Meteorology Bulletin No. 48 (1967). A shorter account of droughts in Australia will be found in a special article in Year Book No. 45, pages 51–6. A more recent account is included with Chapter 22—Water Conservation and Irrigation in Year Book No. 54 of 1968.

*Rainfall and vegetation.* In general, the three main climatic zones of the continent exert a particular controlling influence on the general vegetation. These are the northern third of the continent where rainfall is almost always restricted to the warmer months of the year, the southern third where rainfall is predominantly a winter and spring event, and a transitional zone which experiences rainfall from both sources, although in greatly reduced quantity over the interior, which is subject to frequent drought.

The length of the growing season, or conversely the extent of dry periods during the year, decides the type of vegetation which establishes in a region. The climatic influence on vegetative response is primarily through soil moisture and temperature. Thus in colder south-eastern areas the growing season is mainly temperature dependent, but elsewhere the availability of soil moisture is the prime factor. All rainfall is not equally effective in increasing the soil moisture, its availability from the soil storage to plants depending on the extent of surface run-off, seepage beyond the root zone, and loss by surface evaporation. Furthermore the effectiveness of available soil moisture depends on the evaporative demand of the local climate; for example, an inch of stored moisture may maintain vigorous plant growth for twice as long in Tasmania as in the warmer, drier atmosphere of inland New South Wales. Thus it is not a sound practice to assess the agricultural potential of different areas simply by reference to average rainfall.

Generally speaking, the length of the growing season exceeds nine months over the far south-west of Western Australia and in all eastern coastal districts from Cape York Peninsula to western Victoria, and within this region humid and semi-humid plant formation thrive. Soil types, of course, also play a part in the distribution of vegetation, but they too are, to a considerable extent, the result of climate and weather.

The climate of Arnhem Land (Northern Territory) is such that there is a considerable surplus of moisture for about five months of the warm season, followed regularly by a virtual drought which frequently reaches severe intensity, and this special combination of meteorological conditions results in annual and perennial vegetation adapted to this cycle.

Over the interior the position is more complex because of the lower levels of the rainfall, its greater variability, and the high evaporative power of the drier, warmer atmosphere. In this vast section of the continent the climatic demands are so severe that the vegetative formations of the moisture zones (i.e. the mesophytes, requiring about five months or longer growing season) are unable to exist. Thus a plant species adapted to these very dry and variable conditions (xerophytes), e.g. spinifex, salt bush, blue bush, and stunted eucalypts, capable of maintaining a cattle population, predominates over the arid interior.

The arid and semi-arid lands of Western Australia and inland New South Wales which border the desert carry the majority of the sheep in these States. In New South Wales the most important vegetative formations in these areas are savannah (treeless plains), savannah woodland, mulga scrub, and mallee scrub. In Western Australia sclerophyllous grass steppe and mulga scrub border the deserts and are succeeded to the south by zones of mallee scrub and mallee heath.

*Rainfall intensity.* The study of extremely high rainfall intensities is important in the investigation of the flow characteristics of river systems, and flood prevention measures, the design of irrigation works, and hydro-electric schemes. The highest rainfalls recorded in a period of twenty-four hours up to 1968 for each State and Territory were: Western Australia, Whim Creek, 747 mm, 3 April 1898; Northern Territory, Roper Valley, 545 mm, 15 April 1963; South Australia, Ardrossan, 206 mm, 18 February 1946; Queensland, Crohamhurst, 907 mm, 3 February 1983; New South Wales, Dorrigo, 636 mm, 24 June 1950; Australian Capital Territory, Jervis Bay, 182 mm, 28 April 1963, Victoria, Balook, 275 mm, 18 February 1951; and Tasmania, Mathinna, 337 mm, 5 April 1929. Most of the very high intensities have occurred in the coastal strip of Queensland, where the combination of a tropical cyclone moving close to the mountainous terrain provides ideal conditions for spectacular falls. For other very heavy falls at various localities reference may be made to Year Books No. 14, pages 60–4, No. 22, pages 46–8, No. 29, pages 43, 44 and 51, and No. 53, pages 32–4.

*Snow and hail.* For varying periods from late autumn to early spring snow usually covers the ground to a great extent on the Australian Alps above a level of about 4,500 to 5,000 feet, where in both New South Wales and Victoria ski-ing resorts operate throughout the season.

In Tasmania also the highlands are frequently covered above the 3,500 feet level for extended periods of the winter. There are, however, some years when snowfalls are much lighter than normal and even fail completely. Light snow has been known to fall occasionally as far north as the New England plateau in New South Wales (latitude 31° S.), and in exceptional seasons much of the dividing range from Victoria to Toowoomba (Queensland) has been covered above a level of about 4,000 feet. In ravines around Mount Kosciusko small areas of snow may persist throughout the summer after a heavy winter fall. This winter snowfall of south-eastern Australia is important in aiding the reliable flow of many streams which are utilised in the hydro-electric schemes of the Snowy Mountains, northern Victoria, and Tasmania. Snowfall at low terrain elevations occurs from time to time, particularly in Tasmania and Victoria, but falls are usually light and rarely lie more than a few days.

Hail is most frequent in winter and spring along the south-eastern coastal region of the continent and in Tasmania, where it is usually of a relatively small size. Summer storms, however, which are quite frequent, particularly in the highland plateau regions of eastern Australia, often produce stones of large size and of destructive intensity. Very large stones capable of piercing light gauge galvanised iron are reported from time to time, and damage to fruit crops in southern and eastern Australia from large hail stones is quite frequent.

*Floods.* In general, flooding in Australia is most pronounced on the shorter streams flowing from the Great Dividing Range into the Pacific Ocean along the seaboard of Queensland and New South Wales. These floods are particularly destructive on the more densely populated coast of New South Wales. The chief rivers in this area are the Tweed, Richmond, Clarence, McLeay, Nepean, Hawkesbury, Hunter, and Shoalhaven, all of which experience quite frequent and considerable flooding. These floods occur chiefly in summer but may occur at any time of the year.

The great Fitzroy and Burdekin river systems in Queensland are also subject to floods during the summer wet season, while much of the heavy monsoon rain in northern Queensland flows southward through the normally dry channels of the network of rivers draining into Lake Eyre. This water may cause extensive floods over a vast area, but it is soon lost by seepage and evaporation and rarely reaches the lake in any quantity. The Condamine and other tributaries of the Darling also carry considerable volumes of water south through western New South Wales to the Murray, and flooding along their courses occurs from time to time.

Flooding also occurs from time to time, usually in autumn, winter, and spring, in the Murray-Murrumbidgee system of New South Wales and Victoria and on the smaller coastal streams of southern Victoria. In Tasmania, flooding of the north coast streams, particularly the South Esk system, is common in the same seasons. In South Australia some flooding has occurred in the lower reaches of the Murray owing to rainfall as far away as Queensland and south-eastern New South Wales. In the north of Western Australia and the Northern Territory, flooding of the coastal streams occurs frequently in summer but is not of such economic importance as the flooding of the eastern coastal streams of the continent, where many localities are more vulnerable to damage.

### Temperature

Conditions vary greatly for a particular individual even in a fixed location, so that it is difficult to describe general comfort variability uniquely throughout a region as varied climatically as Australia. A number of indexes which attempt to incorporate some of the factors concerned* have been used experimentally from time to time, and further research continues on this very difficult problem. Generally speaking, there is an increase in discomfort northwards within the tropical regions of Australia in summer, owing to the heat and high absolute humidity which reached a maximum in the extreme north of the continent. Such conditions are, however, ameliorated to a large extent in highland areas such as the Atherton Tableland in Queensland. No part of Australia is uncomfortably hot in winter, and only in a small area of the Australian Alps and highland Tasmania does bodily strain due to cold exist in winter. The history of the settlement of the northern regions of Queensland and the Northern Territory indicates that with accelerating development of studies and experience in the arrangement of living and working accommodation, clothing, and general way of life, the effects of extremes of climate can be minimised.

For some further discussion of the problems of temperature and comfort conditions reference may be made to Ashton, H. T., *Meteorological Data for Air Conditioning in Australia*, Bureau of Meteorology Bulletin No. 47 (1964).

*Average seasonal temperature distribution.* Plates 5 to 8, pages 37–8, show the normal daily maximum and minimum temperatures for January and July, which may be taken as indicative respectively of the summer and winter seasons in Australia. Further detailed temperature data are presented on pages 48–57 for the capital cities and more important country towns of the Commonwealth.

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* *See* Year Book No. 53, page 35.

On the basis of average annual mean temperatures, and latitude for latitude, Australia is somewhat cooler than the other land masses of the southern hemisphere and considerably cooler than the same latitudes in the large continental areas of the northern hemisphere. This is due to the insular nature of Australia and the stronger general circulation of the atmosphere in the southern hemisphere resulting in the transport of higher latitude (cooler) air into the subtropical regions.

July is the month with the lowest mean temperature in all parts of the continent, while the month with the highest mean temperature varies from February in Tasmania and southern Victoria to December in the northern part of the continent and November in Darwin. The lateness of the month of highest average temperature in the extreme south of the continent is due in part to the effect of the Southern Ocean, where the sea surface temperature reaches its maximum in February. The cooler period of the late summer in the north is due largely to increased cloudiness associated with the inflow of north-west winds with the onset of the monsoon season.

In January average maximum temperatures exceed 35°C over a vast area of the interior of the continent. The hottest part of Australia is situated in the north of Western Australia around the Marble Bar and Nullagine area, where the daily maximum screen temperature during the summer frequently exceeds 38°C for weeks at a time.

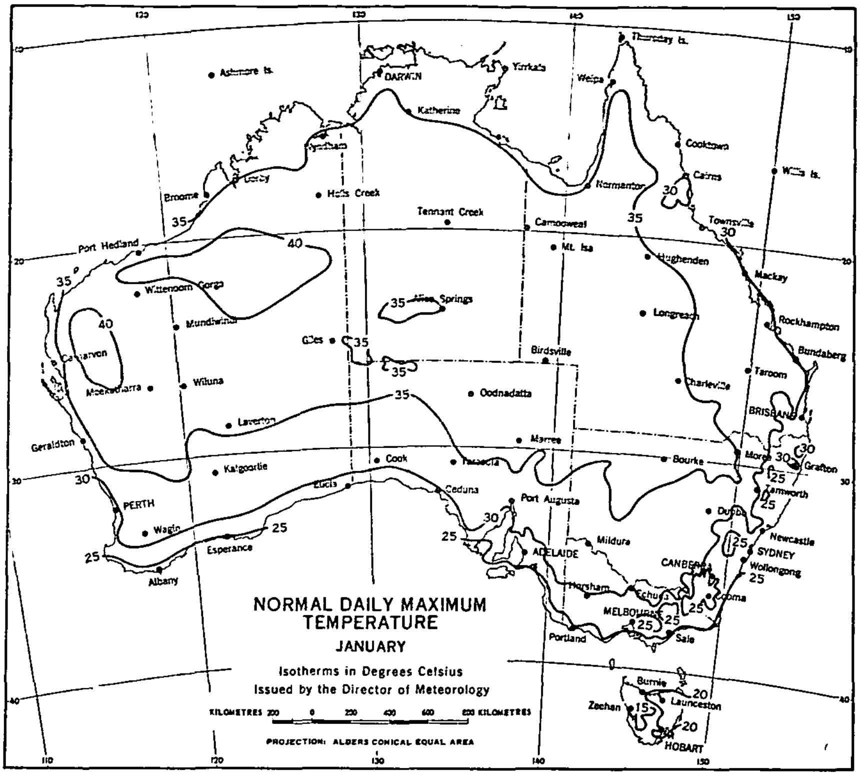
The marked change of maximum temperature in summer with distance from the sea, in areas close to the coasts, particularly along the Great Australian Bight and the Indian Ocean coast of Western Australia is due to the penetration inland of the vigorous sea breezes which are initiated by the considerable temperature contrast between land and sea surface temperatures. The 25°C isotherm of January mean maximum temperature skirts the southern coast of the continent from south-western Western Australia to Gulf St Vincent.

In January the mean minimum temperatures in the tropics, except for some highland regions, exceed 22°C, with a gradual decrease southward to values of 12°C in Victoria and 9°C in Tasmania. Highland regions in the south have mean values of 5°C and lower. In July a more regular latitudinal distribution of mean maximum temperature is evident, only parts of the north of the continent having mean maxima higher than 30°C. Values lower than 15°C are general over the south-eastern part of the continent, with mean maxima falling below 5°C in small alpine areas, Average night minimum temperatures in July fall below 5°C in areas south of the tropics and away from the coast. Alpine regions again record the lowest temperatures with some areas experiencing means lower than −3°C.

*Extreme variation and daily range*. Only at a few inland places in Australia does the absolute range of temperature (i.e. the range from the highest maximum to the lowest minimum) exceed 55°C. Generally it is in the range 45°C to 50°C in the inland areas and somewhat less on the coasts. The highest temperature recorded in Australia was 53.1°C at Cloncurry (Queensland) on 16 January 1889 and the lowest −22.2°C at Charlotte Pass in the Southern Alps on 14 July 1945 and again on 22 August 1947. The world record maximum temperature is 58°C at Azizia (Tripoli) on 13 August 1922 and the world record minimum temperature −88°C at Vostok on the Antarctic plateau on 24 August 1960.

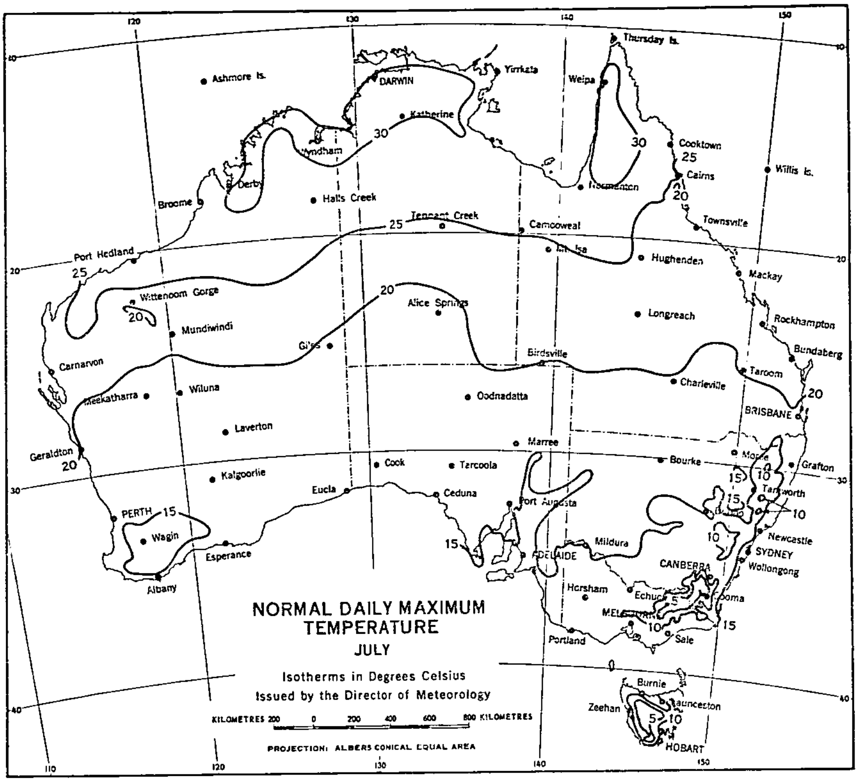
*High temperature*. Heat waves with a number of successive days higher than 38°C are relatively common in many parts of Australia. With the exception of the north-western coast of Western Australia, however, most coastal areas do not usually experience more than a few days in succession of such conditions. The frequency of such conditions increases inland, and periods of up to twenty days have been recorded over most of the settled areas. This figure increases in western Queensland and north-western Western Australia to more than sixty days in places. The central part of the Northern Territory and the Marble Bar-Nullagine area of Western Australia have recorded the most prolonged heat waves for the Australian region. The longest consecutive period of daily maxima greater than 38°C was 160 consecutive days recorded in Marble Bar during the summer of 1923–24.

*Frosts*. Injury to the tissues of growing plants is not caused until the temperature has fallen considerably below the freezing point of water (0°C), and a ground frost is regarded as having occurred when the grass thermometer has fallen below −0.9°C. However, as terrestrial minima are not recorded at all stations, it is usual for statistical purposes to regard the registration of a screen thermometer of 2.2°C as indicating a 'light' frost. A map showing frequency of days with screen minima higher than 2.2°C (i.e. the frost free period) is reproduced in plate 9, page 41. A 'heavy' frost is taken as a screen reading of less than 0°C. A 'black' frost occurs with a combination of low temperature and low humidity, and, although frost crystals are not observed on the ground, damage takes place to the plant cells by the freezing and expansion of the moisture they contain.

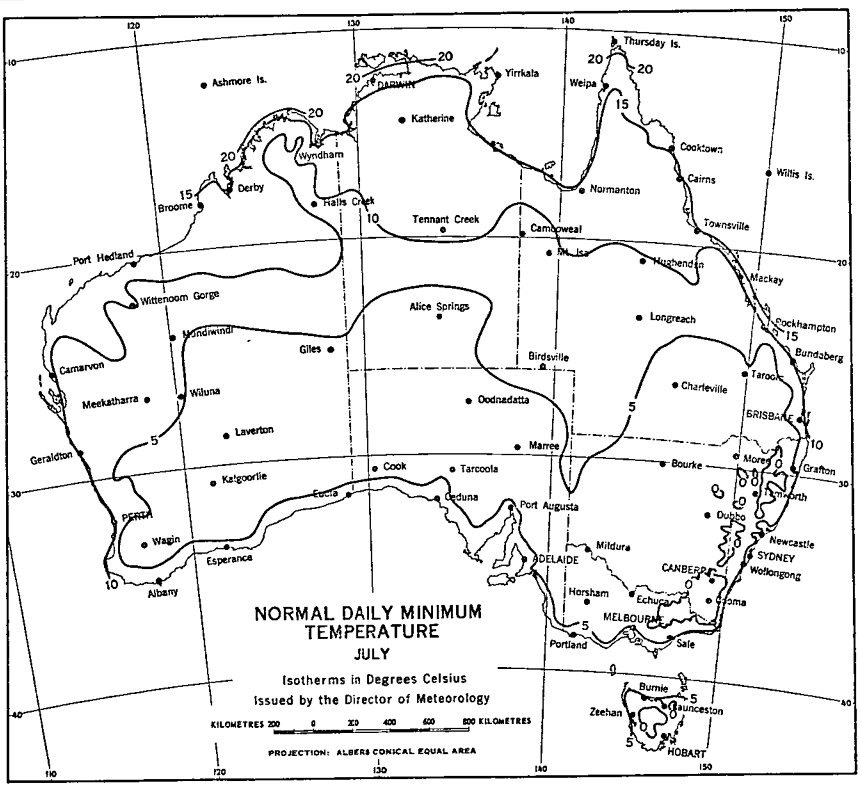




**PLATES 5 and 6**



NORMAL DAILY MAXIMUM TEMPERATURE
JULY
Isotherms in Degrees Celsius
Issued by the Director of Meteorology



NORMAL DAILY MINIMUM TEMPERATURE
JULY
Isotherms in Degrees Celsius
Issued by the Director of Meteorology

**PLATES 7 and 8**

The frequency of frost depends largely on altitude, latitude, and proximity to the sea, and locally, to a very large extent, on even minor variations in contour of the land. The parts of Australia which are most subject to frost are the eastern highlands from north-eastern Victoria to the western Darling Downs in southern Queensland. Most stations in this region experience more than ten nights a month with readings of 0°C or under for three to five months of the year. On Tasmania's Central Plateau similar conditions occur for three to six months of the year. Heavy frosts are comparatively infrequent in Western Australia, except in parts of the south and south-west. In South Australia frosts are most frequent in the agricultural areas of the south-east.

Frosts may occur within a few miles of the coast over the whole continent except the Northern Territory and most of north Queensland. Regions in which frosts may occur at any time of the year comprise most of Tasmania, large areas of the tablelands of New South Wales, much of inland Victoria, particularly the north-east, and a small part in the extreme south-west of Western Australia. Over most of the interior of the continent, and on the highlands of Queensland as far north as the Atherton Plateau, frosts commence in April and end in September, but they are infrequent in these months. Minimum temperatures below 0°C are experienced in most of the sub-tropical interior in June and July.

For further details of frost conditions in Australia reference should be made to Foley, J. C., *Frost in the Australian Region*, Bureau of Meteorology Bulletin No. 32 (1945).

### Humidity and saturation deficit

The annual variation of vapour pressure* for regions outside the tropics closely follows that of temperature. However, the mean relative humidity† in the temperate regions is generally highest in winter and lowest during the summer. In northern Australia the highest relative humidity occurs during the rainy summer season. The relative humidity variation during the day closely follows the diurnal variation of temperature, being highest with low temperatures and lowest with high temperatures. The relative humidity at 9 a.m. for Australian conditions may be considered as a close approximation to the mean for the whole day. In the tables for the capital cities, pages 48–55, the mean monthly vapour pressure and relative humidity for 9 a.m., together with the monthly extremes are listed. The order of the stations in descending values of mean annual vapour pressure at 9 a.m. is Darwin, Brisbane, Sydney, Perth, Melbourne, Adelaide, Canberra, and Hobart, while the annual mean of the 9 a.m. relative humidities diminishes in the order Darwin, Sydney, Canberra, Melbourne, Brisbane, Hobart, Perth, and Adelaide.

In January the mean saturation deficit‡ at the mean temperature for the month has a maximum value of over 20 mm in the central parts of Western Australia and in south-western Queensland. Gradual decreases occur towards the coast, where values close to the north, east, and south coastlines are around 5 mm .On the western coast values are somewhat higher, and a strong gradient exists in the saturation deficit in the narrow region bordering the Indian Ocean. In July the variation is less, with maxima of 10 mm in the dry north of the Northern Territory and Western Australia, slowly decreasing generally to the south, with values over most of the south-east and extreme south-west of the continent being less than 2 mm. Extremely low values (less than 0.5 mm) exist in July over the highlands of south-eastern Australia and Tasmania.

### Evaporation

In Australia the study of evaporation is of great importance, since in its drier regions water conservation must be practised by the use of tanks and dams. The magnitude of the economic loss by evaporation may be appreciated from plate 10, page 41, which shows that the yearly amount varies from 500 mm over the highland areas of central Tasmania to more than 3300 mm in the northern and north-western part of South Australia.

Over an area of some 70 per cent of the continent, comprising most inland districts and extending to the coast in the north-west of Western Australia and to the head of the Great Australian Bight, the rainfall does not exceed the evaporation loss in any month of the year. The central and north-western portion of the continent experience evaporation far in excess of their rainfall. Vegetation over these areas is characterised by acacia, scrub steppe, and arid scrub, while many areas are merely sand hills and stony desert. Over many of the drier areas, however, particularly in the inland areas of south-eastern Australia, the loss of rainfall by evaporation is made good to some extent by the development of irrigation schemes. Some of these schemes, such as those at the Murrumbidgee Irrigation Area in New South Wales and at Mildura in Victoria and Renmark in South Australia, have been very successful. The Snowy Mountains Hydro-electric Scheme has also resulted in the

* *Vapour pressure*—the pressure exerted by the water vapour of the atmosphere. † *Relative humidity*—the ratio of the existing vapour pressure to the saturated vapour pressure at the existing temperature, expressed as a percentage.
‡ *Saturation deficit*—the difference between the saturation vapour pressure and the actual vapour pressure. *See* Year Book No. 53, page 37 for further information.

large scale supply of water from the south-eastern highlands of Australia for use in the drier areas to the west of the ranges in New South Wales and Victoria. The future development of such schemes as these holds promise for the reclamation of many marginal areas in Australia, which because of low rainfall and high evaporation are at present of little economic value.

Since the loss by evaporation depends largely on the net radiation absorbed and consequently on the extent of the exposed area, tanks and dams so designed that the surface area shall be a minimum are advantageous. Further, the more protected they are from the direct rays of the sun and from winds the less will be the evaporation loss.

Further information on evaporation may be found in Hounam, C. E., *Evaporation in Australia*, Bureau of Meteorology Bulletin No. 44 (1961).

**Sunshine and cloud**

The proportion of the sky covered by cloud is of considerable meteorological and climatological importance. A cloud cover inhibits both incoming and outgoing radiation and thus profoundly affects the temperature distribution and other factors at the earth's surface. Cloud amount is measured in eighths of the sky covered.

In Australia the seasonal changes in cloudiness correspond closely to that of rainfall. In the southern or more temperate parts of the continent, particularly in the coastal and low lying areas, the winter months are generally more cloudy than the summer. This is due to the formation of extensive areas of stratiform cloud and fog during the colder months, when the structure of the lower layers of the atmosphere favours the physical processes resulting in this type of cloud. A particularly strong annual periodicity exists in the monsoonal regions of northern Australia, where it is heavily clouded during the summer wet season and practically cloudless during the winter 'dry'. Cloudiness is higher near coasts and on the windward slopes of the mountains of eastern Australia and is least over the dry interior parts of the continent.

A close relationship exists between cloud amount and number of sunshine hours, and it is possible to estimate from cloud data the equivalent number of sunshine hours over a given period. These data can be incorporated with records of direct measurement of sunshine hours, and approximate distribution maps produced for Australia. Maps of the mean sunshine distribution for January and July are reproduced in plates 11 and 12, page 42 and indicate the main features of the variation over Australia in these months.

Except for Tasmania and a narrow fringe bordering the southern, eastern, and northern coasts, the greater part of the continent receives more than 3,000 hours of sunshine each year, and in Central Australia and the mid-western coast of Western Australia totals in excess of 3,500 hours occur. The extreme south coast receives in the main 2,000 to 2,500 hours annually, while the east coast regions of New South Wales and Queensland receive 2,500 to 3,000 hours. A minimum of less than 1,750 hours occurs on the west coast and highlands of Tasmania.

Mean amounts of cloud for each month at the capital cities are included in the tables on pages 48–55, as are the mean daily hours of sunshine. The latter figure is a good single measure of the relative climatic characteristics of the individual cities for different months of the year.

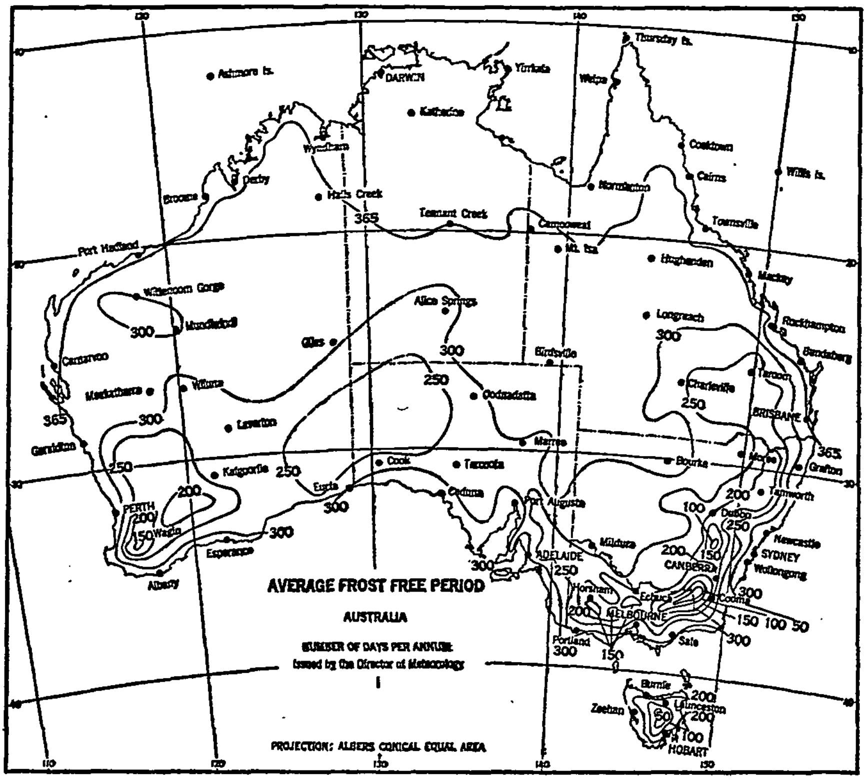
**Wind**

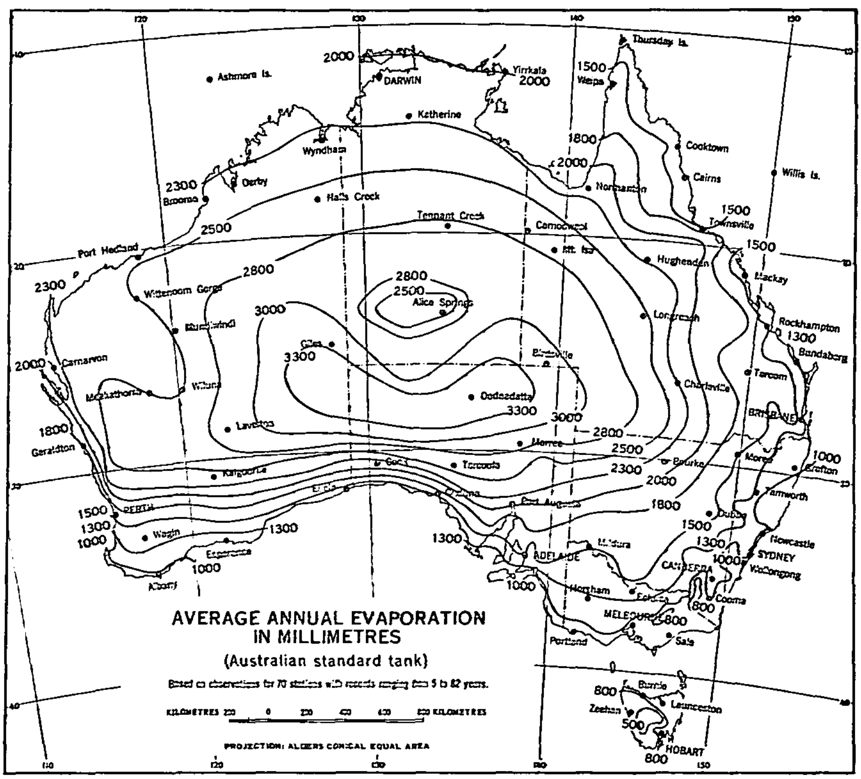
Australia lies in those latitudes of the southern hemisphere where it is influenced largely by two wind systems:

(*a*) the south-east trade winds blowing on the equatorial side of the mid-latitude anticyclones: and

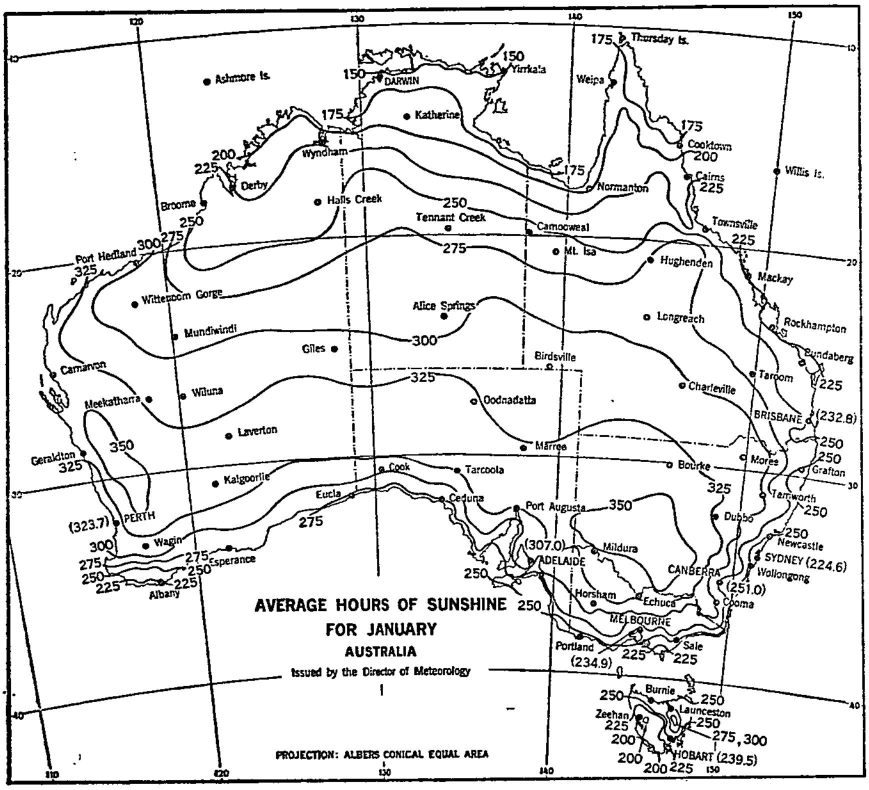
(*b*) the westerlies south of the mid-latitude anticyclones in which successive low pressure systems move eastward over the Southern Ocean.

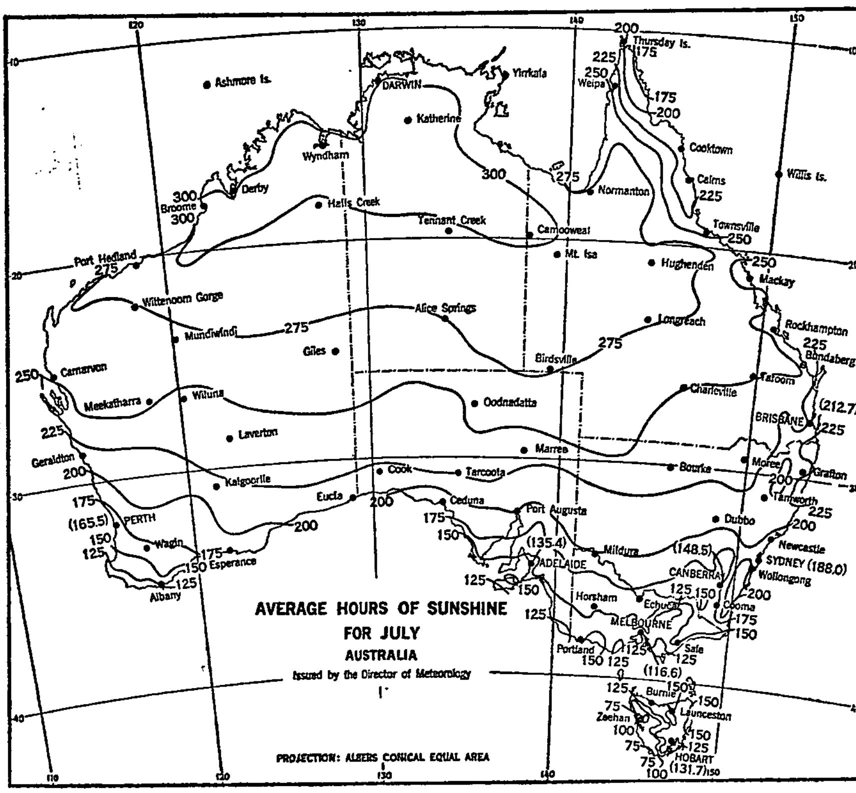
The only pronounced seasonal variations of atmospheric pressure in the middle and high latitudes of the southern hemisphere are related to the latitudinal shift in the axes of the sub-tropical high pressure systems and to the change in the tracks of the migratory anticyclones. The latter systems move generally from west to east in the Australian region between the semi-permanent oceanic anticyclones of the Indian and Pacific Oceans. The mean path of these systems lies over southern Australia during the summer but moves northwards during the winter with the thermal equator. The movement is only of a few degrees of latitude but it is of very great importance to the climate of the Australian




PLATES 9 and 10




**PLATES 11 and 12**

continent. During the summer months, when the anti-cyclones move on a more southerly track, the south-east trades affect the whole coast of eastern Australia north of around latitude 30° S., the westerlies retreating to higher latitudes, and conditions are more settled over southern Australia which then lies close to the axis of the anticyclones. In winter the anticyclones move further north, the trades affect only the northern parts of the continent, and southern Australia is exposed to the westerlies of the Southern Ocean.

In summer, with the retreat of the anticyclones to the south, the whole of northern and north-western Australia is exposed initially to light wind systems, and then during the period from December to April to the effects of the north-west monsoon. This process, which is associated with an inflow of north-west winds and intensive rains, is not as regular or persistent as the south-west monsoon of south-east Asia. However, it is a sufficiently regular feature of the climate of northern Australia to be designated as the north-west season, or, as it is best known in the area, 'the wet'. Its influence affects areas as far south as central Queensland, but southern Queensland and the area east of the Great Dividing Range are largely still under the influence of the south-east trades. Fringe or marginal areas on the southern limits of the monsoonal penetration over the continent have a shorter and more uncertain 'wet' season, which in some years fails to appear at all. With the northward advance of the anticyclones in autumn, the monsoon gives way again to the trades, and 'the dry' of northern and north-western Australia commences.

The general features of these wind patterns may be seen in the wind rose diagrams of plates 13 and 14, pages 44–5. It is important, however, to note the dynamic nature of the atmosphere, and that the continual growth, decay, and motion of the pressure systems result in a wide diversity of wind-flow types. Descriptions of wind conditions for particular geographical areas and seasons can thus be only of a very generalised kind. Further, local features can also be imposed on the overall wind pattern—channelling of winds due to topography (e.g. the high frequency of north-west winds in Hobart) and the marked summer sea breeze characteristics of most of the Australian coast, particularly near the Great Australian Bight as shown in the diagrams of 3 p.m. wind frequencies.

### Storms and tropical cyclones

In general there are two types of weather systems in Australia which produce very strong winds and heavy rainfalls over large areas of the continent:

(*a*) the active depressions which move eastwards over the Southern Ocean; and

(*b*) the tropical cyclones or hurricanes of north-eastern and north-western Australia.

During the winter the southern shores of the continent are subject to the deep depressions of the southern low pressure belt. They are felt most severely over the south-west of Western Australia, the south-east of South Australia, southern Victoria, and Tasmania, and may move inland in all these regions bringing strong winds and heavy rainfall. Further extensions of this type of system frequently develop close to the coast of New South Wales, often bringing severe weather to this region and to southern Queensland. These are generally known as 'east coast lows'.

The frontal systems (i.e. the narrow zones characterised by cloud and bad weather separating two air masses of different density) which are associated with these depressions vary widely in character. A common type in south-east Australia is a cold front located in a $\Lambda$ shaped trough. Such a system usually brings very strong north to north-west winds in advance of the front with a very abrupt backing of the wind to colder west to south-westerly winds after the frontal passage. Such frontal passages are, in their most severe form, associated with thunderstorms and line squalls, heavy rain, and a change to cold winds and showers. These violent changes with the passage of a cold front and strong southerly winds frequently affect the New South Wales coast as far north as Newcastle during the winter, and are popularly known as 'southerly busters'.

The most extensive rains of inland Australia occur when moist tropical air which has moved inland is lifted by convergence ahead of a slow moving colder air mass moving from the Southern Ocean. The coast of Queensland, particularly the section from Cooktown to Mackay and the adjacent waters, is subject to visitations by tropical cyclones (the 'hurricanes' of the Caribbean and 'typhoons' of the China Sea). These destructive systems can affect this region from December to April, normally forming in the Coral Sea, moving south-west close to the coast and then passing away to the south-east into the Pacific. They may, however, cross the coast from time to time and bring torrential rain and violent winds (often more than 150 km/h) to the coastal regions.

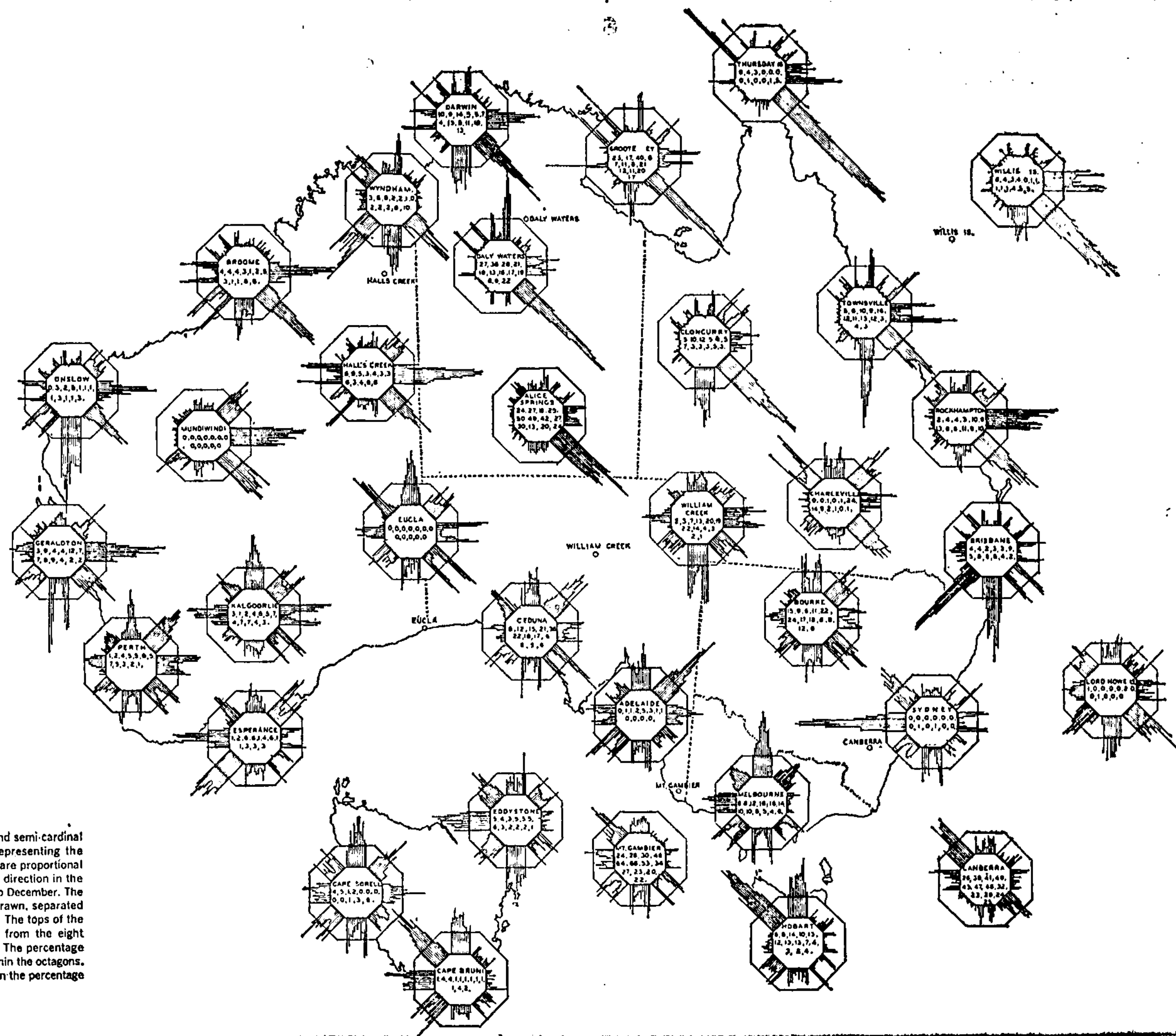
Similar systems affect the north-west coast of Western Australia where they bear the local name of 'willy willies', a name which is, however, often used generally in Australia for minor local whirlwinds or dust devils. The season in this region generally lasts from November to April, the storms originating in the Timor or Arafura Seas travelling usually south-west and approaching the coast most commonly between latitudes 20° S. and 22° S. Thence the systems may move southwards following the coast,

## BUREAU OF METEOROLOGY

# WIND ROSES

### 9 A.M.

**SHOWING MONTHLY PERCENTAGE FREQUENCY DISTRIBUTION OF WIND DIRECTIONS TO EIGHT POINTS OF THE COMPASS**




0 2.5 5 10 20 30 40 50 60 70 80 90 100
SCALE OF FREQUENCIES PER CENT

### EXPLANATION

The sides of the octagons face towards the cardinal and semi-cardinal points. Projecting from each side are twelve columns representing the twelve months of the year, and the lengths of the columns are proportional to the percentage frequencies of the winds from the given direction in the successive months, working round clockwise from January to December. The scale is shown above, and the outer octagons have been drawn, separated from the inner octagons by a distance representing 12½%. The tops of the columns would all be on these outer octagons if winds from the eight directions were equally frequent and there were no calms. The percentage frequency of calms in the 12 months is shown by figures within the octagons. Small dashes within the inner octagons indicate months when the percentage of winds from that direction is practically zero.

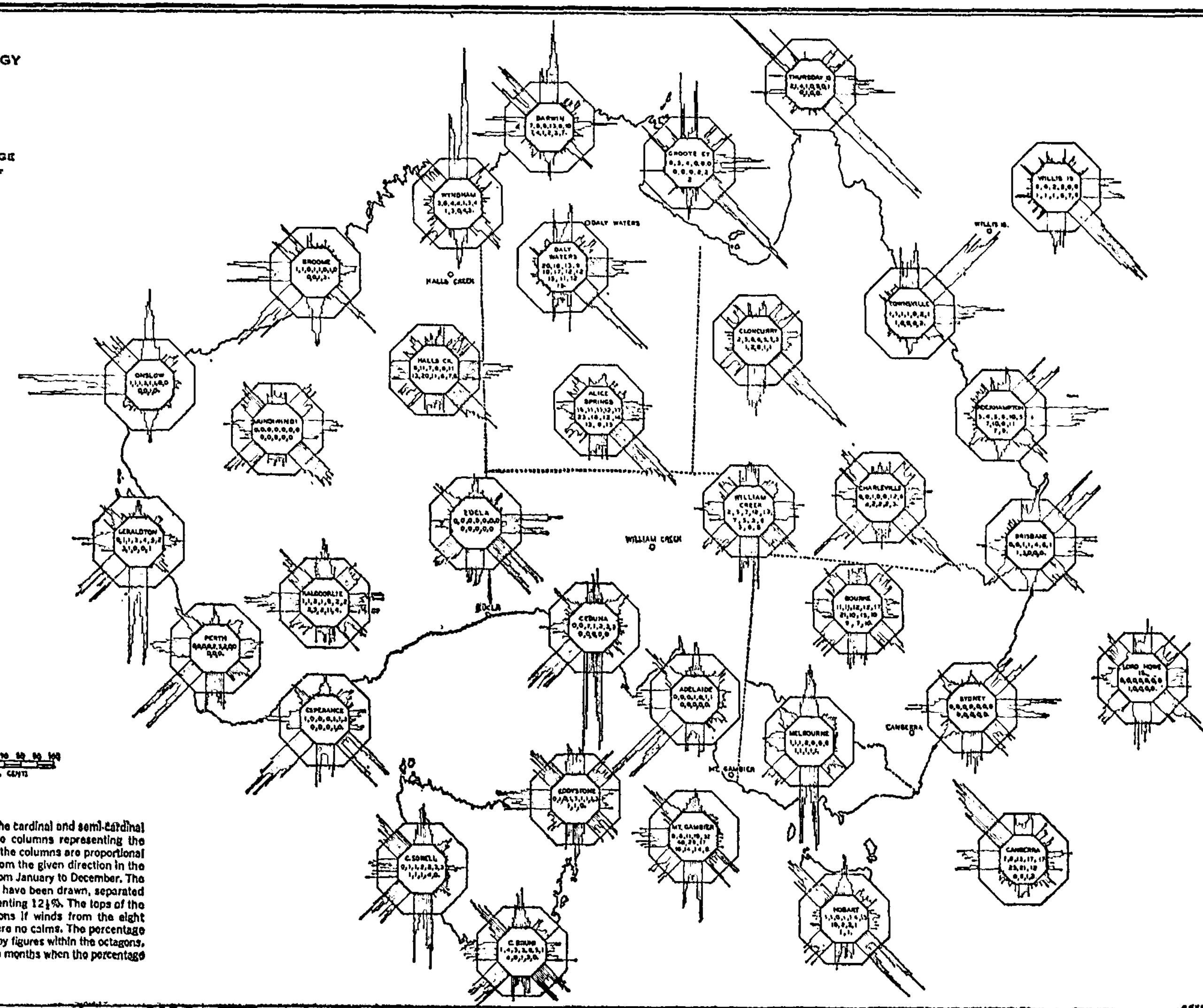
PLATE 13

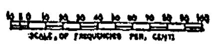
BUREAU OF METEOROLOGY

# WIND ROSES

3 P.M.

SHOWING MONTHLY PERCENTAGE FREQUENCY DISTRIBUTION OF WIND DIRECTIONS TO EIGHT POINTS OF THE COMPASS




## EXPLANATION

The sides of the octagons face towards the cardinal and semi-cardinal points. Projecting from each side are twelve columns representing the twelve months of the year, and the lengths of the columns are proportional to the percentage frequencies of the winds from the given direction in the successive months, working round clockwise from January to December. The scale is shown above, and the outer octagons have been drawn, separated from the inner octagons by a distance representing 12½%. The tops of the columns would all be on these outer octagons if winds from the eight directions were equally frequent and there were no calms. The percentage frequency of calms in the 12 months is shown by figures within the octagons. Small dashes within the inner octagons indicate months when the percentage of winds from that direction is practically zero.

PLATE 14

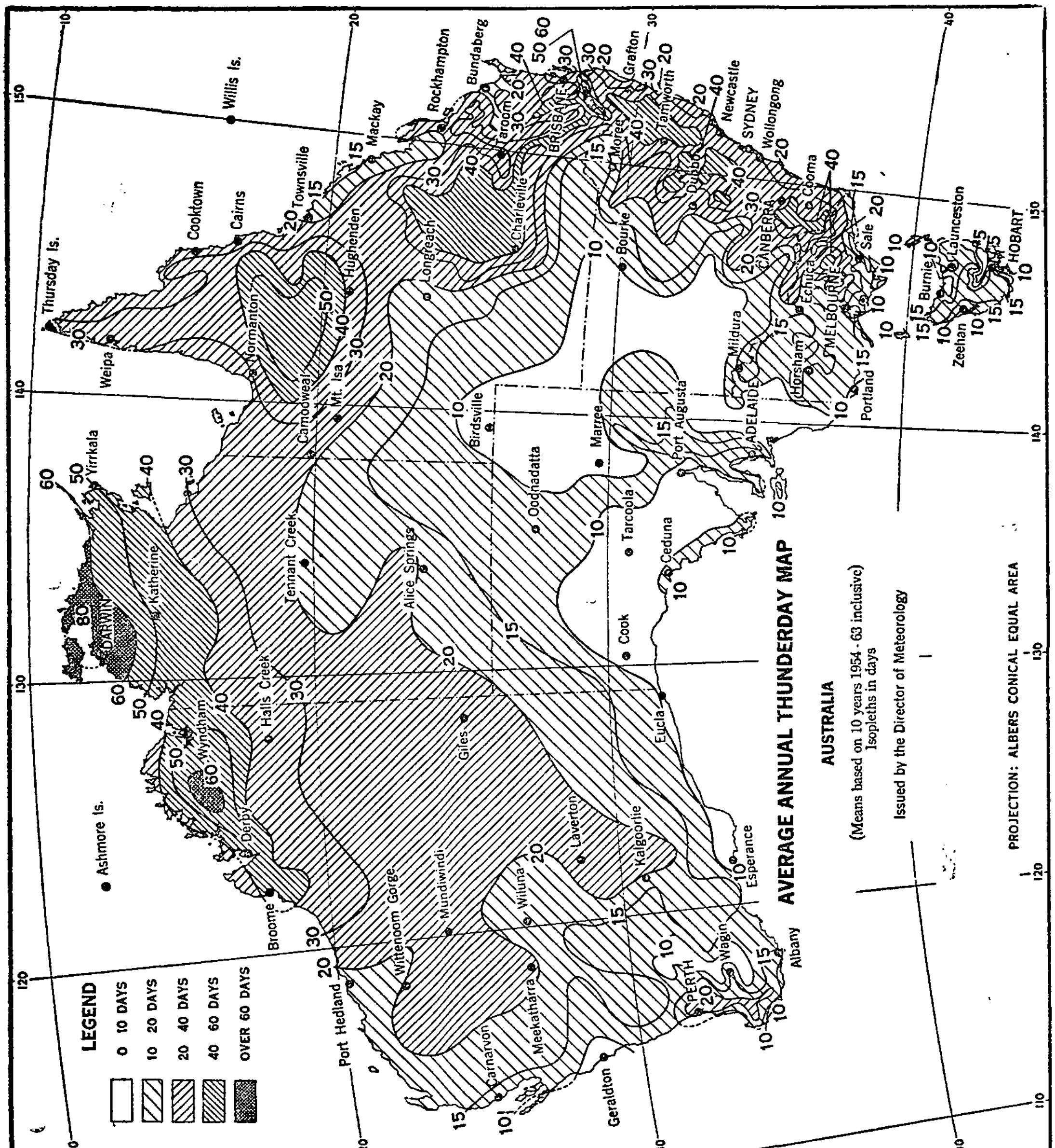

AVERAGE ANNUAL THUNDERDAY MAP
AUSTRALIA
(Means based on 10 years 1954 - 63 inclusive)
Isopleths in days
Issued by the Director of Meteorology
PROJECTION: ALBERS CONICAL EQUAL AREA
LEGEND
0 10 DAYS
10 20 DAYS
20 40 DAYS
40 60 DAYS
OVER 60 DAYS

PLATE 15

or sometimes cross inland bringing high rainfalls to the otherwise dry interior of the continent. A further region which is affected somewhat less frequently by tropical cyclones is the coast of Arnhem Land in the Northern Territory and the waters and coasts of the Gulf of Carpentaria.

Tropical cyclones, in general, soon lose their intensity on crossing from sea to land, but, although the wind force rapidly abates, they are still capable of producing the heavy rainfall which leads to flooding of coastal rivers, damage to stock and property, and general disruption of transport.

Thunderstorms which bring local heavy rain and strong winds are common to most of Australia. They are also of particular importance because of the lightning damage which they cause to power transmission lines, and have been extensively studied for the purpose of siting electrical installations as far as possible in areas of low thunderstorm occurrence. Plate 15, page 46, shows the number of days annually on which thunder is heard, which is a better observational criterion than lightning observed. The region of maximum thunderstorm activity is the extreme north-west of the continent and the region south-east of the Gulf of Carpentaria. In the more settled areas maximum thunderstorm occurrence is in central western and south-eastern Queensland and the highland areas of New South Wales. The minimum number of storms occur over the interior of South Australia, western New South Wales, and eastern Tasmania.

### Climatological tables

The averages and extremes for a number of elements which have been determined from long series of observations at the Australian capitals up to and including the year 1971 (data for Canberra up to 1972) are given in the following pages, together with more limited data for the larger country towns of the Commonwealth.

## CLIMATOLOGICAL DATA: PERTH, WESTERN AUSTRALIA

(Lat. 31° 57′ S., Long. 115° 52′ E. Height above M.S.L. 15 metres)

### BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

| Month | Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb) | Wind (height of anemometer 22 metres) Average km/h | Highest mean speed in one day (km/h) | Highest gust speed (km/h) | Prevailing direction 9 a.m. | Prevailing direction 3 p.m. | Mean amt evaporation (mm) | No. days thunder | Mean amt clouds 9 a.m., 3 p.m., 9 p.m. (a) | No. clear days |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 87 | 30(b) | 71 | 56 | 30(b) | 30(b) | 73 | 75 | 30(b) | 30(b) |
| January | 1,012.6 | 17.5 | 42.3 *27/98* | 81 | E | SSW | 264 | 0.9 | 2.3 | 14 |
| February | 1,013.0 | 17.2 | 34.6 6/08 | 87 | ENE | SSW | 223 | 0.7 | 2.5 | 13 |
| March | 1,015.2 | 16.2 | 34.6 6/13 | 113 | E | SSW | 195 | 0.7 | 2.8 | 12 |
| April | 1,017.9 | 13.7 | 50.7 25/00 | 101 | ENE | SSW | 119 | 0.8 | 3.4 | 9 |
| May | 1,017.9 | 13.5 | 43.9 29/32 | 119 | NE | WSW | 72 | 1.8 | 4.3 | 6 |
| June | 1,017.6 | 13.5 | 48.6 17/27 | 129 | N | NW | 48 | 1.8 | 4.7 | 5 |
| July | 1,018.9 | 14.2 | 53.9 20/26 | 137 | NNE | W | 47 | 1.4 | 4.5 | 5 |
| August | 1,018.8 | 15.1 | 51.3 15/03 | 156 | N | WNW | 63 | 1.2 | 4.5 | 6 |
| September | 1,018.4 | 15.1 | 45.9 11/05 | 109 | ENE | SSW | 91 | 0.7 | 3.9 | 8 |
| October | 1,017.0 | 16.1 | 43.0 6/16 | 105 | SE | SW | 140 | 0.7 | 3.8 | 8 |
| November | 1,015.5 | 17.2 | 41.4 *18/97* | 101 | E | SW | 194 | 0.7 | 3.1 | 9 |
| December | 1,013.4 | 17.7 | 41.2 6/22 | 103 | E | SSW | 247 | 1.0 | 2.6 | 13 |
| Year: Totals | .. | .. | .. .. | .. | .. | .. | 1,703 | 12.4 | .. | 108 |
| Year: Averages | 1,016.3 | 15.6 | .. .. | .. | E | SSW | .. | .. | 3.5 | .. |
| Year: Extremes | .. | .. | 53.9 20/7/26 | 156 | .. | .. | .. | .. | .. | .. |

(a) Scale 0–8. (b) Standard thirty years normal (1911–1940).

### TEMPERATURE AND SUNSHINE

| Month | Air temperature daily readings (°Celsius) Mean max. | Mean min. | Mean | Extreme air temperature (°Celsius) Highest | Lowest | Extreme temperature (°Celsius) Highest in sun | Lowest on grass | Mean daily hours sunshine |
|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 75 | 75 | 75 | 75 | 75 | 63(a) | 73 | 74 |
| January | 29.4 | 17.6 | 23.5 | 43.7 29/56 | 9.2 20/25 | 80.7 22/14 | 4.2 20/25 | 10.4 |
| February | 29.7 | 17.7 | 23.7 | 44.6 8/33 | 8.7 1/02 | 78.7 4/34 | 4.3 1/13 | 10.0 |
| March | 27.7 | 16.4 | 22.1 | 41.3 14/22 | 7.7 8/03 | 75.0 19/18 | 2.6 (b) | 8.8 |
| April | 24.4 | 14.0 | 19.2 | 37.6 9/10 | 4.1 20/14 | 69.4 8/16 | −0.7 26/60 | 7.2 |
| May | 20.6 | 11.5 | 16.1 | 32.4 2/07 | 1.3 11/14 | 63.3 4/25 | −3.9 31/64 | 5.8 |
| June | 18.1 | 9.9 | 14.1 | 27.6 2/14 | 1.6 22/55 | 57.5 9/14 | −3.4 27/46 | 4.8 |
| July | 17.2 | 8.9 | 13.1 | 24.7 2/21 | 1.2 7/16 | 56.2 13/15 | −3.8 30/20 | 5.3 |
| August | 17.8 | 9.0 | 13.4 | 27.8 21/40 | 1.9 31/08 | 62.3 29/21 | −3.0 18/66 | 6.1 |
| September | 19.3 | 10.1 | 14.7 | 32.7 30/18 | 2.6 6/56 | 67.5 29/16 | −2.7 (c) | 7.1 |
| October | 21.1 | 11.4 | 16.3 | 37.3 29/67 | 4.2 6/68 | 71.8 19/54 | −1.2 16/31 | 8.2 |
| November | 24.5 | 13.8 | 19.2 | 40.3 24/13 | 5.6 1/04 | 75.0 30/25 | −1.1 6/71 | 9.6 |
| December | 27.3 | 16.0 | 21.6 | 42.3 31/68 | 8.6 29/57 | 76.0 11/27 | 3.3 29/57 | 10.5 |
| Year: Averages | 23.1 | 13.0 | 18.1 | .. .. | .. .. | .. .. | .. .. | 7.8 |
| Year: Extremes | .. | .. | .. | 44.6 8/2/33 | 1.2 7/7/16 | 80.7 22/1/14 | −3.9 31/5/64 | .. |

(a) Records discontinued 1963. (b) 8/1903 and 16/1967. (c) 8/1952 and 6/1956.

### HUMIDITY, RAINFALL, AND FOG

| Month | Vapour pressure mean 9 a.m. (mb) | Rel. hum. (%) at 9 a.m. Mean | Highest mean | Lowest mean | Rainfall (millimetres) Mean mthly | Mean No. of days of rain | Greatest monthly | Least monthly | Greatest in one day | Fog Mean No. days |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 30(a) | 30(a) | 75 | 75 | 96 | 96 | 96 | 96 | 96 | 75 |
| January | 14.8 | 51 | 63 | 41 | 8 | 3 | 55 1879 | Nil (b) | 44 *27/79* | 0.2 |
| February | 14.7 | 51 | 65 | 43 | 11 | 3 | 166 1955 | Nil (b) | 87 17/55 | 0.3 |
| March | 14.7 | 57 | 66 | 46 | 21 | 4 | 145 1934 | Nil (b) | 77 9/34 | 0.7 |
| April | 13.4 | 61 | 75 | 51 | 46 | 8 | 149 1926 | Nil 1920 | 67 30/04 | 0.8 |
| May | 12.4 | 70 | 81 | 61 | 126 | 14 | 308 1879 | 14 1964 | 76 17/42 | 1.3 |
| June | 11.4 | 75 | 85 | 68 | 187 | 17 | 476 1945 | 55 1877 | 99 10/20 | 1.5 |
| July | 10.9 | 76 | 88 | 69 | 173 | 18 | 425 1958 | 61 1876 | 76 *4/91* | 1.4 |
| August | 10.7 | 71 | 83 | 62 | 139 | 18 | 318 1945 | 12 1902 | 74 14/45 | 1.0 |
| September | 11.6 | 66 | 75 | 58 | 81 | 14 | 199 1923 | 9 1916 | 47 18/66 | 0.3 |
| October | 11.7 | 60 | 75 | 52 | 55 | 12 | 200 1890 | 4 1946 | 50 4/67 | 0.4 |
| November | 12.7 | 52 | 66 | 41 | 21 | 6 | 71 1916 | Nil 1891 | 39 29/56 | 0.2 |
| December | 13.9 | 51 | 63 | 39 | 15 | 4 | 81 1951 | Nil (b) | 47 3/51 | 0.2 |
| Year: Totals | .. | .. | .. | .. | 883 | 121 | .. .. | .. .. | .. .. | 8.3 |
| Year: Averages | 12.7 | 62 | .. | .. | .. | .. | .. .. | .. .. | .. .. | .. |
| Year: Extremes | .. | .. | 88 | 39 | .. | .. | 476 6/1945 | Nil (b) | 99 10/6/20 | .. |

(a) Standard thirty years normal (1911–1940). (b) Various years.

Figures such as *27/98*, 29/56, etc. indicate, in respect of the month of reference, the day and year of the occurrence. Dates in italics relate to nineteenth century.

## CLIMATOLOGICAL DATA: DARWIN, NORTHERN TERRITORY

(Lat. 12° 28′ S., Long. 130° 51′ E. Height above M.S.L. 30 metres)

### BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

| *Month* | *Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb)* | *Wind (height of anemometer 36 metres)* Average km/h | Highest mean speed in one day (km/h) | Highest gust speed (km/h) | Prevailing direction 9 a.m. | Prevailing direction 3 p.m. | *Mean amt evaporation (mm)* | *No. days thunder* | *Mean amt clouds 9 a.m., 3 p.m., 9 p.m. (a)* | *No. clear days* |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 90 | 20 | .. | 22(b) | .. | .. | 14 | 35 | 35 | 35 |
| January | 1,006.2 | 9.3 | .. | 106 | W | NW | 164 | 12.9 | 5.9 | 1 |
| February | 1,006.3 | 10.6 | .. | 101 | W | NW | 141 | 10.2 | 5.8 | 1 |
| March | 1,007.2 | 7.5 | .. | 157 | W | NW | 161 | 10.6 | 5.2 | 3 |
| April | 1,009.3 | 8.8 | .. | 67 | SE | NW | 164 | 4.0 | 2.9 | 10 |
| May | 1,010.9 | 9.6 | .. | 62 | SE | E | 172 | 0.5 | 2.0 | 16 |
| June | 1,012.2 | 10.1 | .. | 64 | SE | E | 172 | 0.0 | 1.4 | 19 |
| July | 1,012.8 | 8.9 | .. | 62 | SE | E | 176 | 0.0 | 1.3 | 20 |
| August | 1,012.6 | 8.6 | .. | 72 | SE | NW | 182 | 0.0 | 1.1 | 20 |
| September | 1,011.7 | 8.6 | .. | 64 | ENE | NW | 206 | 1.0 | 1.8 | 16 |
| October | 1,010.5 | 9.8 | .. | 85 | NE | NW | 232 | 5.3 | 2.7 | 9 |
| November | 1,008.7 | 8.6 | .. | 117 | NW | NW | 211 | 11.8 | 3.9 | 4 |
| December | 1,006.9 | 9.8 | .. | 106 | NW | NW | 189 | 14.2 | 4.9 | 2 |
| Year: Totals | .. | .. | .. | .. | .. | .. | 2,170 | 70.5 | .. | 121 |
| Year: Averages | 1,009.6 | 9.2 | .. | .. | SE | NW | .. | .. | 3.2 | .. |
| Year: Extremes | .. | .. | .. | 157 | .. | .. | .. | .. | .. | .. |

(a) Scale 0–8. (b) Several incomplete years.

### TEMPERATURE AND SUNSHINE

| *Month* | *Air temperature daily readings (°Celsius)* Mean max. | Mean min. | Mean | *Extreme air temperature (°Celsius)* Highest | Lowest | *Extreme temperature (°Celsius)* Highest in sun | Lowest on grass | *Mean daily hours sunshine* |
|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 90 | 90 | 90 | 90(a) | 90(a) | 26(b) | .. | 20 |
| January | 32.2 | 25.0 | 28.6 | 37.8 *2/82* | 20.0 *20/92* | 75.6 26/42 | .. | 6.1 |
| February | 31.9 | 24.8 | 28.4 | 38.3 *20/87* | 17.2 25/49 | 73.2 (c) | .. | 5.8 |
| March | 32.4 | 24.8 | 28.6 | 38.9 (d) | 19.2 31/45 | 74.3 23/38 | .. | 7.0 |
| April | 33.1 | 24.2 | 28.7 | 40.0 *7/83* | 16.0 11/43 | 72.8 1/38 | .. | 8.6 |
| May | 32.3 | 22.4 | 27.4 | 39.1 *8/84* | (e)14.2 28/67 | 71.2 5/20 | .. | 9.3 |
| June | 30.9 | 20.4 | 25.7 | 37.0 *17/37* | 12.1 23/63 | 68.5 2/16 | .. | 9.7 |
| July | 30.4 | 19.6 | 25.1 | 36.7 *17/88* | 10.4 29/42 | 68.9 28/17 | .. | 9.8 |
| August | 31.4 | 20.8 | 26.1 | 36.7 *19/00* | 13.6 11/63 | 69.1 28/16 | .. | 10.4 |
| September | 32.7 | 23.2 | 27.9 | 38.9 *20/82* | 16.7 9/63 | 69.5 (f) | .. | 10.0 |
| October | 33.6 | 25.0 | 29.3 | 40.5 *17/92* | 19.4 8/66 | 71.4 30/38 | .. | 9.5 |
| November | 33.8 | 25.3 | 29.6 | 39.6 *9/84* | 19.3 4/50 | 77.0 14/37 | .. | 8.6 |
| December | 33.2 | 25.3 | 29.3 | 38.9 *20/82* | 18.3 4/60 | 76.2 26/23 | .. | 7.1 |
| Year: Averages | 32.3 | 23.3 | 27.9 | .. .. | .. .. | .. .. | .. | 8.5 |
| Year: Extremes | .. | .. | .. | 40.5 17/10/1892 | 10.4 29/7/1942 | 77.0 14/11/37 | .. | .. |

(a) Years 1882–1941 at Post Office, 1942–1966 at Aerodrome; 1967–1971 at Regional office; sites not strictly comparable. (b) Records discontinued 1942. (c) 5/1938 and 23/1938. (d) 26/1883 and 27/1883. (e) Recorded at Darwin Aerodrome. All other Statistics from 1967 to 1971 at Regional Office. (f) 28/1916 and 3/1921.

### HUMIDITY, RAINFALL, AND FOG

| *Month* | *Vapour pressure mean 9 a.m. (mb)* | *Rel. hum. (%) at 9 a.m.* Mean | Highest mean | Lowest mean | *Rainfall (millimetres)* Mean mthly | Mean No. of days of rain | Greatest monthly | Least monthly | Greatest in one day | *Fog Mean No. days* |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 85(a) | 90 | 57(b) | 57(b) | 86(c) | 74 | 105(d) | 105(d) | 105(d) | 35 |
| January | 31.1 | 81 | 89 | 69 | 391 | 19 | 708 1896 | 68 1906 | 296 *7/97* | 0.0 |
| February | 31.1 | 81 | 88 | 71 | 330 | 18 | 779 1967 | 13 1931 | 279 18/55 | 0.0 |
| March | 30.7 | 80 | 84 | 69 | 260 | 17 | 595 1965 | 21 1911 | 182 6/19 | 0.0 |
| April | 27.0 | 72 | 80 | 60 | 103 | 8 | 603 1891 | Nil 1950 | 158 4/59 | 0.0 |
| May | 21.8 | 65 | 76 | 49 | 14 | 1 | 261 1882 | Nil (e) | 56 6/22 | 0.0 |
| June | 18.7 | 63 | 75 | 52 | 3 | 0 | 39 1902 | Nil (e) | 36 10/02 | 0.4 |
| July | 17.6 | 62 | 71 | 47 | 1 | 0 | 65 1900 | Nil (e) | 43 2/00 | 1.1 |
| August | 20.6 | 66 | 73 | 53 | 2 | 0 | 84 1947 | Nil (e) | 80 22/47 | 0.8 |
| September | 24.7 | 68 | 73 | 54 | 13 | 2 | 108 1942 | Nil (e) | 71 21/42 | 0.2 |
| October | 27.7 | 68 | 72 | 60 | 50 | 5 | 339 1954 | Nil (e) | 95 18/56 | 0.0 |
| November | 29.3 | 70 | 75 | 62 | 126 | 11 | 399 1938 | 10 1870 | 120 *9/51* | 0.0 |
| December | 30.5 | 75 | 83 | 65 | 243 | 16 | 583 1965 | 25 1934 | 200 28/10 | 0.0 |
| Year: Totals | .. | .. | .. | .. | 1,536 | 97 | .. .. | .. .. | .. .. | 2.5 |
| Year: Averages | 25.9 | 71 | .. | .. | .. | .. | .. .. | .. .. | .. .. | .. |
| Year: Extremes | .. | .. | 89 | 47 | .. | .. | 779 2/67 | Nil (f) | 296 7/1/1897 | .. |

(a) Records to 1966 at Aerodrome. (b) 1882 to 1938 at Post Office. (c) 1869 to 1962 at Post Office; 8 years missing. (d) Highest or lowest at either Post Office, Aerodrome or Regional Office Sites. (e) Various years. (f) April to October. Various years. Figures such as 2/82, 26/42, etc., indicate in respect of the month of reference, the day and year of occurrence. Dates in italics relate to nineteenth century.

## CLIMATOLOGICAL DATA: ADELAIDE, SOUTH AUSTRALIA

(Lat. 34° 56′ S., Long. 138° 35′ E. Height above M.S.L. 43 metres)

### BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

| Month | *Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb)* | *Wind (height of anemometer 23 metres)* Average km/h | Highest mean speed in one day (km/h) | Highest gust speed (km/h) | Prevailing direction 9 a.m. | Prevailing direction 3 p.m. | *Mean amt evaporation (mm)* | *No. days thunder* | *Mean amt clouds 9 a.m., 3 p.m., 9 p.m. (a)* | *No. clear days* |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 115 | 20(*b*) | 20(*b*) | 55 | 30(*c*) | 30(*c*) | 5(*d*) | 104 | 100 | 57 |
| January | 1,013.2 | 12.8 | 32.2 12/70 | 116 | SW | SW | 275 | 1.5 | 2.9 | 12.2 |
| February | 1,014.3 | 12.1 | 28.8 25/67 | 106 | NE | SW | 232 | 1.1 | 3.0 | 10.7 |
| March | 1,017.2 | 11.4 | 30.7 24/64 | 126 | S | SW | 184 | 0.8 | 3.2 | 10.7 |
| April | 1,019.8 | 11.4 | 37.4 10/56 | 130 | NE | SW | 131 | 1.0 | 4.1 | 6.6 |
| May | 1,020.0 | 11.3 | 37.8 19/53 | 113 | NE | NW | 76 | 1.0 | 4.7 | 4.6 |
| June | 1,019.8 | 11.6 | 29.7 16/70 | 108 | NE | N | 56 | 0.9 | 5.0 | 3.9 |
| July | 1,020.0 | 11.8 | 32.9 13/64 | 148 | NE | NW | 58 | 0.8 | 4.8 | 3.6 |
| August | 1,019.0 | 12.8 | 38.2 8/55 | 121 | NE | SW | 77 | 1.1 | 4.2 | 4.9 |
| September | 1,017.6 | 13.2 | 34.9 16/65 | 111 | NNE | SW | 115 | 1.4 | 4.3 | 5.6 |
| October | 1,016.0 | 13.6 | 35.4 1/68 | 121 | NNE | SW | 189 | 1.9 | 4.2 | 5.7 |
| November | 1,015.0 | 13.9 | 36.3 14/68 | 130 | SW | SW | 212 | 2.0 | 3.9 | 6.6 |
| December | 1,013.3 | 13.5 | 31.1 18/69 | 121 | SW | SW | 249 | 1.5 | 3.4 | 9.0 |
| Year Totals | .. | .. | .. .. | .. | .. | .. | 1,854 | 15.0 | .. | 84.1 |
| Year Averages | 1,017.1 | .. | .. .. | .. | NE | SW | .. | .. | 4.0 | .. |
| Year Extremes | .. | .. | 38.2 8/8/65 | 148 | .. | .. | .. | .. | .. | .. |

(*a*) Scale 0–8. (*b*) Records of cup anemometer. (*c*) Standard 30 years normal (1931–1960). (*d*) Class 'A' pan.

### TEMPERATURE AND SUNSHINE

| Month | *Air temperature daily readings (°Celsius)* Mean max. | Mean min. | Mean | *Extreme air temperature (°Celsius)* Highest | Lowest | *Extreme temperature (°Celsius)* Highest in sun | Lowest on grass | *Mean daily hours sunshine* |
|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 115 | 115 | 115 | 115 | 115 | 54(*a*) | 111 | 90 |
| January | 29.6 | 16.4 | 23.0 | 47.6 12/39 | 7.3 *21/84* | 82.3 *18/82* | 2.5 *14/79* | 10.0 |
| February | 29.4 | 16.6 | 23.0 | 45.3 *12/99* | 7.5 23/18 | 76.9 10/00 | 2.1 23/26 | 9.3 |
| March | 26.9 | 15.1 | 21.0 | 43.6 9/34 | 6.6 21/33 | 78.9 *17/83* | 0.1 21/33 | 7.8 |
| April | 22.7 | 12.6 | 17.7 | 37.0 5/38 | 4.2 *15/59* | 68.3 *1/83* | −2.2 14/63 | 5.9 |
| May | 18.7 | 10.2 | 14.5 | 31.9 4/21 | 2.7 (*b*) | 64.6 *12/79* | −3.6 19/28 | 4.8 |
| June | 15.8 | 8.3 | 12.1 | 25.6 4/57 | 0.3 (*c*) | 59.3 *18/79* | −6.1 24/44 | 4.1 |
| July | 14.9 | 7.2 | 11.1 | 23.3 11/06 | 0.0 24/08 | 56.9 *26/90* | −5.5 30/29 | 4.3 |
| August | 16.4 | 7.8 | 12.1 | 29.4 31/11 | 0.2 *17/59* | 60.0 *31/92* | −5.1 11/29 | 5.3 |
| September | 18.9 | 8.9 | 13.9 | 35.1 30/61 | 0.4 *4/58* | 71.4 *23/82* | −3.9 25/27 | 6.1 |
| October | 22.1 | 10.8 | 16.5 | 39.4 21/22 | 2.3 *20/58* | 72.2 30/21 | −3.0 22/66 | 7.2 |
| November | 25.2 | 12.9 | 19.1 | 45.3 *21/65* | 4.9 2/09 | 74.9 *20/78* | −0.3 2/09 | 8.5 |
| December | 27.8 | 14.9 | 21.3 | 45.9 29/31 | 6.1 (*d*) | 79.8 *7/99* | 0.3 *4/84* | 9.4 |
| Year Averages | 22.4 | 11.8 | 17.1 | .. | .. | .. | .. | 6.9 |
| Year Extremes | .. | .. | .. | 47.6 12/1/39 | 0.0 24/7/08 | 82.3 *18/1/62* | −6.1 24/6/44 | .. |

(*a*) Discontinued 1934, incomplete 1931–1934. (*b*) *26/1895* and 24/04. (*c*) *27/1876* and 24/44. (*d*) *16/1861* and 4/06.

### HUMIDITY, RAINFALL, AND FOG

| Month | *Vapour pressure mean 9 a.m. (mb)* | *Rel. hum. (%) at 9 a.m.* Mean | Highest mean | Lowest mean | *Rainfall (millimetres)* Mean mthly | Mean No. of days of rain | Greatest monthly | Least monthly | Greatest in one day | *Fog Mean No. days* |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 104 | 104 | 104 | 104 | 133 | 133 | 133 | 133 | 133 | 72 |
| January | 11.9 | 41 | 59 | 29 | 19 | 4 | 84 1941 | Nil (*a*) | 58 *2/89* | 0.0 |
| February | 12.3 | 43 | 57 | 30 | 20 | 4 | 155 1925 | Nil (*a*) | 141 7/25 | 0.0 |
| March | 11.7 | 47 | 62 | 29 | 24 | 5 | 117 1878 | Nil (*a*) | 89 *5/78* | 0.0 |
| April | 11.3 | 56 | 72 | 37 | 44 | 10 | 155 1971 | Nil 1945 | 80 *5/60* | 0.0 |
| May | 10.8 | 67 | 77 | 49 | 69 | 13 | 177 1875 | 2 1934 | 70 *1/53* | 0.4 |
| June | 9.9 | 75 | 84 | 63 | 73 | 15 | 218 1916 | 6 1958 | 54 1/20 | 1.1 |
| July | 9.4 | 76 | 87 | 66 | 66 | 16 | 138 1890 | 10 1899 | 45 *10/65* | 1.3 |
| August | 9.7 | 70 | 80 | 54 | 62 | 16 | 157 1852 | 8 1944 | 57 *19/51* | 0.6 |
| September | 9.9 | 60 | 72 | 44 | 51 | 13 | 148 1923 | 7 1951 | 40 20/23 | 0.2 |
| October | 10.1 | 51 | 67 | 29 | 44 | 11 | 133 1949 | 1 1969 | 57 16/08 | 0.0 |
| November | 10.5 | 45 | 64 | 31 | 31 | 8 | 113 1839 | 1 1963 | 75 12/60 | 0.0 |
| December | 11.1 | 40 | 56 | 31 | 26 | 6 | 101 1861 | Nil 1904 | 61 23/13 | 0.0 |
| Year Totals | .. | .. | .. | .. | 529 | 121 | .. .. | .. .. | .. .. | 3.6 |
| Year Averages | 10.7 | 56 | .. | .. | .. | .. | .. .. | .. .. | .. .. | .. |
| Year Extremes | .. | .. | 87 | 29 | .. | .. | 218 6/1916 | Nil (*b*) | 141 7/2/25 | .. |

(*a*) Various years. (*b*) December to April, various years.

Figures such as 3/55, *21/84*, etc. indicate, in respect of the month of reference, the day and year of the occurrence. Dates in italics relate to nineteenth century.

## CLIMATOLOGICAL DATA: BRISBANE, QUEENSLAND

(Lat. 27° 28′ S., Long. 153° 2′ E. Height above M.S.L. 41 metres)

### BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

| Month | Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb) | Wind (height of anemometer 32 metres): Average km/h | Highest mean speed in one day (km/h) | Highest gust speed (km/h) | Prevailing direction 9 a.m. | Prevailing direction 3 p.m. | Mean amt evaporation (mm) | No. days thunder | Mean amt clouds 9 a.m., 3 p.m., 9 p.m. (a) | No. clear days |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 85 | 56 | 56 | 56 | 30(b) | 30(b) | 63 | 85 | 80 | 64 |
| January | 1,011.7 | 12.3 | 31.8 23/47 | 90 | SE | NE | 177 | 4.7 | 4.6 | 3.4 |
| February | 1,012.5 | 12.1 | 35.7 21/54 | 108 | SE | NE | 141 | 3.8 | 4.7 | 2.4 |
| March | 1,014.7 | 11.6 | 32.7 1/29 | 122 | S | E | 134 | 2.3 | 4.3 | 5.5 |
| April | 1,017.3 | 10.5 | 26.9 3/25 | 103 | S | E | 111 | 1.4 | 3.6 | 7.9 |
| May | 1,018.4 | 9.9 | 28.8 17/26 | 87 | SW | SE | 87 | 0.6 | 3.3 | 10.0 |
| June | 1,018.5 | 10.2 | 30.6 14/28 | 95 | SW | WSW | 70 | 0.5 | 3.3 | 10.5 |
| July | 1,018.8 | 9.9 | 35.4 13/54 | 111 | SW | WSW | 75 | 0.4 | 2.9 | 13.3 |
| August | 1,018.9 | 10.2 | 26.9 4/35 | 100 | SW | NE | 96 | 1.4 | 2.6 | 13.5 |
| September | 1,017.5 | 10.5 | 25.9 1/48 | 101 | SW | NE | 118 | 2.9 | 2.7 | 12.7 |
| October | 1,015.9 | 11.1 | 16.8 1/41 | 100 | S | NE | 149 | 4.4 | 3.4 | 8.6 |
| November | 1,014.1 | 11.6 | 24.9 10/28 | 111 | SE | NE | 167 | 5.8 | 3.9 | 6.1 |
| December | 1,012.1 | 12.1 | 31.4 15/26 | 127 | SE | NE | 184 | 6.7 | 4.3 | 4.4 |
| Year: Totals | .. | .. | .. .. | .. | .. | .. | 1,509 | 34.9 | .. | 98.3 |
| Year: Averages | 1,015.9 | 11.0 | .. .. | .. | SW | NE | .. | .. | 3.6 | .. |
| Year: Extremes | .. | .. | 35.7 21/2/54 | 127 | .. | .. | .. | .. | .. | .. |

(a) Scale 0–8. (b) Standard thirty years normal (1911–1940).

### TEMPERATURE AND SUNSHINE

| Month | Air temperature daily readings (°Celsius): Mean max. | Mean min. | Mean | Extreme air temperature (°Celsius): Highest | Lowest | Extreme temperature (°Celsius): Highest in sun | Lowest on grass | Mean daily hours sunshine |
|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 85 | 85 | 85 | 85 | 85 | 50(c) | 84 | 63 |
| January | 29.4 | 20.5 | 25.0 | 43.2 26/40 | 14.9 *4/93* | 76.2 2/37 | 9.9 *4/93* | 7.6 |
| February | 28.9 | 20.4 | 24.7 | 40.9 21/25 | 14.7 21/31 | 74.0 6/10 | 9.5 22/31 | 7.0 |
| March | 27.9 | 19.2 | 23.5 | 38.8 13/65 | 11.3 29/13 | 72.5 6/39 | 7.4 29/13 | 6.8 |
| April | 26.0 | 16.5 | 21.2 | 35.1 (a) | 6.9 25/25 | 67.7 11/16 | 2.6 24/25 | 7.1 |
| May | 23.1 | 13.1 | 18.1 | 32.4 21/23 | 4.8 30/51 | 63.9 1/10 | −1.2 *8/97* | 6.8 |
| June | 20.8 | 10.7 | 15.7 | 31.6 19/18 | 2.4 29/08 | 57.8 3/18 | −3.7 *23/88* | 6.5 |
| July | 20.3 | 9.4 | 14.9 | 29.1 23/46 | 2.3 (b) | 63.4 20/15 | −4.2 *11/90* | 7.1 |
| August | 21.8 | 10.1 | 16.0 | 32.8 14/46 | 2.7 13/64 | 61.1 20/17 | −2.7 *9/99* | 7.8 |
| September | 24.0 | 12.7 | 18.4 | 38.3 22/43 | 4.8 *1/96* | 68.6 26/03 | −0.9 *1/89* | 8.3 |
| October | 26.1 | 15.7 | 20.9 | 40.7 30/58 | 6.3 *3/99* | 69.7 31/18 | 1.6 *8/89* | 8.3 |
| November | 27.8 | 17.9 | 22.9 | 41.2 18/13 | 9.2 2/05 | 72.4 *7/89* | 3.8 1/05 | 8.3 |
| December | 29.1 | 19.7 | 24.4 | 41.1 *26/93* | 13.5 5/55 | 74.4 28/42 | 9.5 *3/94* | 8.1 |
| Year: Averages | 25.4 | 15.5 | 20.5 | .. | .. | .. | .. | 7.5 |
| Year: Extremes | .. | .. | .. | 43.2 26/1/1940 | 2.3 (b) | 76.2 2/1/1937 | −4.2 11/7/1890 | .. |

(a) *9/1896* and 5/03. (b) *12/1894* and *2/1896*. (c) 1887–1926, 1936–March 1947.

### HUMIDITY, RAINFALL, AND FOG

| Month | Vapour pressure mean 9 a.m. (mb) | Rel. hum. (%) at 9 a.m.: Mean | Highest mean | Lowest mean | Rainfall (millimetres): Mean mthly | Mean No. of days of rain | Greatest monthly | Least monthly | Greatest in one day | Fog Mean No. days |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 64 | 85 | 84 | 84 | 120 | 112 | 119 | 119 | 119 | 85 |
| January | 21.7 | 66 | 79 | 53 | 162 | 13 | 704 1895 | 8 1919 | 465 *21/87* | 0.5 |
| February | 22.0 | 69 | 82 | 55 | 161 | 13 | 1,026 1893 | 15 1849 | 270 6/31 | 0.6 |
| March | 20.9 | 71 | 85 | 56 | 146 | 15 | 865 1870 | Nil 1849 | 284 14/08 | 1.2 |
| April | 17.5 | 71 | 80 | 56 | 87 | 12 | 388 1867 | 1 1944 | 139 5/33 | 2.2 |
| May | 14.3 | 71 | 85 | 59 | 69 | 9 | 352 1876 | Nil 1846 | 143 *9/79* | 3.1 |
| June | 12.1 | 72 | 84 | 54 | 70 | 8 | 647 1967 | Nil 1847 | 283 12/67 | 3.0 |
| July | 11.1 | 70 | 88 | 53 | 55 | 7 | 231 1965 | Nil (a) | 193 20/65 | 3.1 |
| August | 11.7 | 67 | 80 | 53 | 47 | 7 | 373 1879 | Nil (b) | 124 *12/87* | 3.6 |
| September | 13.8 | 63 | 76 | 47 | 49 | 8 | 133 1886 | 3 1907 | 79 12/65 | 2.6 |
| October | 16.0 | 60 | 72 | 48 | 71 | 9 | 290 1949 | (c) 1948 | 136 25/49 | 1.2 |
| November | 18.1 | 59 | 72 | 45 | 94 | 10 | 315 1917 | Nil 1842 | 143 *8/66* | 0.5 |
| December | 20.1 | 61 | 70 | 51 | 131 | 12 | 441 1942 | 9 1865 | 168 *28/71* | 0.4 |
| Year: Totals | .. | .. | .. | .. | 1,142 | 123 | .. .. | .. .. | .. .. | 22.0 |
| Year: Averages | 16.6 | 67 | .. | .. | .. | .. | .. .. | .. .. | .. .. | .. |
| Year: Extremes | .. | .. | 88 | 45 | .. | .. | 1,026 2/1893 | Nil Various | 465 21/1/1887 | .. |

(a) 1841 and 1951. (b) 1862, 1869 and 1880. (c) Less than 1 mm.

Figures such as 23/47, *4/93*, etc. indicate, in respect of the month of reference, the day and year of the occurrence. Dates in italics relate to nineteenth century.

## CLIMATOLOGICAL DATA: SYDNEY, NEW SOUTH WALES

(Lat. 33° 52′ S., Long. 151° 12′ E. Height above M.S.L. 42 metres)

### BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

| Month | Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb) | Wind (height of anemometer 18 metres) Average km/h | Highest mean speed in one day (km/h) | Highest gust speed (km/h) | Prevailing direction 9 a.m. | Prevailing direction 3 p.m. | Mean amt evaporation (mm) | No. days thunder | Mean amt clouds 9 a.m., 3 p.m., 9 p.m. (a) | No. clear days |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 62 | 25(b) | 25(b) | 25(b) | 25(b) | 25(b) | 86 | 52 | 110 | 61 |
| January | 1,012.6 | 12.3 | 30.3 10/49 | 150 | NE | NE | 135 | 3.4 | 4.7 | 5.0 |
| February | 1,014.0 | 11.6 | 30.3 18/57 | 101 | NE | ENE | 107 | 2.5 | 4.8 | 4.6 |
| March | 1,016.4 | 10.5 | 33.3 10/44 | 93 | WNW | ENE | 93 | 1.7 | 4.4 | 5.8 |
| April | 1,018.2 | 10.2 | 36.2 24/44 | 116 | W | ENE | 69 | 1.4 | 4.1 | 7.3 |
| May | 1,018.5 | 10.5 | 33.8 18/55 | 101 | W | ENE | 49 | 0.9 | 3.9 | 7.8 |
| June | 1,018.8 | 11.6 | 36.0 10/47 | 135 | W | WSW | 38 | 0.8 | 4.0 | 8.1 |
| July | 1,018.5 | 11.5 | 34.3 20/51 | 106 | W | WSW | 40 | 0.8 | 3.5 | 10.6 |
| August | 1,017.9 | 12.1 | 39.6 9/51 | 109 | WNW | WNW | 51 | 1.5 | 3.3 | 10.6 |
| September | 1,016.9 | 11.6 | 35.1 23/42 | 113 | WNW | NE | 70 | 1.9 | 3.5 | 9.0 |
| October | 1,015.0 | 12.3 | 39.4 1/57 | 153 | WNW | ENE | 99 | 2.8 | 4.1 | 6.6 |
| November | 1,013.4 | 12.4 | 31.9 21/54 | 114 | WNW | ENE | 119 | 3.7 | 4.5 | 5.3 |
| December | 1,012.0 | 12.3 | 36.2 11/52 | 121 | NE | ENE | 137 | 4.0 | 4.6 | 4.8 |
| Year: Totals | .. | .. | .. .. | .. | .. | .. | 1,006 | 25.4 | .. | 85.5 |
| Year: Averages | 1,016.0 | 11.6 | .. .. | .. | WNW | ENE | .. | .. | 4.2 | .. |
| Year: Extremes | .. | .. | 39.6 9/8/51 | 153 | .. | .. | .. | .. | .. | .. |

(a) Scale 0–8. (b) Years 1938–1962 inclusive.

### TEMPERATURE AND SUNSHINE

| Month | Air temperature daily readings (°Celsius) Mean max. | Mean min. | Mean | Extreme air temperature (°Celsius) Highest | Lowest | Extreme temperature (°Celsius) Highest in sun | Lowest on grass | Mean daily hours sunshine |
|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 113 | 113 | 113 | 113 | 113 | 84(a) | 113 | 51 |
| January | 25.7 | 18.3 | 22.0 | 45.3 14/39 | 10.6 18/49 | 73.5 26/15 | 6.5 6/25 | 7.2 |
| February | 25.4 | 18.4 | 21.9 | 42.1 8/26 | 9.6 *28/63* | 76.3 14/39 | 6.0 22/33 | 6.8 |
| March | 24.5 | 17.3 | 20.9 | 39.2 *3/69* | 9.3 *14/86* | 70.2 10/26 | 4.4 17/13 | 6.3 |
| April | 22.1 | 14.5 | 18.3 | 33.0 (b) | 7.0 *27/64* | 62.3 *10/77* | 0.7 24/09 | 6.1 |
| May | 19.0 | 11.2 | 15.1 | 30.0 1/19 | 4.4 *30/62* | 54.3 *1/96* | −1.5 25/17 | 5.8 |
| June | 16.6 | 9.1 | 12.8 | 26.9 11/31 | 2.1 22/32 | 52.1 2/23 | −2.2 22/32 | 5.3 |
| July | 15.8 | 7.8 | 11.8 | 25.7 22/26 | 2.2 *12/90* | 51.9 *19/77* | −4.4 *4/93* | 6.1 |
| August | 17.4 | 8.7 | 13.1 | 30.4 24/54 | 2.7 *3/72* | 65.0 *30/78* | −3.3 4/09 | 6.8 |
| September | 19.6 | 10.8 | 15.2 | 34.6 26/65 | 4.9 *2/45* | 61.2 *12/78* | −1.1 17/05 | 7.1 |
| October | 21.9 | 13.3 | 17.6 | 37.4 4/42 | 5.7 6/27 | 66.8 20/33 | 0.4 9/05 | 7.3 |
| November | 23.5 | 16.3 | 19.4 | 40.3 6/46 | 7.7 1/05 | 70.3 *28/99* | 1.9 21/67 | 7.6 |
| December | 24.9 | 17.2 | 21.1 | 42.2 20/57 | 9.1 3/24 | 73.5 *27/89* | 5.2 3/24 | 7.3 |
| Year: Averages | 21.4 | 13.6 | 17.4 | .. | .. | .. | .. | 6.6 |
| Year: Extremes | .. | .. | .. | 45.3 14/1/39 | 2.1 22/6/32 | 76.3 14/2/39 | −4.4 4/7/1893 | .. |

(a) Records discontinued 1946. (b) 1/36 and 10/69.

### HUMIDITY, RAINFALL, AND FOG

| Month | Vapour pressure mean 9 a.m. (mb) | Rel. hum. (%) at 9 a.m. Mean | Highest mean | Lowest mean | Rainfall (millimetres) Mean mthly | Mean No. of days of rain | Greatest monthly | Least monthly | Greatest in one day | Fog Mean No. days |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 96 | 96 | 96 | 96 | 113 | 113 | 113 | 113 | 113 | 57 |
| January | 18.8 | 68 | 78 | 58 | 95 | 13 | 388 1911 | 6 1932 | 180 13/11 | 0.3 |
| February | 19.2 | 70 | 81 | 60 | 113 | 13 | 564 1950 | 3 1939 | 226 25/73 | 0.7 |
| March | 18.3 | 74 | 85 | 62 | 127 | 14 | 521 1942 | 8 1965 | 281 28/42 | 1.6 |
| April | 15.0 | 74 | 87 | 63 | 127 | 13 | 622 1861 | 2 1868 | 191 29/60 | 2.2 |
| May | 11.9 | 75 | 90 | 63 | 124 | 13 | 585 1919 | 4 1957 | 212 28/89 | 3.3 |
| June | 10.2 | 76 | 89 | 63 | 131 | 12 | 643 1950 | 4 1962 | 131 16/84 | 2.6 |
| July | 9.6 | 74 | 88 | 59 | 106 | 11 | 336 1950 | 2 1970 | 198 7/31 | 2.2 |
| August | 9.5 | 68 | 84 | 54 | 81 | 11 | 378 1899 | 1 1885 | 140 22/71 | 1.8 |
| September | 11.3 | 66 | 79 | 49 | 70 | 11 | 357 1879 | 2 1882 | 145 *10/79* | 1.0 |
| October | 13.0 | 62 | 77 | 46 | 74 | 12 | 283 (a) | 2 1971 | 162 13/02 | 0.6 |
| November | 15.0 | 62 | 79 | 42 | 78 | 12 | 577 1961 | 2 1915 | 133 27/55 | 0.5 |
| December | 17.6 | 64 | 77 | 51 | 81 | 13 | 402 1920 | 6 1913 | 121 13/10 | 0.4 |
| Year: Totals | .. | .. | .. | .. | 1,207 | 148 | .. .. | .. .. | .. .. | 17.2 |
| Year: Averages | 14.1 | 69 | .. | .. | .. | .. | .. .. | .. .. | .. .. | .. |
| Year: Extremes | .. | .. | 90 | 42 | .. | .. | 643 6/1950 | 1 8/1885 | 281 28/3/1942 | .. |

(a) *1916* and *1959*.

Figures such as 10/49, *28/63*, etc. indicate, in respect of the month of reference, the day and year of the occurrence. Dates in italics relate to nineteenth century.

## CLIMATOLOGICAL DATA: CANBERRA, AUSTRALIAN CAPITAL TERRITORY

(Lat. 35° 19′ S., Long. 149° 11′ E. Height above M.S.L. 571 metres)

### BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

| Month | Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb) | Wind (height of anemometer 11 metres) Average km/h | Highest mean speed in one day (km/h) | Highest gust speed (km/h) | Prevailing direction 9 a.m. | Prevailing direction 3 p.m. | Mean amt evaporation (mm) | No. days thunder | Mean amt clouds 9 a.m., 3 p.m., 9 p.m. (a) | No. clear days |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 33 | 42(b) | 42(b) | 33(c) | 33(c) | 33(c) | 38(d) | 33 | 33 | 33(e) |
| January | 1,012.1 | 6.6 | 24 24/33 | 104 | NW | NW | 197 | 3.4 | 4.1 | 7.7 |
| February | 1,013.0 | 6.1 | 25 24/33 | 104 | NW | NW | 155 | 3.0 | 4.3 | 6.7 |
| March | 1,016.1 | 5.3 | 29 28/42 | 111 | SE | NW | 130 | 1.6 | 4.1 | 8.0 |
| April | 1,018.8 | 5.0 | 30 8/45 | 106 | NW | NW | 80 | 0.8 | 4.2 | 7.3 |
| May | 1,018.9 | 4.3 | 21 27/58 | 104 | NW | NW | 48 | 0.4 | 4.4 | 6.8 |
| June | 1,021.1 | 4.8 | 26 2/30 | 96 | NW | NW | 31 | 0.2 | 4.5 | 6.8 |
| July | 1,020.3 | 5.0 | 38 7/31 | 102 | NW | NW | 31 | 0.1 | 4.4 | 7.3 |
| August | 1,018.6 | 6.0 | 25 25/36 | 113 | NW | NW | 44 | 0.8 | 4.3 | 6.8 |
| September | 1,017.3 | 6.0 | 28 28/34 | 107 | NW | NW | 71 | 1.2 | 4.0 | 8.3 |
| October | 1,014.9 | 6.6 | 23 12/57 | 119 | NW | NW | 108 | 2.1 | 4.3 | 6.4 |
| November | 1,011.9 | 6.9 | 28 28/42 | 128 | NW | NW | 145 | 3.2 | 4.3 | 5.9 |
| December | 1,010.5 | 6.9 | 26 11/38 | 106 | NW | NW | 183 | 3.5 | 4.1 | 7.5 |
| Year Totals | .. | .. | .. | .. | .. | .. | 1,223 | 20.3 | .. | 85.5 |
| Year Averages | 1,016.1 | 5.8 | .. | .. | NW | NW | .. | .. | 4.3 | 7.1 |
| Year Extremes | .. | .. | 38 7/7/31 | 128 | .. | .. | .. | .. | .. | .. |

(a) Scale 0–8. (b) Recorded at Forestry and Timber Bureau, Yarralumla, where a cup anemometer is installed. (c) Recorded at Meteorological Office, R.A.A.F. Fairbairn, where a Dines Pressure Tube anemometer is installed. (d) Australian tank, Yarralumla, 1929–66. (e) 1940–72. Formerly assessed over 37-year period at Yarralumla.

### TEMPERATURE AND SUNSHINE

| Month | Air temperature daily readings (°Celsius) Mean max. | Mean min. | Mean | Extreme air temperature (°Celsius) Highest | Lowest | Extreme temperature (°Celsius) Highest in sun | Lowest on grass | Mean daily hours sunshine |
|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 33 | 33 | 33 | 33 | 33 | .. | 21 | 35 |
| January | 27.5 | 12.8 | 20.1 | 41.4 31/68 | 1.8 1/56 | .. | −0.4 1/56 | 8.9 |
| February | 26.6 | 12.5 | 19.5 | 42.2 1/68 | 3.0 16/62 | .. | 0.2 17/70 | 8.2 |
| March | 24.4 | 10.4 | 17.4 | 36.4 9/40 | −1.1 24/67 | .. | −4.0 (a) | 7.5 |
| April | 19.6 | 6.4 | 13.0 | 32.6 12/68 | −3.3 26/72 | .. | −8.3 24/69 | 7.0 |
| May | 14.8 | 2.7 | 8.7 | 24.5 10/67 | −7.3 16/57 | .. | −10.4 26/69 | 5.5 |
| June | 12.0 | 0.7 | 6.3 | 20.1 3/57 | −8.5 8/57 | .. | −13.4 25/71 | 4.7 |
| July | 11.0 | −0.4 | 5.3 | 16.9 25/72 | −10.0 11/71 | .. | −15.1 11/71 | 5.2 |
| August | 12.6 | 0.8 | 6.7 | 21.7 24/54 | −7.7 11/69 | .. | −12.8 11/69 | 6.1 |
| September | 15.9 | 2.6 | 9.3 | 28.6 26/65 | −5.6 5/40 | .. | −10.6 12/71 | 7.4 |
| October | 19.1 | 5.7 | 12.4 | 32.7 13/46 | −3.3 4/57 | .. | −6.2 4/57 | 8.0 |
| November | 22.3 | 8.2 | 15.3 | 38.8 19/44 | −1.8 28/67 | .. | −6.3 28/67 | 8.8 |
| December | 25.9 | 11.0 | 18.5 | 38.8 21/53 | 1.1 18/64 | .. | −3.9 18/64 | 9.0 |
| Year Averages | 19.3 | 6.1 | 12.7 | .. | .. | .. | .. | 7.2 |
| Year Extremes | .. | .. | .. | 42.2 1/2/68 | −10.0 11/7/71 | .. | −15.1 11/7/71 | .. |

(a) 30/58 and 24/67.

### HUMIDITY, RAINFALL, AND FOG

| Month | Vapour pressure mean 9 a.m. (mb) | Rel. hum. (%) at 9 a.m. Mean | Highest mean | Lowest mean | Rainfall (millimetres) Mean mthly | Mean No. of days of rain | Greatest monthly | Least monthly | Greatest in one day | Fog Mean No. days |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 33(a) | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 |
| January | 13.1 | 60 | 75 | 42 | 59 | 8 | 164 1941 | 1 1947 | 95 12/45 | 0.6 |
| February | 14.0 | 65 | 81 | 53 | 55 | 7 | 145 1948 | Nil 1968 | 53 3/46 | 0.9 |
| March | 12.3 | 69 | 81 | 53 | 52 | 7 | 312 1950 | 1 1954 | 66 5/59 | 1.7 |
| April | 10.0 | 75 | 84 | 38 | 48 | 7 | 154 1940 | 2 1942 | 75 2/59 | 2.9 |
| May | 8.7 | 83 | 96 | 73 | 52 | 9 | 150 1953 | 2 1961 | 96 3/48 | 6.9 |
| June | 7.1 | 88 | 97 | 73 | 38 | 9 | 126 1956 | 5 1971 | 45 25/56 | 7.2 |
| July | 6.6 | 84 | 93 | 68 | 36 | 10 | 103 1960 | 4 1970 | 35 10/57 | 7.1 |
| August | 7.1 | 80 | 92 | 58 | 44 | 12 | 106 1955 | 7 1944 | 28 3/51 | 4.0 |
| September | 8.1 | 72 | 82 | 55 | 49 | 10 | 116 1970 | 6 1946 | 41 16/62 | 2.6 |
| October | 10.0 | 67 | 82 | 50 | 68 | 11 | 148 1959 | 6 1940 | 105 21/59 | 1.8 |
| November | 10.7 | 59 | 76 | 38 | 62 | 9 | 135 1961 | 13 1940 | 64 9/50 | 0.6 |
| December | 12.3 | 57 | 74 | 43 | 59 | 8 | 215 1947 | Nil 1967 | 87 30/48 | 0.1 |
| Year Totals | .. | .. | .. | .. | 622 | 107 | .. | .. | .. | 36.4 |
| Year Averages | 10.0 | 72 | .. | .. | .. | .. | .. | .. | .. | .. |
| Year Extremes | .. | .. | 97 | 38 | .. | .. | 312 3/50 | Nil (b) | 105 21/10/59 | .. |

(a) Formerly assessed over 38-year period at Forestry and Timber Bureau, Yarralumla. (b) 12/67 and 2/68.

Data shown in the above tables relate to the Meteorological Office, R.A.A.F., Fairbairn, except where otherwise indicated, and cover years up to 1972. Figures such as 23/33, 31/68, etc. indicate, in respect of the month of reference, the day and year of the occurrence.

## CLIMATOLOGICAL DATA: MELBOURNE, VICTORIA

(Lat. 37° 49′ S., Long. 144° 58′ E. Height above M.S.L. 35 metres)

### BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

| Month | Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb) | Wind (height of anemometer 28 metres): Average km/h | Highest mean speed in one day (km/h) | Highest gust speed (km/h) | Prevailing direction: 9 a.m. | 3 p.m. | Mean amt evaporation (mm) | No. days thunder | Mean amt clouds 9 a.m., 3 p.m., 9 p.m. (a) | No. clear days |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 116 | 33(b) | 60 | 63 | 54 | 54 | 94(c) | 116 | 65 | 65 |
| January | 1,012.8 | 13.1 | 34.0 27/41 | 106 | S | S | 165 | 1.7 | 4.1 | 6.7 |
| February | 1,014.4 | 12.8 | 30.6 13/47 | 120 | S | S | 129 | 1.9 | 4.0 | 6.0 |
| March | 1,016.8 | 11.5 | 29.0 3/61 | 106 | N | S | 105 | 1.3 | 4.3 | 5.5 |
| April | 1,019.0 | 11.2 | 33.7 27/71 | 108 | N | S | 64 | 0.7 | 4.7 | 4.3 |
| May | 1,019.1 | 11.5 | 33.0 4/61 | 116 | N | N | 39 | 0.4 | 5.2 | 2.9 |
| June | 1,018.9 | 11.7 | 36.7 16/47 | 103 | N | N | 29 | 0.2 | 5.3 | 2.8 |
| July | 1,018.6 | 12.9 | 36.9 24/70 | 109 | N | N | 29 | 0.2 | 5.1 | 2.5 |
| August | 1,017.6 | 12.7 | 34.3 20/42 | 105 | N | N | 39 | 0.6 | 5.0 | 2.8 |
| September | 1,016.0 | 12.8 | 34.0 15/64 | 109 | N | S | 59 | 0.8 | 4.8 | 3.7 |
| October | 1,014.7 | 13.1 | 30.4 6/68 | 111 | N | S | 86 | 1.6 | 4.8 | 3.5 |
| November | 1,013.9 | 13.5 | 35.8 8/71 | 114 | SW | S | 115 | 2.0 | 4.8 | 3.3 |
| December | 1,012.4 | 13.4 | 33.8 12/52 | 98 | S | S | 147 | 2.2 | 4.5 | 4.4 |
| Year: Totals | .. | .. | .. .. | .. | .. | .. | 1,006 | 13.6 | .. | 48.4 |
| Year: Averages | 1,016.2 | 12.5 | .. .. | .. | N | S | .. | .. | 4.7 | .. |
| Year: Extremes | .. | .. | 36.9 24/7/70 | 119 | .. | .. | .. | .. | .. | .. |

(a) Scale 0–8. (b) Early records not comparable. (c) Records to 1966.

### TEMPERATURE AND SUNSHINE

| Month | Air temperature daily readings (°Celsius): Mean max. | Mean min. | Mean | Extreme air temperature (°Celsius): Highest | Lowest | Extreme temperature (°Celsius): Highest in sun | Lowest on grass | Mean daily hours sunshine |
|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 117 | 117 | 117 | 117 | 117 | 86(a) | 113 | 52(b) |
| January | 25.8 | 13.9 | 19.8 | 45.6 13/39 | 5.6 *28/85* | 81.4 *14/62* | −1.0 *28/85* | 8.1 |
| February | 25.6 | 14.2 | 19.9 | 43.1 7/01 | 4.6 24/24 | 75.3 *15/70* | −0.6 *6/91* | 7.5 |
| March | 23.8 | 12.8 | 18.3 | 41.7 11/40 | 2.8 *17/84* | 73.6 *1/68* | −1.7 (c) | 6.6 |
| April | 20.1 | 10.5 | 15.3 | 34.9 5/38 | 1.6 *24/88* | 66.7 *8/61* | −3.9 *23/97* | 5.1 |
| May | 16.4 | 8.3 | 12.4 | 28.7 7/05 | −1.2 29/16 | 61.4 *2/59* | −6.1 26/16 | 3.9 |
| June | 13.9 | 6.6 | 10.3 | 22.4 *2/57* | −2.2 11/66 | 53.9 *11/61* | −6.7 30/29 | 3.4 |
| July | 13.2 | 5.7 | 9.4 | 20.7 22/26 | −2.8 *21/69* | 52.1 *27/80* | −6.4 12/03 | 3.7 |
| August | 14.8 | 6.4 | 10.6 | 25.0 *20/85* | −2.1 *11/63* | 58.6 *29/69* | −5.9 14/02 | 4.6 |
| September | 17.1 | 7.6 | 12.3 | 31.4 28/28 | −0.6 3/40 | 61.2 *20/67* | −5.1 8/18 | 5.5 |
| October | 19.5 | 9.2 | 14.4 | 36.9 24/14 | 0.1 *3/71* | 67.9 *28/68* | −4.0 22/18 | 5.9 |
| November | 21.8 | 10.8 | 16.3 | 40.9 *27/94* | 2.4 *2/96* | 70.9 *29/65* | −4.1 *2/96* | 6.5 |
| December | 24.1 | 12.5 | 18.3 | 43.7 *15/76* | 4.4 *4/70* | 76.8 *20/69* | 0.7 1/04 | 7.3 |
| Year: Averages | 19.7 | 9.9 | 14.8 | .. .. | .. .. | .. .. | .. .. | 5.7 |
| Year: Extremes | .. | .. | .. | 45.6 13/1/39 | −2.8 21/7/69 | 81.4 14/1/62 | −6.7 30/6/29 | .. |

(a) Discontinued 1946. (b) Discontinued 1967. (c) 17/1884 and 20/1897.

### HUMIDITY, RAINFALL, AND FOG

| Month | Vapour pressure mean 9 a.m. (mb) | Rel. hum. (%) at 9 a.m.: Mean | Highest mean | Lowest mean | Rainfall (millimetres): Mean mthly | Mean No. of days of rain | Greatest monthly | Least monthly | Greatest in one day | Fog Mean No. days |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 65 | 65 | 65 | 65 | 117 | 117 | 117 | 117 | 117 | 115 |
| January | 13.1 | 60 | 68 | 50 | 48 | 8 | 176 1963 | (a) 1932 | 108 29/63 | 0.1 |
| February | 14.1 | 63 | 77 | 48 | 49 | 7 | 238 1972 | (a) 1965 | 87 26/46 | 0.3 |
| March | 13.3 | 66 | 79 | 50 | 53 | 9 | 191 1911 | 3 1934 | 90 5/19 | 0.7 |
| April | 11.7 | 72 | 82 | 66 | 59 | 11 | 195 1960 | Nil 1923 | 80 23/60 | 1.8 |
| May | 10.3 | 79 | 88 | 70 | 57 | 14 | 142 1942 | 3 1934 | 46 18/00 | 3.7 |
| June | 9.3 | 83 | 92 | 73 | 50 | 14 | 114 1859 | 8 1858 | 43 21/04 | 4.6 |
| July | 8.9 | 81 | 86 | 75 | 49 | 15 | 178 1891 | 15 1902 | 74 *12/91* | 4.4 |
| August | 9.1 | 75 | 82 | 65 | 49 | 15 | 111 1939 | 12 1903 | 54 *17/81* | 2.3 |
| September | 9.5 | 68 | 76 | 60 | 59 | 14 | 201 1916 | 13 1907 | 59 23/16 | 0.9 |
| October | 10.5 | 63 | 71 | 52 | 67 | 14 | 193 1869 | 7 1914 | 61 21/53 | 0.4 |
| November | 11.3 | 60 | 69 | 52 | 59 | 12 | 206 1954 | 6 1895 | 73 21/54 | 0.2 |
| December | 12.5 | 60 | 69 | 48 | 58 | 10 | 182 1863 | 1 1972 | 100 4/54 | 0.2 |
| Year: Totals | .. | .. | .. | .. | 657 | 143 | .. .. | .. .. | .. .. | 19.6 |
| Year: Averages | 11.1 | 69 | .. | .. | .. | .. | .. .. | .. .. | .. .. | .. |
| Year: Extremes | .. | .. | 92 | 48 | .. | .. | 238 2/72 | Nil 4/23 | 108 29/1/63 | .. |

(a) Less than 1 mm.

Figures such as 27/41, *28/85*, etc. indicate, in respect of the month of reference, the day and year of the occurrence. Dates in italics relate to nineteenth century.

## CLIMATOLOGICAL DATA: HOBART, TASMANIA

(Lat. 42° 53′ S., Long. 147° 20′ E. Height above M.S.L. 54 metres)

### BAROMETER, WIND, EVAPORATION, THUNDER, CLOUDS, AND CLEAR DAYS

| Month | Mean of 9 a.m. and 3 p.m. atmospheric pressure reduced to mean sea level (mb) | Wind (height of anemometer 12 metres): Average km/h | Highest mean speed in one day (km/h) | Highest gust speed (km/h) | Prevailing direction 9 a.m. | Prevailing direction 3 p.m. | Mean amt evaporation (mm) | No. days thunder | Mean amt clouds 9 a.m., 3 p.m., 9 p.m. (a) | No. clear days |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 86 | 61 | 62 | 81 | 30(b) | 30(b) | 60 | 62 | 87 | 30(b) |
| January | 1,010.6 | 12.6 | 33.5 30/16 | 130 | NNW | SSE | 128 | 1.0 | 5.0 | 1.9 |
| February | 1,012.8 | 11.5 | 40.6 4/27 | 121 | NNW | SSE | 98 | 1.0 | 4.9 | 2.3 |
| March | 1,014.4 | 10.9 | 34.4 13/38 | 127 | NW | SSE | 84 | 0.7 | 4.8 | 2.4 |
| April | 1,015.4 | 10.9 | 38.8 9/52 | 119 | NW | W | 54 | 0.4 | 5.0 | 1.7 |
| May | 1,015.4 | 10.4 | 35.4 21/65 | 135 | NNW | NW | 35 | 0.0 | 5.0 | 2.4 |
| June | 1,015.1 | 10.2 | 38.2 27/20 | 132 | NW | NW | 24 | 0.0 | 5.0 | 2.4 |
| July | 1,014.1 | 10.7 | 36.9 22/53 | 129 | NNW | NNW | 24 | 0.0 | 4.8 | 2.0 |
| August | 1,012.8 | 11.0 | 41.0 19/26 | 140 | NNW | NW | 34 | 0.1 | 4.9 | 2.1 |
| September | 1,011.4 | 12.5 | 43.1 28/65 | 150 | NNW | NW | 53 | 0.1 | 4.9 | 1.5 |
| October | 1,010.2 | 12.6 | 32.4 3/65 | 140 | NNW | SW | 79 | 0.4 | 5.2 | 1.0 |
| November | 1,009.8 | 12.8 | 34.1 18/15 | 135 | NNW | S | 98 | 0.6 | 5.3 | 1.3 |
| December | 1,009.4 | 12.3 | 37.7 1/34 | 122 | NNW | SSE | 115 | 0.9 | 5.3 | 1.1 |
| Year: Totals | .. | .. | .. .. | .. | .. | .. | 826 | 5.2 | .. | 22.1 |
| Year: Averages | 1,012.6 | 11.8 | .. .. | .. | NNW | W | .. | .. | 5.0 | .. |
| Year: Extremes | .. | .. | 43.1 28/9/65 | 150 | .. | .. | .. | .. | .. | .. |

(a) Scale 0–8. (b) Standard thirty years normal (1911–1940).

### TEMPERATURE AND SUNSHINE

| Month | Air temperature daily readings (°Celsius): Mean max. | Mean min. | Mean | Extreme air temperature (°Celsius): Highest | Lowest | Extreme temperature (°Celsius): Highest in sun | Lowest on grass | Mean daily hours sunshine |
|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 89 | 89 | 89 | 89 | 89 | 57(a) | 84 | 51 |
| January | 21.4 | 11.5 | 16.5 | 40.6 (b) | 4.5 (c) | 71.1 (d) | —0.8 *19/97* | 7.9 |
| February | 21.5 | 11.7 | 16.6 | 40.2 *12/99* | 3.9 *20/87* | 73.9 *24/98* | —2.1 *—/87* | 7.0 |
| March | 20.0 | 10.5 | 15.2 | 37.3 13/40 | 1.8 31/26 | 66.1 26/44 | —2.5 30/02 | 6.3 |
| April | 17.0 | 8.7 | 12.9 | 30.6 1/41 | 0.7 14/63 | 61.1 *18/93* | —3.9 *—/86* | 5.1 |
| May | 14.2 | 6.7 | 10.4 | 25.5 5/21 | —1.5 30/02 | 53.3 (e) | —6.7 19/02 | 4.2 |
| June | 11.7 | 5.1 | 8.4 | 20.7 1/07 | —1.6 28/44 | 50.0 *12/94* | —7.7 24/63 | 3.9 |
| July | 11.4 | 4.5 | 7.9 | 19.0 14/34 | —2.4 *11/95* | 49.4 *12/93* | —7.4 *16/86* | 4.3 |
| August | 12.9 | 5.0 | 8.9 | 22.0 28/14 | —1.8 5/62 | 54.4 *—/87* | —6.6 7/09 | 5.0 |
| September | 14.9 | 6.1 | 10.5 | 27.6 23/26 | —1.1 *12/41* | 58.9 *23/93* | —7.6 16/26 | 5.9 |
| October | 16.9 | 7.5 | 12.2 | 33.4 24/14 | 0.0 *12/89* | 68.9 *9/93* | —4.6 (f) | 6.2 |
| November | 18.5 | 9.0 | 13.5 | 36.9 26/37 | 1.7 16/41 | 55.6 *19/92* | —3.3 1/08 | 7.0 |
| December | 20.2 | 10.5 | 15.4 | 40.7 *30/97* | 3.4 3/06 | 71.9 10/39 | —2.7 *—/86* | 7.2 |
| Year: Averages | 16.7 | 8.1 | 12.4 | .. .. | .. .. | .. .. | .. .. | 5.8 |
| Year: Extremes | .. | .. | .. | 40.7 30/12/1897 | −2.4 11/7/1895 | 73.9 24/2/1868 | −7.7 24/6/1963 | .. |

(a) Period 1934–1938 not comparable; records discontinued 1946. (b) 1/1900 and 19/1959. (c) 9/1937 and 11/1937. (d) 5/1886 and 13/1905. (e) —/1899 and —/1893. (f) 1/1886 and 1/1899.

### HUMIDITY, RAINFALL, AND FOG

| Month | Vapour pressure mean 9 a.m. (mb) | Rel. hum. (%) at 9 a.m.: Mean | Highest mean | Lowest mean | Rainfall (millimetres): Mean mthly | Mean No. of days of rain | Greatest monthly | Least monthly | Greatest in one day | Fog Mean No. days |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of years of observations | 77(a) | 78 | 78 | 78 | 89 | 88 | 89 | 89 | 89 | 60 |
| January | 11.0 | 58 | 81 | 45 | 49 | 11 | 150 1893 | 4 (b) | 75 30/16 | 0.1 |
| February | 11.7 | 62 | 83 | 49 | 42 | 10 | 232 1854 | 3 1914 | 56 1/54 | 0.0 |
| March | 11.0 | 65 | 78 | 52 | 47 | 11 | 255 1946 | 7 1943 | 88 17/46 | 0.3 |
| April | 10.0 | 70 | 84 | 57 | 55 | 12 | 248 1960 | 2 1904 | 133 23/60 | 0.3 |
| May | 8.8 | 75 | 86 | 51 | 49 | 14 | 214 1958 | 4 1913 | 45 *2/93* | 1.1 |
| June | 7.9 | 78 | 91 | 61 | 59 | 15 | 238 1954 | 7 1886 | 147 7/54 | 1.5 |
| July | 7.6 | 78 | 87 | 72 | 53 | 15 | 155 1967 | 4 1950 | 64 18/22 | 1.3 |
| August | 7.9 | 73 | 86 | 59 | 49 | 16 | 258 1858 | 8 1892 | 58 *14/90* | 0.5 |
| September | 8.3 | 66 | 81 | 52 | 52 | 15 | 201 1957 | 10 1951 | 156 15/57 | 0.2 |
| October | 9.1 | 62 | 74 | 52 | 64 | 17 | 193 1947 | 10 1914 | 65 4/06 | 0.1 |
| November | 9.6 | 58 | 73 | 49 | 56 | 14 | 227 1849 | 8 1921 | 94 *30/85* | 0.1 |
| December | 10.6 | 58 | 73 | 42 | 57 | 13 | 229 1875 | 4 1931 | 85 5/41 | 0.1 |
| Year: Totals | .. | .. | .. | .. | 632 | 163 | .. .. | .. .. | .. .. | 5.6 |
| Year: Averages | 9.5 | 67 | .. | .. | .. | .. | .. .. | .. .. | .. .. | .. |
| Year: Extremes | .. | .. | 91 | 42 | .. | .. | 258 8/1858 | 2 4/1904 | 156 15/9/57 | .. |

(a) 1894–1970. (b) 1915 and 1958.

Figures such as 30/16, *12/99*, etc. indicate, in respect of the month of reference, the day and year of the occurrence. Dates in italics relate to nineteenth century.

**Rainfall and temperatures, various cities**

Year Book No. 34, page 28, shows rainfall and temperature, and No. 38, page 42, temperature, for various important cities throughout the world and for the Australian capitals.

**Climatological data for selected Australian country towns**

The following table shows some of the more important climatological data for selected Australian country towns, based on standard thirty years normals (1911–1940).

CLIMATOLOGICAL DATA FOR SELECTED AUSTRALIAN COUNTRY TOWNS

| | *Rainfall* | | *Temperature* | | | | *Relative humidity* | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Town* | *Average annual rainfall (mm)* | *Average number of wet days* | *Mean maximum, January (°C.)* | *Mean maximum, July (°C.)* | *Mean minimum, January (°C.)* | *Mean minimum, July (°C.)* | *Average index of mean relative humidity(a), January* | *Average index of mean relative humidity(a), July* | *Mean 3 p.m., January (%)* | *Mean 3 p.m., July (%)* |
| WESTERN AUSTRALIA | | | | | | | | | | |
| Albany | 1,008 | 172 | 23.2 | 21.1 | 14.7 | 7.9 | 73 | 76 | 65 | 70 |
| Broome | 582 | 38 | 32.9 | 27.7 | 26.2 | 13.9 | 75 | 52 | 67 | 43 |
| Bunbury | 843 | 125 | 27.8 | 16.9 | 15.1 | 8.4 | 66 | 78 | 57 | 71 |
| Carnarvon | 229 | 35 | 30.7 | 22.1 | 22.3 | 10.9 | 64 | 66 | 61 | 57 |
| Esperance | 678 | 124 | 24.8 | 16.7 | 15.5 | 7.4 | 70 | 77 | 63 | 65 |
| Geraldton | 472 | 80 | 29.2 | 19.8 | 19.1 | 10.9 | 61 | 68 | 60 | 60 |
| Kalgoorlie | 241 | 62 | 34.0 | 16.9 | 17.9 | 6.1 | 43 | 66 | 27 | 50 |
| Meekatharra | 234 | 36 | 38.0 | 19.7 | 22.9 | 6.7 | 31 | 59 | 21 | 44 |
| Narrogin | 544 | 108 | 30.7 | 14.4 | 13.5 | 5.2 | .. | .. | .. | .. |
| Port Hedland | 279 | 20 | 34.6 | 26.3 | 26.3 | 13.1 | 67 | 49 | 63 | 47 |
| Wyndham | 640 | 55 | 35.5 | 29.4 | 26.8 | 19.0 | 66 | 38 | 54 | 35 |
| NORTHERN TERRITORY | | | | | | | | | | |
| Alice Springs | 252 | 31 | 35.2 | 19.4 | 21.0 | 3.8 | 33 | 49 | 26 | 32 |
| Tennant Creek | 353 | 30 | 36.9 | 24.1 | 24.4 | 10.6 | 41 | 36 | 27 | 25 |
| SOUTH AUSTRALIA | | | | | | | | | | |
| Ceduna | 267 | 68 | 27.5 | 17.0 | 14.9 | 6.5 | .. | .. | .. | .. |
| Mount Gambier | 683 | 192 | 23.4 | 13.4 | 11.9 | 5.8 | 65 | 79 | 50 | 69 |
| Oodnadatta | 112 | 20 | 37.2 | 19.1 | 22.3 | 5.9 | 27 | 49 | 17 | 34 |
| Port Augusta | 236 | 62 | 31.9 | 17.1 | 18.5 | 6.6 | 50 | 66 | 33 | 52 |
| Port Lincoln | 462 | 119 | 25.2 | 15.7 | 14.7 | 8.0 | 64 | 76 | 53 | 70 |
| Port Pirie | 330 | 78 | 31.8 | 16.5 | 17.0 | 7.4 | 51 | 72 | .. | .. |
| QUEENSLAND | | | | | | | | | | |
| Atherton | 1,372 | 116 | 28.8 | 21.6 | 18.3 | 10.0 | 78 | 79 | .. | .. |
| Bundaberg | 1,077 | 84 | 30.0 | 22.0 | 20.9 | 9.6 | 74 | 72 | 63 | 55 |
| Cairns | 2,195 | 140 | 32.0 | 25.6 | 23.4 | 16.1 | 77 | 74 | 69 | 63 |
| Charleville | 457 | 49 | 36.4 | 20.3 | 21.6 | 4.5 | 44 | 61 | 28 | 39 |
| Charters Towers | 592 | 59 | 33.8 | 24.4 | 21.8 | 10.9 | 65 | 64 | 46 | 47 |
| Cloncurry | 429 | 35 | 37.0 | 24.7 | 24.7 | 10.8 | 40 | 40 | 30 | 27 |
| Ipswich | 737 | 76 | 32.4 | 21.1 | 19.9 | 6.6 | 65 | 65 | .. | .. |
| Longreach | 394 | 37 | 37.5 | 22.9 | 22.9 | 6.8 | 49 | 56 | 29 | 35 |
| Mackay | 1,605 | 116 | 30.1 | 21.7 | 23.1 | 11.9 | 80 | 77 | .. | .. |
| Maryborough | 1,153 | 122 | 31.0 | 21.9 | 20.4 | 8.7 | 73 | 74 | .. | .. |
| Normanton | 955 | 56 | 34.6 | 28.9 | 25.0 | 14.8 | 70 | 48 | 52 | 34 |
| Rockhampton | 950 | 93 | 32.2 | 23.2 | 22.4 | 10.7 | 68 | 65 | 55 | 45 |
| Roma | 518 | 52 | 34.7 | 19.7 | 20.2 | 4.1 | 51 | 64 | 32 | 40 |
| Toowoomba | 894 | 105 | 28.2 | 16.2 | 16.2 | 4.8 | 73 | 79 | .. | .. |
| Townsville | 1,095 | 75 | 30.7 | 24.4 | 24.6 | 15.4 | 75 | 64 | 69 | 59 |

For footnotes *see* next page.

CLIMATOLOGICAL DATA FOR SELECTED AUSTRALIAN COUNTRY TOWNS—*continued*

| Town | *Rainfall* | | *Temperature* | | | | *Relative humidity* | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Average annual rainfall (mm)* | *Average number of wet days* | *Mean maximum, January (°C.)* | *Mean maximum, July (°C.)* | *Mean minimum, January (°C.)* | *Mean minimum, July (°C.)* | *Average index of mean relative humidity(a), January* | *Average index of mean relative humidity(a), July* | *Mean 3 p.m., January (%)* | *Mean 3 p.m., July (%)* |
| NEW SOUTH WALES | | | | | | | | | | |
| Albury | 704 | 99 | 32.2 | 13.6 | 15.4 | 3.4 | 47 | 74 | 29 | 64 |
| Armidale | 737 | 107 | 27.1 | 12.2 | 13.6 | 1.0 | 60 | 61 | 44 | 57 |
| Bega | 912 | 80 | 27.3 | 17.2 | 14.1 | 1.4 | 72 | 70 | .. | .. |
| Bourke | 297 | 44 | 36.7 | 17.7 | 20.7 | 4.9 | 37 | 64 | 24 | 48 |
| Broken Hill | 234 | 46 | 32.5 | 15.3 | 18.1 | 5.1 | 36 | 67 | 24 | 49 |
| Cooma | 480 | 88 | 26.0 | 10.2 | 11.2 | −1.0 | 55 | 67 | 38 | 56 |
| Dubbo | 531 | 72 | 33.4 | 15.4 | 17.7 | 3.1 | 48 | 74 | 32 | 56 |
| Goulburn | 617 | 112 | 27.5 | 11.3 | 13.4 | 2.1 | 59 | 74 | 43 | 67 |
| Grafton | 881 | 105 | 31.7 | 21.4 | 19.6 | 6.6 | .. | .. | .. | .. |
| Katoomba | 1,351 | 126 | 23.3 | 9.1 | 12.6 | 2.6 | 61 | 71 | 54 | 68 |
| Leeton | 401 | 78 | 31.6 | 13.8 | 17.3 | 3.8 | 44 | 76 | .. | .. |
| Moree | 544 | 56 | 35.6 | 18.2 | 19.7 | 3.9 | .. | .. | .. | .. |
| Newcastle | 1,052 | 132 | 25.4 | 16.3 | 19.2 | 8.7 | 74 | 70 | 69 | 61 |
| Orange | 800 | 95 | 28.8 | 10.9 | 12.1 | −0.3 | .. | .. | .. | .. |
| Tamworth | 620 | 67 | 32.8 | 15.8 | 17.4 | 2.7 | .. | .. | .. | .. |
| Taree | 1,207 | 110 | 28.8 | 18.1 | 16.7 | 5.6 | .. | .. | .. | .. |
| Wagga | 544 | 86 | 32.1 | 13.9 | 16.4 | 3.2 | 50 | 77 | 31 | 65 |
| Wollongong | 1,118 | 112 | 25.8 | 16.5 | 17.0 | 8.4 | 78 | 71 | .. | .. |
| VICTORIA | | | | | | | | | | |
| Ballarat | 696 | 170 | 24.3 | 9.9 | 10.3 | 3.6 | 60 | 81 | 41 | 75 |
| Bendigo | 516 | 111 | 28.3 | 12.3 | 13.6 | 4.1 | 47 | 75 | 30 | 64 |
| Geelong | 541 | 133 | 24.6 | 13.6 | 13.0 | 5.6 | 65 | 81 | 52 | 70 |
| Horsham | 447 | 104 | 29.5 | 13.3 | 12.9 | 3.8 | 50 | 77 | 33 | 67 |
| Mildura | 264 | 61 | 32.1 | 15.3 | 16.1 | 4.7 | 48 | 71 | .. | .. |
| Sale | 602 | 128 | 25.3 | 13.8 | 12.4 | 3.7 | 65 | 79 | 51 | 68 |
| Seymour | 564 | 94 | 29.3 | 12.9 | 12.6 | 3.0 | 56 | 79 | .. | .. |
| Shepparton | 506 | 103 | 30.2 | 13.2 | 14.9 | 4.1 | 49 | 77 | 32 | 63 |
| Wangaratta | 650 | 104 | 30.4 | 12.9 | 14.7 | 3.4 | 41 | 75 | 26 | 66 |
| Warrnambool | 655 | 153 | 21.1 | 13.1 | 12.6 | 6.4 | 73 | 83 | 69 | 77 |
| TASMANIA | | | | | | | | | | |
| Burnie | 988 | 170 | 19.8 | 12.1 | 11.1 | 5.9 | 70 | 82 | 65 | 74 |
| Launceston | 726 | 149 | 24.3 | 12.1 | 11.2 | 2.7 | 60 | 77 | .. | .. |
| Zeehan | 2,390 | 246 | 19.1 | 10.9 | 8.9 | 3.4 | 73 | 81 | 61 | 74 |

(*a*) The average index of mean relative humidity has been derived from the ratio of the average 9 a.m. vapour pressure to the saturation vapour pressure at the average mean temperature of the month. Being thus related to the mean temperature this value of relative humidity is a good approximation to the daily mean.

NOTE. The table on the next page gives the latitude, longitude, and altitude of the weather recording station at each of the above towns.

## LOCATION CO-ORDINATES FOR SELECTED AUSTRALIAN COUNTRY TOWNS

| *Station* | *Lat.* | *Long.* | *Altitude (m)* |
|---|---|---|---|
| Western Australia— | | | |
| Albany | 34° 57′ | 117° 48′ | 69 |
| Broome | 17° 57′ | 122° 13′ | 12 |
| Bunbury | 33° 19′ | 115° 38′ | 1 |
| Carnarvon | 24° 53′ | 113° 39′ | 4 |
| Esperance | 33° 51′ | 121° 53′ | 4 |
| Geraldton | 28° 48′ | 114° 42′ | 28 |
| Kalgoorlie | 30° 46′ | 121° 27′ | 360 |
| Meekatharra | 26° 36′ | 118° 29′ | 517 |
| Narrogin | 32° 54′ | 117° 09′ | 351 |
| Port Hedland | 20° 23′ | 118° 37′ | 6 |
| Wyndham | 15° 31′ | 128° 09′ | 6 |
| Northern Territory— | | | |
| Alice Springs | 23° 48′ | 133° 53′ | 546 |
| Tennant Creek | 19° 38′ | 134° 11′ | 375 |
| South Australia— | | | |
| Ceduna | 32° 08′ | 133° 42′ | 17 |
| Mount Gambier | 37° 45′ | 140° 47′ | 63 |
| Oodnadatta | 27° 33′ | 135° 29′ | 113 |
| Port Augusta | 32° 33′ | 137° 47′ | 4 |
| Port Lincoln | 34° 47′ | 135° 53′ | 4 |
| Port Pirie | 33° 11′ | 138° 01′ | 3 |
| Queensland— | | | |
| Atherton | 17° 17′ | 145° 27′ | 752 |
| Bundaberg | 24° 52′ | 152° 21′ | 2 |
| Cairns | 16° 35′ | 145° 44′ | 3 |
| Charleville | 26° 25′ | 146° 17′ | 290 |
| Charters Towers | 20° 03′ | 146° 08′ | 306 |
| Cloncurry | 20° 40′ | 140° 30′ | 189 |
| Ipswich | 27° 38′ | 152° 44′ | 20 |
| Longreach | 23° 26′ | 144° 15′ | 187 |
| Mackay | 21° 07′ | 149° 10′ | 3 |
| Maryborough | 25° 32′ | 152° 42′ | 6 |
| Normanton | 17° 39′ | 141° 05′ | 10 |
| Rockhampton | 23° 23′ | 150° 29′ | 8 |
| Roma | 26° 36′ | 148° 42′ | 305 |
| Queensland—*contd* | | | |
| Toowoomba | 27° 33′ | 151° 57′ | 586 |
| Townsville | 19° 15′ | 146° 46′ | 3 |
| New South Wales— | | | |
| Albury | 36° 06′ | 146° 54′ | 183 |
| Armidale | 30° 32′ | 151° 38′ | 980 |
| Bega | 36° 40′ | 149° 50′ | 15 |
| Bourke | 30° 05′ | 145° 58′ | 107 |
| Broken Hill | 31° 57′ | 141° 28′ | 298 |
| Cooma | 36° 13′ | 149° 08′ | 838 |
| Dubbo | 32° 10′ | 148° 37′ | 262 |
| Goulburn | 34° 45′ | 149° 43′ | 632 |
| Grafton | 29° 41′ | 152° 56′ | 6 |
| Katoomba | 33° 43′ | 150° 19′ | 1,000 |
| Leeton | 34° 33′ | 146° 24′ | 151 |
| Moree | 29° 28′ | 149° 51′ | 207 |
| Newcastle | 32° 55′ | 151° 49′ | 37 |
| Orange | 33° 18′ | 149° 06′ | 869 |
| Tamworth | 31° 05′ | 150° 56′ | 390 |
| Taree | 31° 54′ | 152° 28′ | 9 |
| Wagga | 35° 08′ | 147° 25′ | 219 |
| Wollongong | 34° 25′ | 150° 56′ | 46 |
| Victoria— | | | |
| Ballarat | 37° 35′ | 143° 50′ | 437 |
| Bendigo | 36° 46′ | 144° 17′ | 223 |
| Geelong | 38° 07′ | 144° 22′ | 17 |
| Horsham | 36° 40′ | 142° 12′ | 133 |
| Mildura | 34° 14′ | 142° 05′ | 48 |
| Sale | 38° 06′ | 147° 08′ | 15 |
| Seymour | 37° 02′ | 145° 08′ | 141 |
| Shepparton | 36° 23′ | 145° 24′ | 113 |
| Wangaratta | 36° 22′ | 146° 19′ | 150 |
| Warrnambool | 38° 24′ | 142° 29′ | 10 |
| Tasmania— | | | |
| Burnie | 41° 04′ | 145° 54′ | 4 |
| Launceston | 41° 33′ | 147° 13′ | 166 |
| Zeehan | 41° 54′ | 145° 23′ | 180 |

**The Weather of 1972 (December 1971 to November 1972)**

The following is a brief summary of weather conditions experienced during the four seasons ended in November 1972. Plate 3, page 31, shows the rainfall distribution for 1972.

*Summer*, 1971–72. Rainfall was much above average in most of South Australia, Victoria, New South Wales and the east coast of Queensland. The Central Tablelands district of New South Wales recorded its highest summer rainfall on record and other districts in central-eastern New South Wales and central Victoria approached record seasonal falls.

Rainfall was very much below average generally in Western Australia and western Queensland. Notably dry areas were the North Kimberley and Central Coast districts of Western Australia and the lower western district of Queensland.

Elsewhere over the continent and in Tasmania summer rainfall was mainly average.

Temperatures were generally average.

*Autumn*, 1972. Rainfall was significantly below average over most of the continent and in Tasmania. In Western Australia conditions were below average apart from above average falls in the Kimberleys. South Australia, Victoria, New South Wales and Tasmania had a generally dry autumn and rainfall deficiencies were causing concern in some areas.

Queensland had mostly below average rainfall although there were some good falls in parts of the north and the south-east.

The Northern Territory received good rainfall, particularly in the Alice Springs district, which had record falls in March.

Temperatures were average or above, Daily maxima were notably above average in the southern half of Western Australia, South Australia, parts of Victoria and most of Tasmania. Daily minima were notably above average in scattered parts of Western Australia and Queensland.

*Winter 1972*. Rainfall was generally much below average over New South Wales and most of Victoria following a below average autumn. The low winter rainfall resulted in serious rainfall deficiencies over the autumn—winter period in most of inland New South Wales and eastern Victoria; and although useful rain fell at the end of August, follow-up rains were required urgently.

In Western Australia and South Australia, the agricultural areas generally received average rainfall resulting in fair seasonal conditions.

Queensland received below average rainfall and much of the southern inland was suffering from serious deficiencies following a below average autumn.

In Tasmania rainfall was average, or above, and seasonal conditions fair.

Temperatures were mainly average but there were some well below average mean minima over the tablelands of New South Wales. Record low temperatures were experienced in Tasmania in June.

*Spring, 1972*. Widespread heavy rains fell over south-east Queensland and north-east New South Wales with coastal areas receiving up to three times their spring average.

Elsewhere rainfall was below average except for scattered areas above average mainly in Western Australia and Queensland. Many areas of South Australia, western New South Wales, Victoria and north-east Tasmania were up to 50 per cent below average for the season.

Temperatures were appreciably above average. Mean daily maximum temperatures were greater than 1°C above average over most of the interior of the continent, in much of Victoria and in north-east Tasmania. Mean daily minima were greater than 1°C above average over a band of country extending from the north-west coast of the continent across the interior to the east coast.