

## Chapter 2

# PHYSICAL ENVIRONMENT

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# Chapter 2

## PHYSICAL ENVIRONMENT

The State of Tasmania is a group of islands lying south of the south-east corner of the Australian mainland. Roughly shield-shaped with the greatest breadth in the north, the Tasmanian mainland extends from 40° 38' to 43° 39' south latitude and from 144° 36' to 148° 23' east longitude. The coastline is bounded by the Southern Ocean on the south and west and the Tasman Sea on the east, while the approximately 240 kilometres wide Bass Strait separates the island from the Australian mainland. Macquarie Island, a part of the State, is situated at 54° 38' south latitude, 158° 53' east longitude in the Southern Ocean.

### 2.1 AREA OF ISLANDS

<i>Island</i>	<i>Area (square kilometres)</i>
Badger	10
Bruny	362
Cape Barren	445
Clarke	113
Flinders	1 374
Hunter	74
King	1 099
Macquarie	123
Maria	101
Prime Seal	10
Robbins	101
Schouten	34
Three Hummock	70
Vansittart	6
Total islands	3 922
Mainland Tasmania	64 409
Total Tasmania	68 331



The area of the whole State, including the lesser islands, is 68 331 square kilometres or about 0.9 per cent of the total area of Australia (7 686 900 square kilometres); it is just under one-third the size of Victoria, the smallest mainland State, and is less than half the size of England and Wales.

Mainland Australia, extending north of the Tropic of Capricorn, and with much of its area in the zone of the sub-tropical anti-cyclones, is basically a warm, dry continent. Tasmania is in the temperate zone and practically the whole island is well watered with no marked seasonal concentration; there are no deserts or drought

areas as found extensively on the adjacent mainland. Being south of latitude 40°, it is on the edge of the wind belt commonly known as the 'Roaring Forties' and, with South America the nearest land mass to the west, Tasmania's weather is subject at times to strong winds and heavy rain about the south and west coastal areas. Its insular position provides protection against temperature extremes — the variation between summer and winter mean temperatures in coastal towns rarely exceeds 8° Celsius.

Apart from the Great Dividing Range in the east, continental Australia is predominantly a land of low plateaux and plains with little relief. In contrast, Tasmania could legitimately be called the island of mountains, since it has the largest proportion of high country to its total area, compared with the other States.

## 2.1 CLIMATE

(The following section was prepared by the Bureau of Meteorology)

Since Tasmania lies between  $40^{\circ}$  and  $43\frac{1}{2}^{\circ}$  south of the Equator and is an island with no point more than 115 kilometres from the sea, its climate is classified as temperate maritime. On the coast the daily temperature range averages about  $8^{\circ}$  Celsius, rising to about  $12^{\circ}$  Celsius further inland, indicating a slight continental effect.

The combination of mountainous terrain in the western half of the State and prevailing westerly winds produces a marked west-east variation of climate, and especially of rainfall.

Summers are mild and characterised by greatly lengthened days. The sun reaches a maximum elevation of  $70-73^{\circ}$  in mid-summer, giving around 15 hours of daylight. In mid-winter, the sun's elevation does not exceed  $20-23^{\circ}$ , and the shortest day consists of about nine hours of daylight.

In winter, westerly winds reach their greatest strength and persistence, causing a distinct maximum in rainfall distribution in the west and north-west. In the east and south-east, rainfall is more evenly distributed throughout the year. In comparison with those areas of Europe and North America which are at similar latitudes, Tasmania enjoys a very temperate climate. This is due to the stabilizing effect of surrounding oceans whose temperatures change only  $3-5^{\circ}$  throughout the year. The higher proportion of ocean to land area confers a similar benefit on the Southern Hemisphere as a whole.

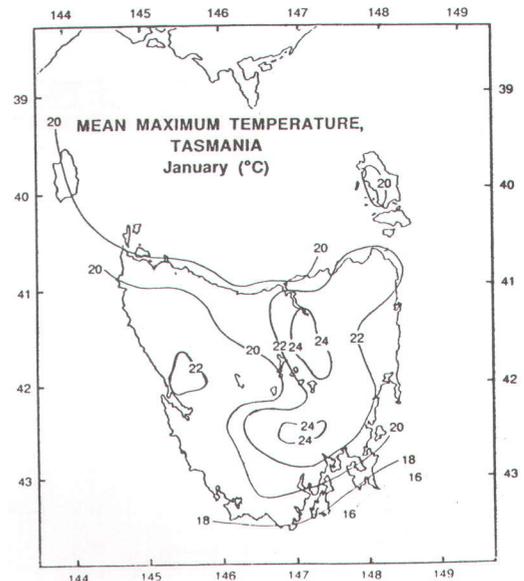
### 2.1.1 Winds

The prevailing winds over most of the Island are north-west to south-west, with greatest strength and persistence during late winter. Speed and direction vary with the eastward passage of high and low pressure systems. In the summer months, when westerlies are weak, afternoon sea-breezes become the predominant wind in

coastal areas. Occasional periods of north-east to south-east winds occur. The highest average wind speeds are associated with extensive deep depressions over ocean areas south of Tasmania.

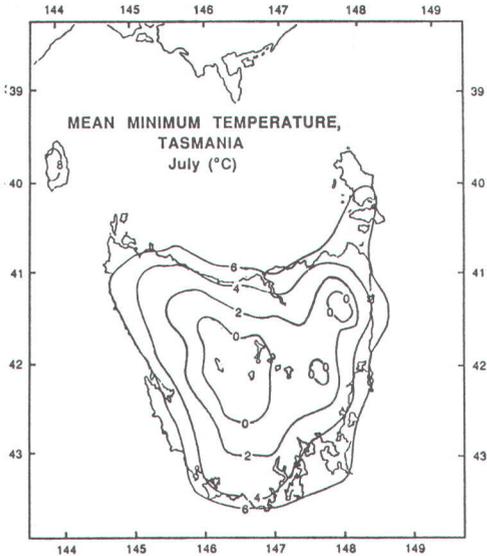
### 2.1.2 Temperature

Tasmania only occasionally experiences the extremes of temperature common to the other States. High temperatures recorded in the east and south-east of Tasmania generally occur on the last day of a warm spell during which a dry air mass of mainland origin is advected over the State from a direction between north and north-west. Some cooling in the lower air layers over the waters of Bass Strait prevents the northern coast from reaching the higher temperatures that are experienced in the south under these conditions. The highest temperatures ever recorded in Tasmania are  $40.8^{\circ}\text{C}$  at Bushy Park in December 1945 and at Hobart in January 1976. The lowest temperature recorded was  $-13.0^{\circ}\text{C}$  at Shannon, Butlers Gorge and Tarraleah in June 1983.



## 2.2 TEMPERATURES AT SELECTED STATIONS, TASMANIA, 1987 (°C)

Station	Summer (Dec-Feb)		Autumn (Mar-May)		Winter (June-Aug)		Spring (Sept-Nov)	
	Mean maximum	Mean minimum	Mean maximum	Mean minimum	Mean maximum	Mean minimum	Mean maximum	Mean minimum
Hobart	21.1	11.3	17.8	8.8	13.0	4.7	18.1	9.0
Launceston Airport	21.4	8.8	17.6	6.5	11.4	2.8	17.7	6.0
Devonport	19.9	10.8	17.3	8.4	12.7	4.6	16.8	7.6
St Helens	22.4	10.6	19.9	7.3	n.a.	n.a.	19.8	7.4
Queenstown	19.1	7.2	16.4	5.5	12.1	2.2	n.a.	n.a.



The recorded extremes of temperature for Hobart are 40.8°C in January 1976 and -2.8°C in June 1972 and July 1981. Readings above 38°C or below -1°C are rare, the mean maximum temperature in summer being 21°C and the mean minimum in winter, 4.8°C.

The average number of hours of sunshine a year ranges from about 2 500 hours in the northern Midlands to less than 1 750 hours on the West Coast and western highlands, this area having the least amount of sunshine in Australia. Hobart averages 2 100 hours per year and Launceston around 2 400.

In January, daily averages of sunshine range from nine hours per day between the Midlands and Launceston to six hours per day on the West and South Coasts. In mid-winter, average daily sunshine is down to a maximum of three hours

#### State Sizzles in Record Heat

Tasmania basked in unseasonably high temperatures on the 27th of September, 1987, breaking temperature records for the month in 16 locations throughout the State.

Beaches and popular picnic spots became havens for hundreds of Hobart residents who basked in the State's new record September temperature of 31 degrees.

Bicheno, on Tasmania's East Coast, also recorded 31 degrees and the other East Coast centres of St. Helens and Swansea both recorded new record temperatures. Launceston and Devonport also recorded new monthly maxima with 25 and 21 degrees respectively.

on the East Coast and to considerably less on the West Coast and highlands.

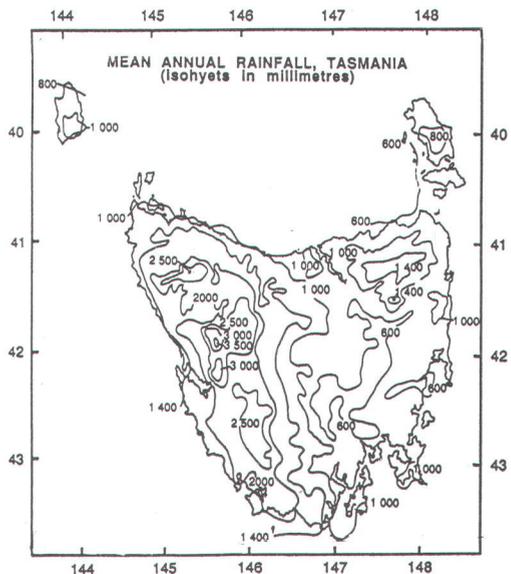
#### 2.1.3 Rainfall

As Tasmania's position is on the northern edge of the 'Roaring Forties' (a westerly air-stream), its exposure to this stream and the mountainous nature of the terrain are the controlling influences on the amount, distribution and reliability of the State's rainfall.

In the west, average annual rainfall ranges from about 1 500 mm on the coast to 3 500 mm at Lake Margaret; in the north-east, from 500 mm on the coast to 1 300 on the highlands; while rainfall in the north-west ranges from 1 000 mm near the coast to 1 600 mm in the higher inland areas.

Extreme three to five-day rainfalls occur most often on the West Coast in late June when the westerlies are increasing in strength and persistence and the sea temperature is well above the land temperature. In the north, short periods of extreme precipitation occur when wind flow is sustained for up to two days from the north-east, usually from late autumn to spring. The high moisture content of such streams from over the relatively warm waters of the Tasman Sea results in heavier, if less prolonged, rainfall than is produced by the westerly streams.

There is a strong gradation in rainfall from west to east, because of topography, with a distinct rain shadow east of the Central Plateau. Parts of the Midlands average less than 500 mm per year. Totals in the east and south-east are higher (over 800 mm on exposed slopes).



Rainfall is least reliable in the east, south-east, Midlands and Derwent Valley. Highest rainfall in these areas tends to occur in autumn and spring, under the influence of small cyclonic depressions off the East Coast.

### 2.3 ANNUAL RAINFALL, TASMANIA (millimetres)

Station	1985	1986	1987	Long-term average (a)
Avoca	596	636	434	561
Beaconsfield	896	968	619	952
Burnie	856	968	672	1003
Campbell Town	590	573	392	547
Cressy	n.a.	613	n.a.	642
Franklin	740	858	773	897
Hobart (Weather Bureau)	716	654	492	628
Hobart (Airport)	625	545	410	519
Kettering	n.a.	1120	n.a.	890
Launceston (Airport)	688	626	480	702
Lilydale	n.a.	954	n.a.	975
Lymington	n.a.	867	n.a.	791
Maydena	n.a.	1239	1123	1224
New Norfolk	n.a.	n.a.	n.a.	552
Oatlands	656	574	279	563
Queenstown	2041	2801	2652	2521
Ringarooma	1218	1237	887	1231
Savage River	n.a.	n.a.	n.a.	1957
Smithton	952	1134	813	1106
St Helens	869	785	541	781
St Marys	1137	1092	681	1032
Swansea	685	718	377	614
Ulverstone	n.a.	890	689	961

(a) Number of years of record used to calculate the long-term average varies from station to station.

#### 2.1.4 Snow, Hail and Thunderstorms

Snow and hail can be experienced over the highlands at any time of the year. Heaviest snowfalls occur, as a rule, in late winter and spring, and less frequently in June and July. Extensive snow below 150 metres occurs, on the average, less than once every two years, associated with an unusually vigorous outbreak of cold air from Antarctic regions. There is no permanent snowline, but patches of snow often remain on the highest peaks until December.

#### Heaviest Snowfall in 65 years

On 25 July 1986 Hobart was buried in eight centimetres of snow, the biggest snowfall since 13 centimetres fell in the city on 31 July 1921.

The freezing conditions were caused by an Antarctic airstream squeezing between an intense high pressure system in the Great Australian Bight and an intense low pressure system in the Tasman Sea. The southerly airstream became colder as it moved directly over Tasmania between the two weather systems.

As the temperature dropped to zero degrees commuters were left stranded and normal city services were either delayed or abandoned for the day.

Hobart Airport was closed for the morning, no mail deliveries took place, many schools were closed and businesses reported a 50 per cent downturn in trade.

The snow was a boon to the trans Derwent Ferry business which increased its river crossings from seven to 15, due to the havoc created on the roads.

Hail is most likely in spring, though possible in any month. Hail storms are a big risk to fruit crops in the Huon Valley and on the Tasman Peninsula, and sometimes cause extensive damage.

Thunderstorms are most common in the west and about the North Coast and are usually associated with the lifting of warm moist air by a cold front. Thunderstorms occur mainly in the summer months. Hobart and Launceston average five to seven storms per year, and the north and north-west, 10 to 15. The Central Plateau and north-eastern highlands report, on average, about five storms per year, while the Midlands, as gauged by Oatlands, has less than three.

### 2.4 CAPITAL CITIES CLIMATIC DATA

	Sydney	Melbourne	Brisbane	Perth	Adelaide	Hobart	Darwin	Canberra
Temperature (°C) —								
Mean daily maximum	21.5	19.9	25.4	23.3	22.0	<b>16.8</b>	31.9	19.4
Mean daily minimum	13.6	9.9	15.7	13.2	11.9	<b>8.2</b>	23.1	6.3
Extreme maximum	45.3	45.6	43.2	44.7	47.6	<b>40.8</b>	40.5	42.2
Extreme minimum	2.1	-2.8	2.3	1.2	0.0	<b>-2.8</b>	10.4	-10.0
Mean daily hours of sunshine	6.7	5.7	7.5	7.9	6.9	<b>5.8</b>	8.5	7.2
Rainfall —								
Mean annual (mm)	1215	661	1157	879	531	<b>626</b>	1536	639
Mean annual days of rain	148	143	123	120	120	<b>160</b>	97	110
Wind — Average (km/hr)	11.6	12.3	10.8	15.6	12.5	<b>11.7</b>	9.2	5.8

### 2.1.5 Floods

In Tasmania the river system most affected by flooding is the South Esk. The Esk catchment includes most of the north-eastern highlands, where annual rainfall averages about 1 300 mm, and part of the Western Tiers where run-off can be rapid. As many rivers in the South Esk system flow through flat country, flooding can be widespread and disruptive.

Flooding of the Derwent River system can be extensive but is less frequent than in the South Esk. The most severe flood on record in the Derwent occurred in April 1960 with the peak discharge flow recorded as 3 400 cumecs (cubic metres per second) at Macquarie Plains. However, it is most unlikely that flooding of this severity will again occur on the Derwent due to the completion of the four dams across the River since 1960 by the Hydro-Electric Commission.

Flooding of rivers in the west and south of the State can be of greater frequency than in the Derwent and Esk systems but because of mountainous terrain and lack of population these pass mostly unnoticed. Similarly, the short, fast-flowing rivers of the East Coast flood and fall rapidly, but can cause damage and disruption of road systems.

In the north and north-west of Tasmania many rivers have their catchments along the northern edge of the Central Plateau and can flood quickly.

### 2.1.6 Hobart's Climate

Hobart is not the wettest Australian capital city; in fact it has the lowest mean annual rainfall

of all capitals except Adelaide. But it is the coldest.

*Temperatures:* Mean maximum temperature exceeds 21°C in January and February. On average there are two or three days per year with maximum temperatures greater than 32°C. Minimum temperatures below -1°C are rare.

*Rainfall:* There is a strong gradient of rainfall to the immediate west of Hobart caused by the bulk of Mt Wellington. On the south-eastern slopes of the mountain the annual rainfall reaches 1 400 mm (at The Springs and The Gap) while at Fern Tree the annual average is 1 140 mm. The rainfall decreases to about 600 mm in the city area, the annual average being 626 mm at the Regional Office of the Bureau of Meteorology. Some eastern shore suburbs receive as little as 500 mm of rain per annum.

Monthly totals are fairly uniform. The wettest 12 months on record at the Bureau's Hobart Office yielded 1 104 mm (to December 1916) and the driest, 320 mm (to November 1943).

*Fog:* Fogs occur in the city about six times per year, in the cooler months, but are more frequent over and near the Derwent River, down which they are often carried on a light north-west wind. Fog frequency is far less than that for either Launceston or Melbourne.

*Wind:* The main wind direction is north-west, induced by the orientation of the Derwent Valley. Next in importance is the sea-breeze (from south or south-east) during summer months. The strongest wind gust experienced in Hobart was 150 km/hr recorded during a storm in September 1965.

## 2.5 HOBART CLIMATIC DATA, 1987

Month	Shade temperature				Mean daily hours of sunshine (a)	Rainfall	
	Mean maxima (a)	Mean minima (a)	Extremes (b)			1987	Long-term average (a)
			Maximum	Minimum			
	°C	°C	°C	°C	hours	mm	mm
January	21.5	11.7	40.8	4.5	7.9	55	47
February	21.6	11.9	40.2	3.4	7.0	25	40
March	20.0	10.7	37.3	1.8	6.3	39	48
April	17.1	8.8	30.6	0.6	5.1	24	53
May	14.3	6.8	25.5	-1.6	4.2	72	49
June	11.8	5.1	20.6	-2.8	3.9	25	57
July	11.5	4.4	21.0	-2.8	4.3	39	53
August	12.9	5.1	24.5	-1.8	5.0	27	52
September	14.9	6.3	31.0	-0.6	5.8	41	53
October	16.9	7.6	34.6	0.0	6.3	35	63
November	18.5	9.1	36.8	1.6	7.0	57	56
December	20.2	10.6	40.7	3.3	7.3	53	57
Annual	16.2	8.2	40.8	-2.8	5.8	492	626

(a) Long-term average. (b) Specific extreme temperatures since records kept.

*Snow and Hail:* Snow below 300 metres occurs, on the average, less than once per year. Falls lying in the centre of the city, almost at sea level, have occasionally been recorded. Snow generally lies on Mt Wellington during winter and early spring months, but it is rare between November and March. Hail occurs about four times a year, mainly between September and November.

*Frost:* The average annual frequency of days of frost is 28, mostly from June to August. Cold air drainage is found in the hilly suburbs and frosts are common on the valley floors.

*Sunshine and Cloud:* No marked seasonal or diurnal variation of cloud amount occurs. However, there is a clear-cut seasonal variation in monthly average hours of sunshine with variations of 235 hours in January to 112 hours in June.

## 2.2 PHYSIOGRAPHY

Tasmania, a mere 296 kilometres from north to south and 315 kilometres from east to west, has a wide variety of mountains, plateaux and plains, of rivers, lakes, and tarns, of forest, moorland and grassland, of towns, farms and uninhabited (and virtually unexplored) country.

### 2.1.7 Monthly Weather Review 1987

#### January

Average monthly maximum and minimum temperatures were below normal in all areas except the East Coast. Most districts, apart from the southeast, received rainfall well above average, with some localities in the western half receiving two or three times their monthly average.

#### February

Although average maximum temperatures were close to or only slightly below normal, average minimum temperatures were generally one or two degrees below normal throughout the State. Rainfall was below average in all districts except the Derwent Valley, Central Plateau and West Coast.

#### March

March was characterised by a succession of rapidly moving cold fronts which produced below normal temperatures and, on two occasions, snow in highland areas. Below average rainfall in the eastern half indicated the dominance of the "westerlies".

#### April

Cold fronts were less frequent and less active during April. Temperatures were above average with new record mean maximum temperatures set at several locations. Rainfall totals were below average with some locations recording their lowest April totals on record.

#### May

During the first half of May Tasmania experienced some lengthy fine weather caused by a very intense high pressure system. Two particularly large and complex low pressure systems brought storms and snowfalls during the latter part of the month. Temperatures were relatively mild and most districts registered above average rainfall.

#### June

June was a relatively dry month with the State receiving only 32 per cent of its average monthly rainfall. Temperatures were close to average.

#### July

Near normal temperatures were experienced during the month. The persistence of anticyclones in higher latitudes than usual and, as a consequence, the lack of "westerlies" and active rain bearing depressions resulted in a significant rainfall deficiency during July.

#### August

Below average rainfall registrations continued during August. Temperatures were close to normal.

#### September

The month of September was characterised by above average rainfall and near normal temperatures in the south-western half of the State, while in the remainder higher temperatures and rainfall below or very much below average were recorded. On the 27th new record maximum temperatures were recorded at 16 locations.

#### October

Most of Tasmania received below normal October rainfall. On the last day of the month new monthly maximum temperature records were established at several locations, but monthly average temperatures were close to normal.

#### November

Temperatures and rainfall were above average throughout the State.

#### December

Apart from the Bass Strait islands, rainfall was below average during December. Temperatures were near normal.

The temperate maritime climate partly explains Tasmania being called the most English of all States but other factors operate to heighten the comparison — the pattern of agricultural settlement with orchards, hedges and hopfields; the lake country; the early freestone architecture still common in the east and south-east and the roadsides and villages dotted with oaks, elms and poplars.

**2.2.1 Mountains, Lakes and Rivers**

With six mountains exceeding 1 500 metres, 28 above 1 220 and a substantial part of the Central Plateau above 900 metres, Tasmania is truly an island of mountains. The tallest is Mt Ossa (1 617 metres) located with a group of mountains, including Cradle Mountain, to the north-east of Queenstown and west of the highland lake country on the Central Plateau containing Lake St Clair, Australia's deepest natural freshwater lake.

**2.6 MOUNTAINS AND LAKES**

Mountains	Height (metres)
Mt Ossa	1 617
Legges Tor	1 573
Barn Bluff	1 559
Mt Pelion West	1 554
Cradle Mountain	1 545
Stacks Bluff	1 527
Mt Gould	1 491
Mt Jerusalem	1 491
Mt Olympus	1 447
Frenchmans Cap	1 443
Mt Ironstone	1 443

Lakes	Area (square kilometres)
Lake Gordon (a)	272
Lake Pedder (b)	241
Great Lake (c)	170
Arthurs Lake (c)	64
Lake Sorell (c)	52
Lake King William (a)	41
Lake Echo (c)	41
Lake Mackintosh (a)	29
Lake St Clair (c)	28
Lake Pieman (a)	22
Lake Rowallan (a)	9
Lake Rosebery (a)	7
Lake Barrington (a)	7
Lake Cethana (a)	4
Lake Murchison (a)	4

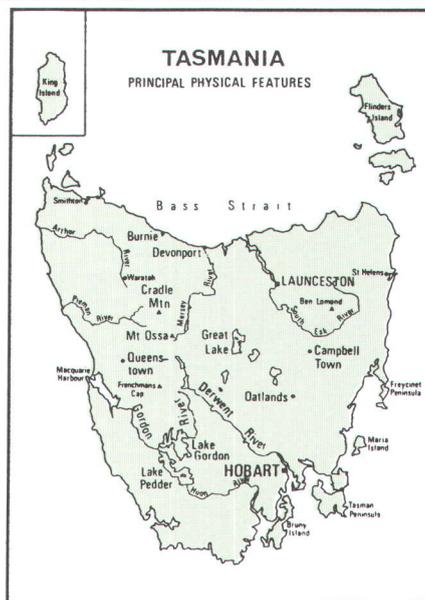
- (a) Man-made.
- (b) Man-made — inundated the much smaller natural Lake Pedder.
- (c) Natural lake enlarged by dam(s).

Although the rivers are short, Tasmania is virtually criss-crossed by a network of rivers and lake systems. In the south, the Derwent flows from the Central Highlands past Hobart, provid-

ing one of the world's best harbours, to the sea at Storm Bay. The Huon River takes the waters of the south-west from the Gordon and Franklin Rivers at Lake Pedder. The State's longest river is the South Esk in the north flowing from the north-east to join the North Esk at Launceston to create the Tamar. Other rivers include the Mersey, Forth and Leven flowing to the North Coast and the Pieman and Arthur rivers on the West Coast.

**2.7 RIVERS**

Rivers	Length (kilometres)
South Esk	201
Gordon	185
Derwent	182
Huon	170
Mersey	146
Franklin	118
Arthur	113
Pieman	100
North Esk	82

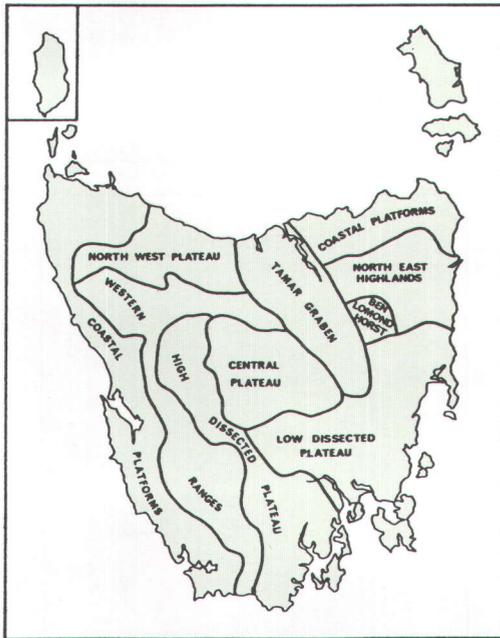


**2.2.2 Physiographic Regions**

**Central Plateau:** The main feature is a relatively undissected, dolerite-capped plateau sloping generally south-eastward from an average level of 1 065 metres in the north to 610 metres in the south, and drained almost wholly by the Derwent system. The northern and eastern boundaries of the Plateau are the Great Western Tiers (paradoxically named since they lie in the central north of the island). This is known as the 'lake country' of the island and is one of the chief sources of hydro-electric power.

**High Dissected Plateau:** West of Lake St Clair, dolerite caps steeply-tilted sediments and the plateau is much dissected; it comprises a series of peaks and broken ridges. The coastlands in the extreme south of the region are rugged but in the D'Entrecasteaux Channel and Huon River areas, narrow coastal belts have been devoted to specialised agriculture.

**Western Ranges:** The high dissected plateau is bounded by a series of mountain ranges running parallel to the West Coast and in this region are located the State's principal mines. The south of the region is virtually uninhabited.



The above regions derive from a classification by J.L. Davies, M.A., Ph.D., University of Tasmania

**Western Coastal Platforms:** Throughout almost the entire length of the West Coast, an uplifted and much dissected peneplain slopes westward from about 275 metres altitude, ending abruptly in cliffs more than 30 metres high. In the south of this region, superhumid button grass plains predominate, and the area is uninhabited. On the coastal plain south of the Arthur River however, dairy cattle are wintered on agistment runs, while north of the river dairying begins to appear and swamps have been drained to allow farming.

**North-West Plateau:** North of the Western Ranges lies a plateau averaging nearly 610 metres altitude which is important mainly for forestry; the coastlands derive mainly from basalt, giving rise to intensive mixed farming based on dairying, potatoes and crops for canning and freezing, such as peas and beans.

**Tamar Graben:** This graben (rift valley) is the largest plain and the leading agricultural and pastoral district in the State; it ends in the drowned inlets of the Tamar and Mersey estuaries and of Port Sorell, in the north.

**North-East Coastal Platforms:** This region consists of undulating lowland but the soils are acidic and the land is used only for grazing.

**North-East Highlands and Ben Lomond Horst:** This region comprises mostly uplifted remnants of old fold mountains dominated by the 1525 metre dolerite-capped plateau horst of Ben Lomond, an outlier of the Central Plateau. Here agriculture is largely confined to small basalt-derived basins. Some minerals are worked.

**Dissected Plateau:** In the south-east lies a low dissected dolerite plateau averaging perhaps 365 metres and used mainly for grazing. The northern coastlands of this region are narrow and also devoted to sheep, but the southern coastland is important for its specialised agriculture. At the extreme south of the region is the drowned estuary of the Derwent and the Tasman and Forestier Peninsulas.

## ISLAND BIRDLIFE

by Trevor Waite

Reprinted from *The Islander*, Number 4, April 1986

**T**ASMANIA, because of the existence of Bass Strait, doesn't have the bird population of some of the mainland States.

But in recent years, because of an increase in the number of people studying birds, several names have been added to the list of Tasmanian species, and more information has been found about the habits and movements of the birds which were already on the list. This applies

especially to transequatorial waders which migrate from northern shores.

Although Tasmania lacks some of the well-known species it does have an abundance of some birds not seen in such large numbers in other States. Nowhere else can the masked (spurwinged) plover be seen in numbers as in Tasmania. Also the beautiful robins are more numerous than in other States.

Other species which are more plentiful are the crescent honeyeater, the olive whistler and the beautiful firetail. Together with permanent residents and migrants there are about 300 species listed.

Some species are found only in Tasmania. These are the flightless native hen, the green rosella, the yellow wattlebird, the yellow-throated honeyeater, the strong-billed honeyeater, the black-headed honeyeater, the forty-spotted pardalote, the dusky robin, the scrub-tit, the Tasmanian thornbill and the black currawong.

Two other species which are sometimes considered endemic are the swift parrot, which breeds only in Tasmania, and the orange-bellied parrot, found only in the south-west of the State where it nests in hollows, usually high in old eucalypt trees.

Most of these rare parrots migrate to the mainland after breeding and it is estimated that there could be less than 200 pairs of this species remaining. The cause of the decline in numbers of the orange-bellied parrot has been the destruction of vegetation combined with competition from the other species. Another parrot which is more numerous in Tasmania, although not often seen, is the ground parrot. The stronghold of this bird is the button grass plains and heathland of the south-west.

A real gem of the forest gullies and creeks is the pink robin. The male, with his magenta pink breast and black back is a delight to see. Although not a shy bird, because of its quiet habits and liking for secluded forest areas, it is rarely seen. Another beautiful bird which has retired to places not often visited by people, is the azure kingfisher. There was a time when this colourful kingfisher could be seen in the lower reaches of the northern rivers. The bird can still be seen at times in the Sisters Creek and other northern streams.

In the wet heathland areas, there is a furtive little bird with a long thin tail, a brown body

Trevor Waite, a prominent Tasmanian ornithologist and wildlife photographer, operates the Birdland native gardens at Sisters Creek on the north-west coast. Tranquil Sisters Creek winds its way through wet sclerophyll forest where platypus can be seen as well as about 60 species of birds. Mr Waite extended his private parkland over many years turning a hobby into a career.

and a blue throat. This is the southern emu wren. The thick heathland wetter areas of the Rocky Cape National Park are favourite haunts.

The white-fronted chat, or nun, is a small bird which has decreased in numbers in the north of the State, although it is not uncommon in other areas. Marshes and swamp areas are the feeding and nesting grounds of this smart little black and white ground feeder and it can easily be identified by the metallic "tang" as it moves around with agitated, jerky movements.

The increase in feral and numerous farm cats has had some bearing on the decrease of the beautiful firetail. The firetail is the only native Tasmanian representative of the large Australian finch family. It is a very attractive bird with fine markings on the body and a bright red beak and rump.

One of the rarer endemic birds is the forty-spotted pardalote, or diamond bird, which is often confused with its common relation the spotted pardalote.

While the spotted pardalote is found all over the State, the forty-spotted is confined mostly to Bruny Island and Maria Island and the population would not exceed 1 000.

A larger ground-loving bird, which is seldom seen, is the spotted quail thrush. This bird is neither a quail nor a thrush but has habits similar to a quail and in appearance is not unlike a thrush. The quail thrush is finely marked and spotted and not easily seen as it moves through the dry forest and stony hillsides.

Two birds of prey are among those species not often seen. The conspicuous white goshawk, although frequenting many parts of the island, is not common anywhere. Although a protected species, as are all birds of prey, it is sometimes shot. Likewise, the peregrine falcon has been greatly reduced in numbers — mainly due to its predation of homing pigeons. However its food includes a great number of animal and insect species including rats, mice and grasshoppers. This fine bird of prey would certainly come out on the credit side if its feeding habits were carefully analysed.

Other interesting species which are not at all common include the great crested grebe, the little grebe and two nocturnal birds, the handsome masked owl and the delicate little owl nightjar.

## 2.3 ENVIRONMENTAL MANAGEMENT AND CONTROL

### 2.3.1 National Parks and Reserves

The value of Tasmania's impressive natural scenery was officially recognised as far back as 1885 when the first reserve, covering 120 ha around Russell Falls, was created by proclamation. This area formed the core of one of Tasmania's first national parks, Mt. Field, when this was established in August 1916. On the same day the new Scenery Preservation Board established Freycinet National Park and reserves at St Columba Falls and Port Arthur.

The Board, a statutory authority set up under the *Scenery Preservation Act 1915*, operated from within the Department of Lands. Its responsibilities were taken over by a new government department with the establishment of the National Parks and Wildlife Service in 1971. In May 1987 the Service was amalgamated with the Lands Department to form the Department of Lands, Parks and Wildlife.

National Parks, State Reserves, Historic Sites, Game Reserves, Aboriginal Sites and Conservation Areas continue to be managed by the new department under the *National Parks and Wildlife Act 1970*.

Tasmania's natural and cultural resources are major reasons for tourists visiting the Island State. A study carried out in 1986-87 by the Centre for Regional Economic Analysis shows that about 35 per cent of visitors based their decision to holiday in Tasmania on the existence of National Parks and Historic Sites. The total contribution to the State's economy from these visitors was at least \$119 million — about 2.4 per cent of the Gross State Product for 1986-87. Furthermore, the income generated directly by the parks and wildlife functions of the Department in 1986-87 was at least \$62 million and the employment generated was 2 368 jobs, about 1.2 per cent of the State's workforce.

A \$9m conservation and development program for the Port Arthur Historic Site, funded two-thirds by the Commonwealth, one-third by the State was terminated in 1986 when the Commonwealth refused to provide further funding. Subsequently the State Government, in order to have the site contribute directly to its operational costs, established the Port Arthur Historic Site Management Authority; it assumed responsibility for the Site on 1st October 1987. The Historic Site remains a State Reserve under the *National Parks & Wildlife Act 1970*.

In December 1982 the UNESCO World Heritage Committee declared Tasmania's three largest National Parks (Cradle Mountain-Lake St. Clair, Franklin-Lower Gordon Wild Rivers and Southwest) a World Heritage Area. This led to cessation of the building of the Gordon-below-Franklin hydro-electric scheme, the payment of compensation to the State and the establishment of co-operative Federal-State management arrangements for the World Heritage Area. These arrangements provide for a Ministerial Council, chaired by the Premier of Tasmania and advised by a Standing Committee of officials and a Consultative Committee of independent experts. Additional planning, research and field staff are being employed, programs of capital works are being developed and management plans are being prepared.

#### Reserves

At 30 June 1987 the reserved land managed by the Department of Lands, Parks and Wildlife was as follows:

##### *National Parks and Wildlife Act 1970*

	No	Area (ha)
National Parks	13	851 141
State Reserves	54	1 999
Historic Sites	30	793
Nature Reserves	38	29 427
Aboriginal Sites	4	1 243
Game Reserves	9	2 779
Conservation Areas	59	851 870
Muttonbird Reserves	5	9 288

##### *Crown Lands Act 1976*

Protected Areas	4	202 925
State Recreation Areas	16	6 355
Coastal, River and Lakeside Reserves	43	7 266

### 2.3.2 The Western Tasmania Wilderness National Parks World Heritage Area

Lying in the remote southwestern quarter of Tasmania, the Western Tasmania Wilderness National Parks World Heritage Area comprises wild rugged lands covering 769 355 ha which form one of the three last great temperate wilderness areas in the southern hemisphere. Within them lie remarkable glacial landscapes, rare and ancient plants, distinctive and uncommon animals, a rich and informative prehistoric cultural heritage and scenery of sweeping grandeur and intimate beauty. The area joins a very select number of places throughout the world that are recognised as being part of the heritage of all humanity, to be conserved for all time.

### The World Heritage Convention

The Convention Concerning the Protection of the World Cultural and Natural Heritage (the World Heritage Convention) was adopted by the UNESCO General Conference on 16 November 1972. Australia became one of the first countries to ratify the Convention, in August 1974, and the Convention came into force in 1975. There are now 100 signatory States from all parts of the world. The Convention is the most successful and widely recognised worldwide instrument in the field of heritage conservation.

The World Heritage Convention aims to promote co-operation among nations to protect heritage properties which are of such universal value that their conservation is a concern of all people. Signatories to the Convention commit themselves to help in the identification, conservation and presentation of World Heritage properties. They also undertake to refrain from any deliberate measures which might damage directly or indirectly the cultural and natural heritage of properties and to take appropriate legal, scientific, technical, administrative and financial measures necessary for their protection.

The Convention is administered by a World Heritage Committee consisting of representatives of 21 nations elected from those nations that are party to the Convention. Under the terms of the Convention there has been established a "World Heritage List" of properties having outstanding universal value. At December 1987 there were 288 places on the World Heritage List. They include the Pyramids of Egypt, the Grand Canyon of the United States, Chartres Cathedral in France and Sagarmatha National Park (containing Mt. Everest) in Nepal.

### World Heritage Criteria

The World Heritage Committee has adopted sets of criteria for assessing nominations for the World Heritage List. For natural property, nominations must satisfy one of the following criteria:

- (i) be outstanding examples representing the major stages of the earth's evolutionary history; or
- (ii) be outstanding examples representing significant ongoing geological processes, biological evolution and man's interaction with his natural environment; or
- (iii) contain superlative natural phenomena, formations or features; for instance, outstanding examples of the most important ecosystems, areas of exceptional natural beauty or exceptional combinations of natural and cultural elements; or
- (iv) contain the most important and significant natural habitats where threatened species of

animals or plants of outstanding universal value from the point of view of science or conservation still survive.

In addition to the above criteria, natural properties need to fulfil certain conditions of integrity.

- (i) The sites described by criterion (i) should contain all or most of the key interrelated and interdependent elements in their natural relationships.
- (ii) The sites described by criterion (ii) should have sufficient size and contain the necessary elements to demonstrate the key aspects of the process and to be self-perpetuating.
- (iii) The sites described by criterion (iii) should contain those ecosystem components required for the continuity of the species or of the other natural elements or processes to be conserved.
- (iv) The area containing threatened species as described by criterion (iv) should be of sufficient size and contain the necessary habitat requirements for the survival of the species.

The Tasmanian World Heritage Area fulfils all four criteria for qualification as natural property and also fulfils criteria for qualification as cultural property.

Australia has seven World Heritage properties: Kakadu National Park, Stages I and II (1981 and 87), Great Barrier Reef (1981), Willandra Lakes Region of NSW (1981), Lord Howe Island Group (1982), Western Tasmania Wilderness National Parks (1982), Australian East Coast Temperate and Sub-Tropical Rainforest Parks (1986), and Uluru National Park (1987).

Australia is currently seeking listing of the Daintree rainforest in northern Queensland.

### Nomination of the Tasmanian World Heritage Area

The Western Tasmania Wilderness National Parks area was initially recommended to the Commonwealth for World Heritage nomination by the Tasmanian Government in 1981. However, in 1982 a new State Government revoked parts of the Franklin-Lower Gordon Wild Rivers National Park to permit a Gordon-below-Franklin power development. Subsequently, the Commonwealth enacted the *World Heritage Properties Conservation Act* 1983, which was upheld by the High Court of Australia on 1st March 1985, to prevent the power development from proceeding.

This action forms the basis for the obligations of the Commonwealth Government to assist in management of the Tasmanian World Heritage Area (WHA).

Regardless of World Heritage listing, sovereignty of any World Heritage Area remains with the country where the site is located. In Australia States control most of the land and so Tasmania is responsible for the WHA, the Commonwealth Government only exerting influence on its management in so far as it believes this is required to ensure that management does not contravene the World Heritage Convention.

#### **Commonwealth-State Joint Management Arrangements**

Following the High Court decision, an agreement establishing joint management arrangements was reached between the State and Commonwealth Governments.

Under the terms of the agreement a Council of Ministers (the Tasmanian World Heritage Area Ministerial Council) was created to advise both governments on:

- management plans for the World Heritage Area;
- management requirements;
- annual and forward programs of expenditure for capital and recurrent costs of managing the World Heritage Area and development of appropriate infrastructure, accommodation and facilities; and
- scientific studies in relation to matters of natural or cultural significance.

The Ministerial Council currently comprises: the Premier of Tasmania (Chairman), the Deputy Premier (and Tasmanian Minister for Tourism) and the Commonwealth Minister for Arts, Sport, the Environment, Tourism and Territories.

A Standing Committee of officials has been set up to advise the Council and to oversee policies, programs, funding arrangements and the administration and preparation of management plans for the area. The Standing Committee comprises representatives of the following government departments: Australian National Parks and Wildlife Service, Tasmanian Department of Lands, Parks and Wildlife, Commonwealth Department of Arts, Sport, the Environment, Tourism and Territories, Department of Prime Minister and Cabinet, Tasmanian Department of Premier and Cabinet, Tasmanian Department of Tourism and Tasmanian Treasury Department.

A 15 member Consultative Committee has been established with a chairman appointed by the Ministerial Council and half the members by each Government. The role of the Consultative Committee is to provide advice to Ministerial Council and Standing Committee on matters relating to the development and management of the WHA.

The Department of Lands, Parks and Wildlife is the agency responsible for planning and on-the-ground management of the World Heritage Area.

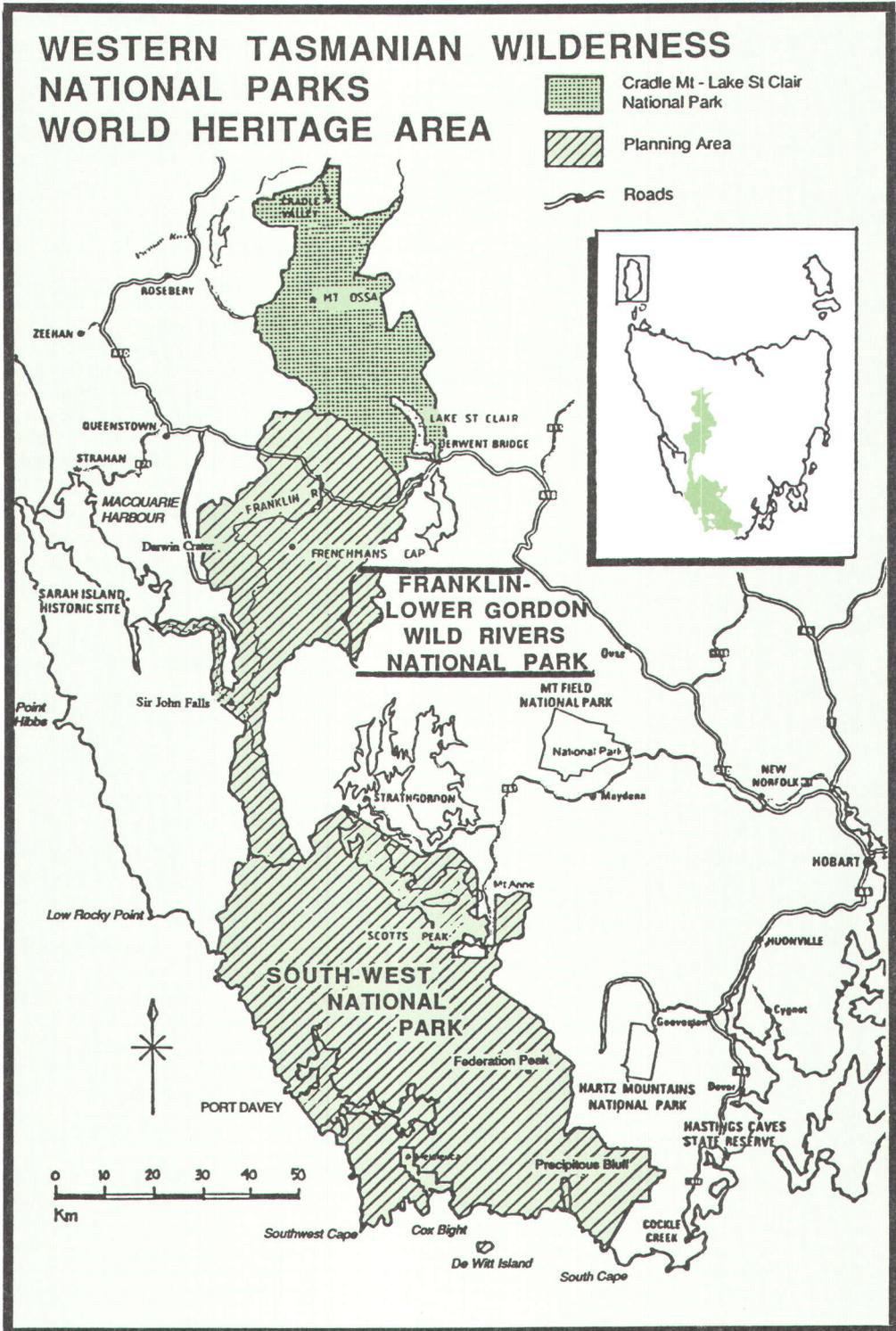
The State-Commonwealth joint management arrangements provide for a rolling program of Commonwealth funding for planning and management of the WHA for the five years 1987-88 to 1991-92. Cost-sharing for this program is 2.2:1, with the Commonwealth contribution \$11 million and the State contribution \$5 million over that period. In addition to the rolling program of recurrent expenditure and minor capital works, the Commonwealth has made a commitment to provide funds for major capital works to be assessed annually on a project-by-project basis.

#### **Management Plans**

Under the WHA funding program a specialist group within the Department of Lands, Parks and Wildlife has been set up to prepare management plans, undertake scientific research particularly related to management and prepare information and interpretative material for visitors.

Management plans are prepared under the Tasmanian *National Parks and Wildlife Act* 1970. These are required to specify how the National Parks are to be "used, developed or managed". Preparation and approval of management plans is a lengthy process requiring consultation with the community, approval of the draft by State Cabinet, a period for public exhibition and comment and review by the National Parks and Wildlife Advisory Council, the WHA Consultative and Standing Committees and Ministerial Council. The draft management plan may then be amended by the Tasmanian Minister for Lands, Parks and Wildlife as is deemed necessary in line with the comments received. The amended draft is then circulated for final endorsement by State Cabinet, the Consultative and Standing Committees and the Ministerial Council. The management plan is then submitted to the Governor-in-Council for approval. Any sections of a management plan relating to the exercise of statutory powers other than is provided for by the *National Parks and Wildlife Act* require the approval of both Houses of the Tasmanian Parliament.

The management plan for the Cradle Mountain-Lake St Clair National Park was commenced prior to the coming into effect of the State-Commonwealth funding arrangements. It was placed on public exhibition in October 1985 and should receive final approval in 1988. Under the joint funding arrangements a combined management plan for the Southwest and Franklin-Lower Gordon Wild Rivers National



Parks was commenced in March 1986. Finalisation of that draft is currently underway.

These management plans outline the known natural and cultural resources of the WHA, define overall objectives for management and give policies and management actions to be undertaken to ensure that world heritage resources are conserved and that appropriate provision is made for visitors. A zoning scheme forms the central part of the management plans with zones ranging from completely natural, where no provision is to be made for visitors and the land is to be managed as wilderness, through to tourist development where facilities such as overnight accommodation, day shelters, picnic areas and visitor centres are to be provided.

### Management of the World Heritage Area

Day-to-day management of the World Heritage Area is carried out by the Land Management Division of the Tasmanian Department of Lands, Parks and Wildlife. Field bases are located at Cradle Mountain, Lake St. Clair, Collingwood River, Strahan and Mt. Field. Field staff undertake a wide variety of tasks including receiving, assisting and informing visitors, search and rescue, fire fighting, maintenance of park facilities, walking track upgrading and construction, monitoring of vegetation and wildlife, and exotic species control.

Under the joint management arrangements and with funds provided from the Commonwealth as part of compensation for not proceeding with the Gordon-below-Franklin power development, numerous minor capital works have been completed or are underway. These include Franklin River picnic facilities, Sir John Falls jetty, Overland Track toilets, upgrading of sections of the Overland, South Coast and Frenchmans Cap tracks, upgrading/construction of staff accommodation at Cradle Mountain, Lake St. Clair, Strahan and Melaleuca, and upgrading of workshops and equipment. Major capital works completed include the new campground for 200 people at Cradle Mountain, and the Lake St. Clair jetty.

The most serious problems for management in the World Heritage Area involve erosion — over 100 km of walking tracks are badly degraded and some 40 km of the Gordon River banks are seriously affected by wave-induced erosion. An annual program of upgrading walking tracks has been commenced. However, progress is slow and it will be many years before all major tracks have been stabilised. Repair of the Gordon River banks is a much more complex task. It has been established that destruction of the banks, first noticeable in 1984, is caused by the wakes of high speed tourist cruise vessels. Wake heights of over

12 cm have been found to generate erosion. The problem is exacerbated by the constant river level maintained by the Middle Gordon power development. Steps that have been taken to minimise the rate of erosion include imposition of a 9 knot speed limit over parts of the river, and rationalisation of cruise itineraries to decrease the frequency of trips. Rehabilitation of the full extent of affected bank is not economically feasible. In the long term the only solution is to eliminate the cause of erosion and allow the banks to repair naturally.

### 2.3.3 Pollution Control

#### Environmental Impact Studies

**Public authorities in Tasmania are required to undertake environmental impact studies before proceeding with any development which may have a significant effect on the environment. During the 12 months to June 1986, 19 environmental impact statements were submitted to the Department of Environment for assessment:**

- Quarry and crushing plant, Longley
- Installation of a woodwaste-fired fluid bed combustor to heat thermal oil, Legerwood
- Sewage treatment plant, Turner's Beach
- Silicon Smelter, Electrona
- Quarry, Riggs Road, Kindred
- Installation of a coal-fired fluid bed boiler, Scottsdale (supplement)
- Expanded operation of log yard, Boyer
- Quarry and crushing plant, East Ridgley
- Modifications to T and H rendering plant, Quoiba
- Establishment of a joint racing complex at Mowbray Racecourse, Launceston
- Upgrading of hockey centre, Cornelian Bay
- Supplement to the draft Environmental Impact Statement on Tasmanian woodchip exports beyond 1988
- Proposed forestry operations on the Sideling Range
- Establishment of a hatchery for Atlantic Salmon at Wayatinah
- Davey Street extension to Tasman Highway
- Reconstruction of the Arthur Highway between Taranna and Eaglehawk Neck
- Upgrading of Bass Highway from Penguin to Howth
- Welcome River drainage works
- 220 kV transmission line from Gretna to Lindsifarne.

In addition, licence applications, transfers or change of operation for various premises were examined and their likely environmental impact

assessed by the Department. These premises included refuse disposal sites, sewage treatment plants, fish processing plants, meat processing works, mines, quarries, loam, sand and clay pits, and abattoirs. Also eight mines, 11 quarries, 34 gravel, clay, loam and sand pits, together with refuse disposal sites, were inspected, and advice given regarding rehabilitation, or rehabilitation reports prepared.

### Prosecutions

During the year 13 successful prosecutions were carried out under the *Environment Protection Act* and 12 under the *Litter Act*. Fines of up to \$500 plus costs were imposed.

### Emission Control Exemptions

Provision is made under the *Environment Protection Act 1973* for the Minister to grant exemptions from the emission controls of Sections 15, 16, or 17 in respect of a specified act or course of action. This is the mechanism by which an industry or operator which is not immediately able to comply with emission controls is enabled to continue operation. Successive Ministers have considered what time is reasonably necessary before compliance is possible, taking into account time for investigation, design and construction, and the economic state of the polluter.

At 30 June 1986, 34 exemptions with an indefinite termination date, and 26 exemptions which expire on various dates between 31 July 1986 and 31 December 1999 were in force.

### Industrial Pollution

During 1985-86 several sawmills at Westbury were directed to cease burning sawdust in incinerators. Problems from excessive smoke and fallout had been experienced at residences close to the mills, due to the type of incinerators employed by the mills. In Hobart, a major glass manufacturer and user of high sulphur fuel oil replaced its glass furnace. The new furnace is more efficient than the old furnace, and as the production rate of glass will be held at the pre-change over level, a reduction in the emission rate of sulphur dioxide is expected. The height of the chimney attached to the furnace was increased to decrease ground level concentrations of sulphur dioxide.

During the year 1985-86, a boat-based fish meal plant commenced operation at Triabunna. A substantial number of complaints regarding odours from the factory and several regarding noise from fans were received. The source of the odours was not established.

The proposed Hydro-Electric Commission's thermal power station attracted a significant quantity of public comment. The proposal has promoted the recording of meteorological vari-

ables at possible sites, and discussion on the possible impact of the station at the different sites.

Further work towards a new boiler system at a milk processing plant at Legerwood was carried out. The company decided to install a fluidized bed unit using woodwaste as the fuel. This was the first unit of its type, and was expected to attract interest from major boiler users and suppliers across Australia.

A brass foundry at Kings Meadows continued to cause problems as a result of odour and fume emissions. The surrounding area was zoned residential/commercial, and the factory was incompatible with the shops, offices and houses that were near the site. During the 1985-86 financial year the factory was relocated to an industrial estate.

A pigment factory at Heybridge started work on the conversion of its boiler fuel from heavy oil to coal. The conversion will reduce the quantity of sulphur dioxide emitted from the plant. A food processing factory near Scottsdale also changed its boiler installation to use coal. Two Launceston sawmills that were sources of many complaints started work on upgrading sawdust conveying systems and boiler operations to reduce the fallout of sawdust and soot. These upgrades were seen as necessary if the sawmills were to remain close to houses.

A hardwood sawmill at Smithton commenced the installation of dust control equipment in the exhausts of its three boilers. It was hoped that down-wind fallout would be significantly reduced by the units.

Clinker loading and clay unloading at a northern sea port caused significant concern in nearby residential and commercial districts. The only satisfactory conclusion is likely to be the setting up of costly bulk loading and unloading facilities.

Evaluation of an open submerged arc silicon furnace proposal, and presentation of evidence at an associated appeal, was a major item during 1985-86. Air pollution considerations of the proposal formed a significant part of the evidence discussed before the Appeal Board.

### Municipal Reports

In accordance with Section 618 of the *Local Government Act*, each municipality is required to make an annual report to the Minister in relation to the prevalence of nuisances and pollution of the environment in the municipality.

The majority of problems mentioned by Councils were in relation to litter and waste disposal, noise from various sources and water

pollution by industries, sewage disposal and drainage.

### Litter Control

A total of 65 contravention notices were issued during the year ended 30 June 1986. This represents a drop of fifty-five on the previous year. However, there was a tendency during the period to prosecute offenders, particularly for offences of dumping, rather than issuing notices as in the past. Eleven notices were issued by police officers, thirty-one by Government officers and voluntary authorised officers and twenty-three were reported to the Department by municipalities.

A total of 12 prosecutions under the *Litter Act* were initiated during the year and 35 persons were appointed authorised officers of which 16 were municipal appointments, 14 Crown employees in government agencies, and five were volunteers.

The most recent litter control initiative is the launching in 1984 of a litter reduction campaign, aimed at promoting and generating public concern about the need for litter control and involving the community in a variety of litter reduction activities. The campaign has maintained a high profile through advertising, radio and television interviews, distributing promotional material such as car litter bags, stickers and posters, staging exhibitions and displays and speaking at schools, service clubs, youth and other community organisations.

The campaign is administered by the Litter Control Council, membership of which comprises representatives of those organisations directly

responsible for litter control in the State. With a and volunteer labour, maintaining and upgrading litter stations on the Arthur Highway and the establishment of a Youth Litter Co-ordinating Committee.

### Water Pollution

The Department of the Environment undertakes a program of monitoring some of the State's rivers and waterways; the Derwent, Tamar and Mersey Rivers, Lisle Creek, Barilla Bay, Port Cygnet Bay, Emu and Cam Rivers, Cooee Creek, Hospital Bay and Buttons Creek, as well as the site of a bark dump on the East Tamar.

On 17 September 1985 a survey was carried out in the Derwent River from Dowsings Point to Kangaroo Bluff to determine heavy metal concentrations at surface, mid-depth and near the river bottom. This survey followed up earlier surveys carried out after the sinking of the *Lake Illawarra* near the Tasman Bridge on 5 January 1975. Generally the results obtained were similar to those obtained on the previous survey on 19 March 1985.

## 2.4 REFERENCES

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