



Department of Conservation and Land Management

*Shannon Park
and
D'Entrecasteaux National Park
Management Plan*



1987 - 1997

Management Plan No. 6

SHANNON PARK
AND
D'ENTRECASTEAUX NATIONAL PARK
MANAGEMENT PLAN

1987 - 1997

Planning Group Coordinator: Alan Walker

This management plan was adopted by the National Parks and Nature Conservation Authority on 30 October 1987, and approved by the Hon. B J Hodge MIA, Minister for Conservation and Land Management on 2 December 1987.

This management plan was endorsed by the Bush Fires Board under the provisions of Section 34(1) of the Bush Fires Act (1954) on 14 December 1987.

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MANAGEMENT PLAN NO. 6

TABLE OF CONTENTS

TABLE OF CONTENTS	<i>i</i>
ACKNOWLEDGEMENTS	<i>v</i>
PREFACE	<i>vi</i>
A. INTRODUCTION	<i>1</i>
1.0 THE PARKS	<i>2</i>
2.0 THE PLAN	<i>2</i>
3.0 THE REGIONAL CONTEXT	<i>3</i>
3.1 Conservation	<i>3</i>
3.2 Recreation	<i>5</i>
3.3 Water	<i>5</i>
4.0 MANAGEMENT POLICIES	<i>5</i>
B. DESCRIPTION OF THE PARKS	<i>6</i>
1.0 LOCATION AND BOUNDARIES	<i>7</i>
2.0 LAND TENURE, PURPOSE AND VESTING	<i>7</i>
3.0 ACCESS	<i>11</i>
4.0 PHYSICAL AND BIOLOGICAL RESOURCES	<i>11</i>
4.1 Climate	<i>11</i>
4.2 Geology	<i>17</i>
4.3 Landform	<i>18</i>
4.4 Water	<i>20</i>
4.5 Soils	<i>25</i>
4.6 Vegetation	<i>26</i>
4.7 Flora	<i>32</i>
4.8 Weeds and Non-native Plants	<i>36</i>
4.9 Fauna	<i>36</i>
5.0 LANDSCAPE	<i>37</i>
6.0 LAND USE CAPABILITY	<i>39</i>
7.0 CULTURAL FEATURES	<i>43</i>
7.1 Aboriginal	<i>43</i>
7.2 European	<i>44</i>
8.0 PAST USE	<i>44</i>
8.1 Aboriginal	<i>44</i>
8.2 European	<i>45</i>
9.0 PRESENT USE	<i>46</i>
10.0 CONSERVATION OPPORTUNITIES	<i>47</i>
11.0 RECREATION OPPORTUNITIES	<i>48</i>
C. MANAGEMENT OBJECTIVES	<i>49</i>
1.0 MANAGEMENT OBJECTIVES FOR NATIONAL PARKS	<i>50</i>
2.0 MANAGEMENT OBJECTIVES FOR THE SHANNON PARK AND D'ENTRECASTEAUX NATIONAL PARK	<i>50</i>
3.0 OBJECTIVES FOR THE PERIOD OF THE PLAN	<i>51</i>

D. MANAGEMENT PRESCRIPTIONS	52
1.0 INTRODUCTION AND METHODOLOGY	53
1.1 Introduction	53
1.2 Methodology	54
2.0 LAND TENURE	54
2.1 National Park Status	54
2.2 Park Boundaries	55
2.3 Alienated Lands Within and Adjacent to the Parks (private property and pastoral leases)	59
2.4 Shire Reserves	61
3.0 LAND AND WATER MANAGEMENT	62
3.1 Geological Features and Landforms	62
3.2 Water Resources	65
3.3 Soil Resources	67
3.4 Rehabilitation	68
4.0 FLORA	70
5.0 FAUNA	81
6.0 PROTECTION	82
6.1 Fire	82
6.2 Dieback and Disease	89
6.3 Pests and Weeds	91
7.0 ACCESS	95
7.1 General Access	95
7.2 Coastal Access	101
7.3 Access for Management	102
7.4 Log Road Access	104
8.0 CULTURAL FEATURES	105
8.1 Aboriginal	105
8.2 European	106
9.0 RECREATION	107
9.1 Levels of Use	107
9.2 Vehicles Off-road	108
9.3 Horse-riding	109
9.4 Camping	111
9.5 Bushwalking	114
9.6 Boat Use	117
9.7 Marroning	119
9.8 Freshwater Fishing (including trout)	120
9.9 Huts	121
10.0 INFORMATION AND PUBLIC INVOLVEMENT	122
10.1 Information	122
10.2 Public Involvement	124
11.0 RESOURCE MANAGEMENT	125
11.1 Mining	125
11.2 Basic Raw Materials (Gravel, Sand, etc)	126
11.3 Commercial Fishing	127
11.4 Wildflower Picking	128
11.5 Beekeeping	129
11.6 Forest Products	130
11.7 Public Utilities	130
12.0 PARK ADMINISTRATION	131
12.1 Finance	131
12.2 Staff	131

12.3	Public Safety	136
13.0	SURVEY, RESEARCH AND MONITORING	137
E.	IMPLEMENTATION AND REVIEW	141
1.0	PROGRAMMING AND BUDGETING	142
2.0	PLAN REVIEW AND EVALUATION	142
	BIBLIOGRAPHY	147
	APPENDICES	152
	<i>Appendix 1.</i>	
	<i>Reserves within the proposed D'Entrecasteaux National Park including the purpose 'national park' (June 1987)</i>	<i>153</i>
	<i>Appendix 2.</i>	
	<i>Pastoral leases within the proposed</i>	<i>154</i>
	<i>D'Entrecasteaux National Park (June 1987).</i>	<i>154</i>
	<i>Appendix 3.</i>	
	<i>Unvested reserves within the proposed</i>	<i>155</i>
	<i>D'Entrecasteaux National Park (June 1987)</i>	<i>155</i>
	<i>Appendix 4.</i>	
	<i>Reserves cancelled since 1984 in the proposed D'Entrecasteaux National Park (June 1987)</i>	<i>156</i>
	<i>Appendix 5.</i>	
	<i>Freehold enclaves within the proposed D'Entrecasteaux National Park (June 1987)</i>	<i>157</i>
	<i>Appendix 6.</i>	
	<i>Reserves controlled by the Shire of Manjimup (June 1987)</i>	<i>158</i>
	<i>Appendix 7.</i>	
	<i>Status of land within the proposed Shannon Park</i>	<i>159</i>
	<i>Appendix 8.</i>	
	<i>Mining status of the Shannon and D'Entrecasteaux Parks (June 1987)</i>	<i>160</i>

MAPS

Map 1.	Regional Location Plan
Map 2.	Park Tenure
Map 3.	Existing Access
Map 4.	Climate
Map 5.	Hydrology
Map 6.	Susceptibility To Soil Erosion and Degradation
Map 7.	Natural Land Units
Map 8.	Recommended Park Boundary Changes
Map 9.	Rare Plants and Fragile Plant Communities
Map 10.	Grazing Leases - Length of Occupancy
Map 11.	Shannon Park Logging History
Map 12.	Fire History
Map 13.	Significant and Fragile Natural Features
Map 14.	Fire Management Plan
Map 15.	Recreation Opportunities
Map 16.	Regional Administration and Park Management

TABLES

Table 1.	Fragile Plant Species of the Shannon and D'Entrecasteaux Parks
Table 2.	Wetland Orchids of the Shannon and D'Entrecasteaux Parks
Table 3.	Resource Characteristics and Land Use Capability of Major Land Units in the Shannon and D'Entrecasteaux Parks
Table 4.	Suggested Boundary Changes - D'Entrecasteaux National Park.
Table 5.	Special Geological and Landform Features of the Shannon and D'Entrecasteaux Parks
Table 6.	Declared and Introduced Plants in the Shannon and D'Entrecasteaux Parks Requiring Management
Table 7.	Declared and Introduced Fauna of the Shannon and D'Entrecasteaux Parks Requiring Management
Table 8.	Rationale Behind Road/Track Closures and Realignments Shannon and D'Entrecasteaux Parks
Table 9.	Proposed Extended Walks ... Shannon and D'Entrecasteaux Parks
Table 10.	Summary of Survey, Research and Monitoring Prescriptions for the Shannon and D'Entrecasteaux Parks
Table 11.	Five Year Works Program for the Shannon and D'Entrecasteaux National Parks

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PREFACE

The management plan for the Shannon Park and D'Entrecasteaux National Park is based on the best available information and resources. The plan has a ten year term (1987 - 1997). Once the Shannon is reserved as national park, 'Shannon Park' should be read through-out this document as 'Shannon National Park'. The existing D'Entrecasteaux National Park is set aside for the dual purpose of the 'national park and water'. This plan covers both Parks so that the two areas can be managed in a complementary way.

The management plan is one of a series prepared by the Department of Conservation and Land Management (CALM) for the relevant controlling body (either the National Parks and Nature Conservation Authority or the Lands and Forest Commission, or both) , to fulfil the requirements of the Conservation and Land Management Act (1984).

The Act states that:

'A management plan for any land shall contain -

(a) a statement of the policies or guidelines proposed to be followed;
and

(b) a summary of the operations proposed to be undertaken,'

(Section 55(1))

and

... in particular management plans shall be designed -

(c) in the case of national parks, ... to fulfil so much of the demand for recreation by members of the public as is consistent with the proper maintenance and restoration of the natural environment, the protection of indigenous flora and fauna and the preservation of any feature of archaeological, historic or scientific interest'

(Section 56(1))

The draft management plan was released on 1 May 1986, and was available for public comment for four months. The draft was reviewed according to the submissions received, and this final plan produced. Further details on the public involvement program, public submissions and amendments to the draft management plan which resulted in this final plan can be obtained from the recently published 'Summary of Public Submissions for the Shannon Park and D'Entrecasteaux National Park' (CALM August 1987). Flora and fauna lists for the two Parks are also available as a separate publication.

A. INTRODUCTION

1.0 THE PARKS

This plan directs the management of the Shannon Park (53 500 ha) and D'Entrecasteaux National Park (118 000 ha) both of which lie south of Manjimup on the south coast of south-western Australia (Map 1). The tenure of both Parks, and particularly the D'Entrecasteaux, is complex. The Shannon Park, proposed for reservation as national park, currently includes both the State forest and vacant Crown land which lies within the Shannon watershed. The D'Entrecasteaux includes the existing areas reserved for 'national park and water', which occupy most of the land to the west of Windy Harbour, plus the area of vacant Crown land and a number of reserves (mostly unvested) to the east. Thus, not all land covered by this plan is, as yet, vested in the National Parks and Nature Conservation Authority (NPNCA) for management as a national park. (B. Description of the Parks 2.0 Tenure, Purpose and Vesting provides more detailed information).

The first major expression of interest in establishing a south coast national park was made in 1972 by the Institute of Foresters. In 1974 the Conservation Through Reserves Committee reported through the Environmental Protection Authority (EPA), recommending the creation of a south coast national park and a national park based on the Shannon River basin. The south coast park was proposed to incorporate the coastline and hinterland. The Shannon was proposed to incorporate a large unbroken area of forest within an entire drainage basin.

The Shannon Park includes most of the Shannon Basin, with its magnificent karri forest. The interpretive and recreation values of the old Shannon townsite in the centre of the Park are being discovered by an increasing number of visitors.

The D'Entrecasteaux National Park has long been recognised as a valuable area, with its long beaches, rugged cliffs, coastal dunes and wetlands. At present the Park is not extensively used by the general public, although the beaches are used, particularly by local people.

The Parks will be managed by the Department of Conservation and Land Management (CALM), for the controlling body - the National Parks and Nature Conservation Authority (NPNCA) - for the purposes of 'national park and water'. Both Parks lie within the Southern Forest administrative region (with headquarters in Manjimup) of CALM. The boundary of this administrative region is shown on Map 1.

2.0 THE PLAN

This document has been written as a reference for day-to-day management. It aims to provide Park managers with guidelines for dealing with existing and future management problems. In most instances specific prescriptions for management are made, with the implementation details being the responsibility of CALM regional, district and other specialist staff.

The plan has five major sections - introduction, description of the Parks, management objectives, management prescriptions and implementation and review. A separate section on survey, research and monitoring, covering all relevant management prescriptions, concludes the prescriptions section. A works program and budget has been included in the last section to guide the annual allocation of funding.

3.0 THE REGIONAL CONTEXT

3.1 Conservation

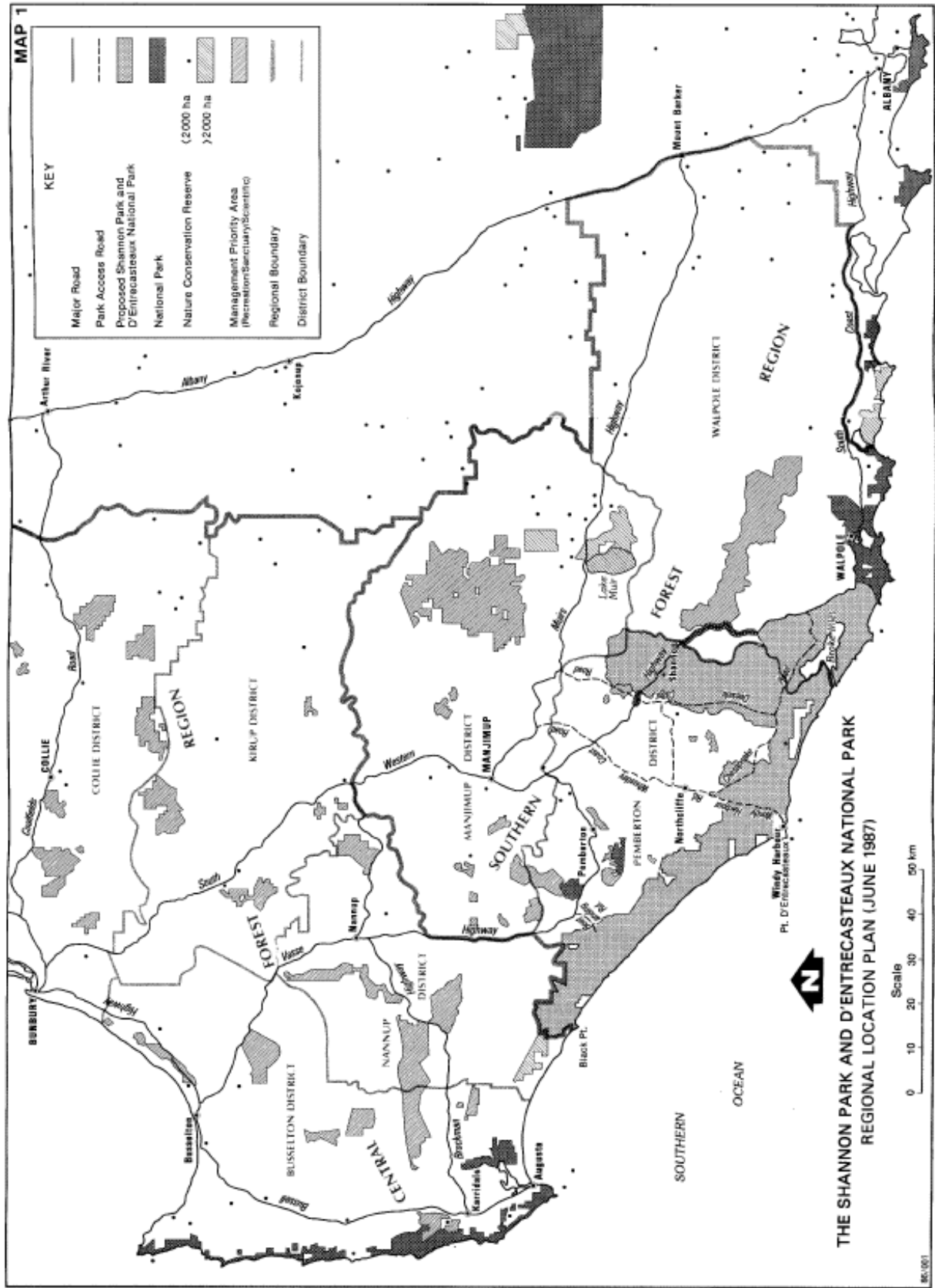
The Conservation Through Reserves Committee divided the State into twelve geographically-defined systems. The Shannon and D'Entrecasteaux Parks formed part of the proposal for conservation reserves in System 2. This System, which extends from the Blackwood River in the west to well east of Albany, encompasses most of the karri forest belt and contains five of the fifteen major estuaries in south-western Australia. System 2 also contains three major wetland complexes - coastal, the Lake Muir complex and wetlands east of Albany.

There are a number of other national parks and many small nature reserves in System 2 (EPA 1976). Beedelup (1 690 ha), Warren (1 460 ha), Brockman (64 ha) and Sir James Mitchell (1 440 ha) are small national parks which are close to the Shannon and D'Entrecasteaux Parks and which consist of relatively undisturbed natural environments with one or more outstanding natural features. Other coastal national parks in the lower south-west are Leeuwin-Naturaliste (over 15 500 ha) , Scott (3 270 ha), Torndirrup (3 868 ha), Walpole-Nornalup (18 790 ha), William Bay (1 900 ha) and West Cape Howe (3 580ha).

In addition, the draft management plans for the Southern and Central Forest Regions (CALM, April 1987) propose tenure changes resulting in the establishment of several new national parks. These plans and associated tenure changes will be formalised once the public submission period has closed and the submissions have been analysed.

The parks, proposed parks and nature reserves of System 2 offer conservation opportunities which complement those available in the Shannon and D'Entrecasteaux Parks. The special conservation values of the Shannon and D'Entrecasteaux Parks are a function of their large area and diversity of natural systems, from coastal to karri and jarrah forest.

Both the Shannon and D'Entrecasteaux Parks are largely bordered by State forest which is of great conservation value and also functions as a protective buffer for the Parks. Fortunately the Parks are not small islands of remnant native vegetation surrounded by cleared land as are many of the conservation areas in the south-west, particularly in the wheatbelt.



3.2 Recreation

There is a great variety of recreational opportunities available in the national parks, proposed parks, State forest and some nature reserves of System 2 (EPA 1976). These areas are used for pleasure driving, camping, canoeing, bushwalking, picnicking, horse-riding and fishing. There are also many cultural features developed for tourism in the area, including fire lookout towers, sawpits, old bridges and arboreta.

The highways in the area carry considerable tourist traffic, particularly in summer months.

In recent years several tourist resorts, providing accommodation and other private recreation facilities in natural and rural settings, have been developed in close proximity to the Parks.

3.3 Water

The EPA (1976) made special reference to the value of the water resources in System 2 (plus 1, 3 and 5):

Water is an essential resource in the natural and human environment and its responsible management for the total benefit of the region is of paramount importance. Water is, in effect, the critical mineral.

The Parks embrace the lower reaches of a major group of rivers, including the Donnelly, Warren, Gardner and Shannon. These provide not only an important conservation and recreation resource, but also a great water supply potential. Total potentially-divertible, fresh water resources of these rivers has been estimated at 680 million cubic metres per annum. (WAWA, pers. comm., 1987). This total is approximately 45% of the resource that remains undeveloped in the South West Drainage Division (the area between Eneabba and Esperance).

4.0 MANAGEMENT POLICIES

Policies for management derive from legislation, principally the Conservation and Land Management Act (1984) and appropriate Regulations. Under the Act, the responsibility for policy development lies with the National Parks and Nature Conservation Authority and the Lands and Forest Commission. CALM is currently developing policies* for these two controlling bodies. This plan is based on departmental policies current at the time of writing (June 1987). Policies in relation to water resource management will be derived in consultation with the Water Authority of Western Australia and will be subject to the existing water acts.

* Policies are published and distributed throughout CALM as policy statements. They are available to the public if requested.

B. DESCRIPTION OF THE PARKS

1.0 LOCATION AND BOUNDARIES

The Shannon and D'Entrecasteaux Parks lie south of Manjimup on the southern coast of the south-western corner of Australia (Map 1). Shannon Park, covering an area of 53 500 ha, encompasses the majority of the Shannon River catchment. D'Entrecasteaux National Park stretches approximately 130 km along the coast, from Black Point in the west to Clifty Head in the east (between Augusta and Walpole). The Park covers an area of about 118 000 ha and extends from low water mark inland for distances ranging from 5 to 20 km.

The nearest towns are Northcliffe, Pemberton, Walpole, Manjimup and Nannup.

The boundaries of the Shannon Park follow the watershed of the Shannon River. The boundaries of the D'Entrecasteaux follow existing cadastral boundaries between vacant Crown land, State forest and private property. A small section of the Shannon Park abuts private property (20 km), while the D'Entrecasteaux shares a common boundary with private property (50 km) in the Jasper and Northcliffe areas. The majority of the boundaries of both the Parks adjoin State forest - 100 km of the Shannon boundary, and 110 km of the D'Entrecasteaux boundary. Walpole-Nornalup National Park, to the east, shares a boundary of some 10 km with the D'Entrecasteaux National Park. The D'Entrecasteaux has 130 km of coastline. These are the boundaries as proposed by the Conservation Through Reserves Committee (1974) and Environmental Protection Authority (1976), and subsequently endorsed by Cabinet.

In addition to the external boundary of the D'Entrecasteaux, there is also a considerable length of internal Park boundary around private property (50 km) and reserves controlled by the Shire of Manjimup (2 km).

In 1982, the Environmental Protection Authority endorsed the former National Parks Authority recommendation that Chesapeake and Pingerup Road should be the common boundary between the two Parks. The Environmental Protection Authority also endorsed the recommendation that the Long Point track be the common boundary between the D'Entrecasteaux and Walpole-Nornalup National Parks. These boundaries have been adopted in this management plan.

Broke Inlet is not part of D'Entrecasteaux National Park, although it is entirely surrounded by it.

2.0 LAND TENURE, PURPOSE AND VESTING

The tenure of the proposed Parks is complex (Map 2).

The D'Entrecasteaux National Park is currently composed of four Class A Reserves (No.s 26628, 28478, 28479 and 36996) vested in the NPNCA and set aside for the purpose 'national park and

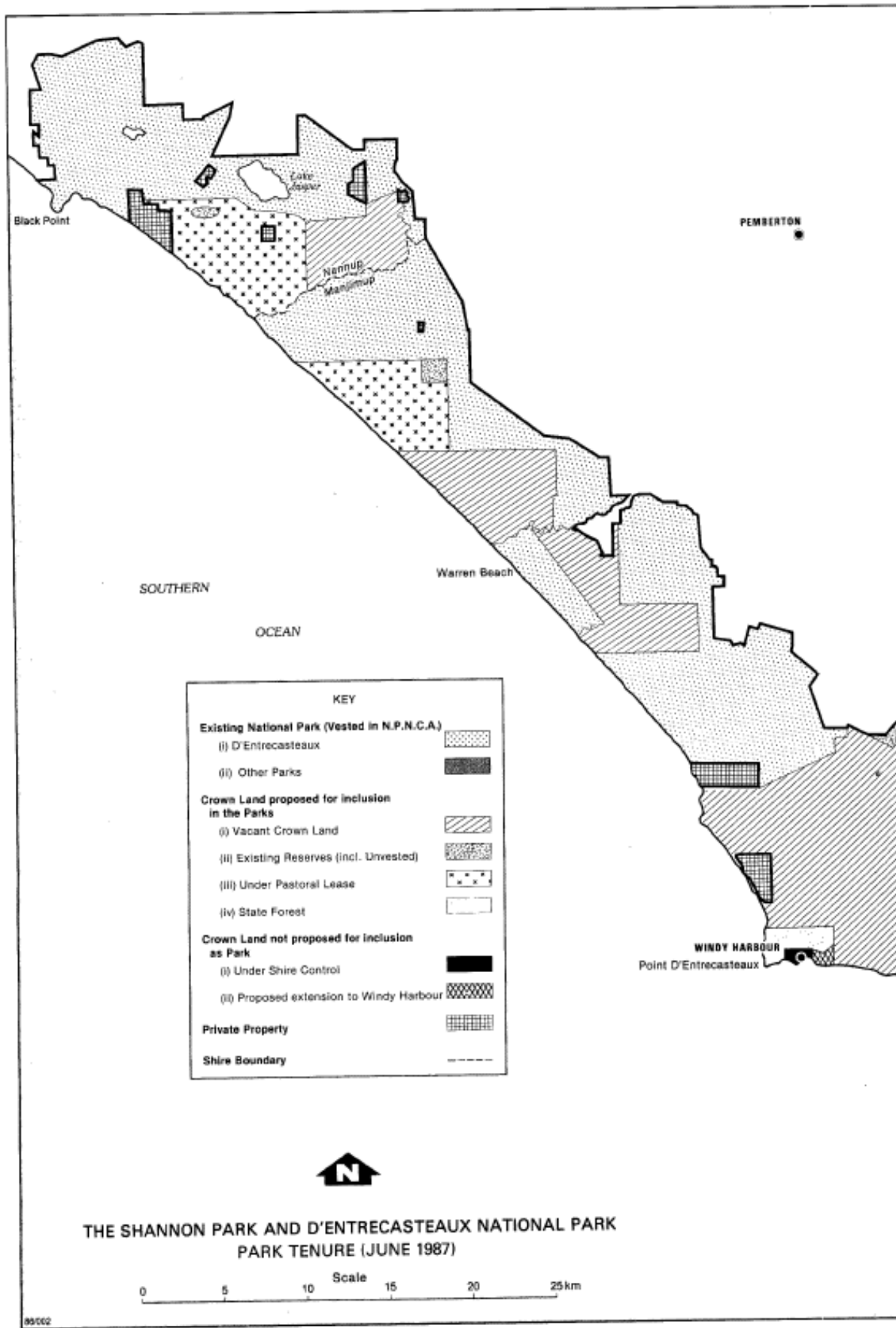
water' (App. I provides further details). Class A Reserve No.s 17495, at Point D'Entrecasteaux, and 39960, on the eastern edge of the Park, are set aside as 'national park' vested in the NPNCA. They are not yet named. All six reserves extend to low water mark.

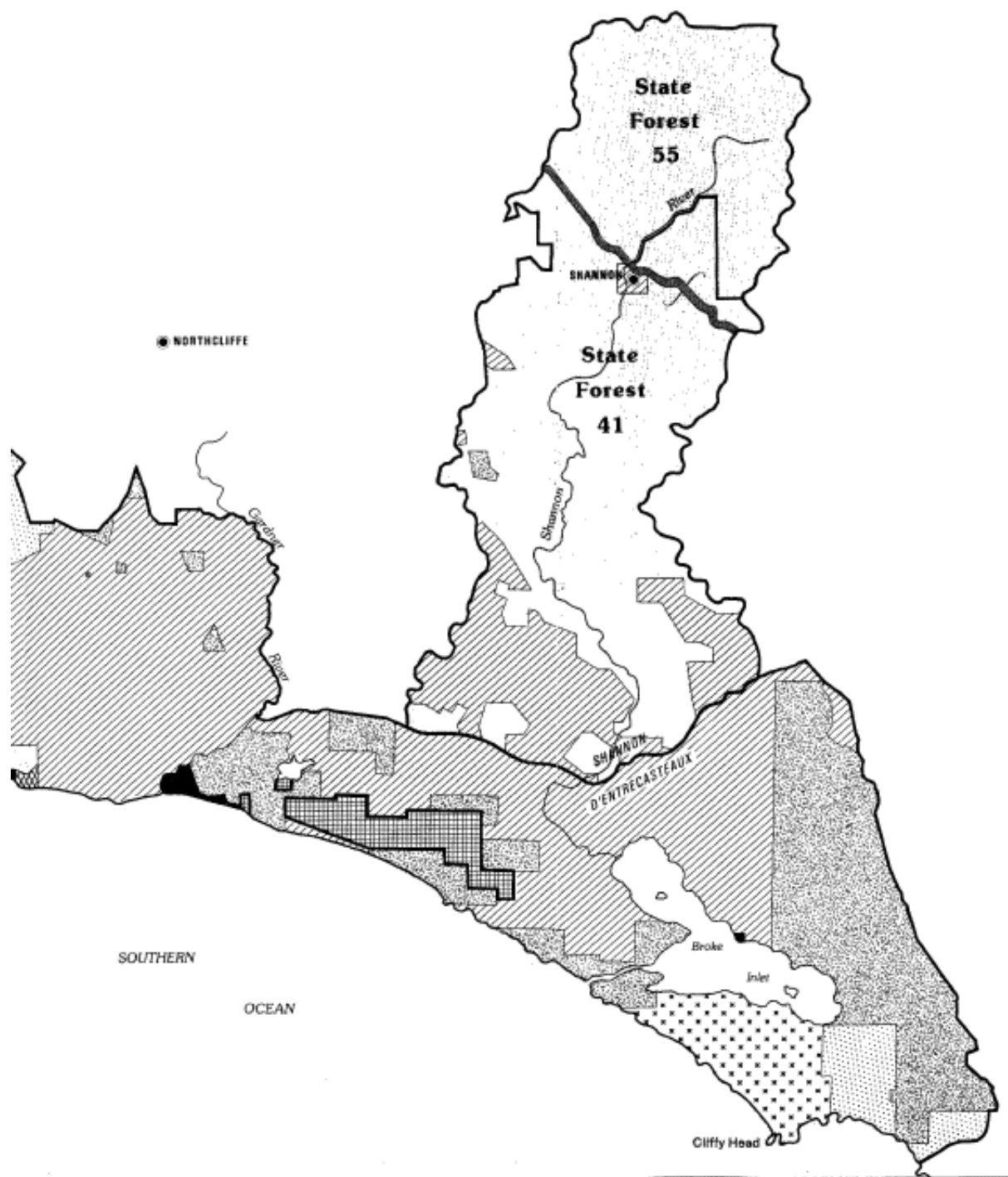
The remaining areas within the proposed D'Entrecasteaux National Park are either Crown land under pastoral lease (5 leases with a total area of 12 273 ha; App. 2), reserved for given purposes (26 reserves with a total area of 18 921 ha,- App. 3) or vacant (about 47 190 ha). The area of vacant Crown land within the D'Entrecasteaux has increased slightly over the last three years as several reserves have been cancelled and areas of State forest revoked in preparation for reservation of the whole area as national park (App. 4).

Twenty-six freehold locations, covering approximately 4 687 ha, occur as enclaves with the D'Entrecasteaux National Park (App. 5). There are also enclaves of Crown reserves vested in or under the control of the Shire of Manjimup: Windy Harbour (Reserve No. A38881, 90.4 ha); Camfield (Reserve No. 19787, 40.5 ha), on the north-eastern edge of Broke Inlet; and a reserve at the mouth of the Gardner River (Reserve No. A15776, 283.3 ha) (App. 6).

The majority of the Shannon Park (80%) is State forest vested in the Lands and Forest Commission and reserved as a management priority area for flora, fauna and landscape (by amendment to State Forest General Working Plan No. 87) (App. 7). The remainder of the Park is vacant Crown land (19-20%) or part of Sir Jams Mitchell National park (less than 1%, Reserve No. A18705). This National Park, with an area of 1 440 ha, forms a disjointed reserve about 100 m wide bordering parts of the South West Highway between Manjimup and Walpole.

There are 15 private properties (total area about 752 ha) within the Shannon basin. These are not proposed for inclusion in the Park.





3.0 ACCESS

Both of the Parks are accessible by road. The South Western Highway passes through the Shannon and follows part of the eastern boundary of the D'Entrecasteaux (Map 3). A sealed road (Windy Harbour Road) provides access to Windy Harbour. Many unsealed, seasonal or four-wheel-drive roads and tracks provide access from the South Western and Vasse Highways, to areas in both Parks - these include Deeside Coast Road, Dog Road, Curtin Road, Upper and Lower Shannon Roads, Pingerup Road, Broke Inlet Road, Mandalay Beach Road and others. Although Chesapeake, Lewis and Mandalay Beach Roads are unsealed they are passable throughout the year to all types of vehicles, but all other roads are either seasonal or four-wheel-drive only. The existing roads and tracks which are most frequently used are shown on Map 3.

Much of D'Entrecasteaux National Park is not serviced by developed public roads. However, in some places there are numerous tracks of variable standards which provide access to private property and the coast. Often these tracks are subject to seasonal flooding or are prone to erosion.

Many waterways provide seasonal access by small boat. The mouth of the Donnelly River can be reached by boat throughout the year.

The Bibbulman Track, which begins near Perth and enters the central part of the Shannon, provides access by foot.

4.0 PHYSICAL AND BIOLOGICAL RESOURCES

4.1 Climate

The climate of the Shannon and D'Entrecasteaux Parks is characterised by warm, dry summers and cool, wet winters.

Rainfall

Annual rainfall in the Parks is amongst the highest in the State, ranging from 900 mm. p.a. in the northern part of the Shannon to 1300 mm p.a. in the central parts of the D'Entrecasteaux (Map 4). Over 75% of the total annual rainfall occurs between April and October, with the maximum occurring in July. Coastal areas receive more consistent summer rainfall than inland areas. Heavy rainfall (over 20 mm per day) occurs mainly in winter, but can occur throughout the year.

Temperature

Temperature varies considerably over the year (Map 4). Along the coast the average daily temperature in winter is 12 C and in the summer 19 C, while inland at Pemberton temperatures range between 10 C in winter and 25 C in summer. Frosts are restricted to inland areas, between June and October.

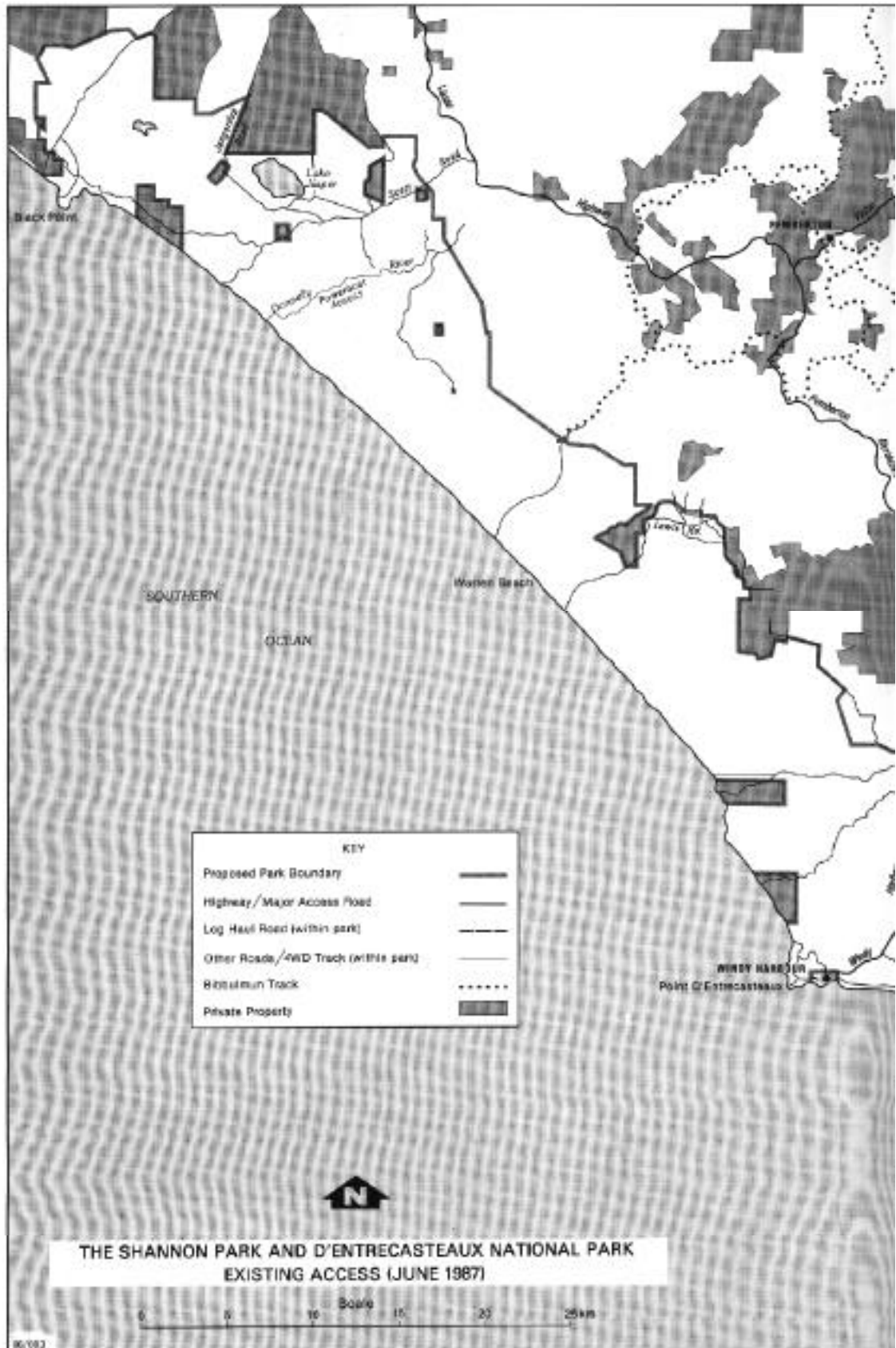
Humidity

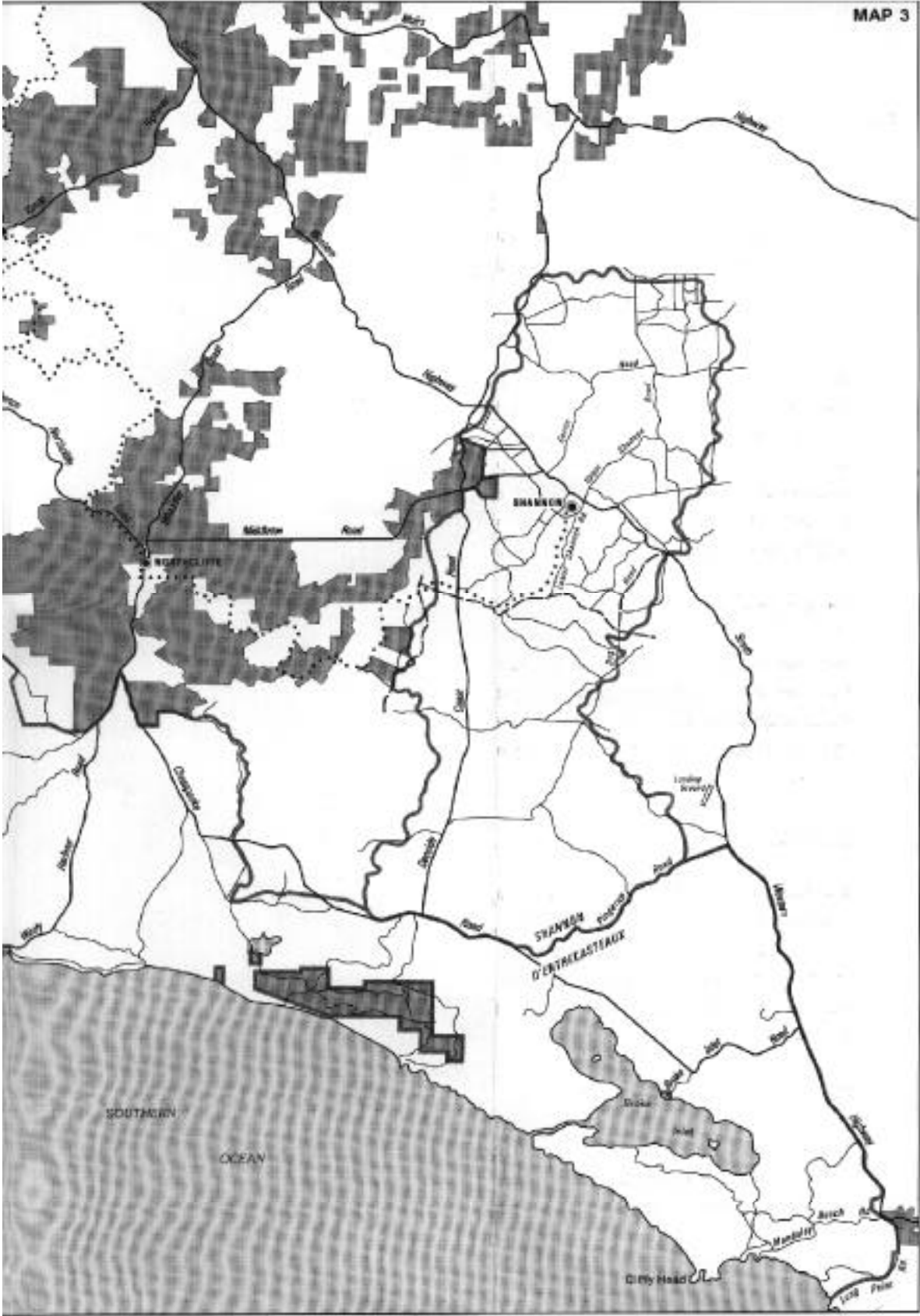
Humidity varies during the day and between seasons. In summer, a combination of low summer rainfall and high daily temperatures results in a relatively low humidity level which falls from about 65% in the morning to 40% in the afternoon. In winter, when there are low temperatures and high rainfall, the humidity level ranges daily from 90 to 75%.

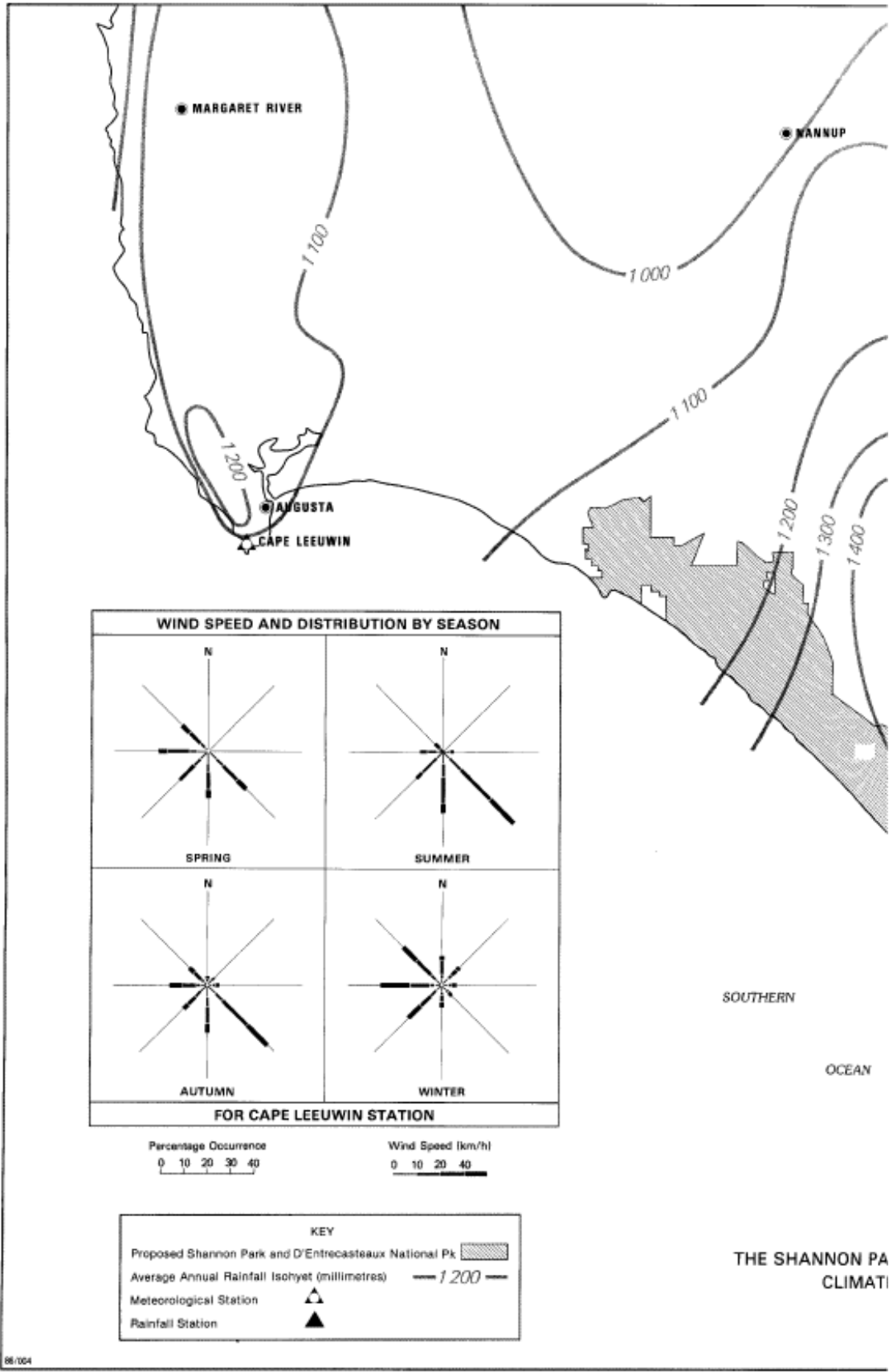
Winds

At Cape Leeuwin to the west, the closest coastal weather station which records wind characteristics, the prevailing winds are from the south-east between November and April (Map 4). During autumn, winds swing to the south and south-west, and in winter to the west. In spring the prevailing winds return to the south, then south-east. Wind speeds on the coast are high, with winds in excess of 20 km/hr (and up to 50 km/hr) for 62% of the time. In winter, wind speeds greater than 50 km/hr occur for 16% of the time.

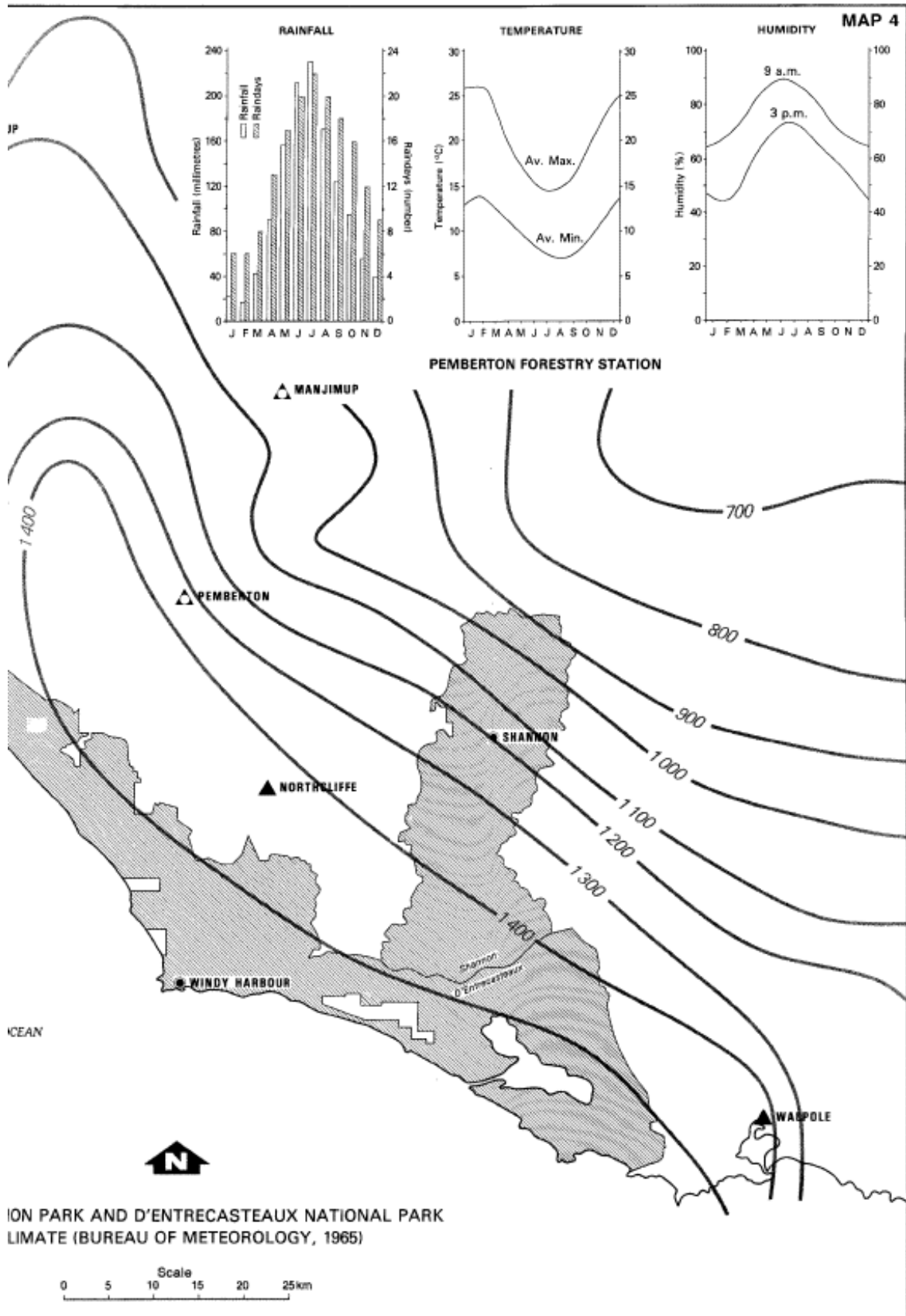
Inland, wind speed generally decreases with distance from the coast.







88/104



4.2 Geology

Most of the Shannon and D'Entrecasteaux Parks lies in the Albany-Fraser Geological Province, although a small section in the north-west of the Shannon Park lies in the Yilgarn Block and about a third of the D'Entrecasteaux forms part of the Perth Basin.

Albany-Fraser Province

The main rock formation within the Albany-Fraser Province is granites and gneisses intruded by dykes of metamorphic rock. This has resulted from a number of phases of metamorphic and plutonic activity, accompanied by sharp tectonism involving pre-existing Archaean basement and Proterozoic supracrustal rocks. These range from granodiorite to granite and constitute the Burnside Batholith, which occupies the south-eastern part of D'Entrecasteaux National Park. Further to the west, the granitic rocks have undergone progressive gneissification. However they are virtually indistinguishable from the Archaean or Proterozoic gneisses (Wilde and Walker 1984).

The Phanerozoic sediments of this Province are dominated by a major cycle of deposition, mainly siltstones - with some sandstones and cycle limestones - which originated in the Tertiary Period. These sediments, known as the Plantagenet Group, filled depressions in the irregular surface of underlying Proterozoic rocks. They attain a maximum onshore thickness of 200 m south of Broke Inlet.

Yilgarn Block

Within the Park, the rocks of the Yilgarn Block form part of the Balingup Metamorphic Belt. The most common rock type is gneiss, with varying proportions of minerals such as quartz, microcline, plagioclase, biotite and hornblende. A number of small, poorly exposed and often deeply weathered lenses of schist also occur.

Perth Basin

Part of the D'Entrecasteaux lies west of the Darling Fault, in the southern part of the Perth Basin. Extensive rifting in the Basin occurred in the Middle and Late Jurassic, a period of major tectonism and continental movement. The oldest sediments in this part of the Basin are Early Permian, and have since been covered by Phanerozoic sediment to a thickness of about six kilometres.

Cretaceous and Cainozoic Deposits

Many parts of the Albany-Fraser Province and Perth Basin have been obscured by Cretaceous and Cainozoic deposits which extend across the Darling Fault without evidence of later displacement. Cretaceous Bunbury Basalts outcrop as columnar jointing at the mouth of the Donnelly River and at

Black Point. Cainozoic deposits cover about 70-80% of the Park, mainly as Eocene marine sandstone sediments.

Known Minerals

Most of the Eocene sediments have been lateritised. This has resulted in pockets of bauxite occurring within the laterite surface of the northern part of the Shannon basin. However, these scattered, shallow mineral deposits are unlikely to be commercially exploitable.

Coal and lignite deposits of various ages are known within the Scott Coastal Plain from the Warren River westward. Previous attempts to identify early or late Jurassic coal measures at exploitable depth have been unsuccessful.

Heavy mineral deposits such as ilmenite, zircon, rutile or monazite occur as remnants buried beneath more recent sandy deposits. Nine applications for exploration licences, which together cover most the D'Entrecasteaux, are currently with the Department of Mines (App. 8).

There are some exposed limestone deposits. At Point D'Entrecasteaux a small pit (1.3 ha) is being used to supply road-base material and agricultural lime.

The special geological features of the Parks are given in D. Management Prescriptions 3.1 Geological Features and Landforms.

4.3 Landform

The Shannon and D'Entrecasteaux Parks straddle two physiographic units - the Ravensthorpe Ramp and Scott Coastal Plain. These are separated by the Darling Scarp. The Ravensthorpe Ramp is the lower south-west portion of the Darling Plateau. The Scott Coastal Plain is based on deposits of unconsolidated sands of marine and alluvial origin, and is characterised by extensive swanpy plains. These units are overlain by three morphological belts *which* lie parallel to the coast: the coastal dune belt; marine and alluvial swampy belt; and the dissected laterite plateau.

Coastal Belt

The coastal dune belt extends the entire length of the Park, varying in width from 500 m near Point D'Entrecasteaux to 9 km in the west and east. It consists of a series of aeolian dunes. In places these dunes are unvegetated and form large areas of drifting sand up to 4 000 ha in extent (eg. Yeagarup, Meerup). These dunes have encroached inland over Precambrian bedrock and pre-existing wetlands and estuaries. In general, the coastal dunes become progressively more stable, vegetated and more regular in form inland from the coastline (McArthur and Clifton 1975). In other places the dunes

have lithified creating massive, consolidated ridges. The most prominent examples are south of Broke Inlet, and in the Yeagarup and Callcup areas.

East of Doggerup, wave action has cut the face of the ridge and created high sea-cliffs. These limestone cliffs occur intermittently along the entire length of the Park, and range from about 40 m in height in the western section near Black Point, where they occur in association with basalt cliffs, to over 150 m in height in the eastern section, between West Cliff Point and Clifty Head. North-west of Doggerup, recent marine deposits have created a new series of dunes in front of the limestone scarp. Beach-building processes appear to be continuing, and the present beach is now located about 1-2 km from the scarp in the area between Doggerup Creek and the Donnelly River.

Most of the coastal ridges are covered by younger Holocene sand dunes which are irregular in form with steep slopes. Further inland older deposits form extensive parabolic dune systems which are generally stabilized but in some locations mobile. Some of these dunes are high, such as Callcup Hill (236 m) and Silver Mount (116 m). The inland margin of the coastal dunes drops sharply onto the extensive, seasonally -inundated, swampy plain.

Swampy Areas

In this belt coastal dunes have blocked surface water flow resulting in a transitional zone of scattered wetlands between the coast and forested laterite plateau. The most striking example is Broke Inlet, which has formed parallel to the coast behind massive consolidated dunes and cliffs. In other places the wetlands are composed of numerous small lakes, swamps and inundated flats formed in the low-lying, interdunal areas or previous lagoons and estuaries. The area is dissected by many small streams forming swampy, unchannelled water-courses. The land surface is generally flat, with a subdued relief to about 20 m above sea level (asl). In places the flood plain and lagoonal area are traversed by remnants of linear, siliceous dunes which have developed parallel to the present coastline.

Minor exposures of granitic and gneissic remnants occur as outcropping hillocks 20-50 m above the surrounding wetlands. These exposures become more common towards the south-east of the D'Entrecasteaux. They do not occur on the Scott Coastal Plain west of the Donnelly River. Occasionally, the outcropping rocks rise to more than 200 m asl forming prominent hills which dominate the otherwise subdued landscape. Examples include Mt Chudalup, Mt Pingerup, and Woolbales Hills. Further north in the Park, Mt Burnside outcrops above the lateritic surface, but it is less prominent in relation to the surrounding relief.

Plateau

A laterite plateau occupies the northern half of the Shannon. The land surface rises gently from the alluvial swampy belt in the south to 200 metres asl in the north.

This plateau can be divided into three landform units, differentiated by the degree of dissection of the lateritic duricrust, the shape of valleys and the nature of the drainage network. In the northern part, deeply weathered rocks, lateritisation processes and erosional modification have resulted in a gently undulating plateau. This plateau extends into the central section of the Park; a landform characterised by granite exposures on the upper slopes. The third, southern unit features an undulating surface with many distinct hills with rounded crests of remnant laterite. In this area many valleys have broad drainage floors which form long, swampy corridors.

4.4 Water

Five rivers drain through the Parks (the Donnelly, Warren, Meerup, Gardner and Shannon). Most of the catchment area of the Shannon River and Broke Inlet lies within the Parks, as does a large proportion of the Meerup River (70%) and Doggerup Creek (90%) catchments. The Parks also encompass the estuaries and lower reaches of the Donnelly, Warren and Gardner Rivers (Map 5).

There are three distinct drainage patterns which are related to the major physiographic units in the Shannon and D'Entrecasteaux Parks. On the sandy coastal plain where soils are free-draining there is very little surface drainage apart from the major river channels which deflect to the south-west before entering the Southern ocean. Dense stream networks drain the seasonally-inundated, swampy flats characteristic of the Chudalup, Lower Shannon and Pingerup Plains. On the plateau the Shannon River, which emanates from broad flat swampy headwaters, forms deep V-shaped valleys in the upper and central parts of the catchment.

Rivers and Streams

Most of the rivers and streams in the Parks are perennial with marked variations in summer and winter flow. Total stream flow for the summer period can be up to 70 times less than total winter flow. Most streams on the plateau (Shannon Park) are maintained by groundwater seepage and are often only a series of swampy pools by the end of summer.

Estuaries

The major estuaries in the Parks are barred for most of the year, breaking in mid-winter when stream flow is greatest. Broke Inlet is the largest, with an area of about 4 500 ha. The other estuaries are much smaller, although the Donnelly and Warren have a long, broad expanse of open water near their mouths.

Lakes

There are many freshwater lakes in the wetland areas of the Parks. Most have formed immediately behind coastal sand dunes which block seaward drainage. The largest are Lake Jasper, Lake Maringup and Lake Quitjup, all of which overlie sandy floors. Lake Jasper is known as a 'white water lake', as the lack of tannic acid in the water results in good light dispersion and clear water. Most of the smaller reedy lakes, such as Lakes Wilson, Smith, Samuel and Florence, and Doggerup Lake, overlie deep organic sediments.

Dams

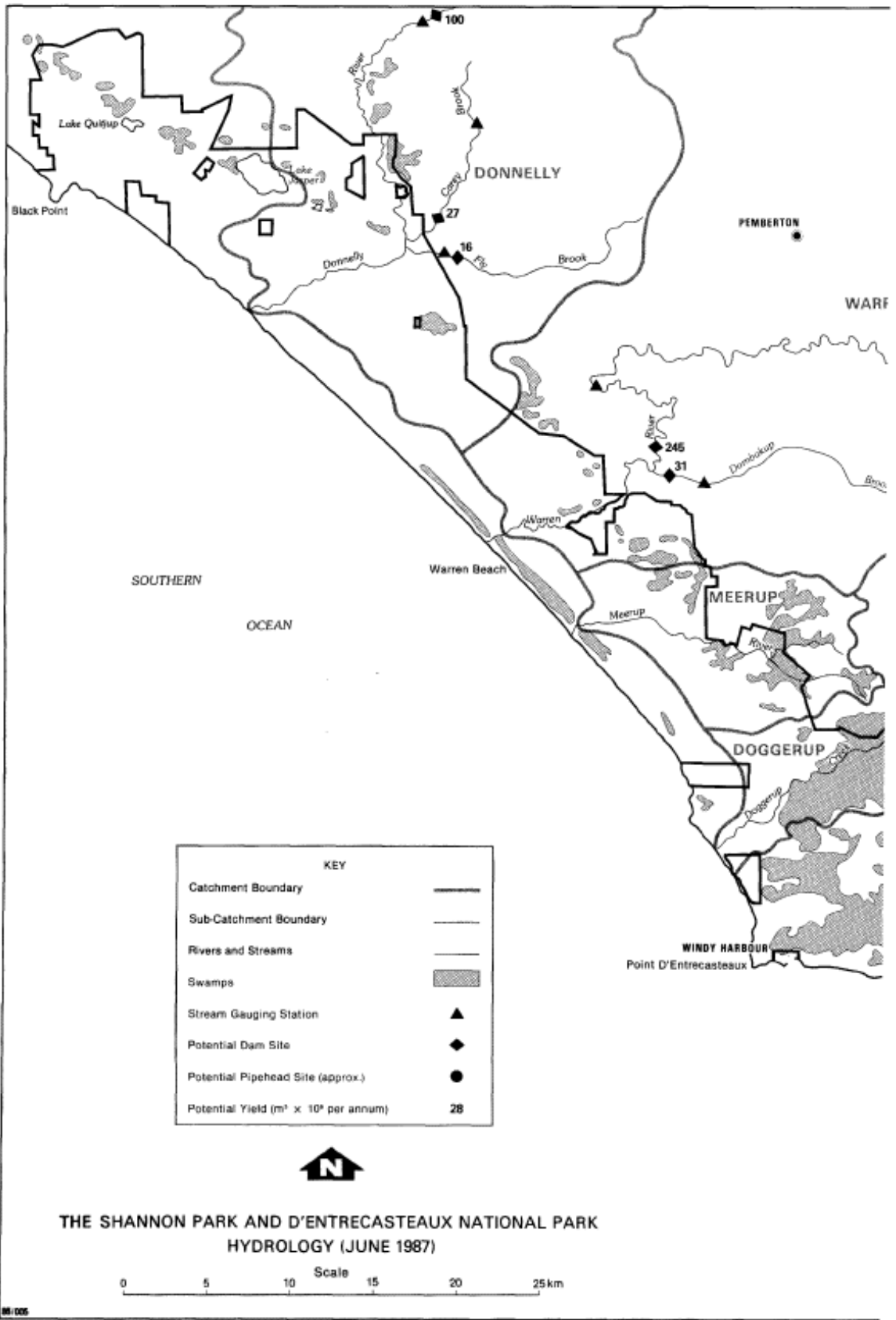
A small dam lies on the Shannon River, just to the north of Shannon townsite. This dam was built in 1949 to supply water over the summer months to the then Shannon Mill and the Mill residences. Picnicking, swimming and marroning were, and still are popular uses. The dam holds about 100 million litres.

Groundwater

On the plateau the groundwater system responds relatively slowly to seasonal differences in rainfall. High rainfall causes only small variations in the permanent groundwater table. The water-table, which lies several metres below the surface in this area, reaches a maximum level in September-October (two months after the peak rainfall period) and is lowest in April-May. In winter, shallow perched groundwater systems developed above impermeable layers contribute to a major proportion of the stream flow.

In the coastal and wetland areas the groundwater systems respond more rapidly to rainfall. In the wetland areas the water-table lies within a metre of the surface. These areas remain inundated for up to eight months of the year. On the sandy coastal areas large unconfined aquifers contribute to perennial seepage areas and small streams (eg. springs near Black Point and Malimup).

There has been very little investigation of groundwater in the Parks, although Muir (1981) reported high quality artesian water from mineral exploration boreholes in the Lake Jasper area. However, in contrast to the large, surface-water resources, ground resources are not great, as far as is known (WAWA, pers. cam., 1987). A small an-cunt off groundwater currently supplies the settlement at Windy Harbour.





Salinity

The Parks are located in high rainfall areas where the risk of salinity is low or negligible. However, large areas of the Warren River catchment (outside the Parks) lie within lower rainfall areas (900 mm p.a.) where salinity risks are high. Past clearing in lower rainfall areas has caused the release of stored salts and consequently the Warren River is more saline now than it was prior to clearing.

Water Quality

There are large parts of the catchments of the Warren, Donnelly and Gardner which have been cleared for agricultural purposes. The use of fertilizers and pesticides in their catchments may lead to changes in water quality in the lower reaches. Increased silt loads may also result from logging and other forest management operations in adjacent State forest.

Surface water, particularly in swampy areas, is stained by tannin originating from organic matter.

Water Supply Potential

As mentioned earlier (A. Introduction 3.3 Water) , the four major rivers (Donnelly, Warren, Gardner and Shannon) which pass through the Parks have the potential to yield, if developed for water supply purposes, approximately 680 million cubic metres p.a. The Warren River is the single, largest potential source of potable water in the south-west.

No major development of any of these surface resources is envisaged in the short to medium term; that is, for at least 30 years. Almost all the potential development sites are outside the Parks.

Conservation Values

The D'Entrecasteaux and Shannon not only have a relatively abundant supply of ground and surface water compared with the rest of the State, the associated systems are relatively undisturbed. The wetlands of the Parks, which are a product of, and dependent on a continuing supply of fresh water, are of particular interest as a number of the plant and animal species recorded from these wetlands are rare or geographically restricted (4.7 Flora and 4.9 Fauna).

Use for Recreation

Recreational activities usually occur on, beside, or close to water bodies. This is because of: the direct recreational use which water offers for swimming, boating and fishing; its scenic and other aesthetic amenities; and its necessity for life. Recreational use of inland water bodies in the Parks includes swimming, fishing, canoeing, sailing, marroning, motor-boating for access and pleasure, water skiing and towing hand-gliders. Most of this activity takes place on Lake Jasper and on the Donnelly River, but other water bodies are also used.

4.5 Soils

Soil type in the Shannon-D'Entrecasteaux Parks is a product of topographic position, degree of dissection and weathering, and the geological characteristics of the substrate. Climatic factors, erosional processes and vegetative cover also have some effect on soil distribution (McArthur and Clifton 1975, Churchward, M., and McArthur, W., pers. cam., 1986). Soils are discussed according to the three morphological belts identified in 4.3 Landforms.

Coastal Belt

The coastal belt is composed of unconsolidated calcareous and siliceous sands and consolidated dunes, both of which support shallow, sandy soils. Iron and peaty podsoles may also occur on the deep sands of dunes.

Swampy Areas

In lower dune slopes and interdunal areas iron podsoles and solonchic soils with a shallow A horizon are common.

Plateau

In the plateau areas of the northern part of the Shannon Park, yellow duplex soils with varying amounts of lateritic gravel are dominant. In some places laterite duricrust occurs. The associated soils are red and yellow earths.

In deeply dissected areas the dominant soils on valley slopes are light yellow-brown sandy and gravelly loams in association with weathered granite. Where metamorphosed rock outcrops occur, the soil has a finer texture, mostly of red or brown clay.

On hills and ridges where granitic and gneissic rock outcrops are common and where the weathered mantle is extensive, yellow duplex soils are dominant with lenses of gravelly pale grey to brown loamy sand. On the lower slopes pockets of deep, sand occur and podsol soils are common. Yellow or light grey solonchic sandy soils generally occur within swampy areas on the plateau.

Soil Erosion and Degradation

The susceptibility of the soil to erosion and degradation has a major influence on management. It is dependent on soil type, topography, vegetation and climate. The risks for the two Parks are summarised on Map 6.

The sandy soils of the coastal plain are readily eroded by wind. They are extremely susceptible where the coastal dunes are sparsely vegetated and/or where there are steep slopes and strong winds. The steep, younger dunes closest to the coast are generally more at risk than the older, stabilised dunes further inland. The coastal dunes are moderately susceptible to water erosion.

The soils of the extensive flats and wetlands are stable if undisturbed but they are highly prone to erosion and degradation when waterlogged. Deep ruts and washed-out, boggy channels develop over the wetter months, even with low levels of use.

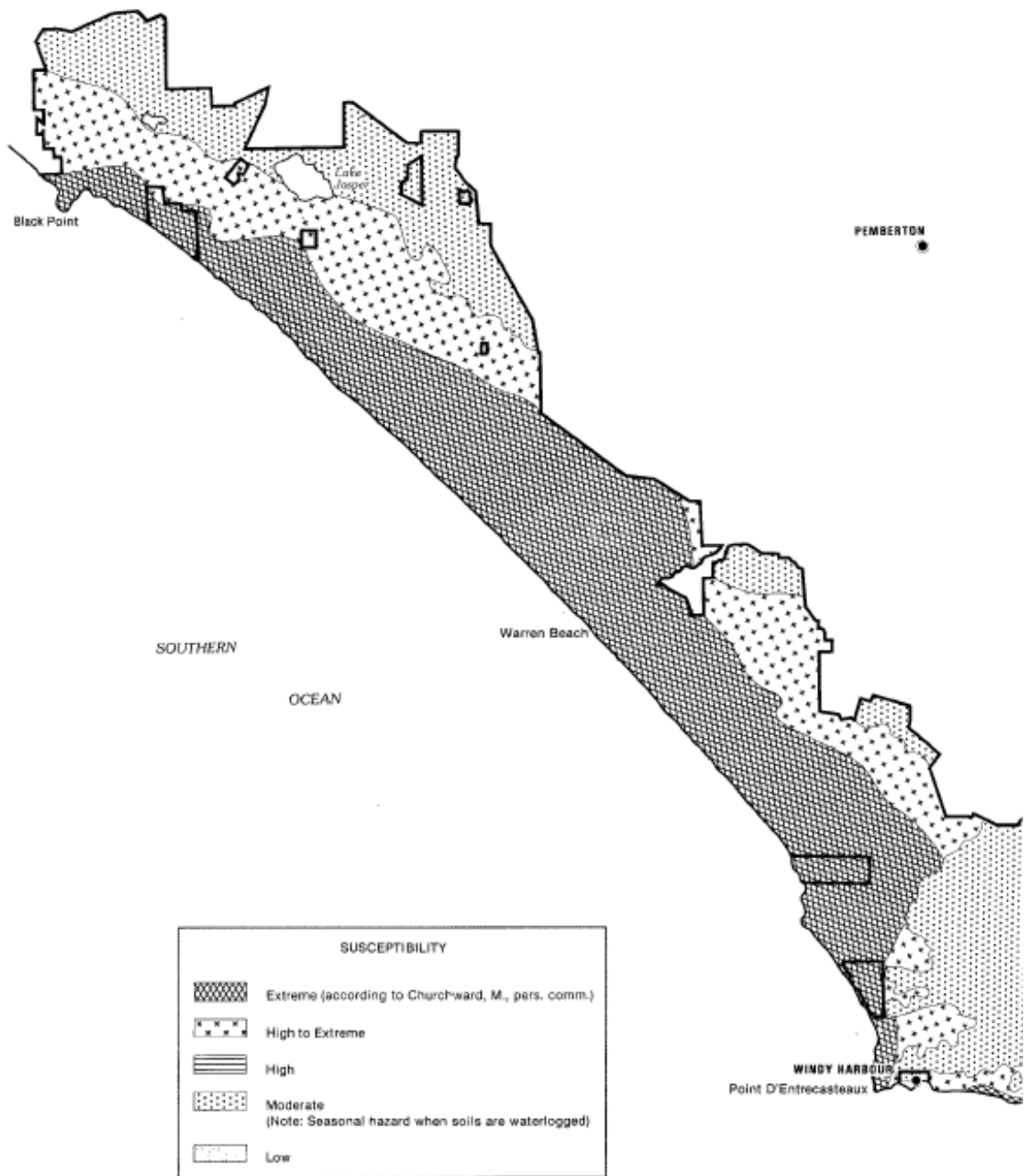
The loam soils of the dissected plateau areas have a moderately high susceptibility to water erosion. However, their characteristic dense vegetation cover provides protection unless severely disturbed. On very steep slopes minor disturbance such as walk tracks can result in localised gullying if the 'disturbance' is not carefully located and designed.

If disturbed, the gravelly soils of the lateritic uplands are likely to be eroded by water. The topography is generally very gentle, and severe disturbance can be easily avoided. Some of these soils are also prone to wind erosion if disturbed on a large scale.

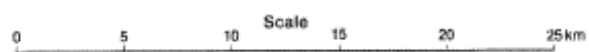
4.6 Vegetation

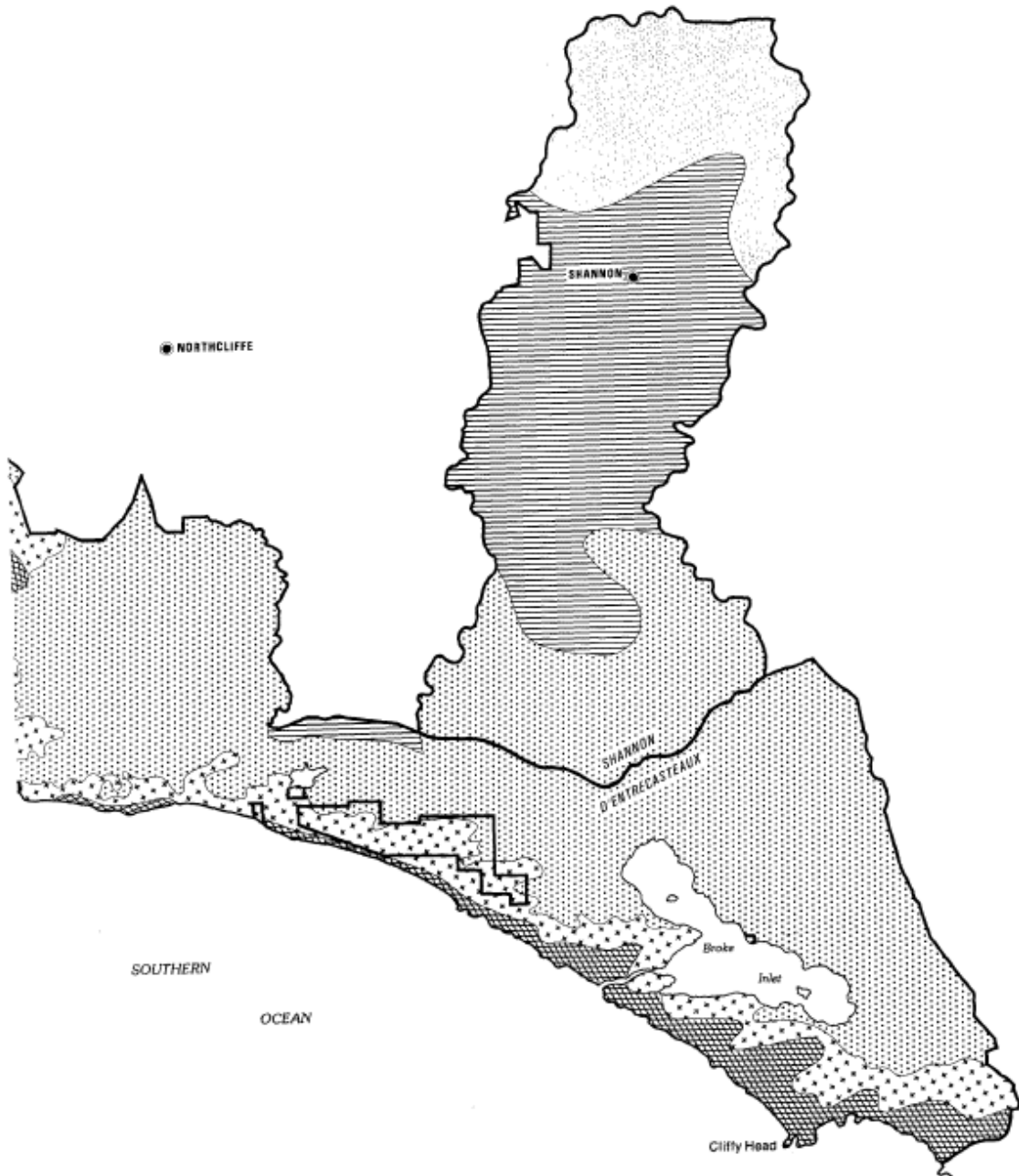
Phytogeographic Location

Beard (1980) divided the State into botanical provinces, districts and sub-districts on the basis of ecological, climatic, geological and soil characteristics. The Parks occur in the Warren Sub-district which occupies the southern portion of the Darling Botanical District, a division of the South West Botanical Province. The Warren Sub-district encompasses the entire karri (*Eucalyptus diversicolor*) forest belt and most of the coastal areas between Albany and Busselton. Tall karri, marri (*E. calophylla*) and jarrah (*E. marginata*) forest associations, paperbark (*Melaleuca spp.*) woodlands, extensive sedgelands and swamps are characteristic. All these associations are represented in the Shannon-D'Entrecasteaux.



THE SHANNON PARK AND D'ENTRECASTEAUX NATIONAL PARK
SUSCEPTIBILITY TO SOIL EROSION AND DEGRADATION (JUNE 1987)





Vegetation Associations

Considerable information is available about the structural characteristics of the forested areas, but only limited information is available about species composition and diversity. In this plan, the general distribution and structural characteristics of the plant associations found in the Parks are described from previously published vegetation surveys (Smith 1972, McArthur and Clifton 1975 and Muir 1981) and recent field surveys. The associations are described according to Muir (1977).

TALL FOREST (30 M+, 30-70% CANOPY COVER)

Tall karri dominated forest occurs throughout the Shannon and in the south-eastern parts of the D'Entrecasteaux. Distribution is closely allied to loamy soils derived from granite and gneiss. Pure karri stands occur throughout the Shannon except in the upper reaches of the river basin where marri-karri associations occur on brown, gravelly, sandy soils. Jarrah becomes co-dominant with karri on soils of lateritic origin. On favourable sites trees exceed 70 m in height.

Isolated patches of karri occur on low hills throughout the lower Shannon, Pingerup, Plains and parts of the Chudalup Plains. However, on these sites, trees seldom reach more than 30-40 m. in height.

The open structure of the canopy in the tall karri forest allows sufficient light penetration for the development of a substantial understorey of small trees and shrubs. In many parts of the forest karri wattle (*Acacia pentadenia*) forms an impenetrable thicket more than two metres high, particularly in areas which have been recently burned. In some more open parts, hazel (*Trymalium floribundum*) and karri oak (*Allocasuarina decussata*) contribute to the forest understorey. Forests of *Agonis* and *Banksia* species, and sometimes *Oxylobium lanceolatum* occur along streams and swampy water-courses.

FOREST (15-30 M, 30-70% CANOPY COVER) AND WOODLANDS (15-30 M, 10-30% CANOPY COVER)

Extensive areas of jarrah forest occur on the lateritic soils of the upper Shannon, and on ridges where remnants of the lateritic surface occur. on more favourable sites in the upper parts of the Shannon, jarrah exceeds 30 m. It forms woodland (10-30% canopy cover) to open low woodland (0-5 m, 2-10% canopy cover) on less favourable sites.

In the lower Shannon Basin and on the Pingerup Plains pockets of jarrah forest on duplex soils form a complex mosaic with islands of tall karri forest, low jarrah-banksia woodland, *Melaleuca* heathland and low sedges on flat, seasonally-inundated land.

On the more sandy soils, jarrah occurs in association with marri. Yarri (*E. patens*) is co-dominant with jarrah on wetter sites along the margins of broad, swampy water-courses.

The understorey is usually more open with more distinct structural variation than in tall karri forest. The major understorey tree species are *Banksia grandis*, *Allocasuarina fraseriana*, *Persoonia longifolia* and occasionally *Banksia littoralis*. The native pear *Xylomelum occidentale* also occurs in the jarrah, yate and bullich forests on coastal dunes near Black Point. A great variety of other species occur in the jarrah forest associations - *Xanthorrhoea preissii*, *Macrozamia riedlei*, *Podocarpus drouynianus*, and *Leucopogon spp.* are amongst the most common.

LOW FOREST (0-15 M, 30-70% CANOPY COVER) AND LOW WOODLANDS (0-15 M, 10-30% CANOPY COVER)

Large pockets of jarrah-dominated low forest and woodlands occur in the lower part of the Shannon Basin and on the Pingerup Plains. They also occur less extensively around the perimeter of tall karri forest, forming a distinctive structural gradient between the surrounding heath and sedge communities. Blackbutt and sometimes marri occur as the co-dominant or dominant species in these woodland associations. The common understorey species in these inland woodlands include *Pteridium esculentum*, *Acacia extensa*, *Adenanthos sp.*, *Agonis parviceps*, *Banksia ilicifolia*, *B. quercifolia*, *Eutaxia obovata*, *Gahnia trifida*, *Kingia australis* and *Leucopogon sp.*

Extensive low forest and woodland associations also occur on the coastal dunes of the D'Entrecasteaux. Yate (*Eucalyptus cornuta*), bullich (*E. megacarpa*), peppermint (*Agonis flexuosa*), marri and jarrah often occur as pure stands or mixed with *Banksia attenuata* and *Banksia ilicifolia*.

East of Broke Inlet and around Lake Maringup yate and yate-marri low woodlands occur in association with a peppermint understorey. In some places low sedges (*Loxocarya flexuosa*) form the only understorey, giving a savannah woodland appearance.

Peppermint (*Agonis flexuosa*) forms a low forest and low open woodland association on the coastal sands.

Many of these coastal low forest and low woodland associations have similar low scrub understoreys, with various combinations of the following species - peppermint and other *Agonis* species, *Macrozamia riedlei*, *Acacia littorea*, *Acacia pulchella*, *Anigozanthos flavidus*, *Banksia grandis*, *Bossiaea linophylla*, *Hibbertia racemosa*, *Kunzea sp.*, *Jacksonia furcellata*, *Leucopogon capitellatus*, *Lrioxocarya flexuosa*, *Oxalys phyllanthi*, *Pimelea longiflora*, *Pteridium esculentum* and *Xanthorrhoea preissii*.

OPEN LOW WOODLANDS (0-15 M, 2-10% CANOPY COVER)

Open low woodlands of *Banksia ilicifolia* occur on the linear sandridges which overlay the swampy plains west of Broke Inlet, and the southern part of Chudalup Plains and the Scott Coastal Plain. *Jacksonia furcellata* and *Loxocarya flexuosa*, forming open low scrubland and low sedge, are the most common understorey species.

Jarrah-banksia and paperbark (often *Melaleuca preissiana*) open low woodland associations are widespread on the Chudalup Plains, lower Shannon Basin and Pingerup Plains. The low scrub and sedge understorey is composed of *Agonis parviceps*, *Kunzea recurva*, *Xanthorrhoea preissii*, *Beaufortia sparsa* and *Leptospermum sp.*

In swampy depressions and along some water courses *Melaleuca* open low woodlands are common. A similar association is also found in the swampy head-waters of the northern part of the Shannon Basin. *Beaufortia sparsa*, *Agonis parviceps*, *A. marginata*, *Kunzea recurva*, *Boronia sp.*, *Lepidosperma sp.* and *Mesomelaena sp.* are common understorey species.

THICKET (0-2 M, CANOPY COVER 30-70%) AND HEATH (1.0-2.0 M, CANOPY COVER 30-70%)

Thickets and dense thickets (canopy cover 70-100%) are common throughout the Parks in swampy gullies, on broad water-courses and in moist sites on the extensive plains.

The thickets and dense thickets along the water-courses of the central and lower Shannon are invariably myrtaceous, and are composed of *Agonis parviceps*, *A. flexuosa*, *A. juniperina*, *Beaufortia sparsa*, *Melaleuca preissiana* and *M. cuticularis*, depending on site and fire history. Other common species include *Beaufortia squarrosa*, *Boronia sp.* and *Eutaxia obovata*. Similar thicket associations can be found in most of the wetlands of the D'Entrecasteaux.

The coastal heath and thicket associations are variable in structure and composition. *Agonis flexuosa* (2-5 m in height) dominates most associations. The following species are generally found in the D'Entrecasteaux coastal heath - *Xanthorrhoea spp.*, *Macrozamia riedlei*, *Podocarpus drounyianus*, *Acacia littorea*, *Bossiaea linophylla*, *Dryandra sessilis*, *Hibertia cuneiformis*, *H. racemosa*, *Lepidosperma effusum* and *Loxocarya flexuosa*. In moister gullies and on slopes protected from the wind, dense thickets of *Agonis flexuosa*, *Acacia cyclops*, *A. littorea*, *Hakea prostrata*, *Jacksonia furcellata*, *Muehlenbeckia adpressa* and *Olearia axillaris* form.

SCRUB (0-2 M, CANOPY COVER 10-30%)

Immediately behind the foredunes and in places where wind erosion is severe, recently stabilised dunes support sparse scrub. Some of the early colonising species may still be present. *Olearia axillaris*, *Muehlenbeckia adpressa*, *Isolepis nodosa*, *Carpobrotus aequilaterus*, *Conostylis sp.*, *Dryandra sessilis* and *Hibbertia cuneiformis* are common in these areas.

Marram grass (*Ammophila arenaria*) - an introduced species - is a vigorous early coloniser along most of the coastal foredunes and in other places where coastal dunes have been destabilised. Other vigorous foredune colonisers; which are common along most of the Park coastline, include *Actites megalocarpa* and *Spinifex hirsutus*. Between the Donnelly and Warren Rivers extensive areas of

marram open grassland (less than 10% canopy cover) have formed, as an early stage of colonization, on plains behind recently formed foredunes.

Dwarf scrub and low heath associations are characteristic of the Point D'Entrecasteaux area and the high dunes south of Broke Inlet. *Jacksonia horrida*, *Melaleuca sp.*, *Acacia littorea*, *Allocasuarina humilis* and *Leucopogon parviflorus* are common in these areas.

LOW SEDGES (0-0.5 M, 30-70% CANOPY COVER)

Sedgelands are common on the seasonally-water-logged flats. Extensive sedgelands occur on the Scott Coastal Plain and Chudalup Plains. In the lower parts of the Shannon Plain and Pingerup Plains sedgelands are interspersed by thickets, scrubland and other woodland and forest associations. There is considerable species diversity within the sedge communities. Some of the species commonly found include *Anarthria prolifera*, *A. scabra*, *Evandra aristata*, *Leptocarpus scariosus*, *Andersonia sprengelioides*, *Johnsonia lupulina*, *Xanthorrhoea sp.*, *Kingia australis*, *Lomandra ordii* and *Reedia spathacea*. The latter two species are relatively uncommon with very restricted distribution.

4.7 Flora

There have been no comprehensive surveys of the Parks' flora. However, opportunistic surveys on or near roads and tracks have revealed a wealth of species of interest to both scientists and the wider community. Table 1 lists rare, restricted, poorly collected, undescribed and high priority species in the two Parks. Systematic flora surveys of less accessible areas would undoubtedly add to this list.

Plants associated with the wetlands and granite outcrops are particularly sensitive to management practices. The majority of these species are vulnerable to fire, thus the frequency and seasonality of fires is critical in these locations.

Also of special note are the great diversity of orchids in the Parks, particularly in wetland areas (Table 2).

Little is known about cryptograms (ferns, mosses, algae, lichens and fungi) in the Parks, but they are known to thrive in high rainfall areas. Mosses, liverworts and lichens are found on the rock outcrops scattered throughout the Shannon and the south-eastern part of the D'Entrecasteaux. Many large fungi are found in the karri forest.

TABLE 1.
FRAGILE PLANT SPECIES OF THE SHANNON AND
D'ENTRECASTEAX PARKS

Sources: ca - CALM records
 xh - Western Australian Herbarium records
 b - pers. cam., Andrew Brown, Wildlife Research Centre, CALM
 s - pers. comm., Steve Hopper, Wildlife Research Centre, CALM
 m - Muir 1981

SPECIES	COMMON NAME AND HABITAT	SOURCE
Gazetted Rare		
<i>Adenanthos detmoldi</i>	Yellow Jugflower - damp, sandy flats	ca
<i>Grevillea drummondii</i>	Drummond's Grevillea - sandy soil	ca
<i>Kennedia glabrata</i>	Northcliffe Kennedia - soil pockets on granite	ca
<i>Prasophyllum triangulare</i>	Dark Leek Orchid - sand and laterite	b
Proposed Gazetted Rare		
<i>Banksia verticillata</i>	- coastal granite	s
<i>Caladenia plicata</i>	- jarrah woodland, sandy soils	b
High Priority Species Considered For Declaration But In Need Of Urgent Further Survey		
<i>Hemigenia podalyrina</i>	- damp marri woodland near base of granite	ca
<i>Lomandra ordii</i>	- wet areas, river and stream edges	ca
Widespread But In Need Of Special Protection		
<i>Calytrix acutifolia</i> (= <i>Lhotskya</i> aff. <i>ericoides</i> m)	- granite	s
<i>Reedia spathacea</i>	- peat swamps	s
Restricted Distribution (range of less -than 160 Jan)		
<i>Aotus passerinoides</i>	- swamps	ca
<i>Bossiaea webbii</i>	- heath and jarrah forest	ca
<i>Dasyopogon hookeri</i>	- jarrah forest, swamps	ca
<i>Microtis pulchella</i>	- swamps	b
<i>Utricularia simplex</i>	- swamps	h

SPECIES	COMMON NAME AND HABITAT	SOURCE
Poorly Collected (less than 5 species at W.A. Herbarium)		
<i>Acacia scalpelliformis</i>	- karri forest, especially banks of permanent streams	h
<i>Deyeuxia inaequalis</i>	---	h
<i>Villarsia violifolia</i> (southern form)	- swamps	h
Undescribed Species		
<i>Aotus sp.</i>	---	m
<i>Banksia occidentalis subsp.</i>	---	s
<i>Banksia seminuda subsp.</i>	---	s
<i>Darwinia sp.</i>	---	m
<i>Hydrocotyle sp.</i>	- swamp	m
<i>Hypocalyma sp.</i>	---	m
<i>Synaphaea sp.</i>	---	m
<i>Utricularia sp.</i>	- swamp	m
<i>Verticordia sp.</i>	---	m
<i>Villarsia sp.</i>	- swamp	m
Other Species (insufficient information to determine status)		
<i>Selaginella aff. uliginosa</i>	- wet edges of swamp	m

TABLE 2.
WETLAND ORCHIDS OF THE SHANNON AND D'ENTRECASTEAUX
PARKS

Source: pers. comm., Andrew Brown, Wildlife Research Centre, CALM.

SPECIES	COMMON NAME
<i>Acianthus tenuissimus</i>	Gnat orchid
<i>Caladenia corynephora</i>	
<i>C. marginata</i>	White Fairy Orchid
<i>C. menziesii</i>	Rabbit orchid
<i>C. nana</i>	Pink Fan Orchid
<i>Calochilus robertsonii</i>	Beard Orchid
<i>Diuris emarginata</i> var. <i>pauciflora</i>	
<i>D. laxiflora</i>	Bee Orchid
<i>Elythranthera emarginata</i>	Pink Enamel orchid
<i>Epiblema grandiflorum</i>	Babe in the Cradle Orchid
<i>Eriochilus scaber</i>	Pink Bunny Orchid
<i>Lyperanthus forrestii</i>	Pink Beaks orchid
<i>Microtis atrata</i>	Swamp Mignonette Orchid
<i>M. orbicularis</i>	Dark Mignonette Orchid
<i>M. pulchella</i>	
<i>M. rara</i>	
<i>M. aff. rara</i> (small flowers)	
<i>M. unifolia</i>	Common Mignonette Orchid
<i>Prasophyllum brownii</i>	
<i>P. drummondii</i>	Swamp Leek Orchid
<i>P. fimbria</i>	Fringed Leek Orchid
<i>P. aff. gibbosum</i>	
<i>P. macrostachyum</i> Var. <i>macrostachyum</i>	Laughing Leek Orchid
<i>Thelymitra canaliculata</i>	Blue Sun Orchid
<i>T. cornicina</i>	Lilac Sun Orchid
<i>T. cucullata</i>	Swamp sun orchid
<i>T. flexuosa</i>	Twisted Sun Orchid
<i>T. fuscolutea</i> aff. <i>fuscolutea</i>	
<i>T. mucida</i>	Plum Orchid
<i>T. tigrina</i>	Tiger orchid

4.8 Weeds and Non-native Plants

Weeds and non-native plants have been introduced as a result of European occupation and use of the Park areas. Many of these species have a very localized distribution, only occurring at the site where they were introduced. However, some of the more effective colonizers have become more widespread.

A variety of non-native tree species occur in forest assessment plots established by the Forests Department. These include *Pinus pinaster* and *Eucalyptus muelleriana*. These plots occur at several places in the Parks. In most cases the introductions were small scale and have remained localised. However, in the Yeagarup area *Pinus pinaster* is spreading beyond the original plot.

Localised infestations of apple-of-sodom (*Solanum sodomaeum*) and arum lily (*Zantedeschia aethiopica*) occur in the Lake Jasper area and on Bolghinup track in the Yeagarup area. Muir (1981) listed and mapped the location of the following species requiring control measures in the northern parts of the D'Entrecasteaux - penny-royal (*Mentha pulegium*) apple-of-sodom (*Solanum sodomaeum*), arum lily (*Zantedeschia aethiopica*), water couch (*Paspalum sp.*), melilotus (*Melilotus indica*), blackberry (*Rubus spp.*), thistle (*Cirsium spp.*) and gooseberry (*Physalis peruviana*). All weeds requiring control are listed in D. Management Prescriptions 6.3 Pests and Weeds.

In general there are few significant infestations in the forested areas of the Parks. However, on parts of the coast which have been grazed for over 100 years and have soils which are prone to disturbance, there are broadscale infestations of annual herbs and grasses. Marram grass is thriving in foredune areas and where large dune blowouts have occurred.

A wide variety of exotic plants were introduced to domestic gardens around isolated dwellings and townsites in the Parks. The old Shannon townsite has numerous exotic shrubs and trees, some of which have been incorporated into the area I s landscaping plan. Most species are not spreading, however, some species such as blackwood (*Acacia melanoxylon*) which grows adjacent to the Shannon Dam, have considerable potential to spread into the surrounding forest.

4.9 Fauna

There have been some surveys of the vertebrate fauna of the Parks, but very little is known about the invertebrate fauna. Some species which have not been noted in the Parks have been recorded in the vicinity of the area and undoubtedly also occur in the Parks. Christensen et al. (1985) have compiled an extensive fauna list for locations in and adjacent to the Parks. Muir (1981) presents a similar list of species which are known to, or could possibly occur in the D'Entrecasteaux.

The following species gazetted as 'rare or in need of special protection' occur in the area - Peregrine Falcon (*Falco peregrinus*). Crested Shrike-tit (*Falcunculus frontatus*), Red-eared Firetail (*Emlema oculata*) and Freckled Duck (*Stictonetta naevosa*).

The most interesting and diverse fauna occurs on the flats and, associated woodlands of the lower Shannon and Broke Inlet area. Several species of endemic, small, freshwater fish - the salamander-fish or Shannon mud-minnow (*Lepidogalaxias salamandroides*) and the black striped minnow (*Glaxiella nigrostriata*) - occur in the wetlands of these areas. Two small snakes with a restricted distribution, Mueller's snake (*Rhinopococephalus bicolor*) and the little brown snake (*Elapognathus minor*) also occur in this area. *Sphenomorphus australis*, a mall skink with a restricted distribution, occurs in the D'Entrecasteaux.

The D'Entrecasteaux area is regarded as critical for the *Geocrinea rosea* group (small frogs); at least two undescribed species have been recorded from the area (D. Roberts, pers. comm., 1987).

Two species known to be vulnerable to park management procedures, such as fuel reduction burning, occur in the Parks. These are the quokka (*Setonix brachyurus*) (*Antechinus flavipes*); both require periods between fires of at least 10 to 15 years for reasonable populations to persist. More frequent burning can be tolerated if it is carried out in spring when the moist gully habitat used by these species remains unburnt.

Dieback, caused by the cinnamon fungus (*Phytophthora cinnamomi*), can also have a major impact on habitat. Species such as the honey possum (*Tarsipes rostratus*) are dependent on plant communities such as the banksia woodlands, which are highly susceptible to dieback. These species may be reduced in number or disappear completely if dieback is introduced or spreads their habitat.

5.0 LANDSCAPE

All landscapes have an identifiable and describable character, which is the overall impression created by:

- 1) the configuration of the ground and the scale of its variations;
- 2) the existing type and pattern of vegetation and land use; and
- 3) the prevailing colour of rock, soil and structures (Crowe 1966).

The character and appearance of the landscape contributes immeasurably to the intrinsic value and public appeal of national parks.

Both the Shannon and D'Entrecasteaux are rich in landscape resources. Within a short distance, it is possible to experience tall stands of karri, savannah woodlands of peppermint, broad

seasonally-inundated wetlands, wind-swept dunes and rugged sea-cliffs. The Parks are a mosaic of landscapes of great diversity and beauty.

The major landscape types represented within the Parks are:

Forest

- karri forest
- karri-marri association
- jarrah forest

Savannah Woodland

- peppermint woodland
- banksia woodland

Coastal Scrubland

- peppermint thicket
- mixed heath

Wetlands/Waterscapes

- swamps, seasonally-inundated wetlands and treeless flats, such as Naenup Swamp and the Pingerup Plains
- Donnelly, Warren, Gardner, Shannon and Deep Rivers
- Doggerup Creek and other creeks.

Coastal

- limestone and basalt cliffs such as Point D'Entrecasteaux, Clifty Head and Black Point
- extensive mobile dune systems, such as Yeagerup, Callcup, Meerup and Doggerup,
- broad expanses of beach and foredunes

Other

- monadnocks such as Mt Chudalup and Pingerup

In many instances, the attractiveness of these landscapes is greatest where different landforms, soils and plant communities meet. Thus, scenic quality is often a direct reflection of the ecological diversity of an environment.

This landscape mosaic is subject to continual change as the result of natural and human forces. Much of the landscape, particularly the northern portion of the Shannon Basin, has been altered by logging and fire. Erosional processes are actively altering the appearance of large areas along and adjacent to the coast. Elsewhere other influences, such as grazing and the introduction of non-native plants, have resulted in more subtle changes.

Despite the nature and extent of such disturbances, large areas of the Parks still retain most of their natural character and in all probability look very similar to the south coast landscapes sighted by the first French and Dutch navigators three or four centuries ago.

6.0 LAND USE CAPABILITY

Resource characteristics, such as topography, soil, vegetation, landscape and hydrology, can be used to identify land units. Nine such units have been identified in the Shannon -D'Entrecasteaux (Map 7). These are listed and described below. The resource characteristics were subsequently used to determine the land use capability of each unit (Table 3). Land use capability in this context refers to the ability of an area to sustain some level of recreational use without damage to the natural environment.

PREDOMINANTLY JARRAH. This unit, in the upper Shannon Basin, is dominated by extensive, tall, jarrah forest on lateritic soils. Valleys are broad and flat with some swampy areas.

PREDOMINANTLY KARRI. This unit dominates the deeply-incised valleys in the upper sections of the Shannon Basin. It is composed of tall forest, dominated by tall karri forest in deeply incised valleys, with jarrah forest associations being restricted to the ridges.

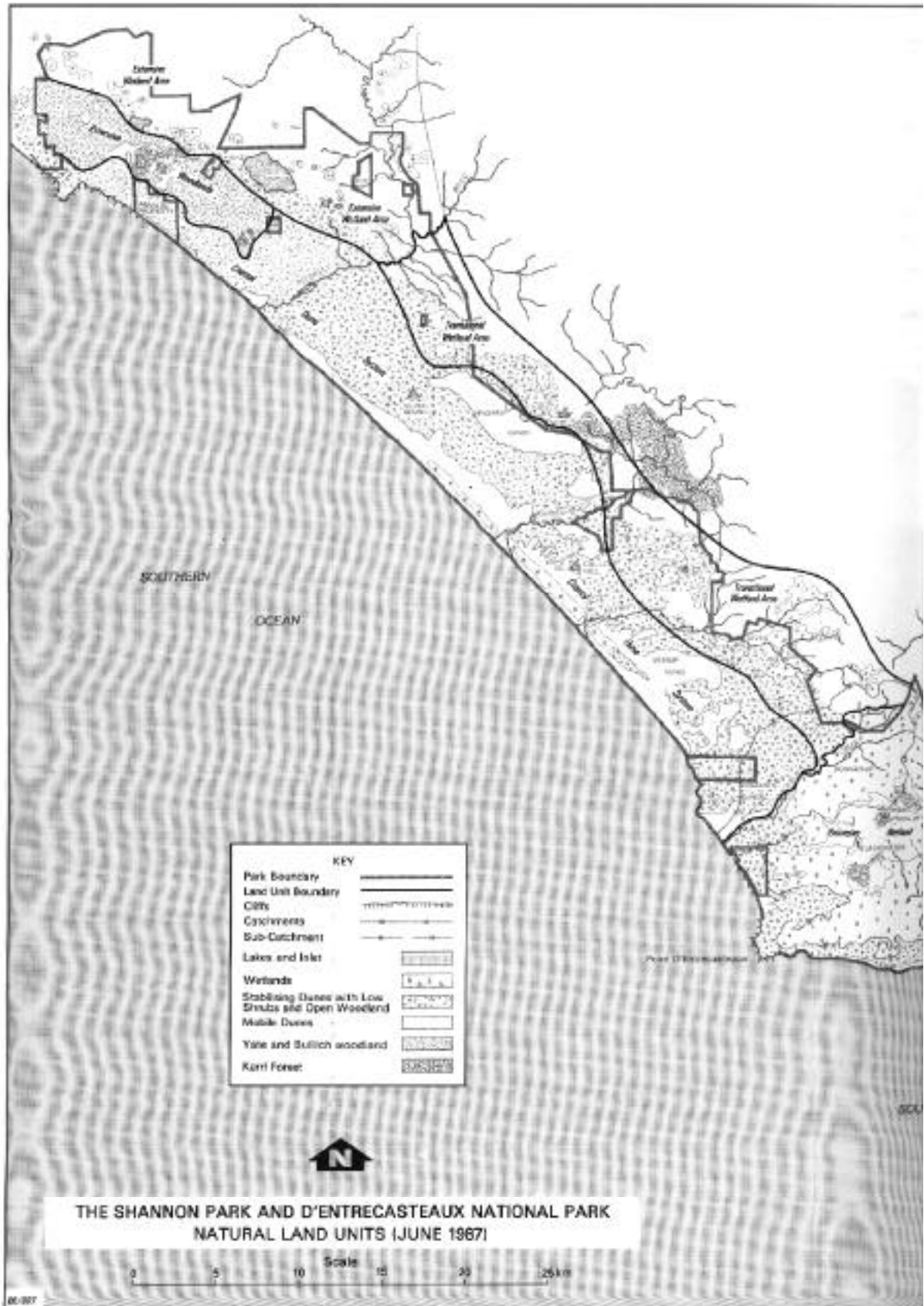
KARRI MOSAIC. The central Shannon Basin is characterised by a complexity of tall forest communities in hilly terrain. Valleys are U-shaped and valley floors form narrow, swampy passages supporting myrtaceous heaths and sedgelands. Patches of karri occur on most slopes. Tall jarrah is restricted to ridges and crests. There are many rock outcrops.

**TABLE 3
RESOURCE CHARACTERISTICS AND LAND USE CAPABILITY OF MAJOR LAND UNITS IN THE SHANNON AND D'ENTRECASTEAUX PARKS**

Resource Characteristic Land Unit	TOPOGRAPHY				SOIL				VEGETATION TYPE				VEGETATION STRUCTURE		HYDROLOGY				LAND USE CAPABILITY	PLANNING CONSIDERATIONS			
	Level	Undulating	Step	Outcrops	Gravelly soils	Loamy soils	Sand dunes	Swampy soils	Tall forest	Mixed forest	Woodland	Heathland (coastal)	Sedeland	Dense forest environment	Open forest environment	Open spacious environment	Seasonally inundated	Permanent creeks			Rivers	Oceans	
PREDOMINANT JARRAH	*	#			*				*					*	#		#					HIGH	
PREDOMINANT KARRI		#	*		#	*		*	*	#				*	*		*	*	#			HIGH	Areas with minor physical limitations
KARRI MOSAIC		*	#	#	#	*			*	*				*	*		*	*				HIGH	
PREDOMINANT FLATS AND SCRUB	*	#		*	#	*			*	*		*		*	*		*	*	*			MODERATE	Areas with some physical limitations which can be overcome with careful design and by adoption of site management techniques to ensure minimal site disturbance.
EXTENSIVE FLATS AND WOODLAND	*			*		*			*	*		*			*		*	*				MODERATE	
EXTENSIVE WETLAND AREA	*						*		*			*		*	*		*	*				LOW - MODERATE	Areas with severe physical limitations. Detailed site investigation and environmental design to prevent site disturbance.
EXTENSIVE WOODLANDS			#			*				#	*				*							LOW - MODERATE	
TRANSITIONAL WETLAND AREA	*		*			*	*		*	*	*	*		*	*	#	*	*	*	*	*	LOW	Areas with very severe physical limitations which are difficult to overcome. No use involving major site disturbance recommended.
COASTAL DUNE SYSTEM			*			*	*		*	#	*	*			*	*			*	*	*	LOW	

* Prominent Feature # Secondary Feature

The resource characteristics of each land unit determines the inherent ability to supply and sustain public use and development (including management activities) without causing irreversible damage to the natural environment. This statement of land use capability determines the types of planning constraints which must be considered in the development or management strategies for the area.





PREDOMINANTLY FLATS AND SCRUB. The lower Shannon Basin is composed of a complex mosaic of sedge and heathlands on seasonally-inundated, sandy flats. Karri and jarrah occur as isolated patches on low hills. Drainage is impeded and often unchannelled in this gently-undulating, seasonally- inundated landscape.

EXTENSIVE FLATS AND WOODLANDS. The characteristics of the Pingerup Plains which drain into the Broke Inlet are similar to the lower Shannon, although on the Plains the flats and woodlands are more extensive and the patches of karri are smaller and more scattered.

TRANSITIONAL WETLAND AREA. Along the length of the D'Entrecasteaux National Park, a transitional zone between the forest and the coastal belt is characterised by interdunal wetlands and swamps. This unit is highly variable, but in general comprises stable dunes with vegetation ranging from peppermint, yate and bullich woodlands to open scrub, interspersed by sedgeland and myrtaceous heath or thickets, and melaleuca swamps on low-lying flats. Dune slopes are often very steep.

COASTAL DUNE SYSTEM. The coastal belt is composed of a number of different sand-dune systems. These dunes are often characterised by steep slopes and sparse vegetation.

EXTENSIVE WETLAND AREA. On the Scott River Plain (in the Jasper area) and Chudalup Plains extensive wetland systems occur. Sedgeland flats are interspersed by paperbark. swamps on broad water-courses. stunted jarrah, paperbark and banksia are scattered through-out the area.

EXTENSIVE WOODLANDS. Between Black Point and Lake Jasper extensive areas of yate, bullich, jarrah and marri woodland occur on the coastal dunes.

7.0 CULTURAL FEATURES

Past and present human use of the Parks is evidenced, in part, by remnant structures and materials. This use is discussed in greater detail in 8.0 Past Use and 9.0 Present Use. The features which remain are discussed below.

7.1 Aboriginal

Although no systematic exploration of the Parks for Aboriginal artefacts has been carried out, a number of sites have been found.

Fish traps remain on a stream near Chudalup and on Broke Inlet. Several shell middens have also been found in this area. Flake and pebble tools have been noted in many places along the coast and at several inland sites.

Factors contributing to the scarcity of known sites are -

- lack of intensive and extensive searches for such artefacts.
- changes in sea level over the past 12 000 years.
- geologically recent age of much of the coastal dune system.
- destruction of material through natural processes (Dortch, Kendrick and Morse 1984).
- density of the vegetation.

7.2 European

Blackboy Hut in the central Shannon, Bolghinup Hut west of Yeagarup and a few bridges and stockyards are the only significant structures in the Parks which are known to date from early European settlement.

All of the original timber mill structures at Shannon townsite have been removed; only the golf-course remains. The nearby Shannon Dam, which once supplied water to the townsite, is now used for swimming and fishing. Barbecue sites adjacent to the Dam have been used for some time.

The wreck of the 'Mandalay' at Mandalay Beach is occasionally visible at low tide. Although outside the Park's boundaries, the ship's skeleton., provides a link with the State's past.

other evidence of human use, such as roads and tracks, and landscape and: vegetation modification, are discussed elsewhere in this plan.

8.0 PAST USE

8.1 Aboriginal

Aboriginal occupation of the southern coastal areas dates from at least 6 790 years Before Present, according to archeological analyses of quarries near Northcliffe.

Many occupation sites prior to this date are likely to have been below the present level of the ocean, which was substantially lower during the last ice age (Chappell 1976; Chappell and Thom 1977). Similarly, many sites are likely to lie beneath the coastal dunes, which have developed over the last

10 000 years. Investigations of other areas close to the Parks (such as Devils' Lair near Augusta) indicate a period of occupation stretching to at least 35 000 years Before Present (Dortch and Meriless 1973; Dortch 1979).

Many sites containing stone artifacts have been found, but the scarcity of biotic material in known archeological deposits at present prevents definitive assessment of pre-historic Aboriginal subsistence and land use (Dortch and Gardner 1976). Such land use was probably similar to that recorded in other south-western coastal districts during the nineteenth century prior to the disappearance of Aboriginal culture from the area in the 1890s (ibid). This would have involved a seasonal, or at least weather-related, alternative use of coastal and inland areas in response to water and food availability. Dortch (1979) believed that Aboriginal groups would stay in an area, using a fixed camping spot such as a cave, until food sources from local forests and woodlands were depleted, then move on. Presumably, the availability of aquatic and marine food would also have influenced Aboriginal use patterns (Dortch 1980; Dortch, Kendrick and Morse 1984).

8.2 European

Since the late 1800s cattle have been driven to the south coast for summer grazing. Grazing on the coast initially took place on an informal basis, with cattle being driven from inland to utilize the coastal, summer feed. In the 1920s some locations were purchased and leases acquired. In recent years grazing activity has decreased, both because of market changes, and the non-renewal of grazing leases in the area following the declaration of parts of the D'Entrecasteaux National Park.

The area has been used for recreation for at least the last 50 years. 'Group settlers' from the Northcliffe area camped near the mouth of the Gardner River in such numbers in the 1930s that a shopkeeper attended their needs. Other favoured carping spots included the Broke Inlet and the mouth of the Donnelly River, although other areas were also used. Access was primarily by foot, horse or cart, and occasionally by tractor.

Recreational use of the Shannon Basin has also been extensive in the past, particularly while the Shannon townsite was a flourishing mill town (1950-1970). During this time local residents hunted, fished and marroned throughout the Basin, with more intensive use focusing on the golf course at Shannon townsite and the Shannon Dam just upstream.

Many resources have been extracted from the Parks. About 15% of the Shannon Basin has been selectively logged or clear-felled over the past century, for use in both the Shannon and other local mills. A now abandoned rail-line served Shannon mill during its operation.

Apiarists have placed hives within the Basin for karri honey when these trees were flowering. Other recent activities include salvage logging in the Boorara area following a severe wildfire in the 1960s.

Logging has also occurred in the D'Entrecasteaux National Park. In particular, Native Cedar (*Agonis juniperina*) was cut and milled for boat-building.

Wildflower picking has taken place in the low-lying wetlands at Chudalup and around Broke Inlet. The species of greatest interest to professional pickers have been *Agonis parviceps*, *Beaufortia sparsa*, *Adenanthos obovatus*., *Podocarpus drouynianus* and *Boronia megastigma*.

Limestone has been mined from a site near Windy Harbour since 1978 for use by farmers. Mineral and hydrocarbon exploration has been carried out over most of the Parks.

More recently, there has been a dramatic change in the recreational use of the Parks. Increased ownership of four-wheel-drive vehicles has greatly increased access throughout the Parks. While twenty years ago the Warren Hill sleeper track constituted the latest in coastal access technology, now light-weight four-wheel-drive vehicles have comparatively easy access to much of the Park. At the same time, the State's population is generally more mobile, leading to many more people from outside the region using the Parks. The result has been increased use of both coastal and inland areas for fishing, camping, picnicking and other activities. This is leading to increased erosion of tracks and landforms.

9.0 PRESENT USE

Present use of the Parks focuses on recreation in a natural environment. This includes inland marroning and fishing, bushwalking and horse riding, of off-road-vehicle use (primarily on dunes), beach fishing, camping, scenic driving, boating and swimming. The following discussion is based on information from traffic counters and observations at Shannon townsite (September 1986 - April 1987), an Easter beach survey in the D'Entrecasteaux (April 1987), and major use patterns determined from opportunistic observations and public submissions. No comprehensive survey of recreational use has been undertaken.

Activity is greatest where vehicle access is easiest and when alternate regional opportunity is most constrained. In addition, vehicle-based activities dominate, with opportunities for recreation based on or facilitated by the use of four-wheel-drive vehicles being much greater than those associated with two-wheel-drive vehicles.

The majority of recreation revolves around fishing, swimming or camping along the coast - particularly where there are long, wide beaches. These activities are most popular in summer and autumn and occur Primarily on Yeagarup, Warren, Malimup, Gardner and Coodamurup Beaches. Rock fishing is also popular, particularly at Black Point and east of Fish Creek. Over Easter 1987,

beaches were surveyed at 0800, 1200 and 1600 hours each day. Maximum vehicles recorded at any one time were Yeagarup - 39, Warren - 18, Malimup - 55, Gardner - 22 and Coodamurrup - 9.

The Shannon townsite is becoming increasingly popular, both as an overnight stopping point, as well as for its interpretive and recreational facilities. The townsite provides huts and camping facilities for overnight visitors, while the interpretive facilities include a visitor centre and walk trail. Average monthly usage over last summer (1986/87) was 130 cars at overnight stays, 500 cars at the visitor centre and 750 people at the walk trail. Additional recreational facilities include the Shannon Dam, barbecues and golf course.

Inland fishing and marroning occurs on virtually every water body within the Parks, the season of activity varying with licence provisions. The area used for bushwalking also varies seasonally with the availability of fresh water. The season and location of other activities also depends upon the presence of necessary or desirable resources and conditions.

Other activities include -

- swimming and picnicking at the Shannon Dam
- walking the Bibbulmun Track, which enters the north of the Shannon Basin
- hang-gliding over Lake Jasper by a local club using a power boat for towing
- private horseback tours between Broke Inlet and Gardner River
- expedition skills courses run by the Western Australian Education Department
- canoeing
- nature study and photography, particularly in spring.

A further recreational activity in the Parks is the private use of huts which have been constructed near the coast. This is discussed in D. Management Prescriptions 9.9 Huts.

Non-recreational use of the Parks includes beekeeping within the Shannon forest areas, and the use of roads and tracks by the public and industry (D. Management Prescriptions 11.5 Beekeeping and 7.0 Access respectively).

10.0 CONSERVATION OPPORTUNITIES

Protection of the natural values of the Parks is the fundamental concern of this plan. Thus, management and sustained use must not cause irreversible environmental damage or impairment of scenic beauty.

Certain areas of the Parks are more susceptible to damage than others. This susceptibility is based on key features such as delicate and unusual geological formations, degree of risk of infection or existing infection by dieback (Map 8), rare plant and fragile plant communities (Map 8), extreme susceptibility to soil erosion and degradation (Map 6), and least disturbed areas (based on leased for

grazing for less than 20 years [Map 91 not logged [Map 101, and burnt twice or less in the last 45 years [Map 111).

Map 12 is a compilation of the above features, and thus provides a summary of the key conservation opportunities in the Parks. Such areas include the most important and fragile biological and physical features of the Parks.

11.0 RECREATION OPPORTUNITIES

This plan also provides for a range of recreation opportunities which can be sustained without irreparable damage to the environment. The Parks will be available for day and overnight use in a variety of settings, from tall forests to open coastal areas (Map 13). Information to enhance appreciation of the Parks and their facilities will be provided for Park visitors.

The Parks will be accessible by four-wheel and two-wheel-drive vehicles, horses, boats and walkers. Vehicle access will be improved in some areas, while other areas will remain largely undeveloped, thereby retaining their inherent natural qualities. The recreational opportunities available in the Parks are intended to complement existing tourist development and public facilities available in the surrounding region.

C. MANAGEMENT OBJECTIVES

1.0 MANAGEMENT OBJECTIVES FOR NATIONAL PARKS

The following management objectives for national parks are derived from the Conservation and Land Management Act (1984) and departmental policies for management. The objectives are to:

1. Protect and conserve native plants and animals and their habitats.
2. Protect and conserve physical, cultural and scenic resources.
3. Provide opportunities and facilities for appropriate public recreation.
4. Regulate use to be consistent with the maintenance and protection of natural resource values and to minimise conflict between uses.
5. Promote visitor safety, awareness and appreciation of natural processes and the scientific and cultural attributes of park resources.
6. Provide information, education and interpretive programs.

2.0 MANAGEMENT OBJECTIVES FOR THE SHANNON PARK AND D'ENTRECASTEAUX NATIONAL PARK

Management objectives specific to the two Parks were derived from: the above general objectives; the dual purpose of 'national park and water'; and the information provided in B. Description of the Parks. The following background information is most relevant to the determination of specific objectives -

- The Shannon Park contains the most protected watershed in the State's south-west and the largest contiguous area of karri forest reserved for conservation.
- The four main rivers (Donnelly, Warren, Gardner and Shannon) , plus other minor rivers and streams which flow through the Parks, are of great conservation and recreation value. In addition, between them they have an estimated potential yield for water supply of 680 million cubic metres per annum. This yield represents 45% of the divertible potable water resources that remain undeveloped in the south-west region.
- The D'Entrecasteaux National Park contains the only major coastal wetland and dune area reserved for conservation in the south-west.
- Several areas contain important biological and physical features.
- Some areas have been disturbed by human activities and this disturbance is likely to spread unless the areas are actively managed and rehabilitated.
- Many areas in the Parks are capable of sustaining very little public use without irreparable environmental damage.

- There is demand for a variety of recreational opportunities within the Parks, some of which cannot be satisfied elsewhere in the region.
- There are few developed opportunities for recreation in the Parks, especially for people without four-wheel-drive vehicles.
- Our knowledge and understanding of the natural environment, cultural heritage, and existing and future recreational use of the Parks is very limited.

The specific management objectives for the Parks are to:

1. Protect the biological and physical environment and the cultural and scientific features of the Parks.
2. Protect and preserve the surface waters and groundwaters of the Park, in terms of both quantity and quality.
3. Rehabilitate the natural environment as necessary.
4. Develop and maintain a basis of knowledge about the biological and physical environment of the Parks, and pass on this information to the public.
5. Provide opportunities for public education regarding the Parks.
6. Provide opportunities for appropriate public recreation, while at the same time ensuring that the environment is capable of supporting the use without unacceptable damage, and that the recreational experiences of visitors are not impaired by conflicting uses.
7. Protect the lives of neighbours and visitors to the Parks.

3.0 OBJECTIVES FOR THE PERIOD OF THE PLAN

It is unlikely that all of the objectives listed under 2.0 management Objectives for Shannon Park and D'Entrecasteaux Park will be achieved during the period of this plan (5 years) , for two reasons - the limited resources available for management, and the limited knowledge of the Parks at the present time. Thus, priority will be given to protecting the conservation values of the Parks (including gathering much-needed information) and providing a range of recreation opportunities, with due regard to the sensitivity of the environment.

D. MANAGEMENT PRESCRIPTIONS

1.0 INTRODUCTION AND METHODOLOGY

1.1 Introduction

Much of the appeal of the Shannon and D'Entrecasteaux Parks can be attributed to the relative remoteness and inaccessibility of the magnificent coastal and forest landscapes they contain. While the areas are by no means pristine, they still contain some of the last large enclaves of relatively undisturbed land in the south-west. In planning for the future management of this Park system, the intrinsic character and wildness of this region must not be jeopardised through insensitive development and use. This requires a delicate balance between preservation and use.

A common tendency in park management is to respond to increasing visitor demands by either upgrading existing areas and facilities or by providing new opportunities. Such a response is understandable and quite often justifiable providing it does not lead to the deterioration of either the park environment or the quality of the recreational experience provided.

It must be clearly recognized, however, that in many instances the provision of new or improved areas and facilities increases demands on park resources rather than alleviating problems of overcrowding. This can lead to physical impacts on the natural environment, vandalism, deterioration in visitor satisfaction (through a loss of natural resources which initially attracted visitors to the Parks), and subsequent loss of support for the management authority.

In the case of the D'Entrecasteaux National Park, for example, the majority of current users have indicated that they, will not support a program of road closures that would deny access to 'traditional' fishing beaches. But at the same time, many of those who presently favour maintaining or increasing access would be very concerned if these beaches were to become over-crowded, or favourite marroning spots 'fished out', thus losing their appeal.

Unfortunately, there are no magical formulae for determining what constitutes an effective and acceptable balance. However, the network of access tracks and facility developments recommended in this plan will cater for reasonable growth in visitor use without jeopardising existing conservation and recreation values.

Future planning is strongly urged to carefully consider the ramifications of increasing access and facility developments beyond that proposed in this plan. Any future changes should only be approved if they fully satisfy the objectives given in C. Management Objectives.

For each issue in this part (D. Management Prescriptions) management objectives, background information and management prescriptions are presented. The objectives are generally a reflection of departmental policy and the general and specific management objectives for the Parks.

1.2 Methodology

Evaluation of the issues and subsequent determination of prescriptions was based on the following criteria:

- relevant legislation and policies.
- capacity of the natural system (landscape, plants and animals) to sustain proposed activity without irreparable damage.
- equity for Park users, given that all forms of use must be generally compatible with conservation and not have adverse impacts on other Park users.
- capacity of managing authority to protect the natural environment and Park visitors.

2.0 LAND TENURE

2.1 National Park Status

Objective

1. *To complete reservation of the Shannon and D'Entrecasteaux National Parks.*

Background

The majority of the area recommended by the Environmental Protection Authority, and endorsed by Cabinet, for inclusion in the D'Entrecasteaux National Park is not yet part of the Park. The recommended area is currently a mixture of national park, Crown land under pastoral lease, reserved for given purposes or vacant, and freehold locations.

The proposed Shannon National Park currently includes State forest, vacant Crown land and part of Sir James Mitchell National Park. None of the Basin has, as yet, been reserved as national park.

Further details on Park status are given in B. Description of the Parks 2.0 Tenure, Purpose and Vesting, Map 2 and Appendices 1-7.

Prescriptions

1. **The gazettal of those parts of the proposed D'Entrecasteaux National Park not yet vested in the NPNCA as national park will proceed over the term of the plan. This will involve the 26 reserves between Windy Harbour and Broke Inlet (App. 3), approximately 47 190 ha of vacant Crown land (Map 2), pastoral leases as they are re-purchased or cancelled (App.**

2), any of the 26 freehold enclaves which are purchased by CALM (App. 5) and Gardner River reserve (controlled by the Shire of Manjimup). Gazettal will also include the sections of river which flow through the existing and proposed National Park.

2. As the remaining unvested areas are gazetted as national park and vested in the NPNCA they will, similarly to the existing D'Entrecasteaux National Park, be given the dual purpose of 'national park and water' and named D'Entrecasteaux National Park. As these areas are reserved as national park they will be given separate reserve numbers. The Park will be amalgamated under one reserve number at a later stage.
3. The government will declare the Shannon Basin a national park. As the philosophy behind its declaration was the setting aside of a complete watershed within a conservation area, the boundaries will follow the boundary of the Shannon Basin watershed, not existing linear cadastral features (as is the case with many other reserves) (Map 2). Gazettal as national park will be preceded by revocation of the State forest that occupies the northern three-quarters of the Basin, and cancellation of part of Sir James Mitchell National Park (Class A).
4. Road reserves not required for access to the private property will be cancelled and added to the Parks. This prescription will be implemented in liaison with the relevant local government authority.

2.2 Park Boundaries

Objective

1. *To adjust the boundaries of the Parks over the period of the plan to achieve a more complete representation of land systems and more efficient management of the Parks.*

Background

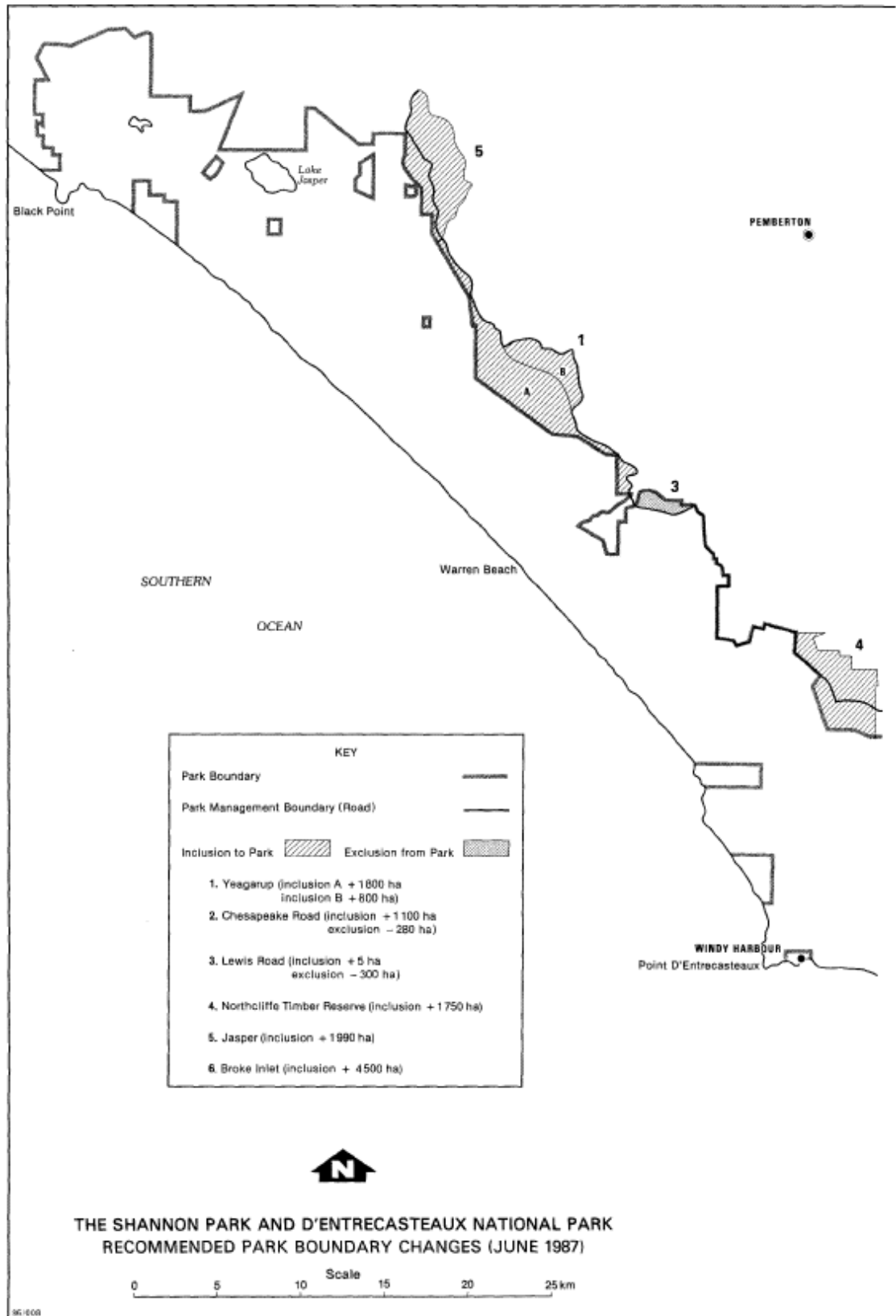
The existing boundaries of the D'Entrecasteaux follow cadastral lines which bear little relation to natural features. In places the boundary crosses features (eg. face of the Yeagarup Dunes) whose values would be enhanced if whole, rather than part of the feature, were included in the Park. Also, Park management and administration would be more efficient if the boundary was delineated, where possible, by existing tracks and roads.

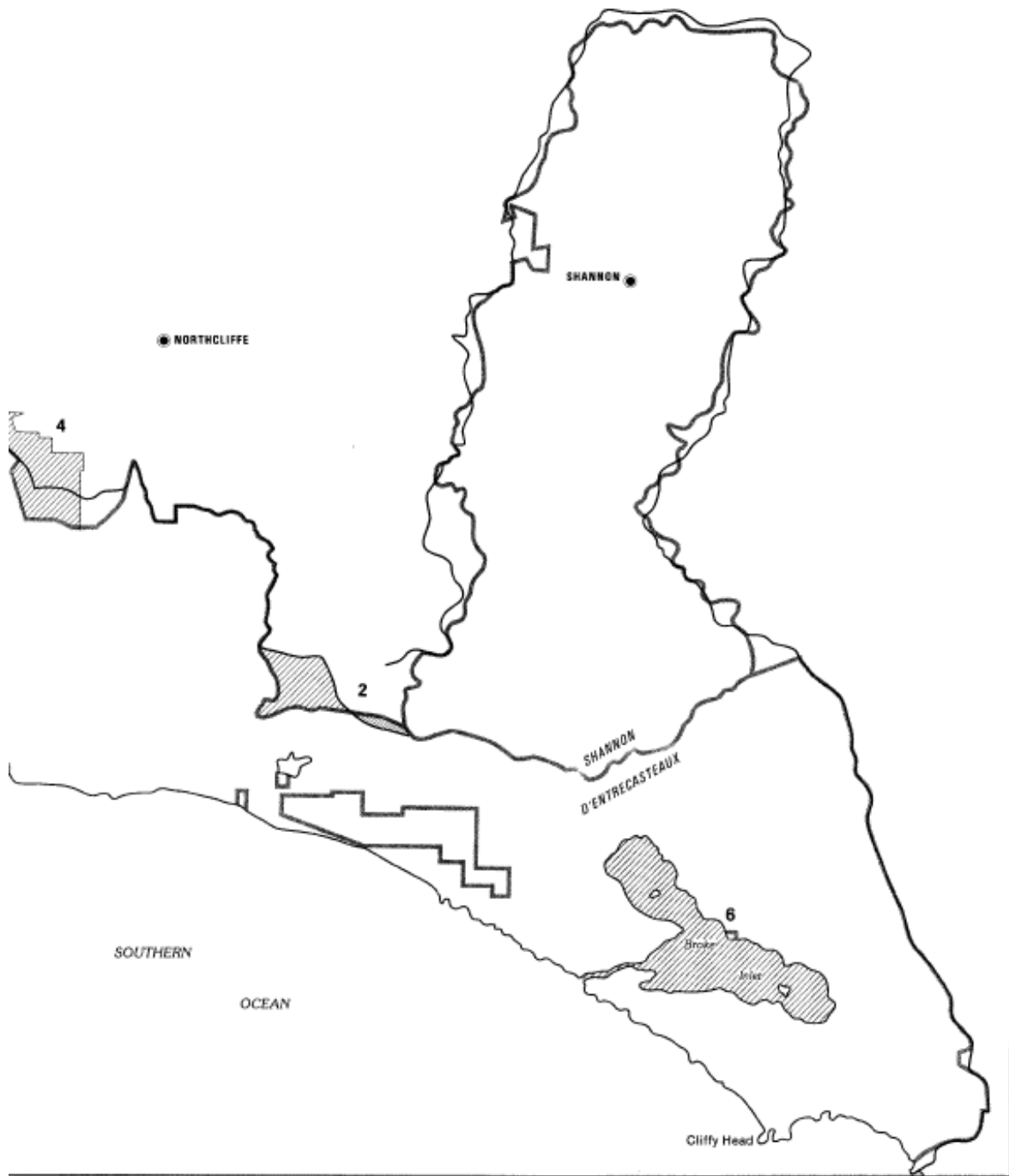
Map 8 and Table 4 indicate six boundary changes which could alleviate these problems.

TABLE 4. SUGGESTED BOUNDARY CHANGES - D'ENTRECASTEAUX NATIONAL PARK

LOCATION*	AREA INVOLVED (APPROX.)	CURRENT STATUS	BENEFITS
1a Yeagarup	include 1 800 ha	State forest	inclusion of entire dune system, including Yeagarup, Lake, in National Park
1b Yeagarup,	include 800 ha	State forest	new management boundary delineated by Charlie, Ritter and Yeagarup Roads
2 Chesapeake Road	include 1 100 ha, exclude 200 ha	state forest, national park	Chesapeake Road provides a readily identifiable Park boundary
3 Lewis Road	include 5 ha, exclude 300 ha	state forest, national park	Lewis Road (east of Warren Beach Track) provides a readily identifiable Park boundary
4 Northcliffe Timber Reserve	include 1 750 ha	timber reserve (majority of area) and vacant Crown land	rationalise management
5 Jasper area	include 1 990 ha	State forest (majority of area) and vacant Crown land	add poorly represented jarrah-forest association to the Park, provide Park 'frontage' to the Vasse Highway
6 Broke Inlet	4 500 ha	vacant Crown land	gazetted as a marine park and associated management benefits

* numbers refer to areas on Map 8.





The boundaries of the Shannon Park are as delineated by the Shannon watershed boundary, except where private property extends into the Basin (Maps 2 and 5).

Prescriptions

- 1. The addition of Areas 1a (Yeagarup) and 2 (Chesapeake Road) (Table 4, Map 8) to the Park will be sought once this plan has been approved.**
- 2. Given that the remaining boundary changes involve either same loss in resource utilisation or decrease in Park size (loss of conservation resource), the remaining changes (those based on Areas 1b, 3, 4, 5 and 6) will be reviewed over the period of the plan. The review will be based on an analysis of the values and resources involved.**
- 3. Existing management tracks will be used to establish a system of Park boundary roads (Map 8). This will not involve clearing additional forest areas.**
- 4. The boundary between the two Parks will follow Chesapeake and Pingerup Roads (Maps 3 and 8).**

2.3 Alienated Lands Within and Adjacent to the Parks (private property and pastoral leases)

Objectives

- 1. To rationalise and simplify Park management by eventually adding existing, alienated lands within the Parks, to the Parks.*
- 2. To ensure that management of adjacent and enclaved properties does not adversely affect Park values.*

Background

There are 26 privately-owned locations, with a total area of approximately 4 687 ha, almost or entirely enclosed by the D'Entrecasteaux National Park (App. 5) . There are five pastoral leases covering 12 273 ha of the D'Entrecasteaux National Park (App. 2). These expire in 2015. There are no private properties or leases within the Shannon National Park. There are, however, privately-owned properties adjacent to the Park within the Shannon catchment. A total of 20 km of the boundary of the Shannon and 100 km of the D'Entrecasteaux (both external and internal) abuts private property.

Because of the need to protect the Park from problems that might emanate from alienated land abutting or within the Park, and conversely to protect development and inhabitants on alienated land from problems (such as fire) that might emanate from the Park, the presence of alienated land greatly increases management complexity. .

Some of the problems include: introduced animals on private property and leases wandering onto Park land if not properly restrained; feral animals, such as foxes, hiding and breeding in Parks and eating farm stock; and weed infestation. Also, the provision and use of public utilities such as roads, and power and telephone lines, may place Park values at risk from weeds and pathogen introduction, erosion, adverse impacts on fauna movement and impairment of landscape character.

Prescriptions

Private Property

- 1. Properties that have important conservation or recreation values, or that border areas within the Parks that have important conservation or recreation values, will be purchased when available and reserved as national park. Over the period of the plan the 26 enclaves within the D'Entrecasteaux will be prioritised in terms of lack of disturbance and environmental significance. This priority listing will guide purchasing.**
- 2. Land use or the sub-division of privately owned enclaves will be controlled through a coordinated approach by the relevant authorities and departments.**
- 3. Guidelines will be established for appropriate development on private land within and adjacent to the Parks.**

Pastoral Leases

- 4. All pastoral leases will be cancelled, purchased or not renewed as soon as possible and the areas concerned reserved as national park.**
- 5. CALM will liaise with the Department of Land Administration to ensure that: lessees comply with the conditions of lease; erosion does not, result from grazing practices; and leases are monitored to determine both compliance with conditions and levels of impact of grazing.**
- 6. No new pastoral leases will be issued.**

General

- 7. Liaison will be maintained with owners of properties within or adjacent to the Parks and leaseholders to ensure that management activities are properly coordinated.**

2.4 Shire Reserves

Objectives

1. *To minimise the management complexity within the D'Entrecasteaux by, minimising the number of managing authorities.*
2. *To ensure that management of the Shire reserves is coordinated with management of the surrounding Parks.*

Background

There are three reserves vested in or under the control of the Shire of Manjimup - Windy Harbour, Camfield and Gardner River (Map 2, App. 6).

Windy Harbour (Reserve No. A38881, 90.4 ha) currently includes 250-300 cottage locations, which are primarily used for holiday and recreation purposes, a public camp-ground and rudimentary boat launching facilities. The settlement's road access, part of its water supply system and rubbish dump lie within the D'Entrecasteaux National Park.

Camfield (Reserve No. 19787, 40.5 ha) lies on the north-eastern edge of Broke Inlet. It has no public facilities, although 10-15 squatters' huts have been constructed. Public use of the foreshore area of Broke Inlet is affected by the presence of these shacks, many of which are old and delapidated. There are no public facilities.

Gardner River reserve (No. A15776, 283.3 ha) lies on the eastern side of the river mouth. The area is inaccessible for much of the year and has no developments.

Prescriptions

Windy Harbour

1. **Liaison between CALM and the Shire of Manjimup will continue, to ensure a coordinated approach to use and management of land adjoining windy Harbour.**
2. **The area of the Windy Harbour Reserve will be increased by 112 ha, to 202 ha (Map 2). These additions will be on the eastern side. This increase in area will ensure that the Windy Harbour rubbish dump is located within the reserve and is therefore the management responsibility of the Windy Harbour Board of Control. No additions are proposed on the northern and western side, as this would lead to encroachment on Point D'Entrecasteaux, an environmentally sensitive and visually significant feature.**

3. **The continued use of those parts of the D'Entrecasteaux National Park now used for supplying water to Windy Harbour will be permitted. A letter of agreement between CALM and the Shire of Manjimup will formalise this agreement.**
4. **Rubbish originating from Windy Harbour must be disposed of within the Windy Harbour reserve or removed to disposal facilities outside the National Park.**
5. **Work on the Windy Harbour road will take into account the risk of introducing or spreading dieback and the landscape amenity of the road.**

Camfield

6. **CALM will provide assistance to the Shire of Manjimup to ensure that the management of Camfield complements the management of the surrounding Park.**

Gardner River

7. **The Gardner River Reserve (No. 15776) will be vested in the NPNCA for the purpose of 'national park and water', subject to agreement by THE Shire of Manjimup.**
8. **A camping area will be established by CALM on the western side of the River mouth.**

3.0 LAND AND WATER MANAGEMENT

3.1 Geological Features and Landforms

Objectives

1. *To protect important geological and landform features in the Parks.*
2. *To protect scenic landscapes from impairment of visual amenity.*
3. *To provide interpretive information to the public about the geology and landforms of the Parks.*

Background

There are a number of geological features in the Parks which are of particular interest because they represent unusual structures or formations (Table 5). Some are locality-specific, such as the columnar basalt formations at Black Point, and the sandstone formations in the Doggerup area. Other structural features are more widely represented in the Parks. These include the major monadnocks (rock outcrops) such as Mt Chudalup, Mt Burnside, Mt Pingerup and the Woolbale Hills, and the massive limestone sea-cliffs.

TABLE 5.
SPECIAL GEOLOGICAL AIM LANDFORM FEATURES OF THE
SHANNON AND D'ENTRECASTEAUX PARKS

FEATURE	LOCATION
Geological Features	
basalt outcrops	- Black Point
sandstone and related features	- Doggerup
limestone sea-cliffs	- D'Entrecasteaux
	- south of Broke Inlet
caves	
major monadnocks	- Mt Chudalup
	- Mt Pingerup
	- Mt Burnside
	- Woolbale Hills
Landform Features	
massive mobile dunes	- Yeagarup
	- Callcup
	- Meerup
	- Doggerup
Shannon Basin	
Broke Inlet	
coastal wetlands	
mouth of the Warren	
mouth of the Broke Inlet	

There are also broadscale landform features such as the extensive sand drifts in the Yeagarup, Callcup, Meerup and Doggerup areas, the Shannon River Basin, Broke Inlet and the extensive depositional plains characteristic of the southern parts of the Parks (Table 5).

Some landforms in the Park are highly susceptible to damage if inappropriately used. Delicate and unusual geological features are indicated on Map 12.

Prescriptions

- 1. A walk trail will provide access to the basalt columns at Black Point, however given the area's susceptibility to erosion, it will not be promoted.**
- 2. No assisted access (eg. walk trails, roads) will be provided to the Doggerup sandstone. The area will not be promoted.**
- 3. The roads and parking facilities providing access to the limestone sea-cliffs at Point D'Entrecasteaux will be upgraded and short walk trail established for day use. The limestone sea-cliffs south of Broke Inlet will remain accessible on foot from Mandalay Beach Road.**
- 4. The existing access and low key facilities at the Mount Chudalup and Mount Burnside monadnocks will be retained. Mount Pingerup and the Wool-bales will be accessible on foot from the South West Highway.**
- 5. At Callcup Hill a carefully located and designed footpath on the leeward side of the hill will be provided.**
- 6. Mobile dunes will not be available for off-road-vehicle use.**
- 7. The road which currently traverses the wetland-dune interface at Yeagarup will be re-routed if possible. Public appreciation of the Yeagarup dunes will be encouraged through the provision of nearby facilities and information.**
- 8. Interpretive brochures will be used to increase the public's appreciation of the Parks' geological and landform features.**
- 9. Landforms that are highly susceptible to damage will be protected from inappropriate use.**
- 10. Scenic landscapes will be protected from impairment of visual amenity.**

3.2 Water Resources

Objectives

1. *To protect the water resources of the Parks from changes to quantity, quality and seasonality.*
2. *To protect water bodies with high conservation values from disturbance by recreational use (eg. Lake Maringup, Lake Quitjup, Charley Lake).*
3. *To facilitate recreational use of other water bodies without endangering their quality.*
4. *To ensure that, as far as possible, activities outside the Parks do not harm the water resources of the Parks.*

Background

The importance of the water resources of the D'Entrecasteaux, both in terms of the protection and maintenance of the area's biotic and physical systems and also their potential regional utility, was recognised in the Conservation Through Reserves Committee Report (1974) and subsequently by the Environmental Protection Authority (EPA) in the 'Red Book' for the Systems 1, 2, 3 and 5 (1976). The EPA recommended that the D'Entrecasteaux be declared a Class A reserve for the purpose of both 'national park and water'. Similarly, one of the main aims of reservation of the Shannon watershed was to maintain in as pristine a condition as possible one major south-western river and catchment system.

The water resources of the Shannon and D'Entrecasteaux are important for three reasons. They are vital in regard to the creation and maintenance of the Park's biotic systems, they play a significant role in recreation within the Parks and they are of considerable regional significance in their potential for development for public water supply purposes.

Maintenance of water quality and quantity is fundamental for the protection of the Parks' values. Water quality parameters of greatest importance are salinity, nutrient loading (especially phosphates and nitrates) and turbidity. Water quantity is important with regard to both the seasonal flow and fluctuation, and the absolute volume.

Actions outside the Parks can affect the quality of water in water bodies within the Parks. This is especially true for the Donnelly and Warren

Rivers, which have the majority of their catchments outside (and *upstream* of) of the Parks. Clearing, fertilising and other activities within the catchments will have an effect on the quality of the water bodies within the Parks.

Any change in the quantity or seasonality of the water passing through the Parks must affect the biological and physical systems of the Parks, Wetland areas could change in size and nature, and the estuaries that are barred from the sea, either permanently or for part of the year, might open for a shorter or longer time each year, or open only every second or third year. These changes could result from the diversion of water from or to the Parks ' water systems or through land management practices in their catchments.

Management actions within the Parks can also affect water quality. Road building and use, particularly across or near streams or lakes, can yield eroded material which will increase salinity, nutrient loading and sedimentation. Fire may result in a reduction in the protective vegetation cover which may predispose soil to erosion. Infecting areas within or outside the Parks with *Phytophthora cinnamomi* (such as through the use of infected gravel for road building) can result in water bodies and especially wetlands becoming affected.

Recreational use of water bodies has a number of direct effects on water quality. These include fuel and oil spillage from motors, erosion of stream-banks by boat wash or launching, and introduction of aquatic weeds. Land-based facilities and activities associated with the use of the water bodies can also affect water quality through pollution and erosion from facilities, roads and other developments close to a water body (eg. camp grounds, toilets, picnic grounds). Activities that are essentially land-based can also affect water quality (eg. activities leading to changes in plant cover in catchment areas).

A number of potential dam sites on the Donnelly, Warren and Gardner Rivers and their tributaries, located just upstream of the D'Entrecasteaux, have been identified by the Water Authority (Map 5). A potential dam site on the upper Shannon and potential pipehead development in the lower Shannon have also been recognised. Any water supply development would have a significant impact on the hydrologic regime, and associated biological and physical systems.

No major developments are proposed in the next 20 to 30 years. However, sufficient time must be allowed to conduct detailed and extensive studies prior to any development proposal being made available for public comment.

Prescriptions

- 1. Park management will be directed towards protection of the hydrologic systems and water resources of the Parks. These will be protected from damage, disturbance, infection and changes in quantity and quality.**
- 2. Any major development for water supply will require environmental assessment according to the Environmental Protection Act (1986).**

3. **The provision of recreational opportunities will take into account the need to protect the water resources of the Parks. Appropriate location, construction and use of facilities will be used to minimise potential impacts.**
4. **Recreational use will not be facilitated on water bodies within areas containing rare, endangered or fragile plant communities (Map 8) or on Lake Maringup, Lake Quitjup and Charley Lake.**
5. **Recreational use of other water bodies will be permitted and where appropriate facilitated provided that it does not endanger water quality. However, power boats will not be permitted on water bodies unless other factors are of overwhelming importance.**
6. **In consultation and with the assistance of the Water Authority, efforts will be made to ensure that activities outside the Parks do not harm the water resources of the Parks. This will require liaison with other government departments, local government and landowners.**

3.3 Soil Resources

Objectives

1. *To minimise impacts on soil resources by management activities (such as road construction and fire protection) and when providing recreation opportunities.*
2. *To protect areas highly susceptible to erosion, and soils subject to seasonal inundation, from physical impacts.*

Background

Just as the biological systems of the Parks are dependent on water resources, they are also dependent on the integrity of the soil resource. When the soil surface is disturbed or vegetation is removed, the process of soil erosion can be accelerated resulting in changes in landform and soil structure, and nutrient loss. The susceptibility of the soil resources of the Parks to erosion and degradation was discussed in B. Description of the Parks 4.5 Soils.

In national parks, the greatest effect on the soil resource occurs as a result of the construction and use of roads and facilities for public and, management purposes. For example, the use of horse and walk trails, picnic areas and campsites can also cause soil disturbance resulting in erosion and degradation.

Soil erosion can be caused or exacerbated by the spread of plant diseases, such as dieback, or by fires. Severe fire can cause loss of both vegetation and litter layers. Repeated fires of mild intensity

may result in the depletion of soil nutrients and in changes in soil structure and composition in the long term.

Prescriptions

- 1. Impacts on the soil resource will be minimised or where possible avoided in:**
 - i) the location and development of all Park facilities including roads, carparks, walk trails and picnic sites;**
 - ii) the provision of recreational opportunities; and**
 - iii) all management operations including fire, weed and pest control, and research programs.**

- 2. The coastal sand dunes and areas that are subject to seasonal inundation will be managed to ensure minimal physical impact on the soil and associated vegetation. These areas are shown on Map 6 as extreme, high to extreme and moderate susceptibility to soil erosion and degradation.**

3.4 Rehabilitation

Objectives

- 1. To realign or close, and subsequently rehabilitate, poorly located roads and tracks, based on a recognition of access and recreational demands.*

- 2. To close and rehabilitate degraded sites or to relocate sites where the facilities are still required and rehabilitate the disused site.*

- 3. To rehabilitate areas formerly used for logging.*

- 4. To remove existing rubbish and minimise future rubbish dumping within the Parks.*

Background

There are many areas in both Parks where the biological or physical environment has been modified or degraded as a result of human activities.

Some roads and tracks in the Parks have been placed on alignments which may cause soil erosion or exacerbate the spread of dieback. Other roads have been built on straight alignments which has significantly reduced their scenic value.

Gravel, limestone and other road-building materials have been removed from pits in many places in the Parks. The location of some pits decreases the scenic quality of the Parks.

Recreational use of the Parks has resulted in damage to the environment through the inappropriate use of vehicles or intensive recreational use of sites in sensitive environments. In some places buildings have deteriorated, and rubbish has been left around campsites and huts.

There are many forest assessment plots located in the Shannon Park and a few in the D'Entrecasteaux. These areas are usually ringed by roads and often contain non-native trees in poor condition.

In the Shannon Basin large areas of forest have been clear felled or selectively logged, and roads have been developed for logging operations. Previous rehabilitation work should be continued, particularly on old 'log landings' where soil compaction is severe.

Prescriptions

- 1. All roads and tracks that are poorly located, resulting in soil erosion, degradation of wetlands or impairment of scenic values will be rehabilitated, relocated or closed. (7.0 Access).**
- 2. Designated public access routes that have been constructed at an inappropriate scale or following alignments with low scenic amenity will be systematically realigned to more appropriate routes, subject to the development of approved design plans (eg. Deeside Coast Road, Chesapeake Road).**
- 3. Gravel and other road-building-material pits will be systematically rehabilitated. Rehabilitation will be an integral part of the road maintenance program for the Parks.**
- 4. Existing recreation sites that are poorly located will be relocated and the areas rehabilitated.**
- 5. Forest assessment plots which serve no research function will not be protected from fire. The sites will be rehabilitated when resources are available, with priority being given to areas which are adversely affecting the scenic values of the Parks.**
- 6. All major disturbances, apart from designated management access tracks, that remain as a result of past logging operations will be rehabilitated.**
- 7. All rubbish discarded or abandoned in the Parks will be removed and legal action taken against offenders where possible.**
- 8. Rubbish dumps in the Parks will be rehabilitated.**

9. **Abandoned and/or undesirable structures will be removed, and the areas rehabilitated.**
10. **Visitors to the Parks will be required to carry their rubbish out (in order to reduce management costs) , the only exception being facility areas where rubbish bins will be provided.**
11. **Only native, locally-occurring species will be used in rehabilitation and replanting programs.**

4.0 FLORA

Objectives

1. *To protect rare and restricted plants and fragile communities from impacts other than those arising from natural processes.*
2. *To prevent the introduction and spread of dieback, other plant diseases, weeds and other non-native plants.*
3. *To rehabilitate plant communities which have been degraded.*
4. *To control and if possible eradicate introduced plant species (6.3 Pests and Weeds).*

Background

The Parks contain a number of plant species that are gazetted rare or have a restricted distribution. There are also several plant communities within the Parks which are not well represented in other parks or reserves. A number of fragile plant communities (those extremely susceptible to disturbance) can also be identified. map 9 gives the general location of these fragile communities and many of the rare plants.

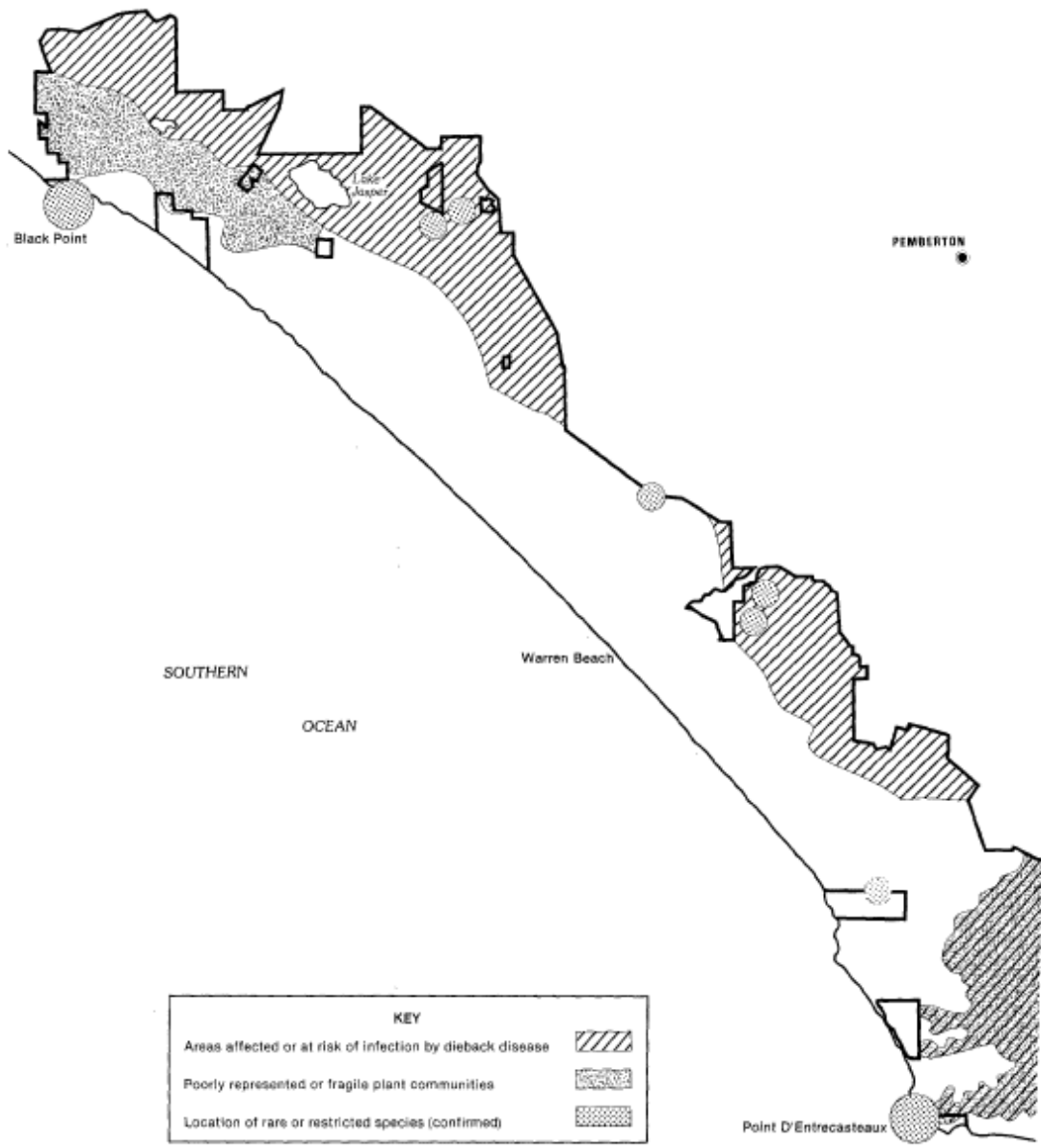
In many areas of the Parks the vegetation has been altered by European management practices, such as grazing (Map 10), logging (Map 11) and burning (Map 12). However, our knowledge and understanding of the changes that have occurred is at best speculative. Similarly, Aboriginal management of the land resulted in changes in the vegetation, although even less is known of the natural system of Aboriginal and pre-Aboriginal times.

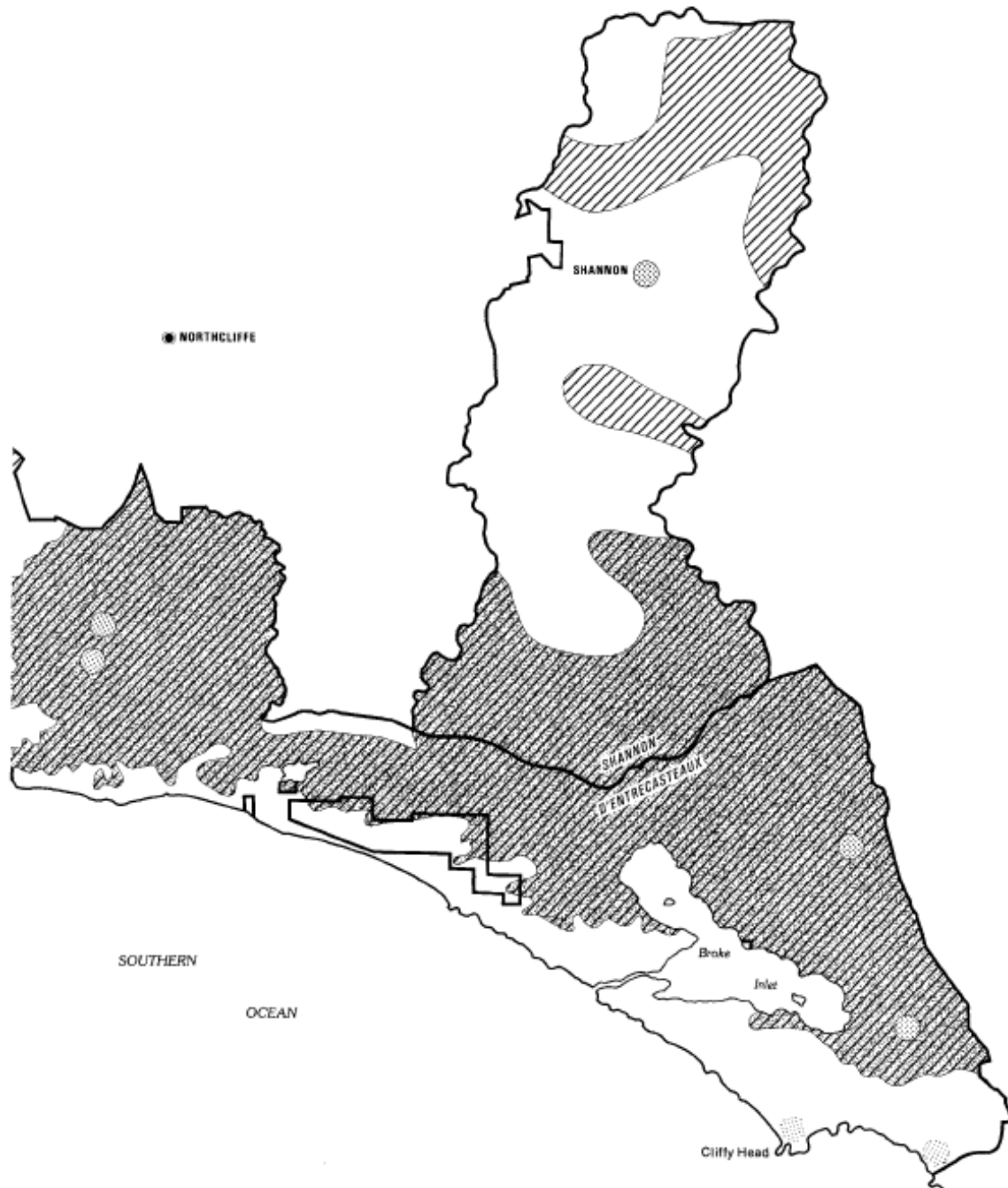
Many of the plant communities in the Parks are susceptible to dieback, particularly species found in the coastal wetlands of the D'Entrecasteaux (6.2 Dieback and Disease).

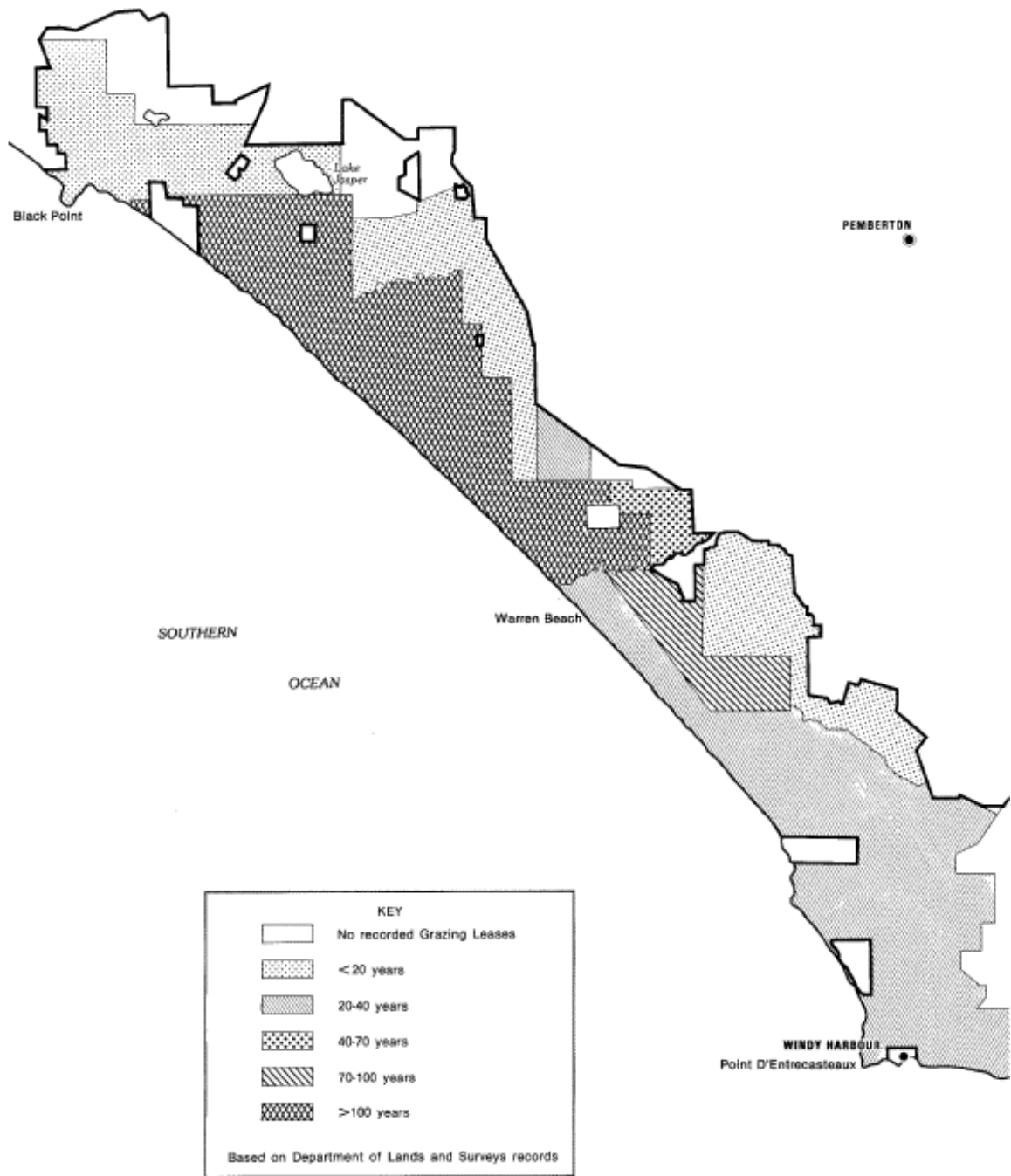
Finally, introduced plants may create management problem (6.3 Pests and Weeds) .

Prescriptions

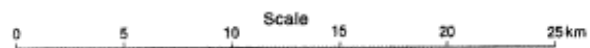
- 1. Areas where rare or restricted plants or fragile communities are known to occur, that have communities highly susceptible to dieback or have communities that are poorly represented on other conservation reserves (Map 9) will be protected from infection by dieback, and from introduced plant species or other impacts (besides those arising from natural processes). Management actions, public use and general access, where permitted, will be managed so that soil disturbance and transport, and spread of seeds are minimal.**
- 2. In areas of the Parks which have been little disturbed by European man (Map 13), natural processes will be left alone, subject to public safety requirements. If active management is considered necessary, a range of approaches will be used and critically evaluated. This will provide further information on the range of responses a community may make to disturbance.**
- 3. In all other areas, natural processes will be left alone, except for the management requirements of public use areas, visitor safety and the control of pests, weeds and disease. The only exception is facility areas where it may be necessary to establish introduced plants which can withstand recreational traffic.**
- 4. Any other areas, in addition to those indicated in Map 12, which require special protection and management will be identified and mapped over the period of the plan.**
- 5. Plant communities which have been degraded will be allowed to regenerate naturally unless the disturbance is so severe that natural regeneration is unlikely to occur. This is particularly important where damage to the plant community has instigated erosion. In these cases the area should be replanted with local species (refer to Prescription 11, 3.4 Rehabilitation).**

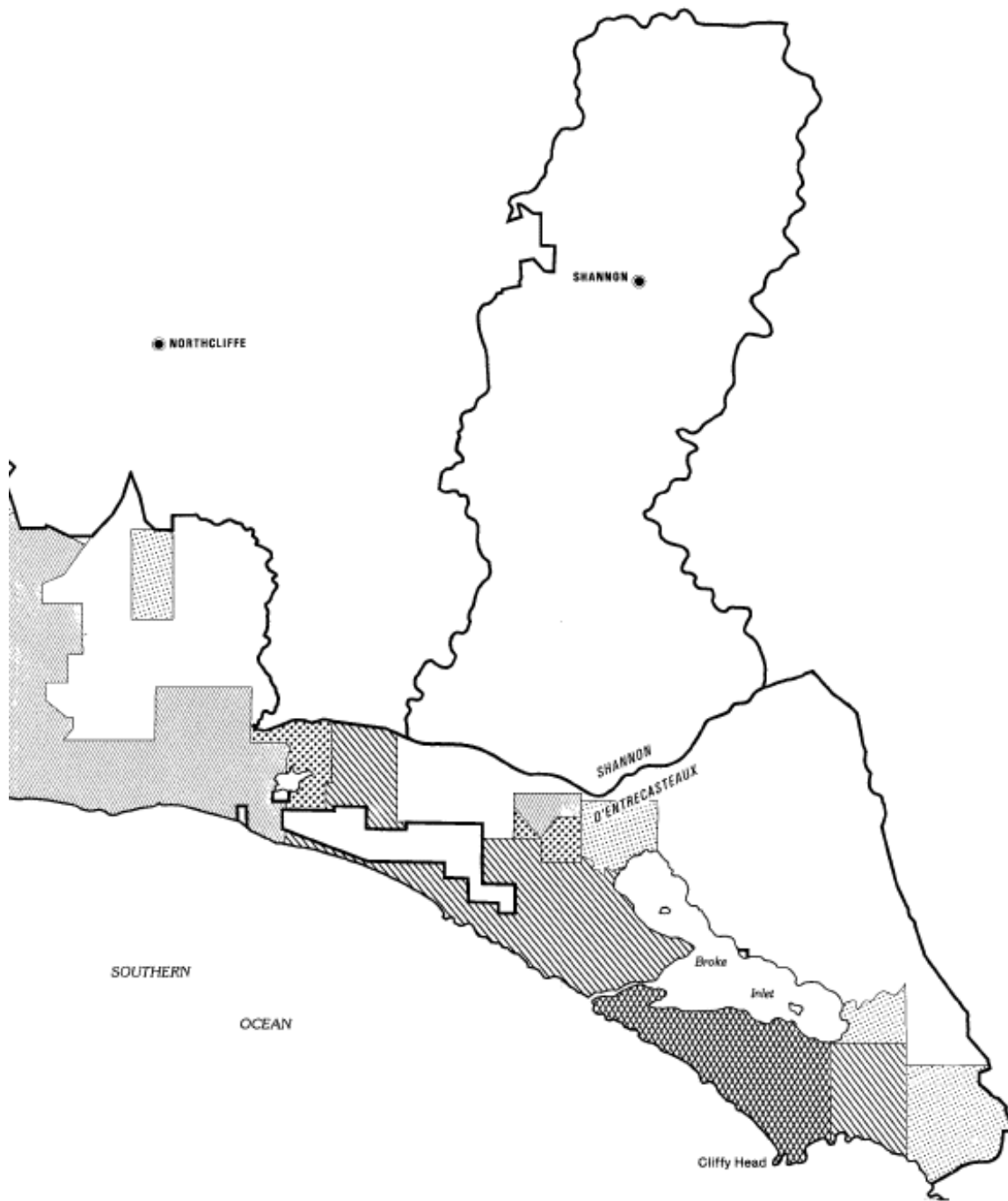


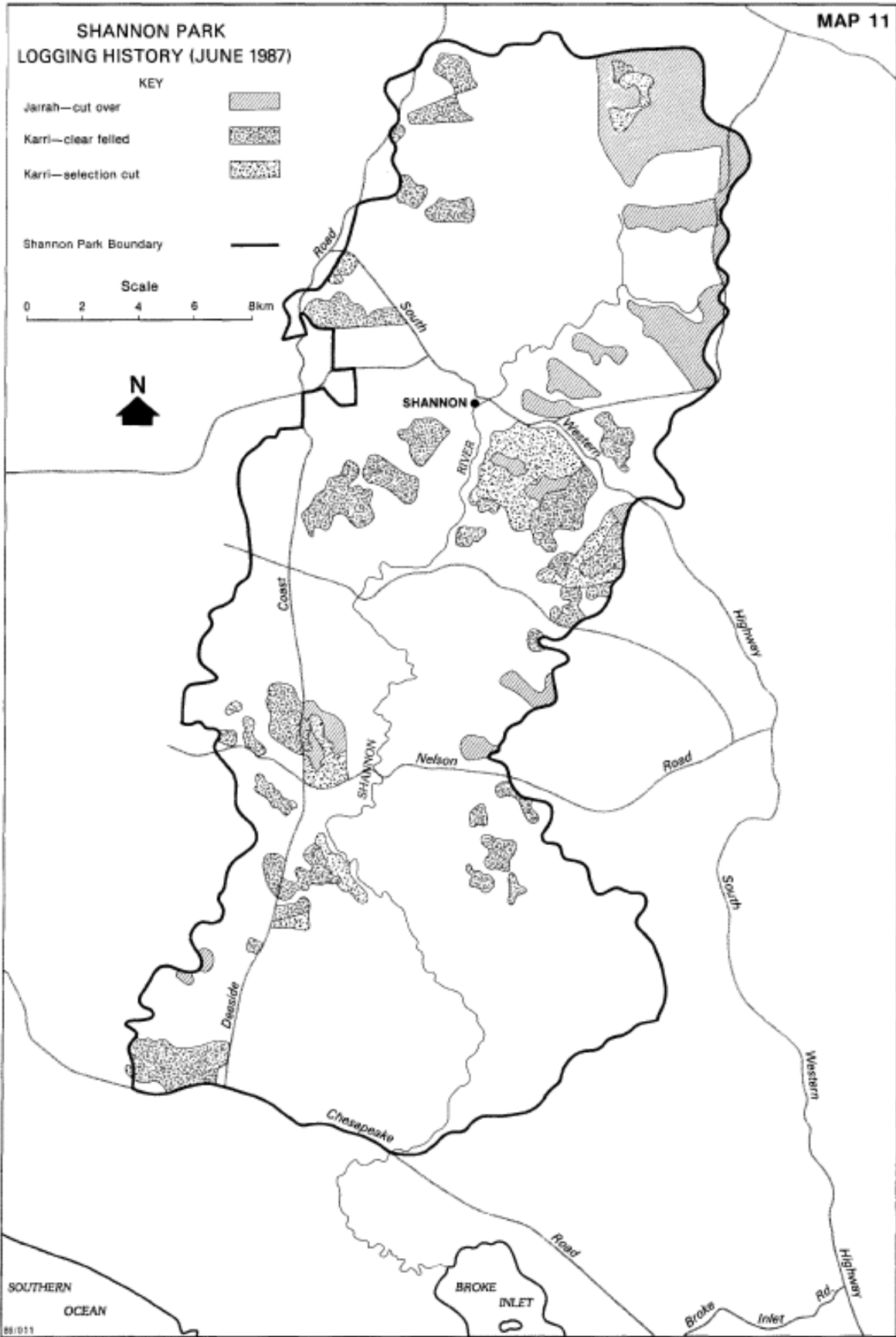


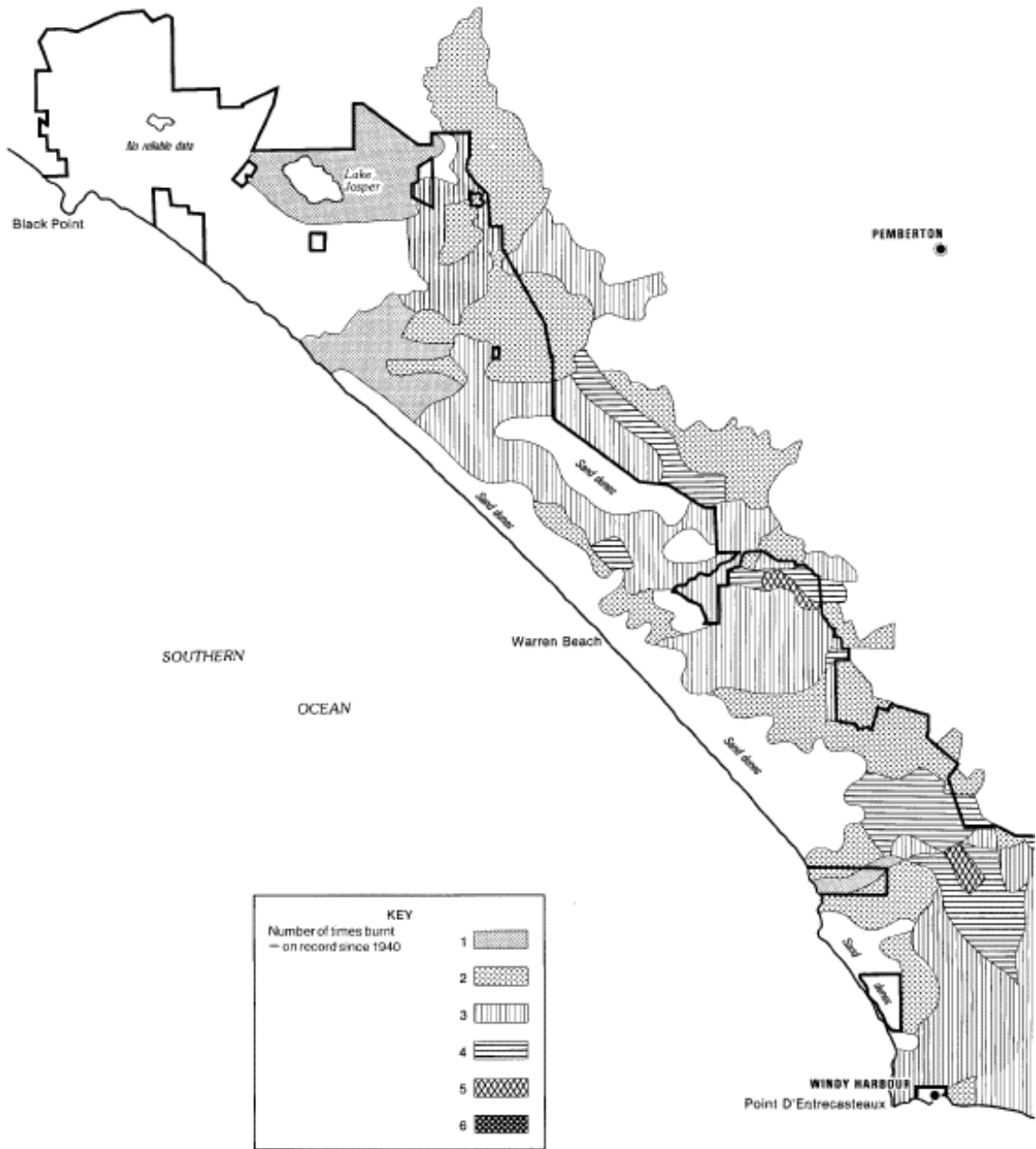


THE SHANNON PARK AND D'ENTRECASTEAUX NATIONAL PARK
GRAZING LEASES—LENGTH OF OCCUPANCY (JUNE 1987)



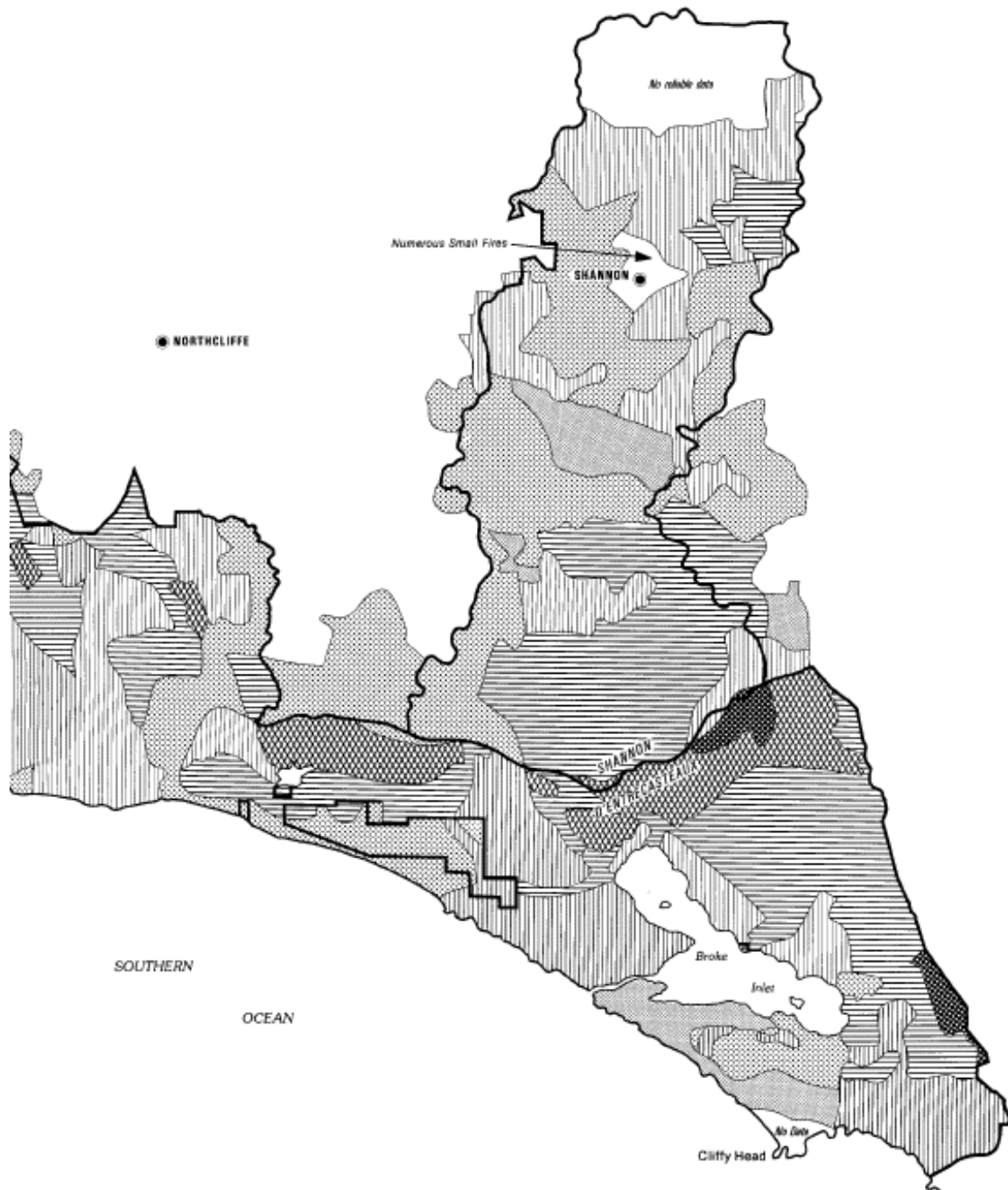


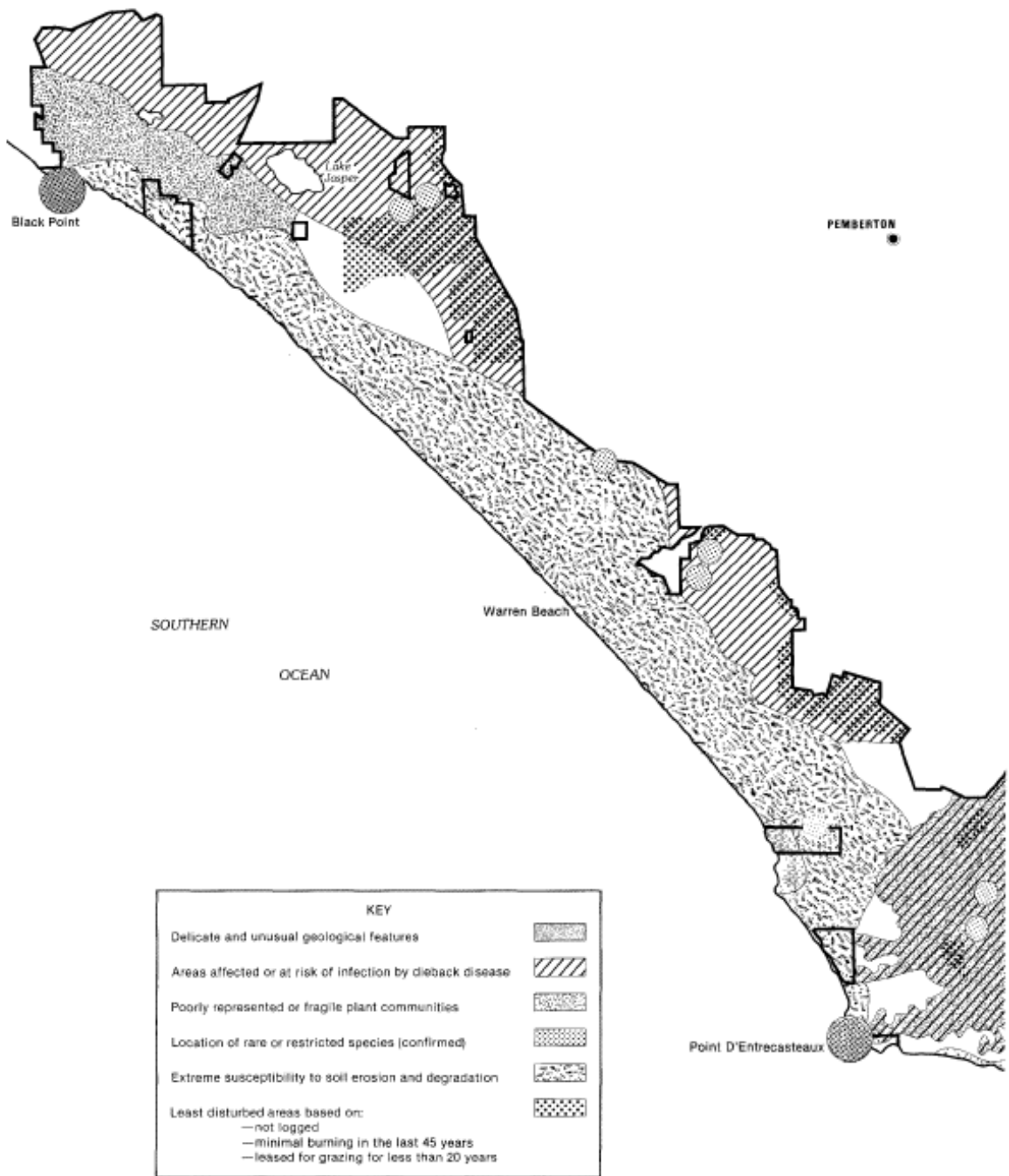




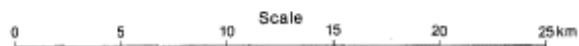
THE SHANNON PARK AND D'ENTRECASTEAUX NATIONAL PARK
FIRE HISTORY (JUNE 1987)

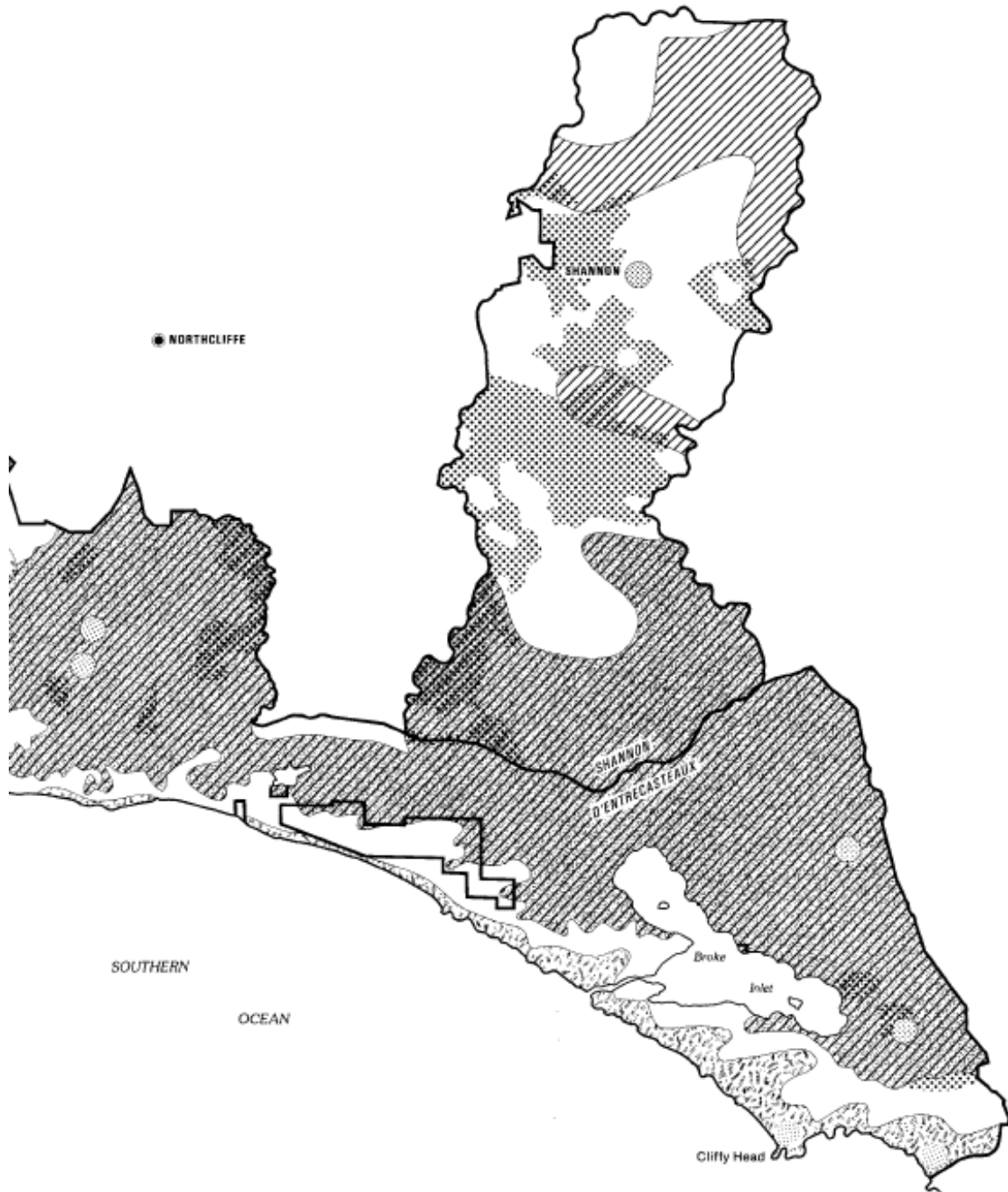
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**THE SHANNON PARK AND D'ENTRECASTEAUX NATIONAL PARK
SIGNIFICANT AND FRAGILE NATURAL FEATURES (JUNE 1987)**





5.0 FAUNA

Objectives

1. *To protect and provide suitable habitat for native fauna that occur in the Parks.*
2. *To re-introduce native animals that once occurred within the Parks (eg. Noisy Scrub-bird).*
3. *To control and if possible eradicate introduced fauna (6.3 Pests and Weeds).*

Background

Four species of rare fauna are known to occur within the Parks - the Peregrine Falcon, Crested Shrike-tit, Red-eared Firetail and Freckled Duck.

There are a number of introduced species in the Parks, the most obvious:, being mammals (eg. cats, dogs, foxes, pigs) , birds (eg. kookaburras) and fish (eg. trout, redfin perch and mosquitofish).

A number of native species, such as the quokka and mardo, have specialised habitat requirements. Introduced fauna, on the other hand, are generally; very adaptable and can often take advantage of changes in habitat resulting from disturbance. Thus, changes in floral community composition and structure must result in changes to the fauna community (both native and introduced). However, so little is known about the habitat requirements of most native species that no manipulative management of given faunal habitats is envisaged over the period of this plan.

The D'Entrecasteaux has been considered as a future re-introduction site for the Noisy Scrub-bird (*Atrichornis clamosus*) . This species is confined to wetter areas of jarrah-marri forest, particularly the ecotone between forest and swamp vegetation. The bird requires long-unburnt sites with dense sedges and shrubs in the swampy areas, adjacent to forested areas with a thick layer of litter (Burbidge et al. 1984).

Prescriptions

1. **Native fauna will be protected.**
2. **If species of rare or endangered fauna with specific known habitat requirements are discovered in the Parks, active management will be used, if necessary, to preserve the communities that support them.**
3. **Efforts will be made to reintroduce native fauna known to have formerly occurred in the Parks (eg. Noisy Scrub-bird).**

4. **Fishing will be permitted on the inland waters of the Parks, however, at least one major waterbody will be kept free from such pressures (9.8 Freshwater Fishing).**
5. **Other harvesting of native animals in the Parks, including ducks, is prohibited.**

6.0 PROTECTION

6.1 Fire

Objectives

The Parks are to be managed primarily to conserve their natural ecosystems and landscapes, whilst ensuring the Park visitors have the opportunity to enjoy the Parks without detrimentally affecting them. In setting the specific fire management objectives to achieve the management objectives for the Parks, the protection of life and property within and near the Parks must be of high importance.

Consistent with this principle, the following objectives will apply in order of priority:

1. To protect the lives of Parks' staff, firefighters and neighbours from wildfires, and to take adequate precautions for the safety of visitors.
2. To protect community and environmental values in or near the Parks including settlements, private property, recreation facilities, forest regeneration and public utilities.
3. To minimize the risk of large wildfires burning out large portions of the Parks by confining them to a single block.
4. To maintain the scenic beauty and visual amenity of outstanding landscapes.
5. To maintain the natural processes and diversity of structure and composition of plant communities.
6. To maintain the natural abundance, diversity and ecological integrity of fauna communities.
7. To ensure the survival of sustainable populations of rare, endangered or restricted flora and fauna species by the protection and maintenance of their required habitat.
8. To minimize the introduction and spread of disease through the application of appropriate hygiene measures, road restrictions and suitable fire regimes.

9. To protect vulnerable soils from the risk of erosion.
10. To maintain the quality of water resources.
11. To provide the opportunity to obtain information about natural processes through the use and non-use of fire.

Background

Australian ecosystems have evolved in the presence of fire (Singh et al. 1981). Such adaptations are widespread in the plant communities found in the Parks.

The array of adaptations enable most of the Western Australian flora to regenerate successfully after fires of almost any intensity and frequency (Gill et al. 1981). Although the close relationship between fire and the Park ecosystems is evident there is uncertainty about the frequency, intensity, season and scale of fires to which Park ecosystems were subjected prior to European settlement.

There is a wide range of opinion about what constitutes a natural or the most appropriate fire regime for these Parks. However, it is generally agreed that fire is a key management tool in the achievement of both conservation and protection objectives for the Parks.

Fire management prescriptions for the Parks must therefore provide a practical basis for improving the understanding of the relationship between the Parks' plant and animal communities and fire, as well as protecting human values from fire.

Following a fire there is a progressive change in the structure and composition of the plant and animal community (a process known as succession). Each stage of recovery favours the survival and reproduction of different groups of plant and animals. Research throughout Australia has shown that it is not possible to achieve optimum conditions for all species of plants and animals in one area at any one point of time. It is only through the wise application of a wide range of fire regimes that such an optimum condition can be approached.

In the absence of detailed information on the successional processes and the fire requirements of the Park ecosystems, it is proposed to aim for a wide range of successional stages within the major plant and animal communities of the Parks.

Apart from the ecological considerations there are many safety aspects which must be considered in fire management. Uncontrolled fire poses a danger to human and conservation values in and surrounding the Parks each summer. The risks are greatest in summer during periods of hot, dry conditions, particularly where large quantities of litter have accumulated and where the probability of

ignition is high. Fires burning under these conditions are unsafe to fight by direct attack, and there is a risk of severe damage to and even death of mature karri trees.

Fire hazards can be reduced by careful design and forward planning. Areas of high public value which can be damaged by fire must be identified and strategies developed to ensure their protection.

Fire Management Regimes

Three fire management regimes are used in this plan. These are:

1. Short-rotation Protection Burns

Under this regime, fuel reduction burns will be applied whenever ground fuel-loads exceed critical levels at which fire containment, by direct attack, under hot summer conditions, becomes very difficult and unsafe for firefighters. The rotation period between burns will vary from approximately six to eight years depending on the rate of fuel accumulation of the vegetation.

The burns will be arranged in wide buffers to restrict the movement of wildfires through large areas of the Parks. These low fuel areas will also be strategically located adjacent to high risk zones (eg. settlements, heavy fuel areas, recreation facilities) and high value zones (eg. karri regrowth, private property).

These short-rotation burns are categorized as either park or forest! protection burns depending on their location.

2. No Planned Burn (NPB)

Parts of each of the major land units (Map 7) will be protected from wildfires and will not to be deliberately burnt within the foreseeable future. These areas are located remote from likely ignition sources such as major roads, recreation areas and settlements. Many of these NPB areas include the least disturbed sites within the Parks.

Maximum protection needs to be ensured for the NPB areas, including maintenance of good perimeter access and regular burning of adjacent areas.

3. Flexible Management Areas (FMA)

Burns in these areas aim to achieve ecological diversity within each of the major land units. Most of these regimes will entail long rotation burns of about 15 years. It is proposed to burn, on an experimental basis, some fire-dependent ecosystem, such as the coastal peppermint/yate association near Lake Maringup, on a rotation of four to five years.

It may be necessary to burn some of the FMA areas for protection reasons if it considered that they constitute a major fire hazard to other values. Each FM will be reviewed annually to determine if it should be burnt or not, for ecological or protection purposes.

Fire Master Plan

To achieve the objectives outlined and using the three regimes given above, a master plan for fire management, essentially geographic in nature, was designed. A framework was developed which details fire management spatially, using defined land units (B. Description of the Parks 6.0 Land Use Capability) and temporarily through the concept of succession. The master plan (Map 14) aims to achieve maximum diversity by using a wide range of successional stages (burn ages) within each of the major land units; subject to the over-riding constraints of the natural resources and the protection of cultural and natural values.

Prescriptions

If funds are not available to implement the following prescriptions fire protection will be undertaken according to the objectives which introduce this section.

Prescribed Burning

- 1. The fire master plan indicated in Map 14 will be implemented. This plan provides for a combination of areas to be periodically burnt to provide buffers (short-rotation protection burns), areas from which fire will be excluded for ecological reasons (no planned burn), and areas to be burnt under a range of fire regimes (flexible management areas).**
- 2. Park protection burns, including settlement protection areas, will be implemented on a rotational basis when fuels reach 15-19 tonnes/ha in karri and 7-9 tonnes/ha in jarrah and other vegetation types. Burns will aim to achieve an effective cover of 60-80%.**
- 3. The Donnelly River settlement, Windy Harbour, the old Shannon townsite and other designated public facility areas will be protected by rotational prescribed burning or by other suitable methods, and by careful site design and management.**
- 4. Wherever possible areas will be burned in a variety of seasons.**
- 5. Aerial ignition will be used to implement most burns. Aerial ignition techniques may also be used to achieve unroaded fire boundaries and mosaic patterns of fire, where considered appropriate.**

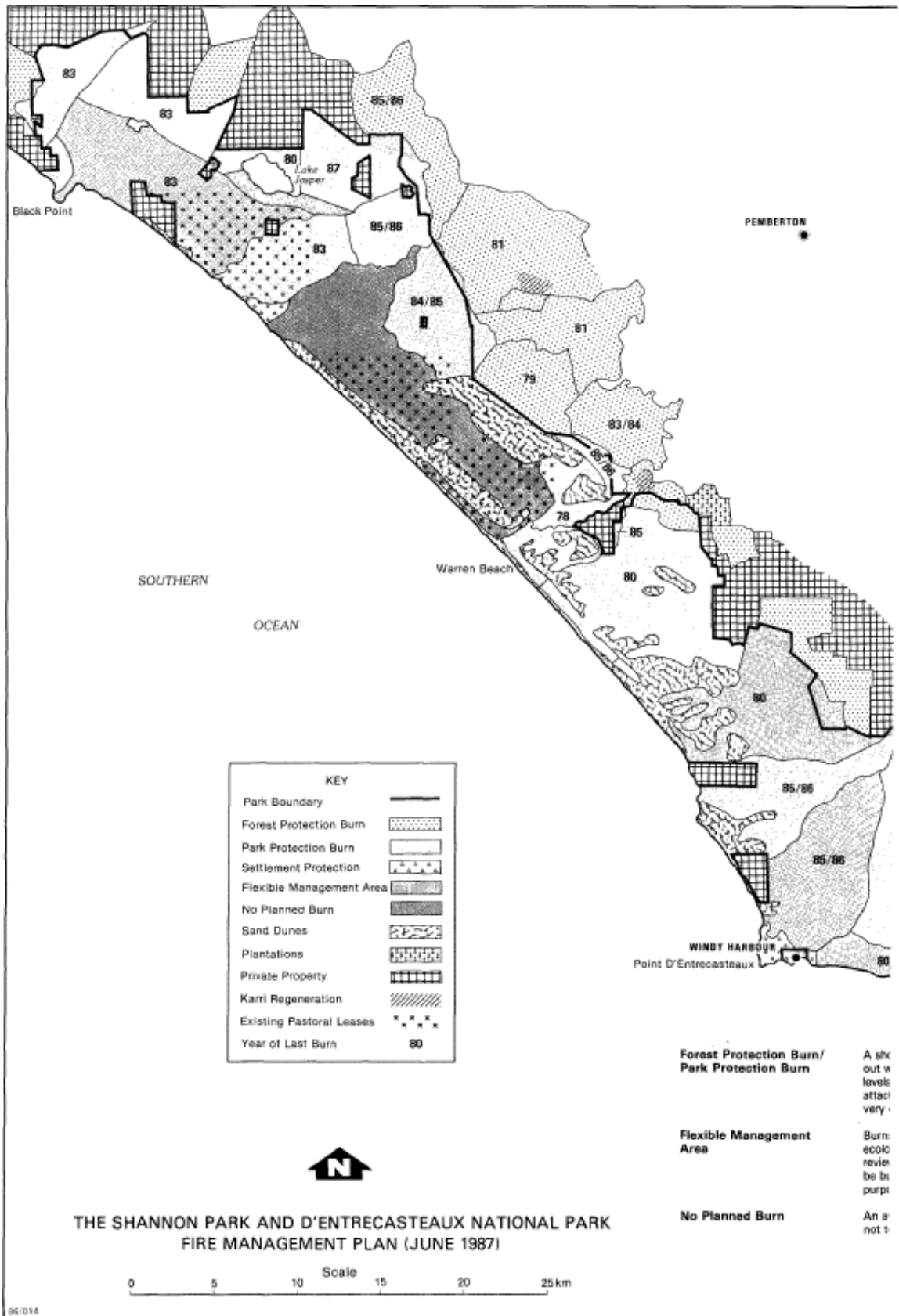
- 6. In those coastal areas shown as extremely susceptible to erosion (Map 6) aerial ignition will not be used.**
- 7. Stands of regenerating karri within areas to be prescribe burnt will not be isolated and protected, as by the time most stands are burnt they will be mature enough to withstand prescribed burning.**
- 8. No planned burn areas will be protected from fire subject to access constraints (7.3 Access for Management). Should a no planned bun area accidentally burn, it way be exchanged for an area of similar size and ecological type after careful review of the ecological and protection requirements.**

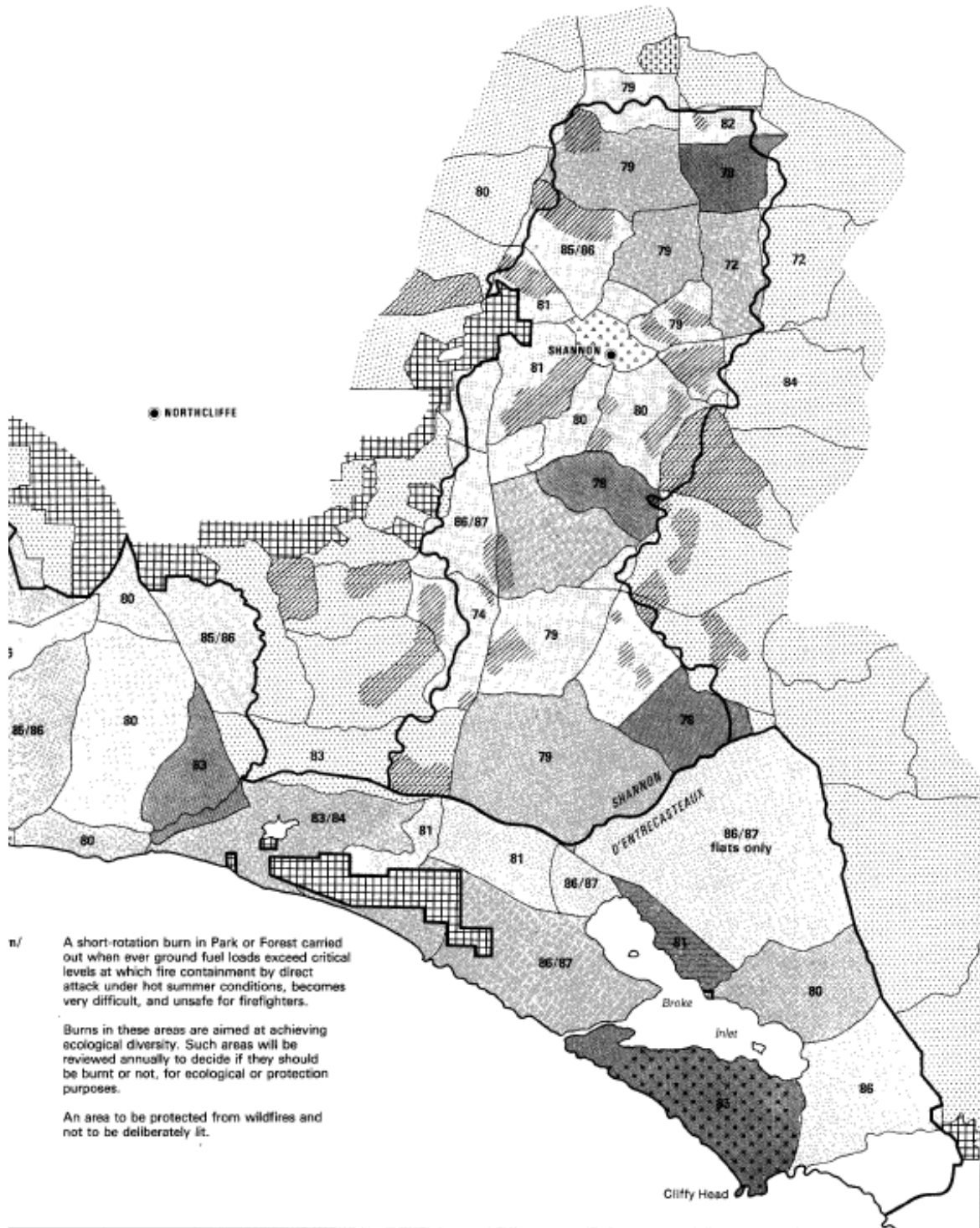
Wildfire Suppression

- 9. The existing chain of command for the control and use of fire in the Parks will be used. This draws on expertise in ecological and wildlife management, recreation and landscape management, fire behaviour, weather and fire control capability.**
- 10. Wildfires that enter or start in the Parks will be contained to the smallest possible area, either by direct attack or by backburning from existing tracks and prescribe burnt boundaries, taking into consideration the likely threats to life and property and Park values, and the impact of the fire and the suppression activities on the environmental and ecological values of the Parks.**

Liaison

- 11. Visitor entry to some areas of the Parks will be restricted on days of extreme fire hazard.**
- 12. CALM will liaise with neighbouring land-holders and the relevant local authorities to develop suitable arrangements for fire management . Firebreaks will be established around private properties unless alternative arrangements are made using existing roads.**
- 13. CALM will liaise with lessees to ensure that the use of fire on land under pastoral or other lease is consistent with and complements the fire management program and objectives outlined above.**





Research and Inventory

14. All prescription details, plus available fire behaviour information, will be recorded.
15. A research and monitoring program will be instigated to establish the level of environmental impact resulting from the prescribed fire regimes and wildfires, and to examine the effectiveness of wildfire prevention and suppression, and prescribed burning procedures in the Parks.
16. An information system pertinent to the use, control and management of fire in the Parks will be established over the term of this plan. This information will be used to develop a decision-making model for the Parks.

6.2 Dieback and Disease

Objectives

1. To prevent the introduction of dieback into disease-free areas.
2. To minimise the spread of dieback in areas where the disease already occurs.

Background

Dieback is the most significant disease threat to the Parks. Dieback is the common name given to the disease caused by the microscopic soil-borne fungus *Phytophthora cinnamomi*. The fungus produces small motile spores which are distributed via water, and large spores which can survive in soil and plant material. The spores infect plant roots and as the fungus becomes established it rots the roots. Plants such as banksias die rapidly after infection, but trees such as jarrah often die gradually, hence the common name for the disease - 'dieback'.

A recent broadscale survey of the D'Entrecasteaux (in 1984) found that the jarrah forest and woodlands, flats and swamps not only had a high risk of infection, but were also highly susceptible. In comparison, the karri forest, yate and bullich woodlands, stabilised dunes and coastal dunes had a lower risk of infection and were less susceptible. Map 8 indicates those areas affected or at risk. No detailed dieback mapping has been carried out in either Park.

The heathlands of the D'Entrecasteaux National Park, in particular, have many members of the families Proteaceae and Epacridaceae. These families, containing genera such as *Banksia*, *Dryandra* and *Leucopogon*, are readily killed by dieback. Death of these plants, which often dominate

heathlands, substantially alters the structure and composition of the plant community. This may have secondary effects on fauna which use or require existing communities for habitat or food.

Prescriptions

All management activities in the Parks will be carried out according to the Dieback Hygiene Manual (CALM 1986). In addition, the following prescriptions also apply.

- 1. A basic road and firebreak network will be defined, based where possible on existing roads and firebreaks. All other roads and tracks will be closed to public vehicles. Management vehicles will be subject to hygiene requirements when using closed roads and tracks.**
- 2. New roads and firebreaks will only be created if absolutely necessary. They will be constructed in a way that will minimise the risk of disease introduction and additional spread.**
- 3. Off-road vehicle use will be prohibited (9.2 Vehicles Off-road). Off-road access for management purposes (eg. fire control, search and rescue) will be strictly controlled and will be subject to hygiene requirements.**
- 4. Earthmoving during road construction or maintenance, facility development or other activities will only take place following a detailed evaluation, using the Seven Way Test (Forests Department 1982), of the activity proposed and the subsequent determination that the risk is acceptable.**
- 5. Hygiene practices, including regular cleandowns, will be implemented for vehicles and plant travelling within the Parks.**
- 6. Accurate disease location maps will be compiled before proposed activities are undertaken. In the interim, some areas may be quarantined to avoid disease introduction and spread.**
- 7. Park rangers will be trained in dieback recognition, sampling and hygiene procedures.**
- 8. CALM will liaise with other government departments and local authorities likely to be involved in earthmoving activities in the Parks regarding the need for hygiene to avoid introducing and spreading dieback.**
- 9. The public information program for the Parks will include information about dieback and ways the public can help CALM prevent its introduction and spread.**

6.3 Pests and Weeds

Objective

1. *To control or, if possible, eradicate introduced species of plants and animals.*

Background

A number of introduced plant species occur in the Parks. These are listed in Table 6. Though many of the plants have only localised distribution, some of which are confined to the sites of introduction, other species have become widespread.

To restore and maintain the natural environment of the Parks it is essential that introduced plant species are controlled, if not eradicated.

The only exception is facility areas, where more durable non-native species may be necessary to minimise erosion or limit site degradation.

Most of the feral animals present in other parts of the State also occur in the Parks (Table 7). This includes feral dogs, cats and pigs, foxes, rabbits, trout and redfin perch.

In addition, as well as controlling declared plant and animal species within the Parks, there is also a need to prevent the spread of such species into adjacent properties.

Prescriptions

Declared and Introduced Plants.

1. **Table 6 lists the declared and introduced plant species known to occur in the Parks and requiring control, if not eradication.**
2. **The size and extent of populations of introduced plant species will be recorded and mapped. Methods of treatment will also be recorded.**
3. **Populations of introduced plant species will be monitored to ensure that numbers are being kept at low levels or that eradication has been successful.**
4. **Where possible, native locally-occurring species will be used for rehabilitation and in facility areas.**

TABLE 6.
DECLARED AND INTRODUCED PLANTS IN THE SHANNON AND
D'ENTRECASTEAUX PARKS REQUIRING MANAGEM24T

SPECIES	COMMON NAME	LOCATION	MANAGEMENT
Annual Grasses	-----	Former grazing leases	Monitor, control
+ Apple of Sodom	<i>Solanum sodomaeum</i>	Lake Jasper	Eradicate
+ Arum Lily	<i>Zantedeschia aethiopica</i>	Lake Jasper	Eradicate
+ Blackberry	<i>Rubus spp.</i>	Warren River	Eradicate
Blackwood	<i>Acacia melanoxylon</i>	Shannon Dan	Eradicate, or control if eradication is impossible
Bidgee Widgee	<i>Acaena ovina</i>	Around huts used by graziers	Control
Cape Gooseberry	<i>Physalis peruviana</i>	Monitor	
Hexham Scent, King	<i>Melilotus indica</i>	Yeagarup, Malimup, if natural processes do not	Monitor, then control or eradicate
Island Melilot			
Marram Grass	<i>Ammophila arenaria</i>	Disturbed dunes	Monitor
Paspalum	<i>Paspalum sp.</i>	Yeagarup, Callcup,	Eradicate
+ Pennyroyal	<i>Mentha pulegium</i>	Malimup, Track	Eradicate
Pinaster Pine	<i>Pinus pinaster</i>	Yeagarup, Callcup,	Eradicate, or control if eradication is impossible (trial plot is spreading)
Thistle	<i>Cirsium sp.</i>	Throughout Parks	Eradicate
Watsonia	<i>Watsonia sp.</i>	Shannon	Control

+ Declared species according to Agriculture and Related Resources Protection Act 1976, Government Gazette (No. 145), 12 December 1986.

Declared and Introduced Animals

- 5. Continuous efforts will be made to control feral dogs, cats and pigs, and foxes. Control measures will include poisoning and trapping; ensuring that these measures will not effect native fauna such as dingoes (unless required; Prescription 8) and birds-of-prey.**
- 6. If rabbit control within the Parks becomes necessary (as determined by CALM in consultation with the Agriculture Protection Board) control will be based on poisoning, and warren fumigation and destruction.**
- 7. As necessary, control action will be undertaken to prevent the establishment of other declared species of feral animals within the Parks (eg. deer). If such animals are introduced they will be eradicated, and if this is impossible population numbers will be kept at the lowest levels possible.**
- 8. Dingo numbers will not be controlled, unless significant levels of damage to adjacent properties is evident. In cases where damage au be proven, control will be implemented by poisoning and trapping on the Parks' edge, to a depth necessary for control on adjoining properties.**
- 9. CALM will record the general location and extent of populations of declared animals. The Agriculture Protection Board will be requested to record control measures used and an estimate of their success.**

General

- 10. CALM will liaise with the Agriculture Protection Board, adjacent landholders and local authorities regarding pest control on Park boundaries and adjacent properties.**

TABLE 7.
DECLARED AND INTRODUCED FAUNA OF THE SHANNON AND
D'ENTRECASTEAUX PARKS

COMMON NAME	SPECIES
Mammals	
Black Rat	<i>Rattus rattus</i>
+ Dingo	<i>Canis familiaris dingo</i>
Feral Cat	<i>Felis catus</i>
+ Feral Dog	<i>Canis familiaris familiaris</i>
+ Feral Pig	<i>Sus scrofa</i>
+ Fox	<i>Vulpes vulpes</i>
House Mouse	<i>Mus musculus</i>
+ Rabbit	<i>Oryctolagus cuniculus</i>
Fish	
Brown Trout	<i>Salmo gairdneri</i>
Mosquitofish	<i>Gambusia affinis</i>
Rainbow Trout	<i>Salmo trutta</i>
Redfin Perch	<i>Perca fluviatilis</i>

+ Declared species according to Agriculture and Related Resources Protection Act 1976, Government Gazette (No. 145), 12 December, 1986.

7.0 ACCESS

7.1 General Access

Objective

- 1. To provide a range of access opportunities, while ensuring that the values of the natural environment and other Park users are not adversely affected.*

Background

Most of the D'Entrecasteaux coastline is accessible only by four-wheel-drive, with Windy Harbour and Mandalay Beach being the only places where two-wheel-drive access right to the coast is possible. Four-wheel-drive use of the area is increasing, as is the demand for two-wheel-drive access. Existing vehicle access to and within the Parks is described in B. Description of the Park 3.0 Access and indicated on Map 3.

Much of this coastline is sensitive to erosion, with several large, mobile dune-fields interspersed by areas of recently consolidated wind-blown sand. The Shannon is less sensitive.

The provision, maintenance and upgrading of vehicle access can be very expensive in some circumstances, particularly for all-weather and all-vehicle roads.

In both Parks access should not be retained or developed further where it will lead to degradation of the environment or an unacceptable level of impact on other user groups. Similarly if access, particularly two-wheel-drive, is provided it is essential to ensure that a planning and funding have been given to site development at the end point Site development may range from parking areas and walk-ways to the to picnic and toilet facilities. other works may include earthworks to prevent erosion, and revegetation of eroded areas.

In the D'Entrecasteaux several of the most important recreation routes pass through private property and hence can be closed by property owner.

Some of the problems that can result from the provision and use of vehicle access include vegetation damage and soil compaction which may initiate wind and water erosion and blowouts in sensitive areas, the introduction weeds and plant diseases, and the impairment of scenic amenity. addition, access may concentrate activity in areas with a limited ability to support public use or where public safety is not easily safeguarded.

There are two basic types of demand for recreational vehicle access: destination-based (eg. for beach-fishing, marroning, camping) travel-based (eg. scenic driving). A single road can sometimes

serve purposes, but often this is not possible or desirable. For instance, that are used for scenic driving must normally be suitable for use by a standard vehicle, whereas a lower standard of track to a particular recreation opportunity may be acceptable.

CALM has developed the following principles for road location:

- i. Before constructing or upgrading a road, it must be determined that: access to the area is necessary; the road is the best alternative for necessary access; the resulting effects on the park environment will be minimal; the road is intimately and harmoniously related to the landscape through which it passes; and it takes maximum advantage, consistent with the foregoing criteria, of interpretive and scenic values.
- ii. Roads should avoid areas of high conservation or recreation value which may be jeopardised by increased access. In particular, roads must not jeopardise park values by the introduction or spread of disease.
- iii. Roads should avoid seasonally waterlogged areas, and areas with erodable soil.
- iv. Roads should offer visual variety and diversity for example by following or crossing the boundaries between different landforms and plant communities, rather than running parallel to linear resources or features. Some roads should offer vantage points over the landscape.
- v. Roads should avoid dividing large areas that currently have no roads or could become roadless given some road closures.

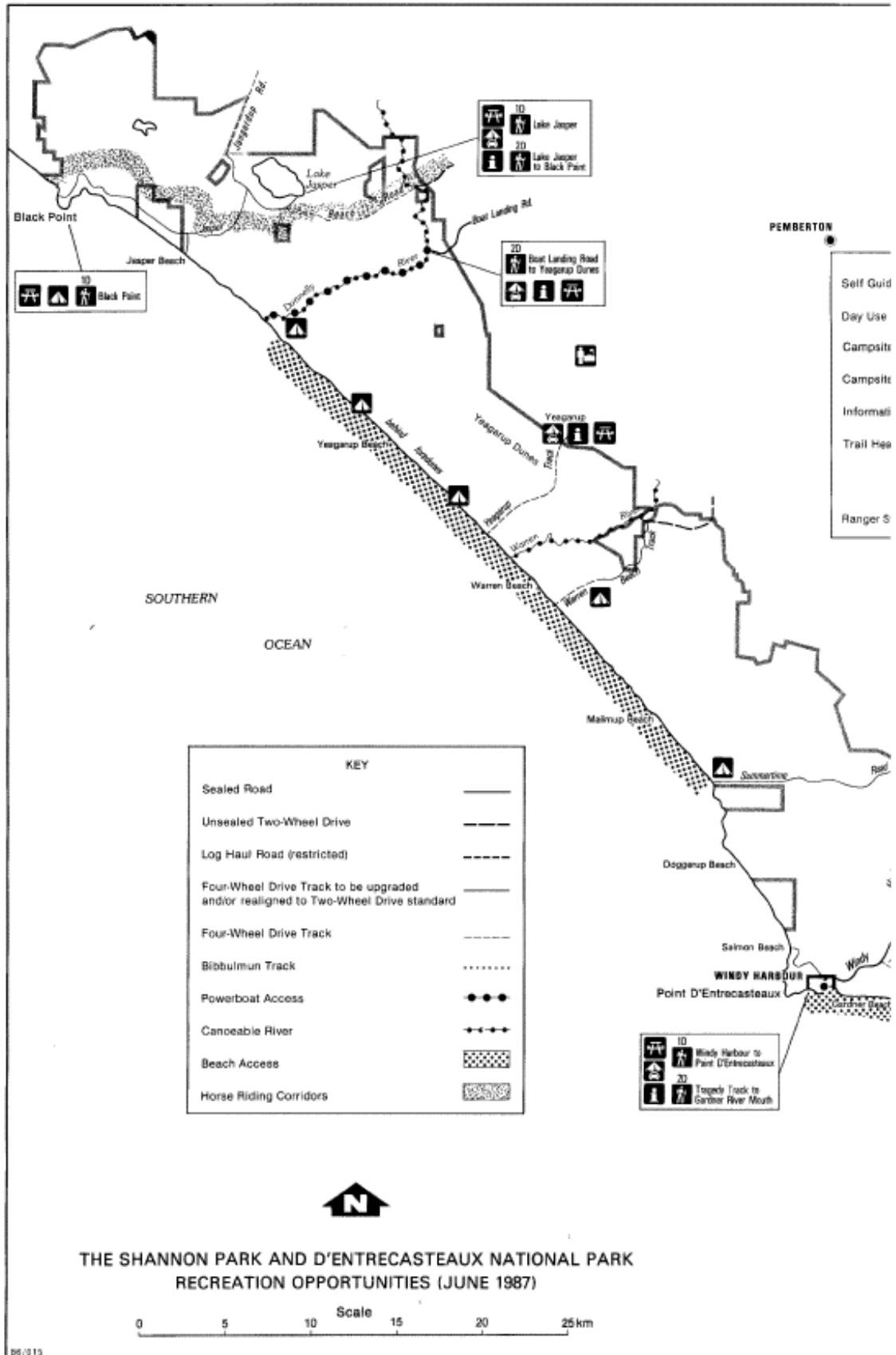
Similar principles are appropriate for the location and maintenance of access routes for management (7.3 Access for Management).

Prescriptions

- 1. Public access will be retained to all parts of the Park. Vehicle access will be provided by the roads and tracks shown on Map 15. Roads and tracks will not be upgraded unless resources are available to provide adequate facilities (eg. parking, toilets, turn-around areas) at the road/track end.**

This prescription provides vehicle access to most areas in the Parks to which public access currently exists and has been requested, by the public, to remain. In a number of instances tracks will be improved to provide access for two-wheel-drive vehicles for part, if not all, of the year. In addition, realignment or closure of a few tracks will take traffic away from sensitive or significant areas.

- 2. During the course of this plan, all roads and tracks (both existing and proposed) within the Parks will be redeveloped or developed in accordance with the previously outlined principles. Thus, the roads and tracks indicated in Table 8 will be closed or realigned. Roads and tracks proposed for realignment will remain open until alternative tracks have been provided.**
- 3. Road maintenance, realignment and closure will be implemented according to the works program and budget given in E. Implementation and Review.**
- 4. The status of tracks and associated facilities (parking areas, toilets, access ways to the beach) will be monitored. Temporary track closures may be necessary from time to time for management purposes.**
- 5. Undeveloped road reserves which are not located according to the above principles and/or are not currently used will be recommended for closure.**
- 6. If re-planting of closed tracks is necessary to encourage revegetation, only local plant species will be used.**
- 7. Negotiations will be instigated with landholders of enclaves of privately owned land within the D'Entrecasteaux National Park to ensure that public access to the coastline, by appropriate routes, is secured.**



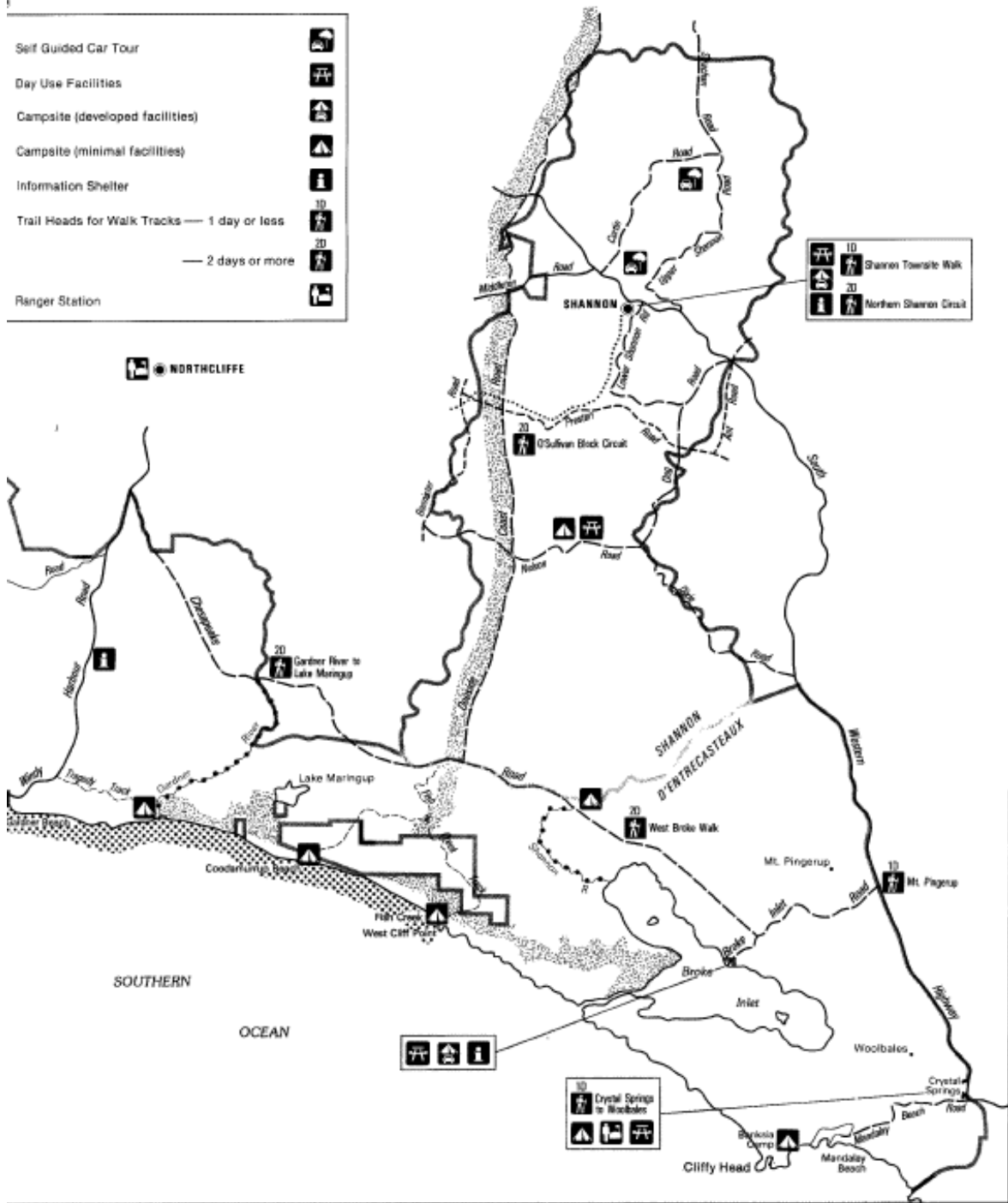


TABLE 8.
RATIONALE BEHIND ROAD/TRACK CLOSURES AND REALIGNMENTS -
SHANNON AND D'ENTRECASTEAUX PARKS

Road/Track	DUPLICATION OF ACCESS	SEASONALLY INUNDATED	DIEBACK AFFECTED	HIGH RISK FOR DISEASE INFECTIONS	EROSION POTENTIAL	LANDSCAPE IMPACT	HIGH CONSN. VALUE-FOOT ACCESS ONLY	2WD ACCESS
CLOSURES								
<i>Black Point Road</i>	x	x	x	x	x			
<i>Lake Jasper Tracks</i>	x	x	x	x	x			
<i>Blackwater Track</i>	x	x	x	x	x			
<i>Lower Gardner Road</i>	x	x	x	x	x			
<i>Cliffy Head Tracks</i>				x	x		x	
<i>Fishermans Track</i>				x	x			
<i>Springbreak Road</i>				x	x		x	
<i>Marron Road</i>				x		x	x	
<i>Dog Road</i>				x		x	x	
<i>Pingerup Road</i>				x		x	x	
<i>Various unnamed tracks</i>	x	x	x	x	x	x	x	
REALIGNMENT AND UPGRADING								
<i>Salmon Beach, Lighthouse</i>	x			x	x	x	x	x
<i>Lake Jasper/Jasper Beach</i>	x	x	x	x	x	x		x
<i>Malimup, Beach</i>	x	x	x	x	x	x		x
<i>Banksia Camp</i>	x		x	x	x	x		x
<i>Warren Beach</i>					x	x		x
<i>Black Point from Jasper</i>	x			x	x	x		x

7.2 Coastal Access

Objectives

1. *To provide a range of access opportunities to a variety of coastal destinations, while ensuring that the values of the natural environment and other Park users are not adversely affected.*
2. *To allow safe vehicle use of selected beaches.*

Background

The D'Entrecasteaux coastline is renowned throughout the south-west for its beach fishing which is undoubtedly the most popular recreational activity in the Park. This activity is likely to increase as the attractions of the area become better known and as more people buy four-wheel-drive vehicles. Activity peaks in summer and autumn, with optimum fishing times being early morning and evening.

Associated activities include camping, either on the beach, behind foredunes or in huts, and four-wheel-driving to gain access to the beach, and then along the beaches.

The majority of fishermen explore for suitable holes and gutters in the surf in which to fish by driving along the beach. If fishing in one hole proves unsuccessful they drive on and try another. For this type of fishing four-wheel-drive capability is required. Access to and along sane beaches is possible throughout the year, although beaches may present difficulties in winter. Several access tracks, such as the aptly named Summertime Road, are closed because of flooding during winter and early spring.

Only two beaches (Windy Harbour and Mandalay) can be reached, to within easy walking distance, in two-wheel-drive vehicles.

Rock fishing and reef fishing are also popular. Several areas of reef are protected and safe at low tide, allowing handline fishing for species such as groper (*Achoerodus gouldi*). Rock fishing is also popular with fishermen seeking smaller migratory fish such as herring (*Arripis georgianus*) and skipjack (*Psuedorcaranx dentex/wrighti?*).

Vehicular access to the beach often damages the steep foredunes, resulting in loss of vegetation and associated erosion. Rubbish accumulation and disturbance of vegetation at campsites are also problems. Vehicle use of the beach may disturb wading birds and seabirds. Vehicles may also adversely affect the recreation experience of other users, such as walkers, swimmers and other fishermen.

Prescriptions

1. **Yeagarup, Warren, Malimup, Gardner and Coodamurrup Beaches will remain open to four-wheel-drive vehicles. Access to these beaches will be available via the tracks indicated on Map 13.**
2. **The tracks to Jasper and Salmon Beaches and Banksia Camp will be upgraded to provide two-wheel-drive access. Once this access is available vehicles will no longer be permitted to drive along these beaches. Access to Malimup Beach will also be upgraded to a two-wheel-drive standard.**
3. **Vehicles on beaches will be restricted to the area between high and low water mark, plus access routes to coastal camping areas.**
4. **Given the erosion hazard of the coastline between West Cliff Point and Banksia Camp, the area will be accessible on foot only, although four-wheel-drive access to Tuckett's Hut will be retained. Thus, vehicular access to two reef fishing spots on this section of the coast - West Cliff Point and the cliffs near Tuckett's Hut - will be retained. The fragile landform, combined with over-grazing and frequent fires, makes the area highly susceptible to erosion.**
5. **The effects of vehicle use on the biological and physical characteristics of the beaches will be monitored. If the results indicate that it is necessary, existing use patterns will be altered.**
6. **Surveys of beach users and usage will be undertaken.**

7.3 Access for Management

Objectives

1. *To maintain a network of roads for essential management purposes, in addition to designated public access roads.*
2. *To ensure that management-only roads are effectively closed to public vehicles.*
3. *To allow the use of management vehicles off-road in exceptional circumstances, primarily if lives are at risk.*
4. *To ensure that the conservation and landscape values of the Parks are recognised in all access requirements.*

Background

In addition to vehicle access for recreation (7.1 General Access and 7.2 Coastal Access), access for management will be required for activities such as edge-control during prescribed burning, fuel sampling, wildfire control, pest and weed control, research and monitoring.

Management tracks may be used for public safety. In particular, access for search and rescue and for evacuations will be required.

Prescriptions

- 1. Vehicular access by the public will be restricted to designated public roads and tracks (map 15). Management-only roads will be open for walking but will not be open to vehicular access by the public, Management-only roads will be closed either by the use of fallen trees or logs or by locked gates. The former more subtle approach is preferred.**
- 2. only roads designated for public access and those considered essential for management purposes, such as the strategic control of fire, disease and exotic species, will be maintained in a trafficable condition.**
- 3. Tracks required for prescribed burning will only be maintained prior to the burn and to a standard sufficient to allow safe access.**
- 4. All tracks surrounding no planned burn areas (Map 14) will be maintained to a standard sufficient to allow rapid access for firefighting.**
- 5. Existing tracks not required for specific purposes will be either left to regenerate naturally or rehabilitated (where -they adversely affect landscape values or appear to be susceptible to erosion).**
- 6. New -tracks will only be established where no feasible alternative for management exists and only following referral to the Environmental Protection, and Recreation and Landscape Branches of CALM for approval. Location should be according to the principles given in 7.1 General Access.**
- 7. The use of vehicles and machines off-road will only be permitted for essential purposes such as fire control, if lives are at risk, or in extreme circumstances as judged by the relevant District Manager. Wherever possible, special care will be taken to avoid entering sites that are susceptible to soil erosion and degradation (Map 6) or are known to contain rare species (Map 9).**

8. **All road maintenance and of off-road use of management vehicles will be subject to strict dieback hygiene measures (Dieback Hygiene Manual, CALM 1986).**

7.4 Log Road Access

Objectives

1. *To allow the continued use of approved Park roads in the Shannon Park for log haulage, while ensuring minimal impact on Park values.*
2. *To explore alternative routes for log haulage to avoid log hauling on Park roads in the longer term.*

Background

The Shannon Basin dissects the karri forest, making it necessary - given the current distribution of timber-cutting permits - to transport logs across the Park. The only unrestricted access through the area is the South West Highway. The timber industry has, since the advent of woodchipping, developed a network of log-haulage roads through the forest. Most of these roads constructed in the Shannon Forest have now, through negotiations with the industry, been closed to log trucks.

Preston Road is the major remaining log-haulage route across the Park (Map 15) and it is currently used in conjunction with Dog Road and Arthur Road. Preston Road has been constructed to a standard suitable for use by high-speed log trucks. As such, it is not suitable for public use. The impact of log-haulage roads on nearby Park values is high. Impacts include noise, dust and visual and environmental impacts. If these roads continue to be used by log trucks alternative visitor access routes may be required.

Prescriptions

1. **Log haulage will continue via Preston Road for the period of the plan. Use will then be reviewed.**
2. **The continued use of the above road will be subject to the following conditions:**
 - a) **a speed limit of 60 km/hr;**
 - b) **no further road or verge development;**
 - c) **vegetation will not be removed from the road verges, however, slashing will be permissible if required to improve visibility;**

- d) any maintenance must be approved by the CALM District Manager, Pemberton; and
 - e) gravel pits will be located outside the Park and existing pit within the Park rehabilitated.
3. Alternative routes will be assessed over the period of the plan.

8.0 CULTURAL FEATURES

8.1 Aboriginal

Objectives

1. *To ensure that Aboriginal cultural features are identified, recorded and protected.*
2. *To provide information about former Aboriginal use of the Parks.*

Background

Although areas of the Parks were extensively used by Aboriginals prior to European settlement there is little detailed knowledge of remaining Aboriginal cultural features. Features which are known and recorded have been found primarily when erosion, road building or similar activities have removed vegetation and soil overburden to reveal the artefacts and remnants of past occupation. Thus, it is likely that further Aboriginal cultural features will be found as the Parks become more developed and used.

Prescriptions

1. **Prior to any significant development within the Park, such as road construction or upgrading, facility construction or construction of walk trails, CALM will ensure that no recorded Aboriginal sites will be degraded.**
2. **If, while undertaking any development, an Aboriginal site is discovered, CALM will notify the Department of Aboriginal Sites of the W.A. Museum and request advice regarding how the site might best be safeguarded.**
3. **A program to record and maintain information about Aboriginal cultural features will be instigated.**

4. **Proper security precautions will be taken in recording, storing, using and disseminating information about Aboriginal cultural features in the Parks.**
5. **Aboriginal artefacts that are found within the Parks by CALM or the public will be reported to the Department of Aboriginal Sites of the W.A. Museum, and protected according to existing legislation.**
6. **Appropriate information about Aboriginal use of the Parks will be provided to the public as part of the information program (10.1 Information).**

8.2 European

Objectives

1. *To ensure that European cultural features are identified, recorded and protected.*
2. *To provide information about past European use of the Parks.*

Background

Although Europeans have used the Parks for only the last 100 or so years, there are already several features of historic interest. These features, which include huts, bridges and stockyards, are made of perishable materials such as wood. Thus, immediate work preservation is essential.

Many of these features and a number of others, including transportation corridors such as tracks, roads and railway lines, and stone construction], or arrangements, may lack meaning to the public unless appropriate information is provided.

Prescriptions

1. **European cultural features that are of historic significance or educational value will be protected from destructive natural processes, visitors and damage arising from management actions.**
2. **Prior to and during any development in the Parks existing or potential European cultural features will be protected.**
3. **A program to collect, record and maintain information about European cultural features will be instigated.**

4. Restorative work will commence, as soon as possible after approval of this plan, on European features in the Parks considered to be of greatest historic importance. The importance of various features and subsequent restoration techniques used will be determined in consultation with the local community and organisations such as the W.A. Museum and National Trust. Community groups will be encouraged to become involved in the restoration work.
5. Further clarification of the European history and culture of the Parks will be sought.
6. Appropriate information about past European use of the Parks and the remaining features will be provided to the public as part of the information program (10.1 Information).

9.0 RECREATION

9.1 Levels of Use

Objective

1. *To facilitate a level of recreational use in the Parks which does not jeopardise -the intrinsic character of -the area, and which does not lead to detrimental impacts on the environment or deterioration in visitor satisfaction.*

Background

B. Description of Parks 9.0 Present Use details existing recreational activities and levels of use in the Parks. This plan enables the Parks to continue to provide a great variety of recreation opportunities. However, it is recognised that these Parks are of special value because they represent some of the last areas in the south-west which have not been fully developed.

Prescriptions

1. **Recreation opportunities will be established in the Parks over the period of the plan, as indicated in Map 15. Greater details on these opportunities are provided in the following sections (9.2 - 9.9).**
2. **Portions of the Parks will be accessible to four-wheel-drive and two-wheel-drive vehicles, people on horseback, boats and bushwalkers. While facilities and services will be available**

for those who wish to use them, some of the more remote areas will remain largely undeveloped, thereby retaining their qualities of 'remoteness.

3. **The recreational opportunities provided by the Parks are intended to complement existing tourist developments and public facilities available in the surrounding region.**

9.2 Vehicles Off-road

Objective

1. *To protect the biological and physical environment of the Parks from damage, by directing all vehicle traffic along nominated roads and tracks.*

Background

There is a steadily increasing demand for off-road driving experiences, whether it be destination-orientated or for the experience itself. The Yeagarup Dunes have been used for a number of years by local off-road enthusiasts.

Off-road vehicles can have many impacts, especially on poorly consolidated soils where even a single pass by a vehicle can damage vegetation and provide a focus for erosion. In waterlogged areas vehicles can cause extensive soil degradation, including compaction or rutting, leaving long-lasting effects on vegetation growth. Vehicles are a major factor' the spread of dieback. Other impacts include vehicle tracks and noise, Off-road driving also places the public at risk, when vehicles are driven at high speed in areas with poor visibility.

Although the Yeagarup Dunes appear unlikely to be damaged by off-road activity, it is highly likely that adjacent vegetation and vegetated areas of the dunes will be damaged by vehicle movement. The other major impact is perceptual, that is, the intrusion of vehicles in a desolate landscape and the resultant impact on those users interested in exploring the dunes on foot.

In national parks all vehicles used must comply with the Road Traffic Act, Non-complying recreational vehicles can be registered under the Vehicles (Off-road) Act, but their use in a national park requires a special permit, endorsed by CALM, from the relevant local government authority. Such a permit is generally only granted in extenuating circumstances.

Prescription

1. **No vehicle activity off road will be permitted in the Parks. All public vehicle use will be restricted to the access routes designated on Map 15.**
2. **Access to Yeagarup, Beach will be provided by a corridor marked poles. On route, allowance will be made for vehicles to drive to vantage points.**

9.3 Horse-riding

Objectives

1. *To provide opportunities for access by horse-back in the Parks, while ensuring that adverse impacts on the natural environment and other Park users are contained.*
2. *To monitor the impacts of horse-riding and review the provision of horse-riding opportunities in the Parks when this plan expires or beforehand if undue conflicts arise.*

Background

Horses were the only form of access, apart from walking, to coastal areas during early settlement of the region by Europeans. Because of the remoteness of the coastal areas and the uneven terrain, the use of horses for pastoral pursuits in these areas persisted until recently. Horses are now almost exclusively used for recreational purposes.

Of the two Parks, the majority of horse-riding occurs within certain areas of the D'Entrecasteaux. In most instances existing tracks or trails are used, but in places where the vegetation is more open, free-range riding is often preferred. Few other similar areas are available to the public for horse-riding in the south-west. While the Shannon forest area is also used, similar riding experiences are readily available in the surrounding State forest.

Although the presence and use of horses can have adverse impacts on some natural environments, many of these impacts can be reduced or avoided by controlling the areas used, intensity and season of use, and use practices. Also, limiting use to biologically, physically and socially non-sensitive areas and to low numbers will help minimise impact.

These impacts may be biological (trampling and eating plants, spreading weeds and diseases, and disturbing native animals) or physical (soil compaction and erosion).

In all cases the level of impact is dependent on the extent and intensity of use, topography and soil type. Climatic aspects such as rainfall and wind speeds are compounding factors. Some sites are

therefore inherently more susceptible to soil damage than others for example, areas with steep slopes, sandy or clayey soils, and swampy or wetland areas.

The landscapes of the D'Entrecasteaux generally have a very low capability to sustain uses which involve disturbance of the soil or vegetation. For this reason the demands made for horse-riding in the D'Entrecasteaux need special consideration even though cattle (another hard-hooved animal) have been grazed in these areas for over 100 years.

Much of Shannon Park, on the other hand, is capable of supporting horse use on roads and tracks because of stable soils and vegetation which is relatively resistant to dieback, and the conflict with other users is not as great.

Prescriptions

- 1. For management purposes, horse-riding in the Parks will be divided into general public use and use by an approved tour operator.**
- 2. Public use will be permitted along a 1 km wide corridor centred on Jasper Beach Road and Deeside Coast Road (Map 15).**
- 3. Horse-riders from the general public will be required to notify the CALM ranger at Northcliffe or Pemberton prior to travelling to the Parks. This requirement is for (a) safety reasons and (b) to explain CALM's code of conduct re horse-riding (including the importance of pasturing horses locally or feeding them treated seed and seed-free food seven days prior to riding in the Parks, and using seed-free feed in the Parks).**
- 4. An approved tour operator will be allowed to use the Parks on a permit basis. The permit will be issued for a three year period. Prior to issue, registration of interest will be requested in State and local newspapers. Prior to the end of the three year period this arrangement will be reviewed and altered as necessary. The permit will be suspended if any breach of the National Park Regulations or permit conditions occurs.**
- 5. Use by the tour operator will be permitted in the area shown on Map 15 between the Gardner River and Broke Inlet and along a 1 km wide corridor centred on Deeside Coast Road.**
- 6. Tethering and yarding facilities will be provided at strategic points. The facilities will be located and designed by CALM, using guidelines written by the Department's Recreation and Landscape Branch, in consultation with local people who regularly use the Parks for horse-riding.**
- 7. Horse use may be limited to designated tracks which may be altered seasonally or annually.**

8. **A program to monitor the effects of horse use on the environment will be established. The information gained through this program will be used to amend these prescriptions as appropriate during the period of the plan. An annual progress report will be produced to assist review.**

9.4 Camping

Objectives

1. *To provide a range of camping opportunities, including backpack camping, vehicle-based camping and formal campsites with basic facilities.*
2. *To ensure that the provision of camping opportunities has minimal impact on the natural environment, particularly sensitive areas, and minimises conflict between users.*

Background

Within the Shannon and D'Entrecasteaux Parks much of the current camping activity is associated with other form of recreation, including bushwalking, canoeing, horse-riding, marroning and beach fishing. Water is an important resource (either for drinking, washing or recreational purposes) and consequently most camping occurs near the coast or along the various rivers and streams in the Parks. The majority of these settings have little or no facilities, the only exception being Windy Harbour where a large grassed area, toilets, tables and barbecues have been provided for overnight visitors. A camping area has also been established at the Shannon Townsite.

Outside the Parks, there are camping areas at Walpole, Pemberton, Northcliffe, Manjimup and Nannup. In general, these areas cater for the interstate tourist trade and resident caravan owners who require facilities of a higher standard. With the exception of peak use periods such

Easter and the Christmas-New Year school holidays, this regional network of caravan/tent camping areas appears adequate to accommodate existing users.

The impact of camping on the environment depends on site characteristics and type, intensity and frequency of use. Common impacts include - trampling understorey vegetation, removing vegetation for firewood, soil compaction (and on steeper slopes, erosion) , littering, polluting ground-water by human waste, and increased risk of wildfire and disease spread. In addition, camping parties with different needs and perceptions may come into conflict over issues such as noise and crowding. These problems intensify during peak periods of use and on sites where there is little or no management.

Camping pressures within the two Parks are still low to moderate, owing the remoteness of the region and the lack of two-wheel-drive access. This situation will change, however, as the public's knowledge of the Parks grows, with much of this increase in visitor use likely to come from outside the region. Therefore, more users will be looking to camp within or adjacent to the Parks.

Three types of camping are provided within national parks - vehicle-based camping with facilities, vehicle-based with no facilities, and backpack camping. Caravan parks are normally not located in national parks.

The following general site selection criteria apply in national parks:

VEHICLE-BASED

- Campsites should be situated in stable landscapes well-removed from major features or attractions where there is potential for conflict with other park users.
- Camping facilities can be located adjacent to, but should remain separate from, day-use areas.
- Preference should be given to relatively level, well-drained sites with adequate shade which are protected from prevailing winds. Forest or woodland settings where there is a high risk of limb-shed from existing trees should be avoided.
- Sites should have reasonable access for users and for management staff for maintenance.

BACKPACK OR NO TRACE

- Areas for this purpose should be located in protected, stable landscapes with well-drained soils and an easterly aspect.
- Areas should be situated within reasonable proximity (200-300 m) of potable water.
- Areas should not be situated within places of high fire risk where accidental ignition could place unacceptably high risks on either park values or human life.
- Areas should be designated adjacent to proposed loop walks at intervals of 15 to 20 Jan.

Prescriptions

- 1. A range of camping opportunities will be provided, including vehicle-based camping with basic facilities, vehicle-based camping with no facilities and back-pack camping. Site selection will be based on the criteria as outlined.**
- 2. Formal campsites with basic facilities will be provided for vehicle-based camping at the Shannon Townsite, Lake Yeagarup, Lake Jasper and the Donnelly River Boat Landing. The Shire of Manjimup will be encouraged to establish similar facilities at Windy Harbour and Camfield.**
- 3. Vehicle-based campsites with no facilities will be provided on the Shannon River near the junction with Chesapeake and Nelson Roads, NEAR the mouths of the Donnelly and Gardner Rivers, behind the foredunes of Yeagarup Beach, and along the coastal access tracks to Callcup Hill, Fish Creek and Black Point and at Banksia Camp and Malimup. Campsites in the latter four areas should be situated inland from the coastline in stable, sheltered landscapes where the risk of erosion and site disturbance can be minimised. These sites will be selected in consultation with local beach-users.**
- 4. Backpack camping associated with bushwalking and canoeing will be permitted throughout the Parks at distances greater than one kilometre from the nearest public road or track. In addition, designated sites for backpack camping should be provided at strategic intervals along all extended bushwalking routes. These sites will be signposted. The co-operation and support of Park users should be sought in safeguarding Park values. This support will be facilitated by the preparation of a 'code of conduct' for low-impact or no trace camping,**
- 5. Fees for the use of formal and some discrete camping areas will be introduced during the period of this plan.**
- 6. Specialised facilities for caravan-based camping will not be provided within either Park. Rather, such developments should be undertaken outside the Parks by local government or private interests on land owned and managed by these authorities or individuals.**
- 7. Generators will not be permitted in any camping area without the prior approval of the CALM District Manager, Pemberton.**
- 8. Rubbish bins will be provided and serviced at some vehicle-based formal campsites. All other camping will require visitors to carry their rubbish with them out of the Parks.**

9.5 Bushwalking

Objective

1. *To provide a range of bushwalking opportunities in all areas of the Parks*

Background

Bushwalking is an activity enjoyed by people of all ages, interests and levels of fitness; thus, a range of opportunities is necessary to meet the needs of this diverse user group. Walks may be short self-guided circuit tracks developed in conjunction with other facilities, such as campgrounds or picnic sites, long distance walking tracks, or cross-country.

Bushwalking activity in the Parks at the present time is thought to be relatively low. The majority of use occurs during long weekends and holiday periods and involves extended cross-country treks.

In recent years, the Ministry of Education has used both Parks to conduct outdoor expedition skills courses for teachers and other group-leaders. At least one commercial operator is known to have conducted guided expeditions through the area.

As part of a recent Commonwealth Employment Program funded recreation development project in the Upper Shannon, the Bibbulmun Track has been extended from Boorara Tree to the Shannon Townsite (Map 15). A one-hour circuit walk which links the Townsite with the Shannon Dam has also been developed.

The impact of bushwalking on the physical environment, while generally low, is variable depending on soil conditions, vegetation type and intensity of use. Where use levels are high, walking can lead to the loss of vegetation as well as localised soil compaction and erosion problems. Other impacts such as the introduction of weeds, the spread of plant diseases or the escape of fires from overnight campfires may also occur. Usually these problems can be effectively minimised through the sensitive location and design of tracks and the careful selection of campsites.

Of greater concern is the potential safety problem associated with long distance walks through remote areas. In the event of a walker becoming lost or injured, search and rescue operations could lead to substantial environmental impacts. Similarly, wildfires may pose a risk to users of remote areas. Such problems can be largely offset through visitor information programs designed to ensure walkers are adequately informed about and equipped to handle the conditions they will encounter.

The vast majority of the Parks is capable of supporting sane level of bushwalking. However, some areas are capable of supporting more intensive use, and/or are more favoured by walkers.

The following criteria guide trail development in national parks:

- Trail alignments or routes should be located along or near the boundaries of different landform, soil types or plant communities to provide maximum visual diversity.
- Trails should provide outstanding views; that is, trails should link high points in the landscape where this can be achieved without jeopardising park values.
- Trails should avoid landscapes where the probability of disturbance or disease introduction is high and/or where the public is placed at risk.
- Trails should be circuits or loops rather than commencing and ending at widely divergent points.
- Trailheads should be relatively accessible to vehicles to facilitate visitor use and management.
- In the case of extended walks, trail routes should be selected so as to provide suitable sites for overnight camping at 15 to 20 km intervals.

Prescriptions

- 1. Bushwalking will be permitted throughout the Shannon and D'Entrecasteaux Parks on an unrestricted basis, however, backpack camping will not be encouraged or facilitated in areas recognised as possessing special ecological significance or at high risk of being damaged by such use.**
- 2. The following day walks will be developed (in descending priority):**
 - **Point D'Entrecasteaux - Windy Harbour**
 - **Shannon townsite ... two additional walks**
 - **Mt Pingerup with access from a trailhead on the South West Highway or Broke Inlet Road.**
 - **Wool-bales with access from the campground at Crystal Springs**
 - **Lake Jasper**
 - **Black Point following realignment of the existing access road.**
- 3. The following walks will be developed, in descending priority, as indicated in Table 9.**
- 4. An information program for walkers, including brochures, track guides and information on safety, will be developed as required.**

**TABLE 9.
PROPOSED EXTENDED WALKS - SHANNON AND
D'ENTRECASTEAUX PARKS**

AREA AND TRAILHEAD	DURATION
• Bibbulmun Track - extend track from Shannon Townsite to Walpole through the lower Shannon Basin	3-4 days
• Gardner River to Lake Maringup and return .. trailhead on Chesapeake Road	2 days
• Boat Landing Road to Yeagerup Dunes and return	2 days
• Northern Shannon circuit from Townsite	2-3 days
• O'Sullivan Block circuit ... trailhead on Deeside Coast Road	2 days
• West Broke walk .. trailhead on Chesapeake Road	2-3 days
• Tragedy Track - Gardner River Mouth and return ... access from Windy Harbour	2 days
• South Coast trek - Black Point to Point Nuyts (as part of Augusta - Walpole walk)	4-5 days
• Lake Jasper to Black Point via lake Quitjup	2 days

5. **A voluntary walker registration system will be developed to help ensure visitor safety and monitor use levels.**
6. **Walkers will be required to carry their rubbish out of the Parks.**
7. **The impacts of bushwalking and use of trails will be monitored.**

9.6 Boat Use

Objectives

1. *To provide for the use of non-motorised craft on selected water bodies in the Parks.*
2. *To allow the controlled use of power boats on the Donnelly River to provide access to the river mouth.*

Powerboats, canoes and sailcraft are used in the Parks for recreation which may be either water-based and/or destination-based. Fishing, touring and water-skiing are the main water-based activities, while gaining access to the mouth of the Donnelly River is the major destination-orientated use. Over the past couple of years a local club has been granted a licence to use one power boat on Lake Jasper to tow hang-gliders. This licence has been issued on an annual basis.

The main water bodies that are used for boating are Lake Jasper and the Donnelly River, but most water bodies are used to some extent, if only seasonally. Other fresh water bodies in the region that provide similar recreational opportunities include the Blackwood River at Alexander Bridge and Lake Poorerecup for power boating, and the Blackwood, Deep and Frankland Rivers for non-power boating.

Boat use requires facilities for the boats and the users. Power boats require launching ramps, small jetties for loading, and parking areas for the trailers on which they are carried; while canoes and sailboards require few, if any, facilities. Navigational aids and information signs about hazards may be necessary in some circumstances. Additional facilities required by users would be the same as those required by other recreational users of the parks - toilets, parking, picnicking or camping facilities.

Conflict can occur between users of different types of boat and between boat users and other Park users. Most of this conflict involves the use of power boats as they create wash which may endanger

smaller craft or swimmers. Power boats also create noise which annoys other users. Most of these problems can be minimised with careful planning and with appropriate safety precautions by users.

Boat use on water bodies can, in some instances, also affect water quality and the stability and biota of the bank. It is unlikely that at this time, with the current levels of use, any of these latter problems are a concern in these Parks.

Prescriptions

- 1. The use of non-motorised craft will be permitted on the Shannon Dam, Lake Jasper and all rivers within the Parks.**
- 2. Power boats will be permitted on the Donnelly River below Boat Landing Road, at the maximum speed limit set by the Department of Marine and Harbours in consultation with CALM.**
- 3. Power boats will be permitted on the lower reaches of the Gardner River.**
- 4. Lake Jasper will be zoned to allow power boat use.**
- 5. A monitoring programme will be developed to determine the biological, physical and social impacts of power boat use on Lake Jasper and the lower reaches of the Gardner River. If unacceptable impacts occur, power boating will cease.**
- 6. No other water bodies in the Park are available for power boat use. (Broke Inlet is not part of the National Park).**
- 7. All other waters within the Parks will be closed to boating.**

9.7 Marroning

Objectives

1. *To allow fishing for marron under the provisions of the Fisheries Act.*
2. *To maintain populations of marron and other aquatic native fauna rotational closure of selected water bodies within the Parks.*

Background

Marron (*Chaerax tenuimanus*) (a large native freshwater crustacean) support by far the largest inland recreational fishery in the south-west. Marroning is a seasonal fishery which is open from mid-December to late April. Prior to -the 1986/87 season, a single licence covering all inland fishing was issued by the Fisheries Department. This has been replaced by a Recreational Fisherman's Licence for which marron are the only scheduled inland species. The bag limit (20/day), minimum legal size (76 mm carapace length), and regulations on method of capture are also set by the Fisheries Department.

Marroning is a social institution for many Western Australians. It often involves camping overnight with friends and family at favoured spots along water courses, resulting in relatively intensive activities adjacent to water bodies. Common impacts include littering, forging new tracks, erosion, occasional wildfires and trampling vegetation.

In recent years, there has been a dramatic increase in marron fishing. The number of inland fishing licences issued has risen from 6 862 in 1970/71 to 28 765 in 85/86, most of these (90%) being issued to marroners (Morrissy et al. 1984). In 1986/87 under the new Recreational Fisherman's Licence, 24 688 licences were issued to marroners. Al-though the species has a high reproductive capability, most marron populations are now being over-fished to the point where it is difficult to catch specimens over the legal size.

In the past, marron are known to have thrived over a much greater area than at present, their natural range extending into the agricultural areas. The decline of fishable stocks, and their disappearance from some inland areas, has been associated with agricultural development over the past 50 years.

This decline is believed to have been caused by a combination of increased stream salinity and eutrophication (stagnation) resulting from land clearing and farming practices, respectively.

Marron distribution in streams and pools is now restricted to the forested areas of the south-west, where stream flow is less saline and less nutrient-enriched. Furthermore, it is likely that increased land use pressures will result in a further loss of marron habitat in the forested areas, which currently

provide all of the marron catch from wild (natural) populations. Predation by introduced species such as red fin perch and kookaburras has added to the problems created by increased harvesting and reduced habitat (Morrisy 1978).

Although the Fisheries Department is responsible for most inland fishing CALM has both the authority and responsibility for the management of fauna populations in national parks under the Wildlife Conservation, and National Park Regulations.

Prescriptions

- 1. marroning will be permitted in the Parks subject to the Fisheries Regulations, the only exception being the Shannon River and its tributaries, which will be closed to marron fishing. The Shannon Dam, however, will continue to be available for marroning.**
- 2. As techniques become available, introduced predators of marron will be reduced in numbers or eliminated.**

9.8 Freshwater Fishing (including trout)

Objectives

- 1. To allow fishing for introduced and native fauna under the provisions of the Fisheries Act.*
- 2. To continue to ensure that those rivers and parts of rivers which lie within the Parks are not stocked with trout, an introduced species.*

Background

A number of native and introduced aquatic fauna species are found in the lakes, rivers and wetlands of the Parks. Native species include fish such as cobbler (*Tandanus bostocki*), and crustaceans such as gilgies (*Cherax crassimanus/quinguecarinatus?*), koonacs (*Cherax plebeius/glaber?*) and marron (*Cherax teniومانus*). Introduced species include brown and rainbow trout, redfin perch and mosquito fish. Little is known about the harvesting pressures on any of these species.

Trout are not stocked in the D'Entrecasteaux or Shannon, although the upper reaches of the Warren and Donnelly, which lie outside the Park, are regularly re-stocked. The Shannon has not been re-stocked, at least over the last 10 to 15 years. Redfin perch are known to occur in the Warren River and Shannon Dam, however, their status in the Donnelly and Shannon Rivers is unknown.

It is likely that in some areas re-stocking is maintaining a dynamic equilibrium between trout, redfin perch and native fish. This is based on an increasing amount of evidence that trout control redfin perch numbers.

Prescriptions

- 1. Fishing will be permitted in all water bodies in the Parks subject to the Fisheries Regulations. The only exceptions are Lake Maringup and Quitjup which will be closed to fishing and retained as a biological reference areas.**
- 2. There will be no trout stocking or re-stocking of waters within the Parks. CALM has no control over re-stocking of areas outside the Parks, unless they are lands or waters under the department's control.**

9.9 Huts

Objectives

- 1. To retain huts which are useful for public purposes, have recognised historic values or are subject to a current leasing arrangement.*
- 2. To progressively remove other huts which impinge on the physical, biological or aesthetic values of the Parks.*

Background

There are a total of 74 huts in the D'Entrecasteaux. Of these, 43 are located near the mouth of the Donnelly River and are under life lease from the National Parks and Nature Conservation Authority. A further 13 are located at Camfield on the Broke Inlet. Camfield is presently vested in the Shire of Manjimup -the 'owners' of these huts have no lease on the land or buildings. The remainder of the huts (18), only a few of which are under lease, are scattered throughout the D'Entrecasteaux. All huts were built on Crown land without legal tenure before the Parks were declared. As the managing agency, CALM is responsible for determining the future use of all huts within the Parks. Camfield is not part of either Park. There are no such structures in the Shannon.

Most of the huts were built by families or groups of friends who enjoyed fishing, marroning or camping on remote parts of the coast. One or two of the older huts were built by pastoralists who brought cattle to the coast for summer grazing - these huts may be of historic value. A few were built for forest assessment or as fire lookouts by the Forests Department. Almost all of these huts are now

used on a private basis by families or groups of friends, however, one or two are available for public use.

Prescriptions

- 1. All huts at the mouth of the Donnelly River are currently under life lease. These leases are not transferable. The current lessees will be permitted to remain until they surrender their leases or they die. The structures will then be removed by their successors or assessed by CALM as outlined in Prescription 2.**
- 2. All other huts will be assessed in terms of their impact on the environment, historical values and usefulness for public purposes as soon as possible after approval of this plan. Huts which do not meet the assessment criteria will be removed. Huts which meet the criteria will remain and be maintained by CALM, for public use. Determination of criteria and subsequent assessment will be in consultation with representatives from the Shires of Manjimup and Nannup, AND hut-owners. As Camfield is not part of the National Park, its huts will not be assessed and therefore may not be made available for public use.**
- 3. No new huts or cabins will be constructed and no new leases issued.**

10.0 INFORMATION AND PUBLIC INVOLVEMENT

10.1 Information

Objective

- 1. To provide an information program which incorporates elements of public use, interpretation, resource protection and visitor safety.*

Background

Provision and exchange of information is one of the key components in developing an effective park management program. The protection of resource values and the enhancement of the public's use and enjoyment of an area can only occur when both the user and the manager are aware of each other's objectives and needs. In the absence of such information, the risk of resource degradation and visitor dissatisfaction is greatly increased, Lack of information may also jeopardise public safety and lead to added management costs.

There are four broad categories of information which are important to the use and management of national parks -

1. **Public Use:** descriptive information that provides current and potential users with an outline of available recreation opportunities. This type of information is particularly useful in pre-visit planning.
2. **Interpretation:** information that assists people to gain an understanding and appreciation of the Park environment and the processes that have and are shaping it.
3. **Resource Protection:** information that identifies and describes the major resource features of an area and outlines the management guidelines that have been adopted to safeguard them.
4. **Visitor Safety:** information that advises the public of potential hazards.

Provision of such information will not in itself ensure that Park management objectives and visitor needs are met. Careful consideration must also be given to the mechanisms used to distribute this information. In general, an information program that is broadly based, relying on personal contact as well as signs, printed material, displays and other means of communication, is much more likely to be successful than a program that is narrower in scope.

The existing information system for the Shannon and D'Entrecasteaux Parks is in its infancy. A preliminary park interpretation program for the Shannon was devised in 1984, and an interpretation display and walk trail at the Shannon Townsite completed in 1986. Other work completed to date includes the production of four brochures and three posters. Signposting throughout the Parks is variable, and is inadequate in many areas.

The Parks are staffed by two full-time rangers with back-up support from district staff at Pemberton. A third ranger, with responsibilities in the Walpole-Nornalup National Park, also assists with the management of the eastern end of the D'Entrecasteaux. Section 12.2 provides a detailed analysis of and prescriptions for staffing.

Prescriptions

1. **Signposting requirements such as area identification signs, regulatory signs and road signs will be identified and satisfied.**
2. **A Shannon-D'Entrecasteaux Parks handbook and a set of interpretative brochures will be prepared with the assistance of specialist staff.**
3. **Information on current management practices and flora and fauna checklists for the Parks will be available at the CALM Southern Forest Region Office, Manjimup.**

4. **A program of guided tours and talks will be organised and conducted using both departmental and voluntary staff.**
5. **Regular liaison with commercial interests, such as local tourist bureaus and tour operators, and known user groups will be maintained by personal contacts and written material such as a Parks newsletter.**
6. **This information program will be linked to other regional and departmental programs to ensure that consistent standards are maintained and that the Parks are not inadvertently over-promoted.**

10.2 Public Involvement

Objective

1. *To involve the public in the management of the Parks.*

Background

Public involvement in park management includes involvement in making and implementing management decisions. This generally leads to better relations between the various interest groups and management agencies. It can also lead to a wider public appreciation of the Park values and the many obligations of agencies responsible for their management. Equally importantly, the involvement of the public in Park management is likely to result in better management. This is because many of the existing user groups have an intimate knowledge of the Park areas, and so are in a good position to help solve some management problems.

Prescriptions

1. **The CALM Southern Forest Region office, Manjimup will advise the public about stages of implementation of this plan, via the local media.**
2. **The recently-established Karri-D'Entrecasteaux Regional Advisory Committee will:**
 - a) **advise on implementation of this plan;**
 - b) **provide advice on issues referred to it;**
 - c) **draw matters of concern or interest, to the committee, to the Department's attention;**
 - d) **assist the Department in providing information to the public; and**
 - e) **provide liaison between CALM local government and the community.**

3. **The public will be encouraged to become involved in survey, rehabilitation, development and public information projects.**

11.0 RESOURCE MANAGEMENT

11.1 Mining

Objectives

1. *To pursue, on behalf of the NPNCA, a policy of not favouring proposed mining activity.*
2. *To ensure that in the event of exploration or mining activity being approved that they are carried out in such a way that it will minimise or restore any damage to the biological, physical and landscape values of the Parks.*

Background

Mining activity (including marking out and exploration) in national parks is controlled by the Mining Act (1978). As a consequence of Sections 24 and 26 of this Act no mining activity can be carried out unless the Minister for Conservation and Land Management consents. Furthermore, a mining lease covering national parks can only be obtained with the consent of both Houses of Parliament. Thus, mining activity and the allocation of leases are not within the control of the Authority.

A small agricultural-lime quarry operates approximately 1.5 km north-west of Windy Harbour in the D'Entrecasteaux National Park. This 1.3 ha claim (70/13595) was pegged and commenced operating in 1972 when the surrounding area was vested in the Shire of Manjimup for 'recreation and camping'. In compliance with the new Mining Act in 1978 the operators applied for a mining lease in 1983, but to date this has not been approved. In 1984 surrounding area was set aside as national park. Current production averages 3 000 tonnes of lime per year and many years pit life remain.

The pit is located in a sensitive part of the landscape, being immediately behind the cliff face overlooking Windy Harbour. However, recently the operators have successfully controlled the visual impact by construction of a vegetated bund and tree planting. Other impacts include the development of haulage roads which have provided access to other rock and soil sources in the Park, and extensive localised disturbance at the pit itself.

Nine applications for exploration licences, which are currently with the Department of Mines, cover most of the D'Entrecasteaux. The main mineral of interest is heavy mineral deposits in coastal sands.

There are no mining or exploration tenements in the Shannon.

Prescriptions

- 1. In its management of the Parks the Authority will pursue a policy of not favouring proposed mining activity. By giving advice and by other appropriate means the Authority will seek to ensure that if mining does occur it is strictly conditioned so as to minimise and require restoration of any damage to the physical environment of the Parks.**
- 2. The Department of Mines is currently transferring mineral claim 70/13595 (lime quarry, Windy Harbour) which has been regarded as transitional since the new Mining Act of 1978, to mining lease (70/48) status. CALM will liaise with the Department of Mines and relevant parties to (a) ensure that satisfactory environmental conditions accompany issuing of the mining lease and (b) to subsequently seek an alternative quarry site outside the Parks, close the existing site and rehabilitate it.**

11.2 Basic Raw Materials (Gravel, Sand, etc)

Objectives

- 1. To minimise extraction of basic raw materials from the Parks.**

Background

Basic raw materials include gravel, shale (excluding oil shale) , sand, clay, limestone and rock. Extraction necessitates localised disturbance, and often results in a decrease in landscape quality. Also, the association movement of machinery and soil is likely to increase the risk of dieback introduction and spread.

Prescriptions

- 1. Basic raw materials for Park maintenance should be sought within the Parks, while ensuring that pit area and numbers are minimised. All pits will be rehabilitated after use.**
- 2. In the case of roads or facilities servicing the Parks, but maintained by local government, maintenance material should be sought outside the Parks. Existing pits should be phased out and rehabilitated.**

3. **If basic raw material extraction from the Parks is unavoidable, the initial location of the pit(s) and subsequent mining should be based on a thorough consideration of landscape impact, presence of rare flora and fauna, and dieback hygiene.**
4. **Basic raw material requirements by other agencies (eg. Main Roads Department, local government, contractors) will not be met within the Parks. Existing pits will be closed and rehabilitated.**

11.3 Commercial Fishing

Objective

1. *To continue to allow access for commercial ocean and estuarine fishing in the D'Entrecasteaux area, subject to conditions which ensure minimal impact on the Park environment and visitors.*

Background

The south coast is fished commercially from east of Point D'Entrecasteaux to Bremer Bay. The industry relies on selected beaches along the coast (ocean-based) and five major inlets (estuarine-based), including Broke.

The ocean fishery is based on a salmon season (February-April) , rock lobster season (November-June) and unrestricted shark and deep-sea fishing. The estuaries are usually fished commercially from May to October. Most operators hold several fishing licences and fish on a year-round basis. Some operate on a part-time basis in conjunction with farming or some other business enterprise.

While fishing operations take place outside of the Park (that is, out to sea or in Broke Inlet) , land-based operations such as power-boat servicing and launching and the use of vehicles and power generators can affect the Park and its users.

One commercial, ocean-based fisherman operates from Windy Harbour and along the Gardner Beach. Other fishermen operate out of Windy Harbour on a seasonal basis. A salmon-fishing concession is also held for Gardner Beach. This involves considerable use of vehicles on the beach. However, it appears to cause little physical damage. As in the Walpole-Nornalup National Park, where another salmon concession operates, the fishing operation is of tourist interest.

The operations of commercial fishermen are controlled by the Fisheries Department. However, the use of vehicles and access through national parks are regulated by CALM.

Prescriptions

- 1. Existing commercial fishermen operating in the Parks will be permitted to continue at the present (1987) scale in accordance with existing regulations and as controlled by the Fisheries Department.**
- 2. All operations associated with commercial fishing will be controlled to ensure minimal impact on the Park environment and minimal disturbance to Park users.**
- 3. Transportation of boats, tackle and produce in the Park will be restricted to designated public access routes.**
- 4. The use of vehicles for fishing operations on Gardner Beach will be restricted to the inter-tidal zone. All access points must be approved by the Ranger-in-charge.**
- 5. CALM will liaise with the Fisheries Department to ensure that there are no inappropriate changes in fishing operations which might adversely affect the Park or its users.**

11.4 Wildflower Picking

Objective

- 1. To prevent wildflower Picking in the Parks.*

Background

Wildflower picking is a significant local industry in the south-west. No licences have been issued to permit picking in the proposed Shannon or D'Entrecasteaux Parks since August 1983.

The collection of wildflowers or other plant parts can reduce the available seed stock and, by reducing the number of flowers available for cross-pollination, may reduce genetic diversity. Driving into areas to pick wildflowers may lead to the spread of dieback and increased fire risk. Given the need to protect representative plant communities, the

Conservation and Land Management Act (1984) prohibits the removal of flora or fauna from national parks, nature reserves and conservation management priority areas in State forest.

Prescriptions

- 1. Wildflower picking will not be permitted in the Parks. Commercial wildflower pickers will be directed to alternative sites outside the Parks.**
- 2. Effective communication with the public, via rangers and written material, will be used to ensure that wildflowers are not picked in the Parks.**

11.5 Beekeeping

Objective

- 1. To minimise the impact of honey-bees on the natural environment of the Parks and on Park users.*

Background

Over the last 18 months all apiary sites within 2 km of the Shannon facility area and all sites without access have been relocated or cancelled. This re-organisation was carried out in consultation with the apiarists involved. There are now 21 apiary sites in the Shannon and none in the D'Entrecasteaux.

Honey-bees are exotic fauna which can affect the ecological processes of native plant and animal communities. They may displace native species that feed on pollen and nectar, thus affecting all other dependent or related plants and animals. They can also adversely affect pollination of native species (Matthews 1984).

Although these impacts are known to occur, quantitative evidence is lacking. Studies are continuing in this field. In view of the lack of conclusive evidence it seems appropriate to pursue a strategy which will set aside some areas free of hives, while allowing bee-keeping to continue in others. one area of high conservation value in the central Shannon has been kept free of sites.

In W.A. bee-keeping requires a licence; in national parks this licence is subject to conditions including no new tracks to be constructed and no interference with visitors or resource management.

Prescription

- 1. CALM will encourage research in the Parks to determine the impact of honey-bees on native plants and animals.**

11.6 Forest Products

Objectives

1. *To prevent the illegal removal of forest products (eg. trees, speciality timbers, chiplogs, sawdust, building timber, firewood) from the Parks.*
2. *To allow the use of forest products from unavoidable clearings (for safety or management purposes) in the Parks for management purposes.*

Background

Prior to the establishment of the Parks forest products and plant materials including sawlogs, chiplogs, firewood and fencing material were removed from the areas. Following the Boorara wildfire in the 1960s, timber was salvaged from large areas of fire-affected forest in the Shannon Basin.

Prescriptions

1. **The removal of forest products for commercial purposes from the Parks is prohibited under the CALM Act (1984).**
2. **Trees that pose a danger to the public or to public facilities, or which obstruct designated access tracks, may be removed and used for Park management purposes.**

11.7 Public Utilities

Objectives

1. *To seek alternatives outside the Parks for any utility corridors proposed within the Parks.*
2. *To ensure that any approved utility corridors are constructed and maintained so as to minimise impacts on the physical, biological, landscape and recreational values of the Parks.*

Background

Utility corridors are often requested so that power or telephone services can be provided to enclaves of private property within parks, or to shorten the route for these services to other nearby lands. The construction and subsequent maintenance of these corridors can result in scars on the landscape, soil erosion, the introduction of weeds and dieback and problems associated with increased public access, such as increased risk of wildfires.

Prescriptions

- 1. In general, no utility corridors will be provided through the Parks. Any proposed utility corridors will be subject to environmental review, including biological surveys and analysis, both of alternative sites outside the Parks and alternative methods of service provision (eg. wind or solar-generated power rather than grid-supplied).**
- 2. Where it is proved to be essential for utilities to pass through the Parks they must avoid any impact on significant or fragile natural features (Map 13).**

12.0 PARK ADMINISTRATION

12.1 Finance

Objective

- 1. To ensure that sufficient funds are available to successfully implement this plan.*

Background

The capacity of CALM to implement this plan will depend on the availability of adequate finances.

Prescriptions

- 1. A budget will be sought annually to implement this plan progressively.**
- 2. This plan will be implemented progressively according to E. Implementation and Review 1.0 Programming and Budgeting.**

12.2 Staff

Objective

- 1. To increase the Ranger staff with full-time responsibility within the Parks so that Park values and visitors are adequately protected.*

Background

The staff requirement given in this section refers specifically to the regional and district offices of the CALM Southern Forest Region.

Rangers are the staff most immediately involved in Park management. At present there is the equivalent of two full-time Rangers allocated to the two Parks (Map 16). One Ranger in the Pemberton area is responsible for the western half of the D'Entrecasteaux National Park and Pemberton National Parks. Of his time, 50% is devoted to the D'Entrecasteaux. A second Ranger at Northcliffe has full-time responsibilities in the D'Entrecasteaux. A third Ranger at Crystal Springs devotes some of his time to the D'Entrecasteaux (50%), the remainder being devoted to management of Walpole-Nornalup (where he assists two other Rangers based at Walpole).

District staff at Walpole, Pemberton, Northcliffe and Nannup are also available to work within the Parks on the construction and maintenance of facilities and rehabilitation. In the past, the public has been involved in Park development, maintenance and interpretive work.

Implementation of this plan and the associated increase in facilities and visitor numbers will result in a substantial increase in Ranger duties.

Prescriptions

- 1. At least three Rangers with full-time and one with part-time (50%) responsibilities within the Parks will be allocated during the period of this plan, if and when finances become available.**
- 2. To make management easier, the Parks will be divided into the broad administrative blocks indicated on Map 16.**
- 3. These Rangers will have the area responsibilities as indicated below, with the ability to pool resources when the need arises.**
 - (i) Pemberton (full-time)**
Location: Pemberton
Area Responsibility: Jasper block
Yeagarup block.

The existing ranger at Pemberton will nominally be the Ranger-in-charge for the Parks. Another ranger will be established in the area when finances become available.

- (ii) Northcliffe (full-time)**
Location: Northcliffe townsite

**Area Responsibility: Callcup block
Chudalup block
Maringup block**

This Ranger is centrally located to the Parks and can be readily deployed in the Shannon Basin as required.

(iii) Crystal Springs (half-time)

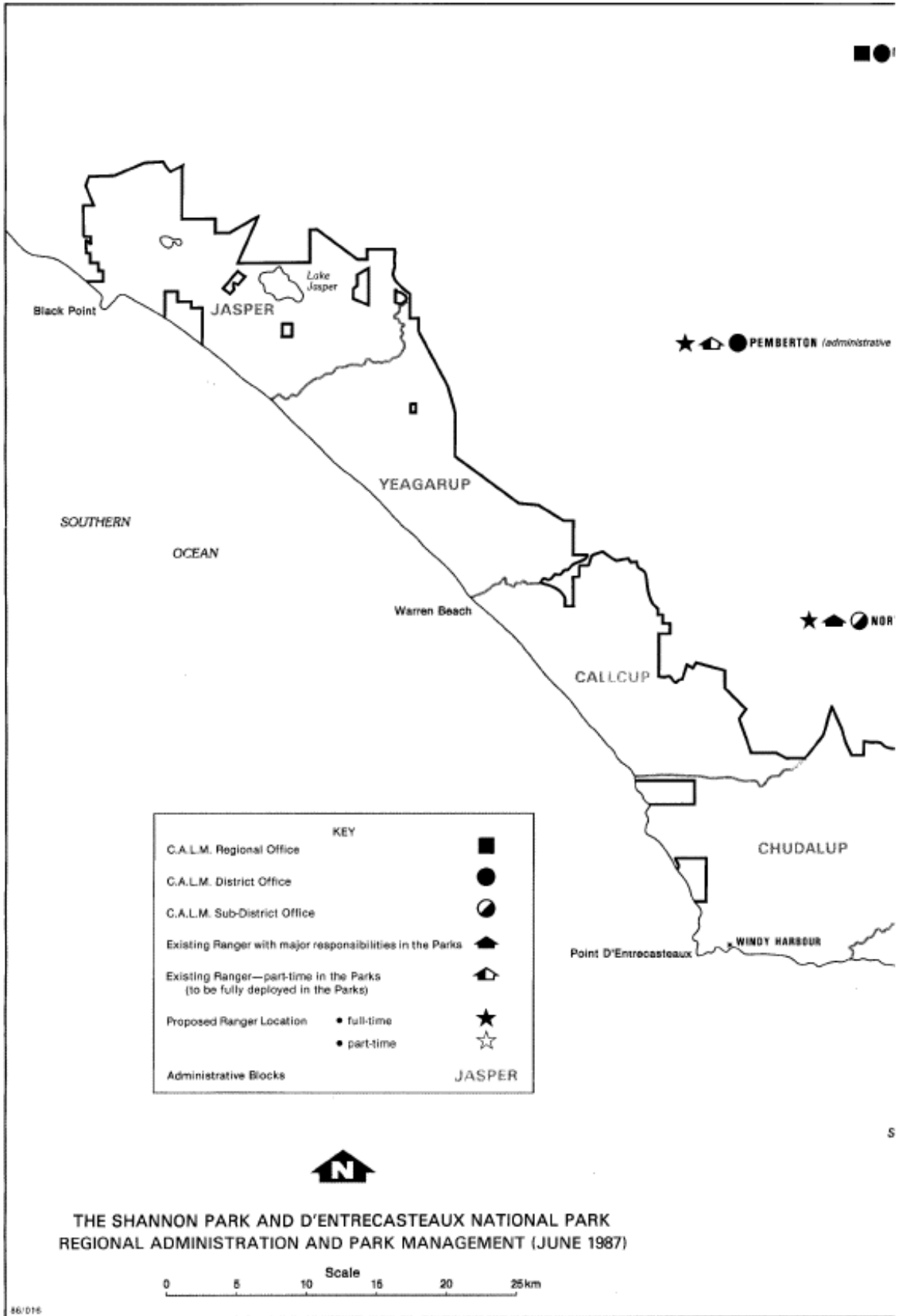
Location: South West Highway at present ranger residence

Area Location: Broke block

Pingerup block

Lower Shannon

There is presently very limited use of this large area. As use increases, this Ranger will need to spend an increasing amount of time in the Shannon and D'Entrecasteaux Parks.



MANJIMUP

(administrative responsibility for the Parks)



(iv) **Upper and Central Shannon Area (full-time)**

A ranger will be allocated to the Shannon recreation area when use increases. Until then, this area will be serviced on a part-time basis by the Northcliffe ranger and by CALM district staff based at Pemberton.

- 4. Mobile rangers will assist existing staff on a seasonal basis as required.**
- 5. The CALM District Officer at Pemberton will have management responsibility for the Parks, with support from Walpole and Nannup districts.**

12.3 Public Safety

Objectives

- 1. To ensure that visitors to the Parks are protected as much as is possible and reasonable from dangers arising from the Parks' natural environment, management and public use.*
- 2. To ensure that the values of the Parks are not adversely affected by efforts to make it safe for visitors or by rescue operations.*

Background

Dangers inherent to the natural environment of the Parks include poisonous snakes, fire and adverse weather conditions. Different types of recreational use of the Parks will place participants at varying degrees of risk. For instance, bushwalkers using isolated areas of the Parks may be at greater risk than people staying in designated campgrounds.

Prescriptions

- 1. The need to provide a reasonable level of care for Park visitors will be taken into account in Park management, the use and provision of public facilities and the development of information programs.**
- 2. While the native fauna of the Parks is protected, Park Rangers or other departmental staff may remove fauna from designated camping or picnicking areas, if it is endangering the public.**

3. CALM will consider providing specific safeguards where the needs of public safety warrant it. Such safeguards might include protective railing, emergency shelters, specialised rescue equipment and registration for entry into remote areas.
4. Registers for bushwalkers and other users (eg. horse-riders) will be established and the public encouraged to use them.
5. If lives are considered to be at risk by the CALM District Manager, Pemberton, then vehicles may be used off-road, subject to strict hygiene measures and avoiding, where possible, environmentally sensitive areas (Map 13).

13.0 SURVEY, RESEARCH AND MONITORING

Objectives

1. *To plan and implement an integrated program of survey, research and monitoring to provide information which will aid management of the Parks.*
2. *To involve other organisations and volunteers in the program.*

Background

References to survey, research and monitoring needs have been made in several sections of this plan. In some cases they refer to the need for basic survey information about the Parks' biological and physical environment, and in others to the need to determine the impacts of management or use in certain areas. Table 10 summarises the survey, research and monitoring needs over the period of this plan.

This program will involve the integration of surveys and research in the Parks with other departmental research and management programs, some survey and research by regional staff and Rangers, and the help of interested local groups. No work in the Parks will be carried out without approval by CALM.

All information must be collected in a uniform way, so that meaningful comparisons can be made between sites and over time. This is best achieved by recording data at a 'fixed-point' which is marked and can be readily re-located.

A key element of the research and monitoring program is an experimental approach to management. This has been adopted in several parts of this plan, primarily in areas where uncertainty exists regarding how a particular area or resource should or might be managed or used. In brief, the

approach involves setting hypotheses about the effects of particular types or levels of management or use and then testing them. Such programs, with associated management, must therefore be planned and implemented with the involvement of both management and research staff, and the results of the program must be used to amend relevant management and use, as appropriate.

Prescriptions

- 1. The summary given in Table 10 will be used to design, within the first two years of this plan, an integrated program of survey, research and monitoring. Specialist staff from the Research Branch of CALM will be involved in the design, and in some instances will facilitate the implementation of the survey, research and monitoring program.**
- 2. CALM will encourage other agencies and institutions to undertake research projects which are relevant to the long-term conservation and management of the Parks.**

TABLE 10.
SUMMARY OF SURVEY, RESEARCH AND MONITORING PRESCRIPTIONS FOR
THE SHANNON AND D'ENTRECASTEAUX PARKS

SECTION	PRESCRIPTION	PRIORITY	DURATION
B10.0	Survey regional conservation and recreation opportunities.	Medium	Short
B11.0			
D3.1	Survey and monitor user impact on landscape and geological features.	Medium	Ongoing
D3.2	Hydrologic survey, including wetlands and groundwater - quantity, seasonality and quality.	Low	Long
D3.3	Survey of soils types in Parks.	Medium	Medium
D3.4	Survey and monitor areas requiring rehabilitation.	High	Ongoing
D4.0	Floristic survey, especially species and communities currently considered rare or restricted.	High	Medium
D4.0	Analyse plant community composition and function, with reference to: experimental Aboriginal management; and rare and endangered species which might be re-introduced.	High	Ongoing
D4.0	Monitor disturbance to native vegetation through management and public use of the Parks.	High	Ongoing
D5.0	Fauna survey, especially of species currently considered rare or endangered.	High	Medium
D5.0	Survey native fauna populations and determine relationship to changes in habitat due to management or natural processes.	Medium	Ongoing
D5.0	Establish whether or not species of native fauna absent from the Parks but likely to have previously occurred there, could be re introduced without detriment to native fauna currently present.	Medium	Ongoing
D6.1	Develop information system for fire management.	High	Ongoing

SECTION	PRESCRIPTION	PRIORITY	DURATION
D6.1	Monitor impacts of prescribed fire regimes.	Medium	Ongoing
D6.1	Monitor succession.	High	Ongoing
D6.1	Monitor wildfire occurrence.	Medium	Ongoing
D6.2	Survey occurrence of <i>Phytophthora cinnamomi</i> .	High	Ongoing
D6.3	Survey and monitor presence of introduced fauna.	High	Ongoing
D6.3	Survey and monitor presence of introduced plants.	High	Ongoing
D7.1	Monitor use of public roads.	Medium	Ongoing
D7.1	Monitor erosion on roads and tracks to establish those needing upgrading, realigning or rehabilitation, and the susceptibility to erosion of differing soil types and landscapes.	Medium	Ongoing
D7.2	Survey beach users.	Medium	Ongoing
D7.2	Monitor impact of vehicles on beaches.	Medium	Medium
D8.1	Identify and record Aboriginal and European cultural features.	High	Medium
D9.1	Survey present recreational use patterns.	High	Ongoing
D9.3	Monitor impacts of horse use.	High	Medium
D9.4	Monitor the effects of camping.	Medium	Ongoing
D9.5	Monitor bushwalking.	Medium	Ongoing
D9.5	Monitor erosion and other impacts of walkers on tracks.	Medium	Ongoing
D9.7	Survey and monitor marron and other freshwater fauna populations.	Medium	Ongoing
D9.8			
D9.9	Survey existing huts and cabins within Parks to determine those which may be useful for public purposes or have historic values.	High	Short
D10.1	Monitor use and usefulness of public information program.	Medium	Ongoing
D11.3	Monitor activities of commercial fishermen within the Parks.	Medium	Ongoing

E. IMPLEMENTATION AND REVIEW

1.0 PROGRAMMING AND BUDGETING

In this plan a number of management program are given. Table 11 presents a summary of the optimum practical program and the estimated annual costs of implementation. It is recognised however, that sufficient funds may not be available to implement this optimum program. When this is so, the priority between programs can be determined through reference to C. Management Objectives.

2.0 PLAN REVIEW AND EVALUATION

This plan will be reviewed before the end of its term (1997).

It is expected that there will be two levels to the review -

- a) determination of the degree to which objectives of the plan were achieved (C. Management Objectives); and
- b) updating and refinement of the information upon which the planning analysis was based, using information gained through the survey, research and monitoring programs set out in Table 10.

In addition, a brief annual review of the plan and the extent to which the objectives and prescriptions are being achieved will be prepared. Interim alterations to the plan arising from these reviews, improvements in information available (resulting from survey and monitoring), or changes in policy should take into account the philosophies outlined in D. Management Prescriptions 9.1 Levels of Use.

TABLE 11. FIVE YEAR WORKS PROGRAM AND BUDGET FOR THE SHANNON AND D'ENTRECASTEAUX PARKS

ITEM NO.	JOB DESCRIPTION	ANNUAL QUANTITY	UNIT COST (\$)	TOTAL ANNUAL COST	LOCATION AND PRIORITIES
1.	ROAD CONSTRUCTION				
	(including parking areas)				
1.1	Realignment and clearing	15 km			Salmon Beach, lighthouse, 3km
1.2	Surfacing	15 km	10,000/km	150,000	Malimup Beach 12 km
1.3	Drainage	15 km			Banksia Camp 2 km
1.4	Stabilization	15 km			Warren Beach 5 km
					Lake Jasper, Jasper Beach and Black Point 30 km
2.	ROAD MAINTENANCE				
2.1	Patch surfacing	260 km			Shannon 120 km
2.2	Grading	260 km			D'Entrecasteaux 140 km
2.3	Slashing and log removal	260 km	30/km	8,000	
2.4	Drainage and guide posts	260 km			
2.5	Signposting <ul style="list-style-type: none"> • names • regulatory 	260 km			
3.	ROAD CLOSURE				
3.1	Ripping and planting				Black Point Road, roads around Lake Jasper,
3.2	Barrier construction	5 km	2,000	10,000	Blackwater Track, Lower Gardner Road, and
3.3	Signposting				other roads specified in the plan.

ITEM NO.	JOB DESCRIPTION	ANNUAL QUANTITY	UNIT COST (\$)	TOTAL ANNUAL COST	LOCATION AND PRIORITIES
4.	FACILITY CONSTRUCTION AND MAINTENANCE				
4.1	Toilets <ul style="list-style-type: none"> • flushing • long drop 	2 4	40,000 5,000	80,000 20,000	YR1 - Shannon Townsite, Salmon Beach, Malimup.
4.2	Other facilities (barbeques, tables, bins, signs overnight shelters)	2	4,000	8,000	YR2 - Black Point, Gardner River Mouth, Fish Creek.
4.3	Facility maintenance	12 sites	2,500	30,000	Other sites will be prioritised over period of plan.
5.	WALK TRAILS				
5.1	Clearing alignments, erosion control etc				Trail heads: (a) one day walks Windy Harbour, Shannon, S.W. Highway (Mt Pingerup), Woolbales, Lake Jasper, Black Point (b) two day walks Gardner River Mouth, Springbreak Road (West Broke), Deeside
5.2	Boardwalks, steps, bridges				Coast Road (O'Sullivan)
5.3	Trail head registers			15,000	
5.4	Trail and stage markers				
5.5	Information signs and brochures				
5.6	Maintenance				

ITEM NO.	JOB DESCRIPTION	ANNUAL QUANTITY	UNIT COST (\$)	TOTAL ANNUAL COST	LOCATION AND PRIORITIES
6.	HORSE TRAILS				
6.1	Trail and corridor marking			5,000	
6.2	Information brochures				
7.	INFORMATION				
7.1	Information centres	1			Northcliffe visitor's centre, Shannon
7.2	Interpretive signs and shelters	1		10,000	Townsite, Windy Harbour, Salmon Beach, Mt Chudalup, lake Jasper, Black Point, Callcup Hill, Lake Yeagarup, Gardner River Mouth
7.3	Brochures, posters etc	2			
7.4	Guided tours and talks				
7.5	Video				
8.	REHABILITATION				
8.1	Dune stabilization				Gardner River Mouth, Yeagarup, Broke, Fish Creek, Yeagarup, Doggerup, Shannon
8.2	Beach erosion control		300/ha	12,000	
8.3	Gravel pit and track rehabilitation	5			
9.	FIRE MANAGEMENT				
9.1	Firebreaks	50	200/lan	10,000	
9.2	Prescribed burns (aerial)	13,000	6/ha	78,000	2 coastal burns, 2 forest
9.3	Prescribed burns (hand)	300	15	5,000	
9.4	Fuel sampling and surveys			1,000	
9.5	Installation of waterpoints			3,000	

ITEM NO.	JOB DESCRIPTION	ANNUAL QUANTITY	UNIT COST (\$)	TOTAL ANNUAL COST	LOCATION AND PRIORITIES
10.	DISEASE PROTECTION				
10.1	Quarantine implementation (signs, road closure, etc)			2,000	
10.2	Washdown points			2,000	
10.3	Information signs			1,000	
11.	WEEDS AND VERMIN CONTROL				
11.1	Weed control			5,000	Blackberries etc
11.2	Vermin control			2,000	Foxes, pigs
12.	RESEARCH AND MONITORING				
12.1	Assistance to research			4,000	
12.2	Park surveys (flora, fauna etc)			6,000	
12.3	Recreation surveys			4,000	
13.	ADMINISTRATION				
13.1	Ranger facilities - house, power - sheds, store, office			15,000 10,000	Total cost approx. \$65,000 (bulk of cost will be Year 1)
13.2	Stores, tools and equipment			4,000	
13.3	Vehicles and plant			30,000	
13.4	Radios and telephones			5,000	
	TOTAL			<u>\$535,000</u>	

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APPENDICES

Appendix 1.
Reserves within the proposed D'Entrecasteaux National Park including the purpose 'national park' (June 1987)

RESERVE NO.	AREA (HA)	PURPOSE	VESTING	NAMED
A17495	680	national park	NPNCA	No
A26628	1 607	national park and water	NPNCA	Yes
A28478	65	national park and water	NPNCA (with power to lease)	Yes
A28479	32	national park and water	NPNCA (with power to lease)	Yes
A36996	34 895	national park and water	NPNCA	Yes
A39960	2 522	national park	NPNCA	No

All of the above reserves extend to low water mark.

NPNCA - National Parks and Nature Conservation Authority

Appendix 2.
Pastoral leases within the proposed
D'Entrecasteaux National Park (June 1987).

LEASE NO.	OWNER	LEASE NAME	AREA (HA)
3114/824	L.F. Dickson Beddelis P.O. Box NANNUP	Quannup Station	4 352
3114/666	T. Dickson and L.A. Scott 37 Bignell Drive Sussex Green BUSSELTON	Silver Mount Station	3 237 (includes Reserve No. 9537)
3114/834	C.D Mottram C/- P.O. MANJIMUP	Banksia Flats Station	1 186
3114/875	L.W Wheatley Brooklyn Station P.O. Box 67 BRIDGETOWN	Brooklyn Station	2 268
3114/868	M.F. Kanny P.O. Box 138 MANJIMUP	Broke Inlet Station	1 230

Appendix 3. Unvested reserves within the proposed D'Entrecasteaux National Park (June 1987)

RESERVE NO.	AREA (HA)	PURPOSE	VESTING
9537	192	excepted from sale	n.v.
9539	304	excepted from sale	n.v.
9540	526	excepted from sale	n.v.
9588	1 762	experimental farm	n.v.
11182	352	excepted from sale	n.v.
12702	40	water	control of Shire of Manjimup
13356	1 037	public utility	n.v.
14145	10 909	timber	n.v.
14891	405	excepted from sale	n.v.
15776	283	camping and recreation	control of Shire of
15979	147	timber - government requirements	Manjimup n.v.
17015	405	public utility	n.v.
17072	809	public utility	n.v.
21122	5	recreation	n.v.
21712	405	excepted from sale	n.v.
24080	40	water	n.v.
25784	26	water	n.v.
26198	672	recreation	n.v.
29681	4	conservation of flora and fauna	NPNCA
30503	4	experimental plot - agriculture department	n.v.
31357	247	conservation of fauna	n.v.
33495	52	government requirements	n.v.
33496	101	government requirements	n.v.
33993	108	government requirements	n.v.
34075	85	government requirements	n.v.
38234	1	education purposes	minister for Education

n.v. - not vested

WAWA - Water Authority of Western Australia

NPNCA - National Parks and Nature Conservation Authority

**Appendix 4.
Reserves cancelled since 1984 in the proposed
D'Entrecasteaux National Park (June 1987)**

AREA	CALM 1:50 000 MAP	CHANGE AND DATE	CURRENT STATUS
A30523 (conservation of flora and fauna)	Warren Broke Inlet	cancelled 13-7-84	VCL
Pt SF 41	Broke Inlet Walpole	revoked 22-6-84	VCL
20167 (recreation and camping)	Broke Inlet	cancelled 13-7-84	VCL
24158 (camping and water)	Walpole	cancelled 13-7-84	VCL
208/25 timber reserve	Broke Inlet	cancelled 1-2-85	VCL
SF 66	Northcliffe Broke Inlet	revoked 26-7-85	VCL
Inverary PL	Warren	re-purchased	VCL
Nel. Loc. 3656	Warren	purchased	VCL
Pt A31362 (Walpole-Nornalup National Park)	Walpole	cancelled July 1986; reserved 3-4-87 (App. 1, A39960)	VCL national park

VCL - vacant Crown land

Appendix 5.
Freehold enclaves within the proposed D'Entrecasteaux
National Park (June 1987)

NELSON LOCATION NO. (HA)	CALM 1:50 000 MAP	AREA
8520	Jasper	162
8516	Jasper	162
8519	Jasper	162
7226	Jasper	72
147	Jasper	51
13101	Jasper	154
2928	Jasper	41
1147	Jasper	8
2417	Warren	267
2416	Warren	65
5469	Warren	52
5468	Warren	36
153	Warren	40
3869	Warren	552
7965	Broke Inlet	353
1226	Broke Inlet	40
1234	Broke Inlet	40
5606	Broke Inlet	405
5240	Broke Inlet	405
5601	Broke Inlet	405
5604	Broke Inlet	324
5605	Broke Inlet	405
5600	Broke Inlet	243
5602	Broke Inlet	190
5273	Broke Inlet	49
11522	Broke Inlet	4

Appendix 6.
Reserves controlled by the Shire of Manjimup (June 1987)

RESERVE NO.	LOCALITY	AREA (HA)	PURPOSE	OTHER DETAILS
A15776	Gardner River	283	camping and recreation	control of Shire of Manjimup
19787	Camfield	40	camping	vested in Shire of Manjimup
A38881	Windy Harbour	90	recreation, camping, caravan park and holiday cottages	vested in Shire of Manjimup, power to lease for 21 years

**Appendix 7.
Status of land within the proposed Shannon Park
(June 1987)**

PARCEL IDENTIFIER	APPROX. AREA (HA)	PURPOSE	VESTING
VCL	10 750	-	-
Pt SF 41	43 000	State forest	LFC
Pt SF 55		State forest	LFC
Pt A18705	330	national park	NPNCA
29058	2 ha	school site	n.v.

n.v. - not vested

LFC - Lands and Forest Commission

NPNCA - National Parks and Nature Conservation Authority

Pt - part

SF - State forest

VCL - vacant Crown land

**Appendix 8.
Mining status of the Shannon and D'Entrecasteaux Parks
(June 1987)**

TENEMENT IDENTIFIER	MAP	TENEMENT STATUS	HOLDER INTEREST	HOLDER NAME
E70/382	Broke Inlet	Pending	Active	Cable Sands
E70/143	Broke Inlet Walpole	Pending	Active	Cable Sands
E70/380	Broke Inlet Northcliffe	Pending	Active	Cable Sands
E70/414	Broke Inlet Northcliffe Warren	Pending	Active	Jackson
M70/48 MC70/13595	Broke Inlet	Pending	Active	Jackson
E70/415	Warren Northcliffe	Pending	Active	Cable Sands
E70/376	Jasper	Pending	Active	Cable Sands
E70/381	Jasper Augusta	Pending	Active	Cable Sands
E70/398	Jasper Augusta	Pending	Active	Cable Sands
E70/416	Jasper Warren	Pending	Active	Cable Sands