

GARDEN ISLAND

Boundary Definition: management/bushland boundary

SECTION 1: LOCATION INFORMATION

Bush Forever Site no. 63

Area (ha): bushland 956.9

Map no. 56, 62, 68

Map sheet series ref. no. 2033-IV SE

Other Names: not known

Local Authorities (Suburb): City of Rockingham (Garden Island)

System 6 (1983): M96 part System area bushland, only bushland described

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS

Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1)

Quindalup Dunes (Holocene dunes)

Safety Bay Sands (Qhs: S1, S2, S13)

VEGETATION AND FLORA

Vegetation Complexes

Quindalup Dunes

Quindalup Complex

Floristic Community Types: *not sampled, types inferred

Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

29a Coastal shrublands on shallow sands

*29b *Acacia* shrublands on taller dunes

30a2 *Callitris preissii* and/or *Melaleuca lanceolata* forests and woodlands (DEP 1996, re-allocated from 30a, equivalent to 30a in Gibson *et al.* 1994, English and Blyth 1997)

30c2 Woodlands and shrublands on Holocene dunes

*S13 Northern *Olearia axillaris* — *Scaevola crassifolia* shrublands

*S14 *Spinifex longifolius* grassland and low shrubland

WETLANDS

No wetlands mapped

THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined, Vulnerable (floristic community type 30a as defined by English and Blyth 1997)

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: island, ocean — limestone cliff

Vegetation and Flora: detailed survey (Keighery, GJ, 1998, McArthur 1957, McArthur 1990, McArthur and Bartle 1981, Marchant and Abbot 1991); limited survey (Gibson *et al.* 1994 (Gard 01-04)); synopsis (Keighery, BJ, Gibson and Keighery 1997)

Structural Units: mapping (McArthur 1957, McArthur 1990, McArthur and Bartle 1981)

Spearwood Dunes

Uplands — Tamala Limestone with shallow Quindalup sands: Closed Low Heath dominated by combinations of *Scaevola crassifolia*, *Acrotriche cordata*, *Boronia alata* and *Alyxia buxifolia*

Quindalup Dunes

Uplands — Youngest dunes: Low Forest to Low Open Forest dominated by *Callitris preissii*, *Melaleuca lanceolata*, *Melaleuca huegelii*, *Acacia rostellifera* and combinations of these; Closed Tall Scrub dominated by *Acacia rostellifera*, *Spyridium globulosum*, *Pittosporum phylliraeoides*, *Melaleuca huegelii*, *Beyeria viscosa*, *Diplolaena dampieri* and combinations of these

Uplands — Strand: *Spyridium globulosum*, *Alyxia buxifolia*, *Olearia axillaris* and *Calocephalus brownii* Open Heath; *Sarcocornia blackiana* Low Shrubland; *Cakile maritima*, *Salsola kali* and *Carpobrotus virescens* Open Low Heath; *Lepidosperma gladiatum* and *nodosa* Sedgeland

Vegetation Condition: >80% Excellent to Pristine, <20% Very Good to Good, with areas of severe localised disturbance

Total Flora: 105 native taxa, 78 weed taxa (Keighery, BJ, Gibson and Keighery 1997, Keighery, GJ, 1998, McArthur 1957, Marchant and Abbott 1981) (estimated >90% expected flora)

Significant Flora: Keighery, BJ, Gibson and Keighery 1997 — *Lepidium puberulum* (4) (only record on the Plain south of Lancelin), *Melaleuca lanceolata* (only population in PMR, disjunct from Margaret River), *Callitris preissii* (endemic to the PMR, most extensive populations), *Amyema melaleucae* (a mistletoe growing on *Melaleuca lanceolata*, disjunct south from Dongara and the only record on the Swan Coastal Plain),

Lasiopetalum angustifolium (previously *L. oppositifolium*, disjunct south from Green Head and the only record on the Swan Coastal Plain), *Boronia alata* (disjunct north from Cape Naturaliste, also recorded from two other locations in the Perth area — Rottneest Island and Minim Cove), *Myosotis australis*, disjunct from Margaret River (only record on the Swan Coastal Plain), *Pittosporum phylliraeoides* (significant populations of a species that is very uncommon on the Swan Coastal Plain), *Cynoglossum australe* (disjunct population from the Abrolhos Islands) and *Trachymene coerulea*

Fauna: structured surveys for birds (94 species) (Brooker *et al.* 1995a), native mammals (1 species) (Brooker *et al.* 1995a) and reptiles (14 species) (Brooker *et al.* 1995a, Robinson *et al.* 1987). Significant bird species: category 2 (14), category 3 (5) and category 4 (5). Significant island populations of Tammar Wallaby, Carpet Python (*Morelia spilota*), Lined Skink (*Lerista lineata*), Brush Bronzewing and Golden Whistler

Linkage: no adjacent bushland

Other Special Attributes

Meets five of the six specific criteria for coastal reserves:

- (i) Quindalup Dune types: deep and shallow dunes and thin sands overlaying Tamala Limestone
- (ii) Continuing natural processes: 1019.9ha (865.5ha bushland) of Quindalup Dunes; almost completely vegetated island
- (iii) Shoreline: soft (sandy) and hard (rocky)
- (v) Vegetation: six regional floristic groupings, one confined to Woodman Point and Garden Island
- (vi) Habitats: see Fauna section above

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Entered in the Register of the National Estate; location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

Criteria: Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

Recommendation: Other Government Land Mechanism (see Table 3, Volume 1).

GARDEN ISLAND

Boundary Definition: management/bushland boundary

SECTION 1: CADASTRAL INFORMATION

(Lots, locations and derived information to be updated in the public submission period)

Bushplan Site no. 63 **Map no.** 71, 78, 79 **Map sheet series ref. no.** 2033-IV SW
System 6 (1983): M96 part System area bushland, only bushland described

Other Names: not known

Local Authorities (Suburb)
 City of Rockingham (Garden Island)

Area (ha): total 1120.5; bushland 956.9

Zoning

MRS: Public Purposes-Commonwealth Government,
 Public Purposes-Special Uses, Waterways

TPS: Landscape

Ownership Categories

Commonwealth Government, State Government

**Lot/Location/Reserve numbers (Purpose),
 Street name**

9, 696

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Structural Units: mapping (McArthur 1957, McArthur 1990, McArthur and Bartle 1981)

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Strand: *Spyridium globulosum*, *Alyxia buxifolia*, *Olearia axillaris* and *Calocephalus brownii* Open Heath; *Sarcocornia blackiana* Low Shrubland; *Cakile maritima*, *Salsola kali* and *Carpobrotus virescens* Open Low Heath; *Lepidosperma gladiatum* and *Isolepis nodosa* Sedgeland

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SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Register of the National Estate; Location for JAMBA/CAMBA species

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

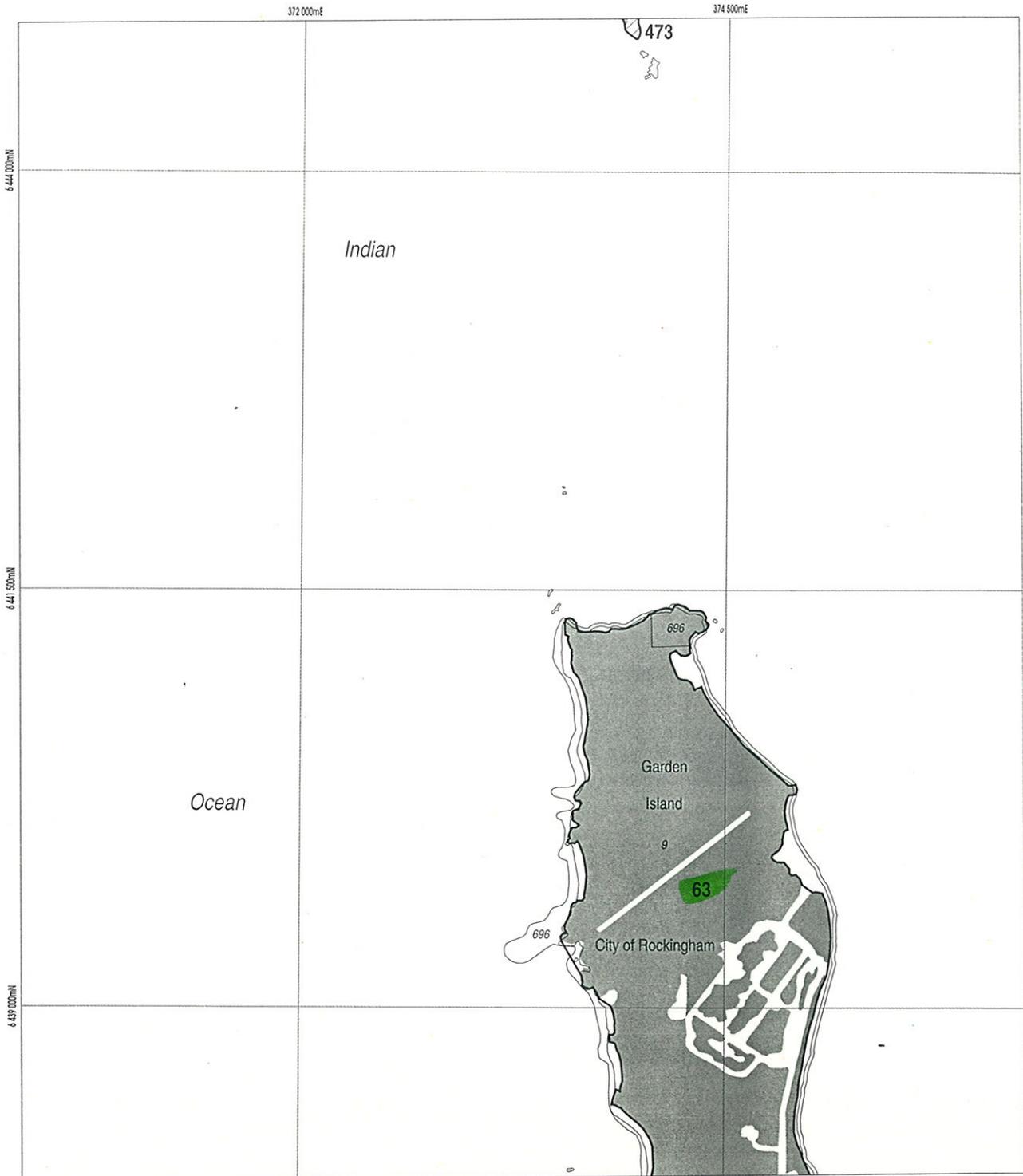
Criteria: Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

Opportunities and/or Constraints

Opportunities: Bushplan Site/part Bushplan Site location of Scheduled Fauna, under TPS Landscape Zoning

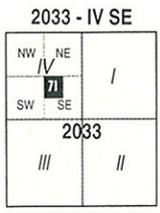
Recommendation: The existing care, control and management intent of the reserve is endorsed. Long-term security and support for conservation management of the Bushplan Site to be enhanced by: amending the purpose of the reserve to include conservation; and applying appropriate mechanisms in consultation with the reserve management body.



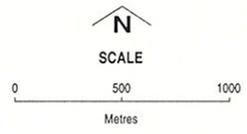
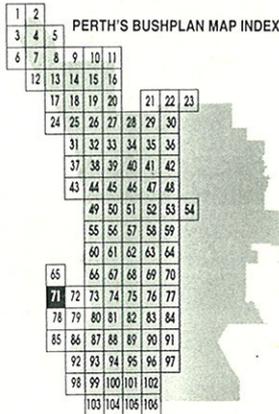


LEGEND

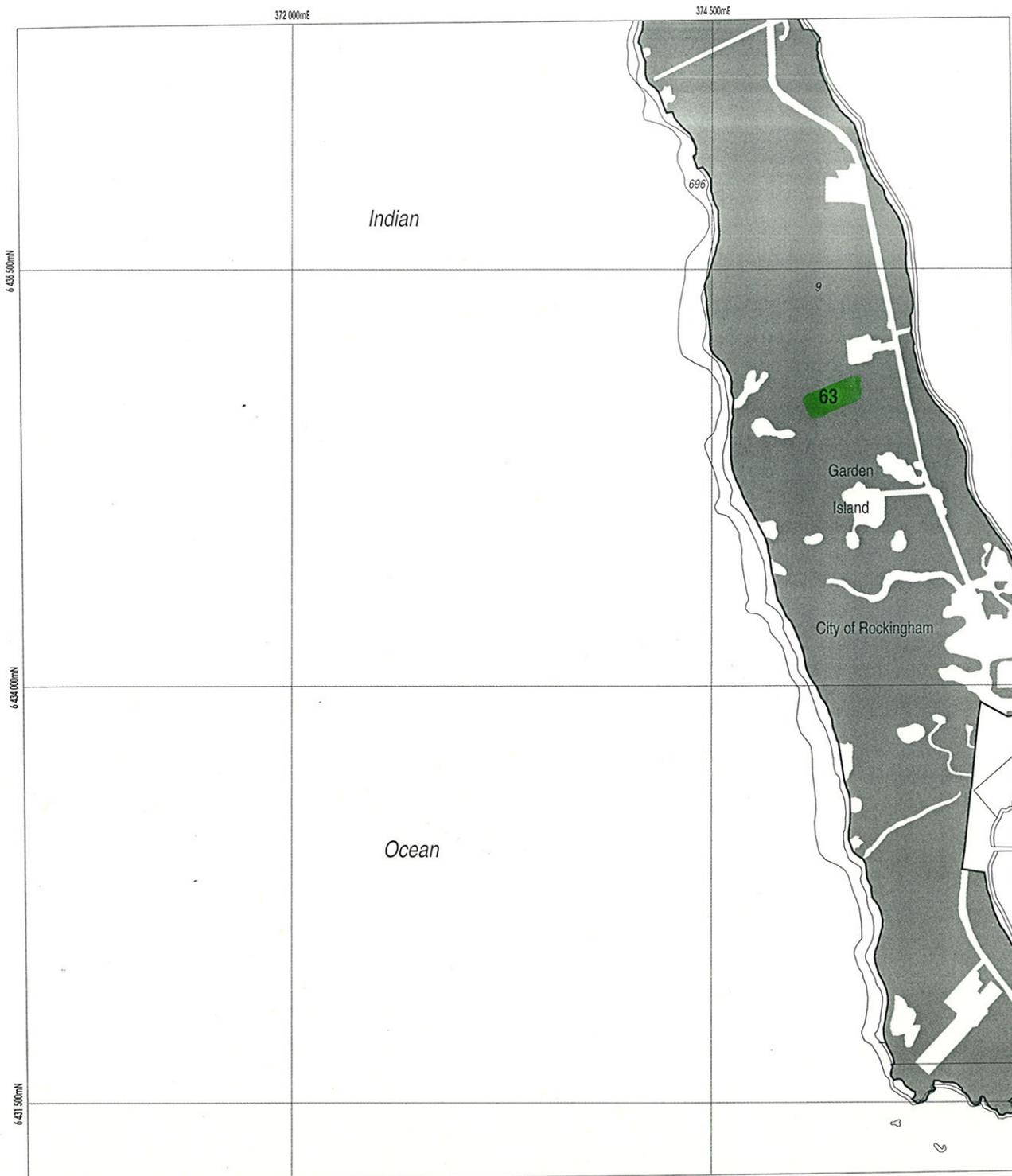
- 472 Bushplan Sites With Regionally Significant Bushland
- Other Native Vegetation
- Conservation Category Wetlands
- Bushplan Sites With Some Existing Protection
- 696 Lot Number, Location Number
- Channel Wetlands
- Local Government Boundary



1 : 25 000 AMG Reference Grid showing Perth's Bushplan Map Sheet Breakdown



Produced by Project Mapping Section
 Land Information Branch, Ministry for
 Planning, Perth W.A. November 1998
 ntw-map9/environ/bushplan/bushv2_71.dgn
 Cadastral Data supplied by Department
 of Land Administration, W.A.
 Wetlands Data supplied by
 Water and Rivers Commission
 Native Vegetation Extent for Study Area
 supplied by Agriculture Western Australia
 Garden Island Vegetation Data
 supplied by McArthur, WM 1998

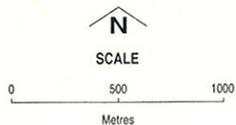
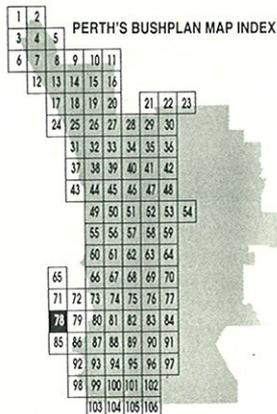


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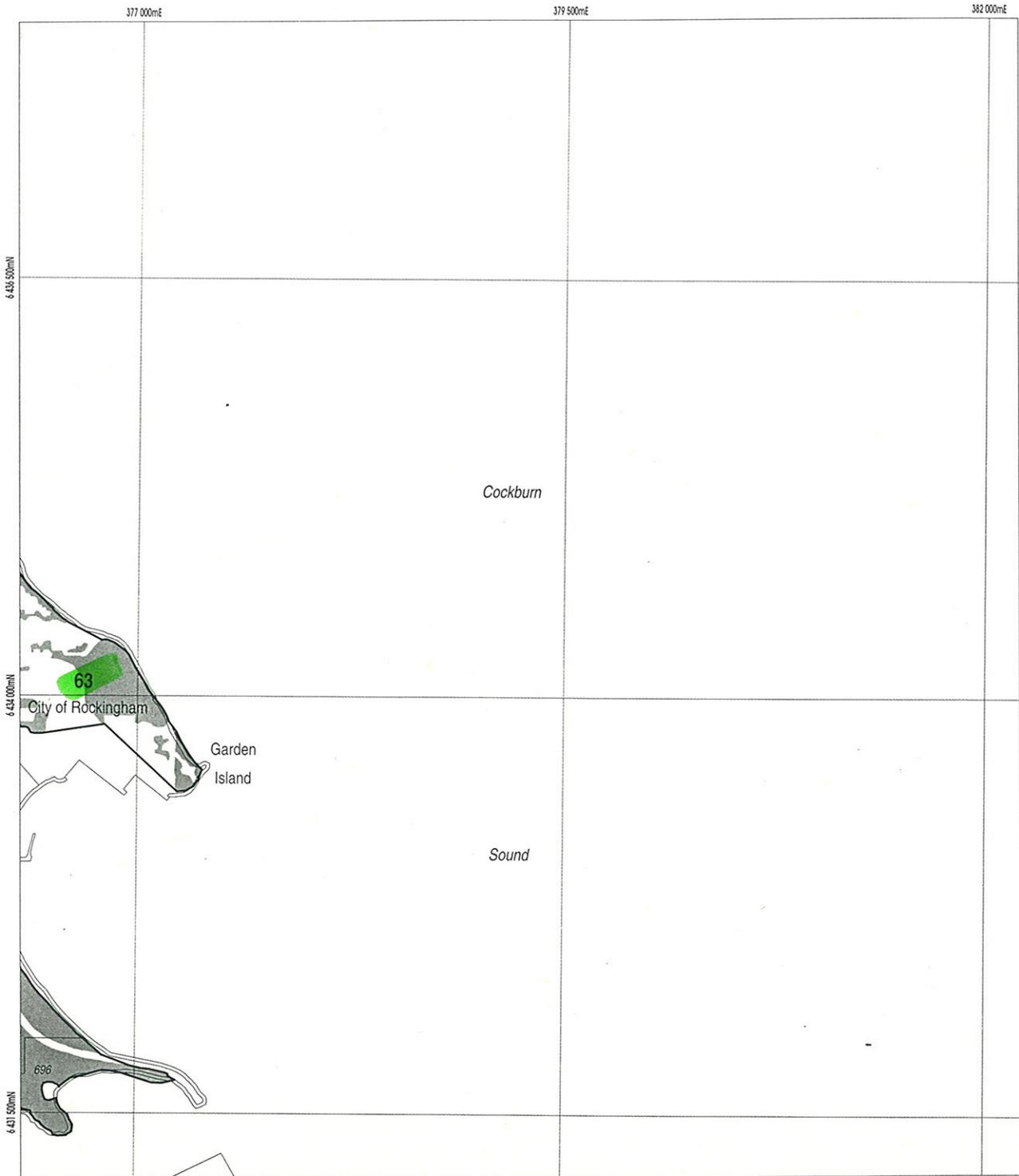
- 472** Bushplan Sites With Regionally Significant Bushland
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LEGEND

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2033 - IV SE

NW	NE	
SW	SE	I
2033		
III		II

1 : 25 000 AMG Reference Grid showing Perth's Bushplan Map Sheet Breakdown

PERTH'S BUSHPLAN MAP INDEX

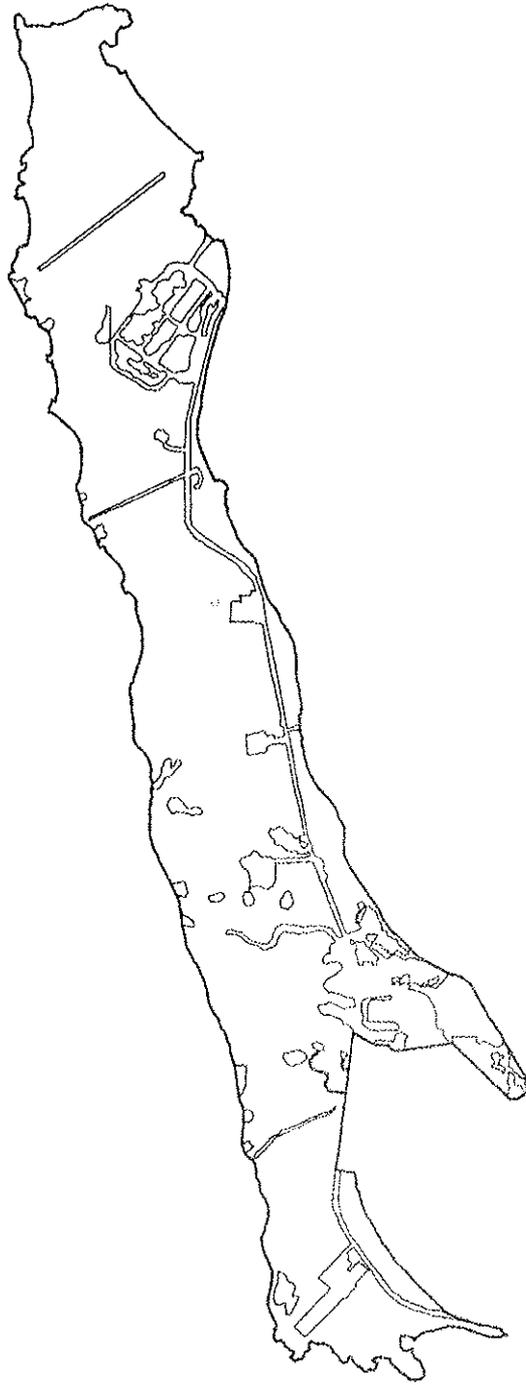
1	2					
3	4	5				
6	7	8	9	10	11	
12	13	14	15	16		
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	32	33	34	35	36	
37	38	39	40	41	42	
43	44	45	46	47	48	
49	50	51	52	53	54	
55	56	57	58	59		
60	61	62	63	64		
65	66	67	68	69	70	
71	72	73	74	75	76	77
78	79	80	81	82	83	84
85	86	87	88	89	90	91
92	93	94	95	96	97	
98	99	100	101	102		
103	104	105	106			

SCALE

0 500 1000

Metres

Produced by Project Mapping Section
Land Information Branch, Ministry for Planning, Perth W.A. November 1998
ntw-map9/environ/bushplan/bushv2_79.dgn
Cadastral Data supplied by Department of Land Administration, W.A.
Wetlands Data supplied by Water and Rivers Commission
Native Vegetation Extent for Study Area supplied by Agriculture Western Australia
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63.

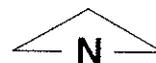
BUSHPLAN SITES CORRECTED



WESTERN
AUSTRALIAN
PLANNING
COMMISSION



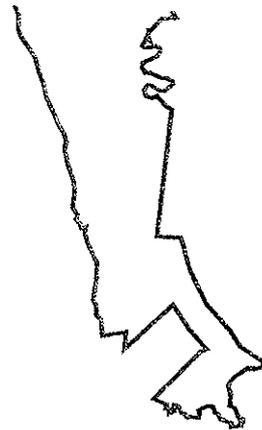
B 6/1/76 22/10/98



BJK 1/7/98

BS 63

These Veg/bushland boundaries were NEVER accurate (was not mapped in 1994/1996) we have arranged to use Dept. Geog (WGA's) mapping (GIS)



bp site 63

LEAVE AS IS.

- AG VEG 1998 BOUNDARY THEME
- Cadastre
- Bushplan sites refno 1-500 SCP BOUNDARY THEME

MFP INTERNAL USE ONLY

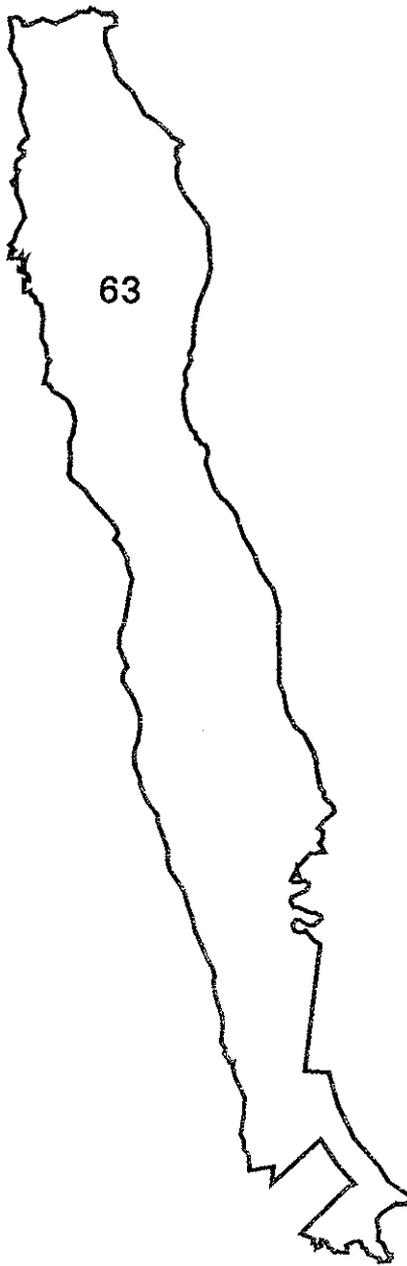
Prepared By: Andrea Zappacosta

Prepared For:

Map Ident: plot980522_1

Date: 22 May 98

Scale 1:60422



bp site 63

leave as is.



AG VEG 1998 BOUNDARY THEME



Cadastre



Bushplan sites refno 1-500 SCP BOUNDARY THEME

MFP INTERNAL USE ONLY

Prepared By: Andrea Zappacosta

Prepared For:

Map Ident: plot980522_1

Date: 22 May 98

Scale 1:60422

AREA INFORMATION

System 6 Area (C or M) or Update Area (Update)

M96

Conservation Area
Nature Reserve
Reserve No
National Park
Reserve No
Local Government
Reserve No
Other
Proposed Conservation Areas
Local Government
Reserve No
Other

GARDEN ISLAND
Commonwealth of Australia

Conservation Area
Nature Reserve
Reserve No
National Park
Reserve No
Local Government
Reserve No
Other

AREA

Total Area	1214	hectares
Completely Degraded		hectares
comments:		

AREA MAPPED FLORISTIC UNITS

Boundaries: System6 CALM

Units	Site (Condition)	Code G: GARDEN	Bound	Area (ha)	Area(ha)
29a	φ2 (1.5)				
30a	φ1 (3.5) φ3 (3) φ4 (3.5)				

Boundaries determined by use of

aerial photograph	Metro Street Directory run 4 5036-42 even only
orthophoto	NOT AVAILABLE 17/1/91
vegetation map	
soil map	



M96 Garden Island
 Bulletin 399 (HMAS Stirling)

' Friends ' Advocate Management

Other Names:

Specific Study/studies Miscellaneous studies

Flora

Vegetation Map 1 2 3

Flora list 1 2 3 4

Significant Taxa done / suitable doubtful

Fauna

Mammals 1 2

Birds 1 2 RAOU

Reptiles and Amphibia 1 2

Invertebrates 1 2

Vegetation Condition Map Sites Comment

Disturbance Factors Comment Management

Swan Coastal Plain Floristic Survey 4

AHC: National Estate- Listed / Interim / Nominated Notified NT (WA): Heritage Classification

Notes

M96 Garden Island Bulletin 399 (HMAS Stirling)		
M96 The Garden Island Environmental Advisory Committee's management plan for area between 4 and 14 kilometres north-west of Rockingham (Garden Island) is endorsed.	Implemented	At this stage there is no regional park proposal for this area. CALM has a management presence on the island. Kwinana/Rockingham Naturalists Club has an interest in this area.

PB - Armillaria by Brian Shaver
 - Jim Maher doing Python work
 Grant Pearson

Please circle the appropriate response or respond in the space provided.

Area M	Name <i>Garden Island</i>
Title	

Author: Bell D.T. Moredoundt J.C. Loneragan W.A.
 Date: 1987
 Title: Grazing pressure by the Tammar on the vegetation of Garden Is., W.A. and the potential impact on food reserves of a controlled burning regime
 Source: Journal of the Royal Society of Western Australia 69: 89-94

Author: CSIRO Division of Wildlife and Ecology
 Date: 1992
 Title: Biological survey of Garden Island Final Report 1992
 Source: CSIRO Unpublished Report for the Department of Defence, Canberra

Author: Davies S.J.J.F.
 Date: 1980
 Title: A bird census of Garden Island, Western Australia
 Source: Western Australian Naturalist 14: 220-224

Author: Department of Conservation and Environment
 Date: 1979
 Title: Outline working plan for public use of Garden Island
 Source: Dept. Conservation and Environment, Perth

Author: Marchant N.G. Abbott I.
 Date: 1981
 Title: Historical and recent observations of the flora of Garden Island, Western Australia.
 Source: Western Australian Herbarium Research Notes 5: 49-62

Author: McArthur W.M. Bartle G.A.
 Date: 1981
 Title: The landforms, soils and vegetation as a basis for management studies on Garden Island, W.A.
 Source: CSIRO Land Resources Management Series 7:

_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Vegetation Condition				
Site based	_____	Mapped	_____	Units
Disturbance Factors				
Phytophthora	observed	_____	Other	Incidental
_____	tested	_____	_____	itemised

Notes



41

BS 63

PB018

CITY OF ROCKINGHAM

Civic Boulevard, Rockingham
Western Australia

OUR REF: TP11-2-44 PM.mw
YOUR REF:

ENQUIRIES TO: Mr Monks

23rd April 1999

Manager
Environmental Planning Branch
Ministry for Planning
469 Wellington Street
PERTH WA 6000

MINISTRY FOR
PLANNING
27 APR 1999
805-2-1-32 P/H 2
FILE

Dear Sir

Re: Submission on the Draft Perth's Bushplan

I refer to your letter dated the 27th November 1998 inviting comment on the draft Perth's Bushplan. The report and plans were presented to Council at its ordinary Meeting held on the 23rd March 1999, where it was resolved to submit the following comments, which are divided into four sections:-

1. Principles and Recommendations.
2. Comments on specific sites nominated in the City of Rockingham.
3. General Comments.
4. Implementation.

1. PRINCIPLES AND RECOMMENDATIONS

The retention of regionally and locally significant bushland is an important measure that has the support of the City of Rockingham, and the draft Perth Bushplan provides important information and recommendations to achieve this objective.

The methodology used to establish which sites are of regional significance is clear, once the reporting structure of the various volumes of the documents is understood.

Council has attended a number of briefing sessions organised by the Ministry for Planning and WAMA and these sessions have played a very important role in understanding both the implications of the recommendations of Perth Bushplan, and the views of the various parties that are affected by the Report.

SUBMISSION NO. 501

- (viii) Bushplan Site No 394 - Lake Amarillo, Serpentine River and Adjacent Bushland, Karnup

Council has previously supported the inclusion of the Serpentine River and its environs, in the locality of Amarillo, as a 'Parks and Recreation' reserve in the MRS. Future structure planning for the area should be consistent with the proposed status of the reserve as a Bushplan site.

- (ix) Bushplan Site No [redacted] - Paganoni Swamp and Adjacent Bushland, Karnup

This site includes a portion of privately owned bushland west of Paganoni Swamp on the southern side of the CSR Quarry on Mandurah Road. This portion of the site is zoned 'Urban Deferred' and it is queried why this land is included as a Bushplan site, given its approval for extractive industries and its location adjacent to the Paganoni Swamp reserve, which would contain similar examples of the same vegetation complexes.

- (x) Bushplan Site No [redacted] - Garden Island

Garden Island is reserved as 'Public Purposes - Commonwealth Government and Special Use' in the Metropolitan Region Scheme. The island comprises a significant parcel of remnant bushland and accordingly should be protected against any development that may threaten its current condition.

- (xi) Bushplan Site No [redacted] - Serpentine River, Stakehill and Harvey Roads Bushland, Karnup

This site is adjacent to the Serpentine River, is a low lying well vegetated fringe area of the Serpentine River which is reserved in the MRS as 'Parks and Recreation', is an EPP wetland and is a Conservation status floodplain. It is appropriate that this site is included in Perth's Bushplan.

- (xii) Bushplan Site No 55 - Point Peron and Adjacent Bushland, Peron/Shoalwater Bay

The majority of this area is reserved as 'Parks and Recreation' and, although portions of the area have been degraded through human activity, it comprises a regional recreation, tourist and conservation focus for the City. The site is included within the Rockingham Lakes Regional Park and CALM is currently preparing a Management Plan for this area. It is appropriate that it is included in Bushplan.

R. A. O. U. TRACKING DATABASE

23/06/96

PARK SIGHTINGS REPORT

Page No.

1

Garden Island (M96)

ORDER:	REF:	BIRD NAME	NO. SIGHTINGS
0025	0207	Australian Shelduck	2
0028	0202	Australian Wood Duck	1
0032	0208	Pacific Black Duck	1
0041	0061	Australasian Grebe	1
0028	0101	Darter	1
0129	0100	Little Pied Cormorant	3
0131	0099	Pied Cormorant	3
0132	0097	Little Black Cormorant	1
0133	0096	Great Cormorant	1
0135	0106	Australian Pelican	1
0139	0188	White-faced Heron	2
0141	0191	Eastern Reef Egret	2
0163	0241	Osprey	3
0172	0226	White-bellied Sea-Eagle	1
0177	0222	Collared Sparrowhawk	4 1
0181	0225	Little Eagle	4 2
0187	0240	Nankeen Kestrel	1
0225	0150	Whimbrel	2 2
0235	0157	Common Sandpiper	2 1
0236	0155	Grey-tailed Tattler	2 1
0238	0129	Ruddy Turnstone	2 3
0242	0166	Sanderling	2 3
0265	0130	Pied Oystercatcher	2
0271	0136	Grey Plover	3
0275	0143	Red-capped Plover	2
0285	0135	Banded Lapwing	3
0297	0125	Silver Gull	3
0303	0112	Caspian Tern	2
0305	0115	Crested Tern	3
0313	0118	Fairy Tern	3
0314	0121	Bridled Tern	1
0324	0957	Rock Dove	3
0326	0988	Laughing Turtle-Dove	1
0331	0035	Brush Bronzewing	3 3
0387	0290	Red-capped Parrot	1
0451	0326	Sacred Kingfisher	2
0517	0463	Western Gerygone	3
0561	0608	Singing Honeyeater	3
0650	0398	Golden Whistler	3 3
0671	0415	Magpie-Lark	3
0673	0361	Grey Fantail	3
0676	0364	Willie Wagtail	3
0678	0424	Black-faced Cuckoo-shrike	3

(2) 5
 (3) 2
 (4) 2

0675	0702	Grey Butcherbird	3
0698	0705	australian Magpie	2
0706	0930	Australian Raven	3
0763	0357	Welcome Swallow	3
0765	0359	Tree Martin	3
0781	0574	Silvereye	3

Page No.

2

*** END OF REPORT ***

SUMMARY REPORT

TOTAL BIRDS SIGHTED : 49

TOTAL NUMBER OF CARDS : 3

*** END OF SUMMARY ***

CONTACT DR N. GIBSON CALM WOODVALE for further information.

Flora list for M96 Garden Island (extracted from Swan Coastal Plain database, Gard 1-4, 65 taxa, 9/5/1995).

Department of Environmental Protection System 6 Update: Site Based Flora List M96 Garden Island

(extracted from the CALM Swan Coastal Plain database, Gard 1-4, 65 taxa, 9/5/95)

Anthericaceae

Thysanotus patersonii

Apiaceae

Apium annuum

Daucus glochidiatus

Trachymene coerulea

Trachymene pilosa

Apocynaceae

Alyxia buxifolia

Araceae

* *Zantedeschia aethiopica*

Asparagaceae

* *Myrsiphyllum asparagoides*

Asphodelaceae

* *Trachyandra divaricata*

Asteraceae

Gnaphalium indutum

Podotheca angustifolia

Senecio lautus subsp. *dissectifolius*

Waitzia citrina

Boraginaceae

Myosotis australis

Brassicaceae

Lepidium puberulum

Lepidium sp scps

Campanulaceae

Wahlenbergia preissii

Caryophyllaceae

* *Cerastium glomeratum*

Chenopodiaceae

Rhagodia baccata subsp. *baccata*

Crassulaceae

Crassula colorata

* *Crassula glomerata*

Cupressaceae

Callitris preissii

Cyperaceae

Lepidosperma angustatum

CONTACT DR N. GIBSON CALM WOODVALE for further information.

Flora list for M96 Garden Island (extracted from Swan Coastal Plain database, Gard 1-4, 65 taxa, 9/5/1995).

Dasyogonaceae

Acanthocarpus preissii

Epacridaceae

Acrotriche cordata

Leucopogon australis

Leucopogon parviflorus

Leucopogon racemulosus

Euphorbiaceae

Phyllanthus calycinus

Poranthera microphylla

Haemodoraceae

Conostylis candicans

Juncaginaceae

Triglochin calcitrapum

Lamiaceae

Westringia dampieri

Lobeliaceae

Lobelia gibbosa

Loganiaceae

Mitrasacme paradoxa

Mimosaceae

Acacia cochlearis

Acacia rostellifera

Acacia saligna

Acacia sp. scps

Myoporaceae

Eremophila glabra

Myrtaceae

Melaleuca lanceolata

Oxalidaceae

Oxalis perennans

Papilionaceae

Hardenbergia comptoniana

Poaceae

Agrostis preissii

* *Aira caryophyllea*

* *Bromus sp. scps*

Danthonia caespitosa

* *Lolium rigidum*

Stipa flavescens

* *Vulpia sp. scps*

CONTACT DR N. GIBSON CALM WOODVALE for further information.

Flora list for M96 Garden Island (extracted from Swan Coastal Plain database, Gard 1-4, 65 taxa, 9/5/1995).

Polygalaceae

Comesperma integerrimum

Polygonaceae

Muehlenbeckia adpressa

Primulaceae

* Anagallis arvensis

Ranunculaceae

Clematis microphylla

Clematis pubescens

Clematis sp. scps

Rhamnaceae

Spyridium globulosum

Rubiaceae

* Galium murale

Santalaceae

Leptomeria preissiana

Sapindaceae

Dodonaea viscosa

Solanaceae

* Solanum nigrum

Solanum symonii

Sterculiaceae

Thomasia triphylla

Urticaceae

Parietaria debilis

→ CCS 42

The National Trust of Australia (W.A.)

P.O. Box 1162, West Perth, 6872
The Old Observatory
4 Havelock Street
West Perth
Western Australia 6005
Telephone (09) 321 6088
Fax (09) 324 1571



1 August 1994

Dr Ray Steedman
Chairman
Environmental Protection Authority
Westralia Square
141 St George's Terrace
PERTH WA 6000

DEPARTMENT OF ENVIRONMENTAL PROTECTION	
- 5 AUG 1994	
File No 1	257/93 Initials RKS
File No 2	140/93 Initials CCS

076/096

Dear Sir,

NATIONAL TRUST ASSESSMENT - GARDEN ISLAND

I am pleased to inform you the Council of the National Trust of Australia (WA), having received an informed assessment on the above place, has resolved that it be CLASSIFIED and entered in the Trust's List of Classified Heritage Places.

The Statement of Significance on the enclosed Assessment Exposition states why the Trust considers the area to be of heritage significance.

I should like to make it clear that classification by the Trust has no legal significance and does not infringe any rights of ownership in any way, nor does it imply the public have any right to enter the area to view it without the owner's permission. It is, on the other hand, an honour and a mark of distinction which it is hoped will be welcomed and valued.

Naturally, the Trust hopes that all places which it has classified will be conserved so their great value as part of our heritage may continue for the benefit of the community of the future.

If the Trust can be of any assistance to you, please do not hesitate to write to me.

Respectfully,

Thomas E Perrigo

THOMAS E PERRIGO
Chief Executive Officer

Noted

Received at 8:30 am

9/8/94

TP:lv

8:30.

ENVIRONMENTAL PROTECTION AUTHORITY		
Date Received	5-8-94	ID 502
<u>RKS</u>	BB	CR
BL	CS	<u>DEP</u>

78270

41

NATIONAL TRUST OF AUSTRALIA (WA)
LANDSCAPE ASSESSMENT FORM
NATURAL AND CULTURAL LANDSCAPES

1. NAME OF PLACE Garden Island (System 6 area M96)

Computer file name: NT Garden Is

2. LOCATION/BOUNDARIES

Garden Island is close to the west coast of WA 45 km south west of Perth on the western margin of Cockburn Sound. It lies south of Rottnest Island and Carnac Island and is a long narrow island running north-south for 9.5 km being 2 km across at the widest point.

Administrative area

State: WA

Local Government area: City of Rockingham

Area: 1100 hectares

Property details

Garden Island is owned by the Commonwealth of Australia. The Commonwealth Department of Defence is responsible for management of the whole island and the naval base HMAS Stirling occupies the area around Colpoys Point and Careening Bay and a number of smaller sites on the island.

3. ASSESSMENT

Type of assessment: natural landscape

Assessment team

Mary Gray, 24 Hillview Rd, Mt. Lawley 6050.

Bronwen Keighery 224 Hamersley Rd, Subiaco, Wildflower Society of WA (Inc)

Date assessed: March 1994

Previous assessments

1. System 6 Report, specific recommendation M96 (Department of Conservation and Environment 1983). Conservation value identified as high, with remarkable value in vegetation.
2. CSIRO Division of Wildlife and Ecology, Perth WA. Biological Survey Garden Island, Final Report July 1992 to the Dept of Defence.
3. Garden Island has been the subject of a number of research projects and surveys which are referred to in Reference lists given by McArthur and Bartle 1981, Marchant and Abbott 1981, and in the Report in (2) above.
4. Land Management Plan Garden Island WA 1980. Department of Defence, Canberra.
5. The Environmental Management Plan for HMAS Stirling and Garden Island WA, Canberra March 1993.

In addition to the above three major groups of plant communities there are also another 8 communities in cove } limited areas.

In total, 103 native plant species have been found on the island. Some of the less frequent species of plants are reported to have declined or disappeared (13 species) since surveys in 1952. Others have increased in abundance.

Both Garden Island and Rottneest Island have a depauperate fauna in comparison to the mainland. Garden Island supports 14 species of reptiles (16 on Rottneest) including 2 geckoes, 1 legless lizard, 9 skinks, the carpet python, and 1 elapid snake the tiger snake; 5 of these are not found on Rottneest. Interestingly there are no frogs, the preferred prey of tiger snakes, because of the lack of wetlands.

There are 52 land birds and 42 shore birds making a total of 94 species recorded. Of the land birds, however, probably only 20 species are seen regularly and those in sites with good tree cover include Grey Fantail, Golden Whistler, Western Gerygone, Silveryeye and Grey Butcherbird. Low heathland habitats support aerial foragers such as Welcome Swallows, Willie Wagtails, Singing Honeyeaters, and Australian Ravens. Less common species of interest include the Brush Bronzewing, a secretive ground feeding bird vulnerable to feral predators and which is now rare in the region; the Sacred Kingfisher; Rufous Night Heron; Black Shouldered kite; Little Eagle; Australian Kestrel; several Quail; Banded Lapwing, Red-capped Parrot; Rainbow Bee-eaters and Richard's Pipit.

Shorebirds are similar to those found along mainland coastal areas and other islands. They include the Pied Cormorant; Osprey known to breed on the island; Pied Oystercatchers; the Sanderling, a migrant which feeds on sandy beaches on the west coast of the island; abundant Silver Gulls; Bridled Terns; and Fairy Tern which nest on undisturbed beaches.

There is a healthy population of the small (3-7 kg) tammar wallaby *Macropus eugenii*, the only species of native mammal. They have thrived in the absence of feral predators such as foxes, dogs, and cats.

The invertebrates include 1 species of native land snail, and 2 species of scorpions. Many insects, moths, weevils, caterpillars, grasshoppers, are common and have influence on the vegetation. Spiders form dense webs over some shrubs.

5. HISTORICAL TIMELINE OF SIGNIFICANT EVENTS AND BOTANICAL RECORDS

Note: Compiled from McArthur and Bartle 1981, Marchant and Abbott 1981, and Seddon 1972.

June 18, 1801 First recorded landing by Europeans on the island by a French expedition on 'Le Naturaliste'. Pierre Millius and Stanislas Levillain, a zoologist, visited the island and named it 'Ile de Buache' and also named Point Baudin. It was described as completely wooded, ...trees high and shrubs attractive (Peron 1807).

1822 Levillain, a zoologist, made comments on the density of the vegetation. The botanist Cunningham visited nearby Rottneest Island and stated that *Callitris*, *Melaleuca* and *Pittosporum* constituted the main timber on Rottneest.

March 1827 Charles Fraser visited during the James Stirling expedition on the 'Parmelia' to the Swan River and reported thick cover of *Callitris preisii* on southern cliffs, thickets of *Solanum* up to 10 ft, and soils capable of producing light garden crops. In the north and in valleys, beautiful *Brunonia (Trachymene caerulea)*, and extensive thickets of arborescent *Metrosideros* (presumably *Melaleuca lanceolata*) were described (Fraser 1830, p 233).

April 25, 1829 Captain C.H. Fremantle was the first settler in the fleet to arrive on 'HMS Challenger' and spent a few days exploring Ile de Buache and the adjacent mainland. He noted an area of the island as barren with dry grass and rushes (27 April); areas apparently burnt recently as young wood was coming up all over (28 April); the island thickly covered with Pine wood (28 April); and a good deal of Fir (19 May) and so on (Cottesloe 1928 p. 32-51).

May 31, 1829 Captain Stirling arrived on the 'Parmelia' and anchored off the north end of the island. Two days later he set sail for Cockburn Sound but ran aground on Parmelia beach. Deflected with

6. STATEMENT OF SIGNIFICANCE

- | | |
|---|---|
| presence of endangered species, communities | + 6 recreational importance |
| + 1 scientific importance | + 7 diversity of species, communities |
| + 2 educational importance | + 8 'naturalness' |
| + 3 social importance | + 9 rarity |
| + 4 aesthetic importance | + 10 fragility |
| + 5 historic importance | + 11 position in an ecological or geographic unit |

Sulphur Bay near Cliff Head has great significance as the site of the first settlement on the west coast of WA on June 5th 1829 by Captain Stirling arriving on the 'Parmelia' and Captain Fremantle on the 'Challenger'. A well still remains at Cliff Head and foundation stones of Stirling's cottage and others are still visible at this historic site. There is no evidence of Aboriginal occupation of the island. This site is already listed on the RNE as an historic site.

Garden Island is outstanding as a relatively undisturbed site of high ecological integrity compared with the mainland and comparable islands such as Rottnest. Still 86% vegetated, the absence of feral animals such as foxes, rabbits, cats and restricted human use has enabled maintenance of unusual natural habitats for flora and fauna largely intact on the Quindalup landform. Remarkable is the unusual vegetation dominated by very few species often in very dense stands. Dense scrub dominated by *Acacia rostellifera*, *Callitris preisii*, *Melaleuca lanceolata*, and *M. huegelii* covers most of the island often in a single closed layer. There are no eucalypts and no members of the banksia family. The island is renowned for the best example of the now rare *Callitris preisii* low forest communities covering much of the inland northern half of the island. Less extensive but also outstanding are the rare communities of Cheesewood *Pittosporum phylliraeoides*; Rottnest teatree *M. lanceolata* reaching attractively to the waters edge on the eastern side of the island; and coastal heath which is distinctly different in composition from comparable mainland sites.

The island provides an important habitat and is the site of important gene pools for 4 species of fauna which are vulnerable or rare on the mainland: the Tammar wallaby *Macropus eugenii*, the Brush Bronzewing *Phaps elegans*, a ground feeding secretive bird; the Lined Skink *Lerista lineata*; and the Carpet Python *Morelia spilota*. The tammars show distinct differences from other populations in WA and may actually be a different subspecies. The island is now the stronghold of Tammars and Brush Bronzewing in WA. The Lined Skink is a species of reptile with a restricted range and is probably now extinct on Rottnest. The Tammar, Carpet Python, and the Lined Skink are listed by CALM as threatened fauna for special protection under the Wildlife Conservation Act 1950.

The island also provides important habitat for the Tiger Snake; the migratory Sanderling which feeds on sandy beaches at the edge of waves; and the Fairy Tern which requires undisturbed nesting periods.

The natural history of the offshore islands is unusually well recorded from earliest European records in 1801. Anecdotal records by early naturalists and botanists give us an idea of the vegetation pre settlement in 1829 to 1850 for Garden Island. Plant collections made by Ludwig Preiss an eminent botanist in 1839 were formally recorded in 'Flora Australiensis' by Bentham (1863-1879) and in 'Plantae Preissianae' by Lehmann (1844-48). Major plant surveys have been recorded in more recent years by Alexander in 1921, McArthur in 1951 and 1957, Loneragan in 1969, Marchant and Abbott in 1981, and by McArthur and Bartle in 1981.

The island is an important research site contributing to the understanding of many branches of science. The island is the first site where detailed quantitative effects of fire are being monitored in 22 permanent quadrats in which every plant has been identified, described and measured commencing in 1990. The biology of the tammar has been studied in detail by many scientists and there have been many bird surveys. The effects of grazing by tammars on plant distribution after disturbance by fire has shown a dramatic impact.

The island has been an important teaching site over the years for students of botany, zoology, and marine biology - particularly reef ecology where outstanding examples occur.

There are 4 plant species found on the island which are outside their usual range: the Mistletoe *Amyema melaleuca*, *Lepidium puberulum*, *Myostotis australis* and *Acacia truncata*.

9. PERSONAL CONTACTS

1. Bill McArthur, formerly CSIRO Division of Land Resources Management, now retired, still conducts some research. Telephone (09) 330 2275.
2. Denis Saunders, CSIRO Division of Wildlife and Ecology, Helena Valley WA 6056. Representative of the Commonwealth on the Garden Island Environmental Advisory Committee. Telephone 09 290 8111.
3. Jim Maher, Garden Island Ranger, seconded from CALM. Telephone (09) 550 0432.
4. Captain John Wood, HMAS Stirling Naval Base. Telephone (09) 550 0223. Chairman of Garden Island Environmental Advisory Committee.
5. Greg Keighery, Department of Conservation and Land Management (CALM), Woodvale Research Centre, Ocean Reef Rd., Woodvale. Telephone 09 405 5100.
6. Robert Powell, Dept. of CALM Hayman Rd. Como. Telephone (09) 245 2411
7. Neil Gibson, CALM, Woodvale Research Station, Ocean Reef Rd., Woodvale. Telephone 09 405 5100.
8. Bill Poole, formerly CSIRO Div. Wildlife and Ecology Canberra, now retired and still involved in research into tammars. PO Box 602 Dickson ACT 2602. Telephone 06 248 0176.
9. John Scott, CSIRO Div. Entomology, Floreat Park. Telephone 09 387 0200.
10. Neville Green. Historian, active in the Historical Society in the 1970's when the 'Save Garden Island' (especially the north end of the island) movement was active. Telephone 09 384 0075.
11. John Dell, WA Museum, Francis St Perth. Telephone 09 328 4411.

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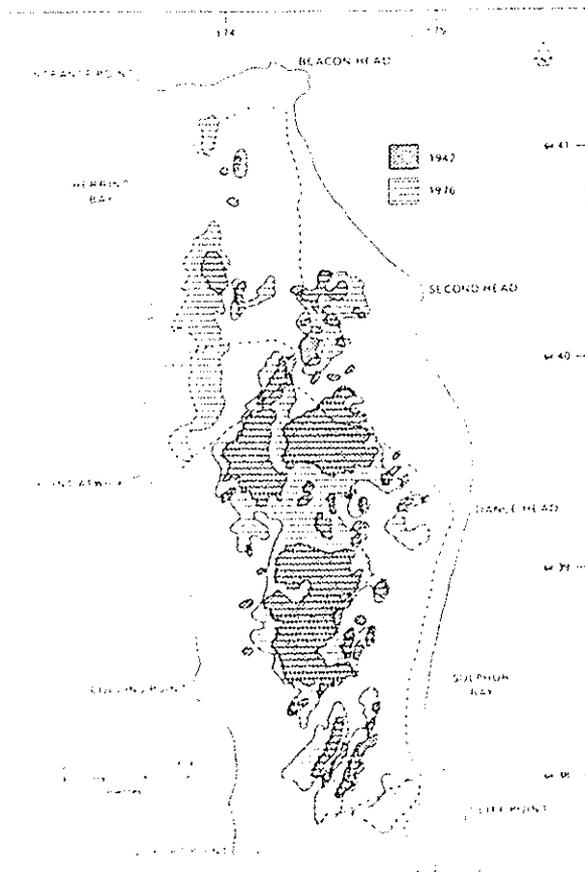
Powell, R.L. 1990. Leaf and Branch Traces and Tall Shrubs of Perth. Dept of CALM 1000 Perth



Fig. 12. Immature *Callitris preissii* trees in association with *Melaleuca lanceolata* and *Acacia rostellifera* (right); the scale is marked in 10 cm (photo ref. 74851734)



Fig. 13. Mature *Callitris Preissii* - *Melaleuca lanceolata* forest showing tall straight boles and the foliage making a dense canopy (photo ref. 74851911)



Northern part of Garden Island showing the increase in area of the *Callitris preissii* - *Melaleuca lanceolata* community between 1942 and 1976

VEGETATION COMMUNITIES

Sources: McArthur and Gentle 1981



16. Heath community on cliffs and cliff tops near Pt Atwick (grid ref. 73663930). Shrubs been prostrated and shaped by wind action.



Pittosporum phylliraeoides community near Goodwin Bay (grid ref. 75803160). This community littoral vegetation fringing the bay have been shaped by the prevailing south-westerly winds.

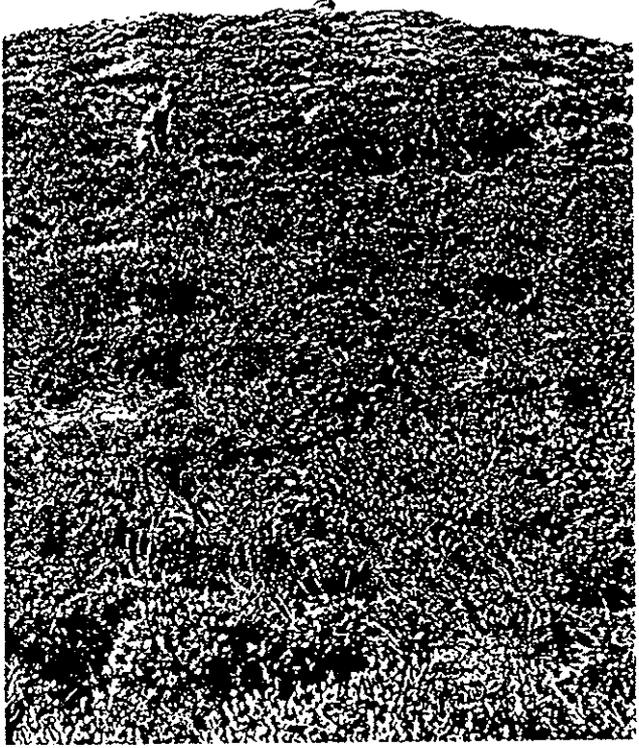
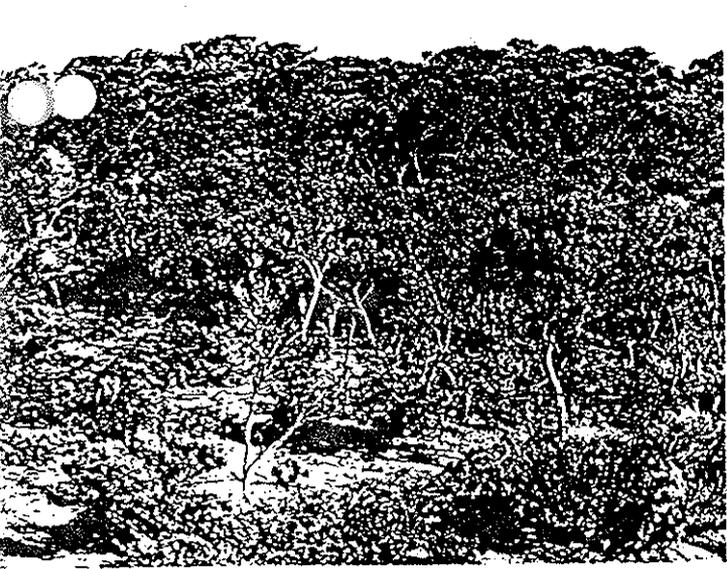


Fig. 15. *Acacia rostellifera* - *A. cochlearis* heath community near Pt Atwick (grid ref. 73753945).



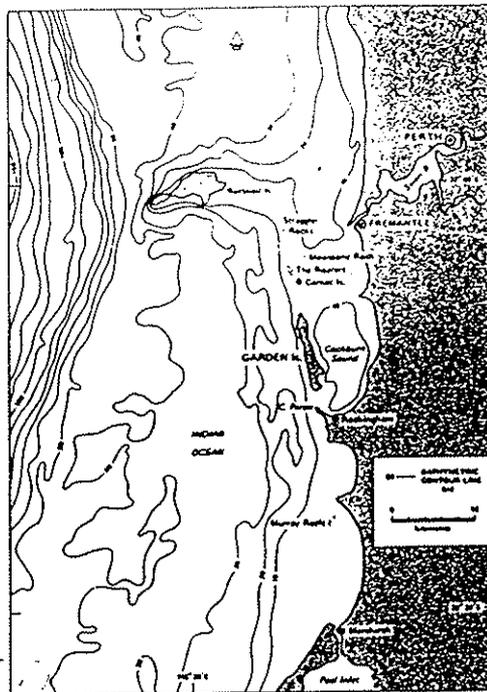
Open stand of *Acacia rostellifera* showing some dead trees and development of an understory (77913780).



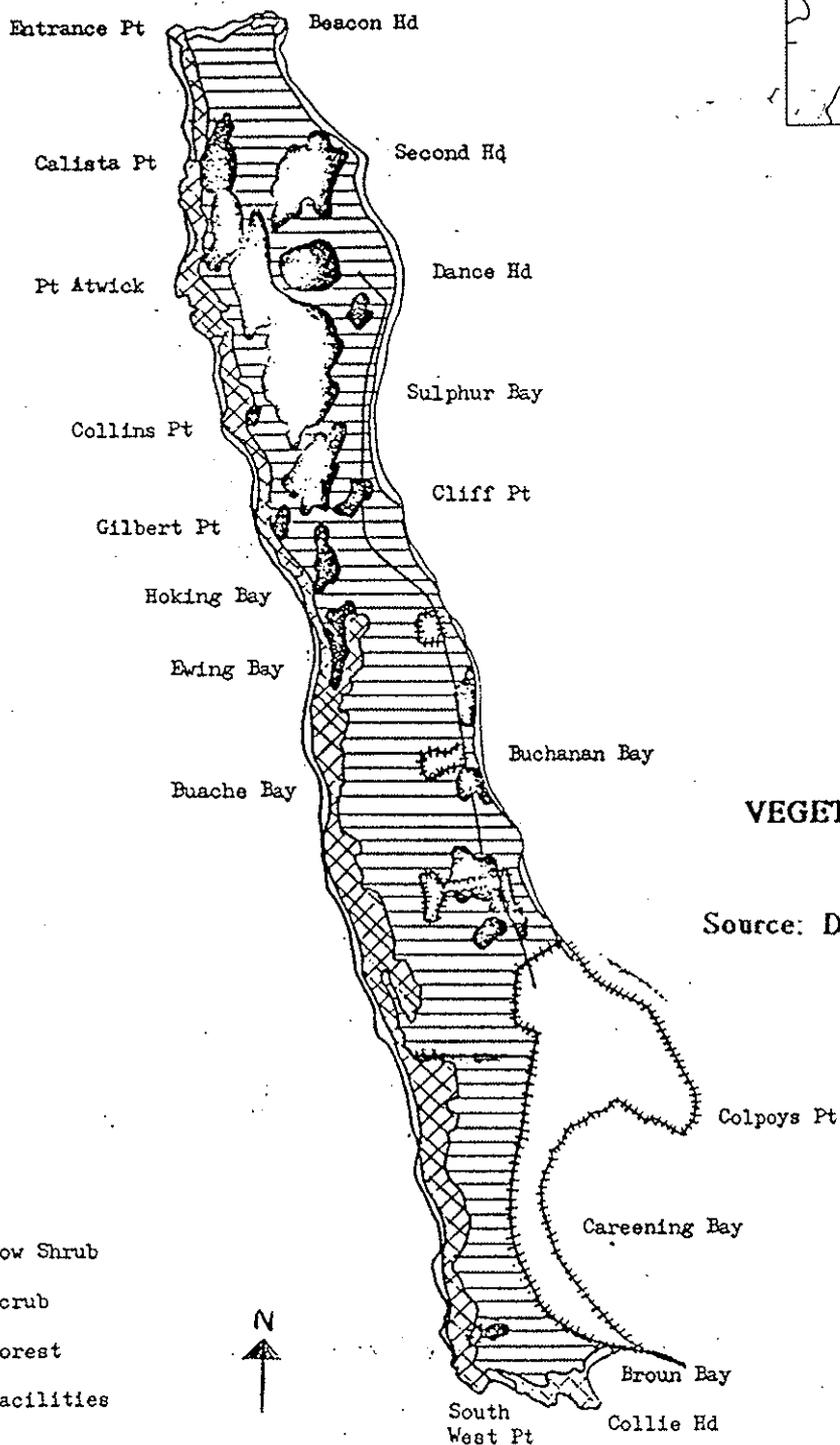
Fig. 11. Dense stand of *Acacia rostellifera*; the scale is marked in 10 cm intervals (grid ref. 7524377).

LOCATION MAP

Source: McArthur and Bartle 1981, p2.



Garden Island in relation to the mainland, the adjacent islands, and the configuration of the ocean floor.



VEGETATION - structural grouping

Source: Dept of Defence 1980 Map 5 part I

- KEY**
-  Low Shrub
 -  Scrub
 -  Forest
 -  Facilities

Evaluation of the National Estate value of remnant
bushland on the Swan Coastal Plain between Moore River
and Mandurah

GARDEN ISLAND

System 6 area M96



The tammar *Macropus eugenii* showing characteristic attitude when moving quickly
(photo A. G. Wells as in McArthur and Bartle 1981).

Prepared by Mary Gray

For the Wildflower Society of WA (Inc.)

March 1994

This project was funded under the National Estate Program, a Commonwealth financed grants scheme administered by the Australian Heritage Commission (Federal Government) and the Heritage Council of WA (State Government).

Natural Environment Nomination for the Register of the National Estate

GARDEN ISLAND, System 6 area M96

1. NAME OF PLACE Garden Island (System 6 area M96)

Computer file name: Garden Is

2. LOCATION/BOUNDARIES

Garden Island is close to the west coast of WA 45 km south west of Perth on the western margin of Cockburn Sound. It lies south of Rottnest Island and Carnac Island and is a long narrow island running north-south for 9.5 km being 2 km across at the widest point.

Administrative area

State: WA

Local Government area: Shire of Rockingham

Area: 1100 hectares

Property details

Garden Island is owned by the Commonwealth of Australia. The Commonwealth Department of Defence is responsible for management of the whole island and the naval base HMAS Stirling occupies the area around Colpoys Point and Careening Bay.

3. NOMINATOR

Nomination prepared by Mary Gray, Consulting Environmental Scientist.

Organisation: Wildflower Society of WA (Inc.), PO Box 64 Nedlands 6009 WA. Telephone 09 383 7979.

Details of organisation may be released on request.

Signature of nominator

Mary Gray

Date

24-3-94

4. PREVIOUS ASSESSMENTS

1. System 6 Report, specific recommendation M96 (Department of Conservation and Environment 1983). Conservation value identified as high, with remarkable value in vegetation for three reasons:

Firstly certain families present on the mainland are absent or represented by few species, secondly pure stands of the rare Rottnest Pine occur, and thirdly the structure of the vegetation at Garden Island is rare elsewhere and different from the mainland.

The tamar wallaby is found on the Island, together with species of bird and reptiles now becoming rare on the mainland.

The Garden Island Environmental Advisory Committee has produced a plan of management.

2. CSIRO Division of Wildlife and Ecology, Perth WA. Biological Survey Garden Island, Final Report July 1992 to the Dept of Defence.

3. Garden Island has been the subject of a number of research projects and surveys which are referred to in Reference lists given by McArthur and Bartle 1981, Marchant and Abbott 1981, and in the Report in (2) above.

5. DESCRIPTION

Garden Island was first called Meeandip by the Aborigines and Ile de Buache by the French. Rottneest, Carnac and Garden Islands have been separated from the mainland for about 6000 to 7000 years which makes them relatively young islands in geological terms. In 1973 Garden Island was connected to the mainland by a causeway to facilitate access to the naval base HMAS Stirling on the Island.

The topography of the Island is dominated by a ridge of Tamala limestone (Pleistocene aeolianite) covered by calcareous sand dunes of the Holocene period (Quindalup dunes). There are two main landscapes: on the western side of the Island are Quindalup dunes exposed to strong wind and ocean conditions and on the more sheltered east side are lower relief and gently undulating benches with extensive flat areas facing Cockburn Sound and the mainland. Areas of calcareous dune rock commonly occur on the western and southern littoral zones.

Only 14% of the Island has been cleared and the remainder is almost completely vegetated by relatively few species. Unlike the adjacent mainland there are no Proteaceous species present (banksia family) and no eucalypts occur naturally making the appearance of the tree canopy quite different. Most of the plant communities are dominated by various combinations of six tree and one shrub species: Rottneest Island Pine *Callitris preisii*, Rottneest Teatree *Melaleuca lanceolata*, Chenille Honey Myrtle *M. huegelii*, *Acacia rostellifera*, *Myoporum adscendens*, and Cheesewood *Pittosporum phylliraeoides*; and the one shrub species *A. cochlearis*. These communities may be divided into low shrub, scrub, and low forest based on canopy height. Where the canopy is dense or closed, there is very little understorey consisting of annual species. Where the canopy is open, a dense shrub understorey occurs and creepers are usually present. In addition there are several mixed heath communities where dominance is not evident. The most widespread plant community is dense scrub of *Acacia rostellifera* 3-4 m in height covering more than half the island.

Firstly the low shrub communities are less than 1m in height and occur on the very exposed and windy western side of the island. The littoral (or shoreline) community on the youngest dunes is low, wind-pruned and often prostrate heath which suffers the most extreme conditions of sand blast, salt spray, intense light, and calcareous soil. Common plants are *Olearia axillaris*, *Scaevola crassifolia*, *Calocephalus brownii*, *Alyxia buxifolia*, *Lepidosperma gladiatum*, *Scirpus nodosus*, and *Westringia dampieri*; in open spaces *Senecio lautus*, *Conostylis candidicans*, and *Threlkeldia diffusa* may be found; and a seaward fringe of *Cakile maritima* may occur. The clifftop vegetation on limestone is similar in habit and includes *Scaevola crassifolia*, *Acrotriche cordata*, *Boronia alata*, *Exocarpus sparteus*, *Conostylis candidicans*, *Calocephalus brownii*, and *Spyridium globulosum*, and at the base of cliffson tumbled rocks succulent species occur including *Nitraria billardieri*, *Tetragonia amplexicoma*, *T. decumbens*, *Threlkeldia diffusa*, and *Carpobrotus virescens*.

Inland from this zone and still exposed to extreme westerly conditions is the low community of *Acacia rostellifera* with *A. cochlearis*, other low shrubs and some annuals in open areas. This is probably the climax community for this zone, conditions not allowing higher growth.

Secondly the broad belt running up the centre of the island is mostly covered in scrub up to 3-4 m in height with a varied understorey and some emergent trees. The scrub is dominated by *Acacia rostellifera* in various communities with *Melaleuca huegelii*, *M. lanceolata*, and *Callitris preisii*. In some parts the canopy is dense and closed, often with creepers in the canopy, and with little understorey and annuals. In others the canopy is open with a well developed understorey of *Acanthocarpus preisii*, *Eremophila glabra*, *Phyllanthus calycinus*, *Thomasia cognata*, *Guichenotia ledifolia*, *Leucopogon parviflorus*, *Solanum symonii*. Common creepers are *Clematis microphylla*, *Cassytha glabella*, *Comesperma integerrimum*, and *Hardenbergia comptoniana*. Annuals including *Parietaria debilis* and *Trachymene pilosa* the Rottneest Daisy form a colourful ground cover in spring.

The open mature stands of *Acacia rostellifera*-*Melaleuca lanceolata* scrub occur mostly on the more sheltered bench landscapes on the eastern side of the island and on subdued topography inland between Pt. Gilbert and Pt. Atwick on the west coast.

Thirdly the low forest community of *Callitris*-*M. lanceolata* is 8-10 m in height with a varied understorey. It occurs almost exclusively on the sheltered bench landscapes and flatter low areas of the older dunes. Forest covers much of the north half of the island inland between Cliff Pt. and Herring Bay. Where it is dense and mature, the canopy at 8-10 m is closed and supports a ground cover of only mosses and annuals. The open mature stands have a dense shrub layer and many annual species. Immature stands at 4-6 m are usually dense. There are some on bench landscapes or on depressions between dunes where *M. lanceolata* forms a pure stand. Other tree species are the Cheesewood *Pittosporum phylliraeoides* which is not grazed by tammar, and *Myoporum adscendens* a robust spreading tree to about 3m which produces purple berries in spring eaten by tammar.

VEGETATION COMMUNITIES

Source: McArthur and Bartle 1981



Fig. 16. Heath community on cliffs and cliff tops near Pt Atwick (grid ref. 73663930). Shrubs have been prostrated and shaped by wind action.



Fig. 14. *Pittosporum phylliracoides* community near Goodwin Bay (grid ref. 75803160). This community and the littoral vegetation fringing the bay have been shaped by the prevailing south-westerly winds.

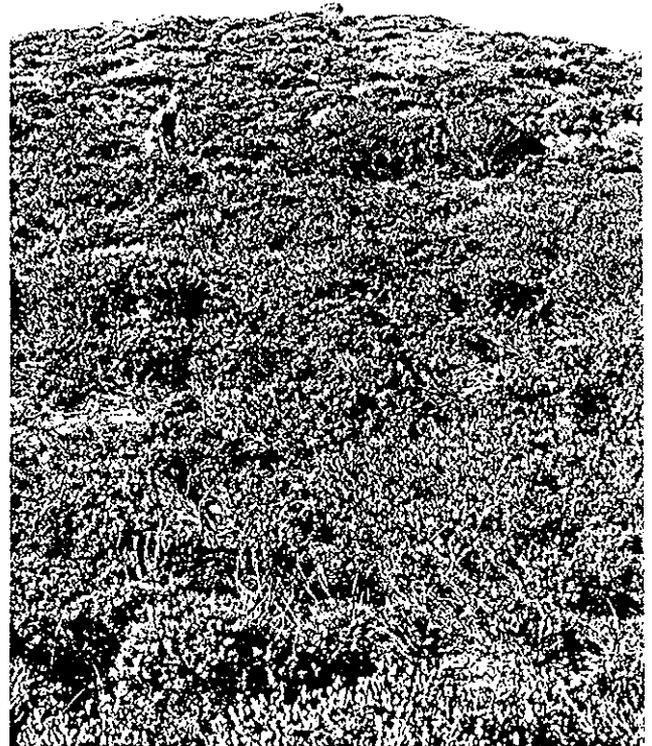


Fig. 15. *Acacia rostellifera* - *A. cochlearis* heath community near Pt Atwick (grid ref. 73753945).



Fig. 12. Open stand of *Acacia rostellifera* showing some dead trees and development of an understory (grid ref. 77913780).



Fig. 11. Dense stand of *Acacia rostellifera*; the scale is marked in 10 cm intervals (grid ref. 75243726)

In addition to the above three major groups of plant communities there are also another 8 communities covering limited areas.

In total, 103 native plant species have been found on the island. Some of the less frequent species of plants are reported to have declined or disappeared (13 species) since surveys in 1952. Others have increased in abundance.

Both Garden Island and Rottnest Island have a depauperate fauna in comparison to the mainland. Garden Island supports 14 species of reptiles (16 on Rottnest) including 2 geckoes, 1 legless lizard, 9 skinks, the carpet python, and 1 elapid snake the tiger snake; 5 of these are not found on Rottnest. Interestingly there are no frogs, the preferred prey of tiger snakes, because of the lack of wetlands.

There are 52 land birds and 42 shore birds making a total of 94 species recorded. Of the land birds, however, probably only 20 species are seen regularly and those in sites with good tree cover include Grey Fantail, Golden Whistler, Western Gerygone, Silvereve and Grey Butcherbird. Low heathland habitats support aerial foragers such as Welcome Swallows, Willie Wagtails, Singing Honeyeaters, and Australian Ravens. Less common species of interest include the Brush Bronzewing, a secretive ground feeding bird vulnerable to feral predators and which is now rare in the region; the Sacred Kingfisher; Rufous Night Heron; Black Shouldered kite; Little Eagle; Australian Kestral; several Quail; Banded Lapwing, Red-capped Parrot; Rainbow Bee-eaters and Richard's Pipit.

Shorebirds are similar to those found along mainland coastal areas and other islands. They include the Little Pied Cormorant; Osprey known to breed on the island; Pied Oystercatchers; the Sanderling, a migrant which feeds on sandy beaches on the west coast of the island; abundant Silver Gulls; Bridled Terns; and Fairy Tern which nest on undisturbed beaches.

There is a healthy population of the small (3-7 kg) tamar wallaby *Macropus eugenii*, the only species of native mammal. They have thrived in the absence of feral predators such as foxes, dogs, and cats.

The invertebrates include 1 species of native land snail, and 2 species of scorpions. Many insects, moths, weevils, caterpillars, grasshoppers, are common and have influence on the vegetation. Spiders form dense webs over some shrubs.

6. TIMELINE OF SIGNIFICANT EVENTS AND BOTANICAL RECORDS

Note: Compiled from McArthur and Bartle 1981, Marchant and Abbott 1981, and Seddon 1972.

- June 18, 1801 First recorded landing by Europeans on the island by a French expedition on 'Le Naturaliste'. Pierre Millius and Stanislas Levillain, a zoologist, visited the island and named it 'Ile de Buache' and also named Point Baudin. It was described as completely wooded, ...trees high and shrubs attractive (Peron 1807).
- 1822 Levillain, a zoologist, made comments on the density of the vegetation. The botanist Cunningham visited nearby Rottnest Island and stated that *Callitris*, *Melaleuca* and *Pittosporum* constituted the main timber on Rottnest.
- March 1827 Charles Fraser visited during the James Stirling expedition on the 'Parmelia' to the Swan River and reported thick cover of *Callitris preissii* on southern cliffs, thickets of *Solanum* up to 10 ft, and soils capable of producing light garden crops. In the north and in valleys, beautiful *Brunonia* (*Trachymene caerulea*), and extensive thickets of arborescent *Metrosideros* (presumably *Melaleuca lanceolata*) were described (Fraser 1830, p 233).
- April 25, 1829 Captain C.H. Fremantle was the first settler in the fleet to arrive on 'HMS Challenger' and spent a few days exploring Ile de Buache and the adjacent mainland. He noted an area of the island as barren with dry grass and rushes (27 April); areas apparently burnt recently as young wood was coming up all over (28 April); the island thickly covered with Pine wood (28 April); and a good deal of Fir (19 May) and so on (Cottesloe 1928 p. 32-51).
- May 31, 1829 Captain Stirling arrived on the 'Parmelia' and anchored off the north end of the island. Two days later he set sail for Cockburn Sound but ran aground on Parmelia bank. Refloated with help from Fremantle, Stirling anchored at Sulphur Bay on June 5th.

- June 5, 1829 The first European settlement of the West coast of WA was at Sulphur Bay near Cliff Head on the island which was renamed Garden Island by Stirling at that time. Most coastal features were named after people and ships associated with the first settlement.
- 12 November 1829 Thomas Braidwood Wilson, a naturalist visiting Garden Island noted that on landing on the south of the island the undergrowth was so thick that they abandoned efforts to cross the island (Wilson 1835, p.218).
- Late 1830 The first settlers had experienced difficulty in establishing gardens on the island and it was abandoned in favour of other settlements at Fremantle and Perth also established in 1829 (Seddon 1972, p 214).
- 1833 Lyon recognised that the island was called 'Meeandip' by the Aborigines (Lyon 1833, p 64).
- November and December 1833 Karl von Huegel, naturalist, visited and commented on the overgrown and almost impenetrable creepers of Clematis (probably *C. microphylla*) and Viscum (probably *Cassytha glabella*) (Napier 1975).
- November and December 1839 Ludwig Preiss, botanist, collected plant specimens cited by Bentham (1863-1879) in 'Flora Australiensis' and by Lehmann (1844-48) in 'Plantae Preissianae'.
- 1845 A.C. Gregory recorded dense thickets of Cypress Pine immediately south of Beacon Head.
- 1870-1888 Careening Bay often used as shelter and anchorage by visiting sailing ships during export of timber from Rockingham.
- 1897 Much of the island owned by the 'Garden Island Syndicate'. Subdivision of the southern part of the island from Careening Bay to the west coast approved for 500 lots and access roads. Only a few houses were built.
- Early 1900's Permanent dwellings built.
- December 1919 Royal Society of WA held an excursion to the island reported by W.B. Alexander (1921). Mt Haycock (in north) was thickly covered by Cypress Pines with creepers to form a dense matted jungle; thickets of *Acacia cyclops* and *Melaleuca*; and open places with grasses. Thirty species of flowering plants were recorded.
- ~1928 Shop established, regular boat service commenced. Vegetation around Careening Bay largely destroyed and reduced to a woodland of *Melaleuca* trees.
- Early 1930's An extensive fire reported.
- 1939-1945 Artillery units occupied the island during World War II. Roads, tracks, gun positions and buildings installed. Four bores sunk 350-400 m tapping water from the Yarragadee formation (Playford et al 1976) and supplied fresh water for the first time for domestic use and irrigation of lawns affecting food supply to Tammar wallabies.
- Early 1940's An extensive fire reported.
- 1943 First topographic map based on 1942 aerial photography.
- 1951 Honours thesis by McArthur on plant ecology of Garden Island, later published as McArthur 1957. Beach around Colpoys Point was and still is receding, estimated recession 70 m. (McArthur and Bartle 1981)
- 1956 Uncontrolled fire burnt most of the island except north and south extremities.
- 1958 Effects of 1956 fire and regeneration recorded by Baird 1958.
- 1969 Vegetation map compiled by Loneragan using 1963 air photos (unpublished).
- 1971 Pearman studied growth rings on *Callitris preissii* at the northern end of the island (Pearman 1971).
- 1972 Details of early visits to the island published by Seddon 1972.
- 1973 Construction of a Causeway to the island completed, including a groyne from Parkin Pt. As a consequence sand started to accumulate in Broun Bay increasing the width of the beach by more than 30 m by 1981. Sand is also accumulating north of the groyne on Colpoys Pt. (McArthur and Bartle 1981).
- 1978-79 Plant species list by Marchant and Abbott 1981.
- 1979 Details of early visits documented by historians Appleyard and Manford 1979.

6. SIGNIFICANCE AGAINST REGISTER CRITERIA

A1. Importance in the evolution of Australian flora, fauna, landscapes or climate.

There are 4 taxa of flora with disjunct populations on Garden Island. *Amyema melaleucae* is a Mistletoe growing on *Melaleuca lanceolata* in a major range disjunction from the Dongara population and is the only known record in the Perth region. *Lepidium puberulum* growing in the woodland is the only known population in the Perth region. *Myosotis australis* also present on Rottnest is a disjunct population from Margaret River. Populations of *Acacia truncata* are also disjunct (G.J.Keighery pers. comm.1994).

high

The populations of the 14 species of terrestrial reptiles and the population of tammars wallabies *Macropus eugenii* have all been isolated from the mainland populations for some 6000-7000 years. Their gene pools are therefore of evolutionary importance, and the populations of tammars, Lined Skink *Lorista lineata*, Carpet Python *Morelia spilota*, and Tiger Snake *Notechis scutatus* are of particular interest (CSIRO 1992).

The tammars on Garden Island show distinct morphological differences from other populations: for example those on the Abrolhos Islands where they are smaller and have different head and body shapes; the SA tammars on Kangaroo Island are different again and are much bigger (9.5 kg) and have a different coat colour (Poole et al 1991). Garden Island tammars have a distinctive russet coat colour and they may be a different sub-species but this has not yet been determined genetically (Poole pers. comm. 1994)

The population of Brush Bronzewing *Phaps elegans* is also considered a refuge population (Saunders pers. comm. 1994).

The Lined Skink *Lerista lineata* has a very small geographic range on the coastal plain from Perth to Mandurah and on Rottnest and Garden Islands. The species may be extinct on Rottnest Island as it has not been collected there since 1930 and this may be due to the clearing of forest habitat (CSIRO 1992).

high

A2. Importance in maintaining existing processes or natural systems at the regional or national scale.

Garden Island stands out as a good example of a relatively undisturbed site of high ecological integrity when compared with adjacent mainland sites and Rottnest Island (McArthur; G.J.Keighery; Gibson; pers. comm. 1994). The plant species mix has stayed the same although the distribution of species is dynamic and the distribution of vegetation communities has changed. There is evidence that the *Callitris preisii* - *Melaleuca* forests have diminished since 1829 due to fire and natural forces and *Acacia rostellifera* scrub now covers over half the island (McArthur and Bartle 1981). The island is still 86% vegetated, some areas are unburnt for at least 50 years, and no species have been endangered by human activities (CSIRO 1992).

The island fauna is virtually free of disturbance by feral animals; foxes and rabbits being absent and feral cats controlled (Department of Defence 1980), and most of the island is unburnt since 1956 (McArthur and Bartle 1981). The northern section including *Callitris preisii* stands appears unburnt for about 80 years (at 1994) (McArthur and Bartle 1981; McArthur pers. comm.) and is particularly important as undisturbed vegetation (DCE 1983). Disturbance due to recreational activities is well controlled and limited to day visitors by boat (McArthur and Bartle 1981).

very high

The island provides an important habitat and is the site of important gene pools for 4 species of fauna which are vulnerable or rare on the mainland: the Tammars wallaby *Macropus eugenii*, the Brush Bronzewing *Phaps elegans*, a ground feeding secretive bird; the Lined Skink *Lerista lineata*, and the Carpet Python *Morelia spilota*. Tammars were once widespread in south west WA and coastal SA (Poole et al 1991) and distribution has contracted considerably since white settlement (Perry 1973). In WA isolated populations still exist on the mainland and 5 populations exist on islands. Populations on Garden Island in WA and Kangaroo Island in SA are the strongholds of the species (CSIRO 1992). The Garden Island tammars however, show distinct population differences (Poole et al 1991) and may be a different subspecies (Poole pers. comm. 1994).

The stronghold of Brush Bronzewing in the region is now on Garden Island (CSIRO 1992).

The Lined skink is confined to the coastal plain between Perth and Mandurah and Rottnest and Garden Islands, although it may be extinct on Rottnest as it has not been collected there since 1930, perhaps due to clearing of forest habitats. It is uncommon on Garden Island and was found in forest habitat or *Melaleuca huegelii* scrub where trees are present (CSIRO 1992).

The Carpet Python is fairly common on the island, not found on Rottnest, and is now very rare on the adjacent mainland (CSIRO 1992).

very high

The island also provides an important habitat and gene pool for the Tiger Snake which is abundant but whose major prey, frogs, are absent (CSIRO 1992).

The west coast of the island provides ideal and important feeding habitat for the Sanderling *Calidris alba* a migratory species which breeds in the Arctic circle and prefers to feed on sandy beaches at the edge of waves (CSIRO 1992).

The island provides nesting habitat on beaches for the breeding migrant Fairy Tern *Sterna nereis* which requires undisturbed nesting periods (CSIRO 1992).

high

A4. Importance for association with events, developments or cultural phases which have had a significant role in the human occupation and evolution of the nation, State, region or community.

The island has had a long history of association with European peoples from the middle of the seventeenth century when Dutch, French and British seamen visited. The Dutch left no evidence of their visit but the French visits in 1801-1803 named the island Ile de Buache and named Pt Baudin (McArthur and Bartle 1981).

The site of the first settlement (consisting of about 20 buildings) on the west coast of WA was at Sulphur Bay near Cliff Head on Garden Island in June 1829. At that time, Captain Stirling renamed the island from Ile de Buache to Garden Island, and most of the coastal features were named after people and ships associated with the first settlement (McArthur and Bartle 1981; Seddon 1972).

A well still remains at Cliff Head, and stones consistent with foundation stones of Stirling's home and others are still visible. A memorial has been placed at this significant historical site. Most settlers left after 3 miserable winter months and some remained for about 12 months. The settlement was 'burnt off' when it was finally abandoned (Green, ca 1970).

very high

Whilst there is no evidence of Aboriginal occupation of the island, Aboriginal weapons have been found whilst excavating an old well. Seddon believes these may have been brought over from the mainland by early settlers (Seddon 1972).

very high

B1. Importance for rare, endangered or uncommon flora, fauna, communities, ecosystems, natural landscapes or phenomena, or as a wilderness.

The vegetation of Garden Island is very unusual in three respects when compared with the adjacent mainland. i. Important families on the mainland are absent (Proteaceae) or are present in restricted numbers (Myrtaceae, Papilionaceae); ii. dominant species show a remarkably high frequency with five sixths of the island covered by dense scrub consisting of *Acacia rostellifera*, *Callitris preisii*, and *Melaleuca lanceolata* and *M. huegelii* in various combinations; iii. the vegetation structure is probably unique in WA where the scrub exists in a single layer of dominants compared with three distinct layers of *Eucalyptus marginata* and *E. gomphocephala* communities of the mainland. The closed canopy over much of the island is another distinguishing feature of the vegetation structure (McArthur 1957).

very high

Although widely distributed as a species in southern Australia (Powell 1990), there are only three woodland or forest communities of *Callitris preisii* remaining (Keighery and Keighery 1992), the largest, best representation and most mature being on Garden Island (Powell pers. comm 1994). The other two are on the mainland at Woodman Point and Trigg Dunes, being much more degraded remnants of a formerly more widespread plant community. It also survives as understorey trees in tuart woodland at Peppermint Grove by the Swan River (Powell 1990). *Callitris preisii* forms a dense low forest on bench landscapes of Garden Island and is always present in a mixed stand with *Melaleuca lanceolata* (McArthur and Bartle 1981).

very high

The coastal heath (together with that on Rottnest) is floristically very distinct from mainland coastal and limestone heaths and includes disjunct populations of *Acacia truncata* (Keighery pers. comm. 1994).

Garden Island has the best remaining stands of the now uncommon communities of Cheesewood *Pittosporum phylliraeoides* var. *phylliraeoides*, (also found on Rottnest Island) (G.J.Keighery pers. comm. 1994), a coastal small tree to 8m in height associated with limestone (Powell 1990).

very high

Other unusual flora records in the woodland are the only record in the Perth region of *Lepidium puberulum*; and a disjunct population of *Myostotis australis* from Margaret River (G.J.Keighery pers. comm 1994).

medium

The tamar wallaby which is common on the island is listed as threatened fauna by CALM on Schedule I (likely to become extinct or in danger of extinction) under the Wildlife Conservation Act 1950 (WA). This population is one of the two most important remaining in Australia (CSIRO 1992).

very high

The Carpet Python is listed as threatened fauna by CALM on Schedule II (in need of special protection) under the Wildlife Conservation Act 1950. Common on Garden Island, it is now very rare on the adjacent mainland and is not found on Rottnest (CSIRO 1992).

The island is important for the Lined Skink and Brush Bronzewing which are uncommon elsewhere (CSIRO 1992).

very high

C1. Importance for information contributing to a wider understanding of natural history, by virtue of its use as a research site, teaching site, type locality, reference of benchmark site.

The successive changes in the plant communities through time are unusually well recorded for the offshore islands including Garden Island (Seddon 1972). The earliest records of the vegetation are by the French who visited in 1801, calling the island Ile de Buache (Peron 1807). Descriptions before the turn of the century include those by Levillain, a zoologist, 1822; Cunningham a botanist, 1822; Fraser 1830; Fremantle in 1829 as recorded by Cottesloe 1928; Wilson, a naturalist, who visited in 1829, in Wilson 1835; Lyon 1833; Karl von Huegel naturalist in 1833 (Napier 1975); Ludwig Preiss, an eminent early botanist collected plant specimens in 1839 cited by Bentham 1863-1879 and by Lehmann 1844-48; and Gregory 1845 (McArthur and Bartle 1981; Marchant and Abbott 1981; Seddon 1972).

Records of flora and vegetation have continued this century with major surveys documented by Alexander 1921, McArthur 1951, McArthur 1957, Loneragan 1969 (unpublished), Marchant and Abbott 1981, and Mc Arthur and Bartle 1981.

high

The site has contributed to the understanding of the dynamics of the plant communities over time. McArthur and Bartle (1981) have documented the changes in distribution of dominant species: for example *Melaleuca lanceolata* stands now dominate the east coast between Buchanan Bay and Cliff Pt. rather than *A. rostellifera*; grasses on clifftops and thickets of *A. cyclops* in the north are now replaced by *A. rostellifera*; *Callitris preisii* has disappeared from the south and has spread in the north since 1942.

high

Garden Island is the site where bridal creeper *Myrsiphyllum asparagoides* was first described as a weed by McArthur in 1956 (J.K. Scott pers. comm.1994).

medium

The northern section of the island north of Collins Point is especially important as a reference site for natural history. The mature relatively undisturbed heath, scrub and low forest communities unburnt for about 80 years (as in A2, D1) are probably similar to those seen on Rottneest by the early explorers (DCE 1983).

very high

The island is an important research site contributing to the understanding of many branches of science. The island is the first site where detailed quantitative effects of fire are being monitored in 22 permanent quadrats in which every plant has been identified, described and measured commencing in 1990 (McArthur pers. comm., unpublished report to the Department of Defence).

The physiology and breeding biology of the tamar wallaby *Macropus eugenii* have been studied in detail on Garden Island and summarised by Bradshaw 1988. The effects of grazing by tammars have been studied and have a dramatic effect on the distribution of some species of plants especially after burning (Bell, Moredount and Loneragan 1987). There have been many studies of birds which are listed in the reference list by CSIRO 1992.

Marine biology studies by CSIRO into the reproduction cycles and habitat preferences of the crayfish (*Panulirus longipes*) off Garden Island has contributed to the understanding of this species and has had commercial application (Seddon 1972).

high

The island has been an important teaching site over the years for students of botany, zoology, and marine biology - particularly reef ecology where outstanding examples occur (McArthur; Poole pers. comm. 1994)

high

<p>D1. Importance in demonstrating the principal characteristics of the range of landscapes, environments or ecosystems, the attributes of which identify them as being characteristic of their class.</p>	<p>Garden Island is an outstanding example of an island habitat on the Quindalup landform, close to Perth, which has retained its ecological integrity largely intact despite human use in contrast to the adjacent mainland and to Rottnest Island which are generally much more degraded (McArthur; Saunders; G.J. Keighery; Dell; Powell; Gibson; all pers. comm. 1994).</p>	<p>very high</p>
	<p>The outstanding representation of the now rare <i>Callitris preisii</i> community occurs on Garden Island. It is always mixed with <i>Melaleuca lanceolata</i> and occurs on eastern bench landscapes as a low forest in unusually dense stands with foliage forming a completely closed canopy when mature. The oldest stands in the north are at least 80 years old (as at 1994) and show no signs of senescence (McArthur and Bartle 1981; McArthur pers. comm. 1994). Other stands occur at Woodman Point and Trigg Dunes on the mainland but in comparison are very degraded and are more vulnerable to frequent fires. There is evidence that <i>Callitris preisii</i> as a community was considerably more widespread on the mainland, on Garden Island, and on Rottnest Island (now extinct) before European settlement (ibid; R.J. Powell pers. comm. 1994).</p>	<p>very high</p>
	<p>The island provides representation of excellent coastal heath which is floristically very distinct from mainland coastal and limestone heaths (G.J. Keighery pers. comm. 1994).</p>	<p>very high</p>
	<p>The island provides representation of a Mistletoe <i>Amyema melaleucae</i> growing on <i>Melaleuca lanceolata</i> in a 1:1 parasitic relationship (as described in A1). This parasite was first observed by McArthur in 1951. Generally it does not grow in sufficient numbers to affect the host plant and only one area showed heavy infestation in 1978 (McArthur and Bartle 1981). The island has the best remaining stands of Cheesewood (as in B1) (G.J. Keighery pers. comm. 1994) and good representation of the now rare community of <i>Melaleuca lanceolata</i> low closed woodland to forest in excellent condition (Keighery and Keighery 1992).</p>	<p>high</p>
	<p>The island provides excellent representation of the tamar wallaby, Brush Bronzewing, Carpet Python, Tiger Snake, and Lined Skink (Saunders pers. comm. 1994).</p>	<p>very high</p>
<p>E1. Importance for a community for aesthetic characteristics held in high esteem or otherwise valued by the community.</p>	<p>The Garden Island landscape has important aesthetic value (McArthur pers. comm. 1994). The low forest vegetation has a very deep green appearance differing from the mainland. Approaching the east coast from the water, the island is very attractive with shady trees coming right down to the water's edge (McArthur and Bartle 1981). The western coastline has its own more rugged and exposed beauty with very interesting limestone cliffs and cliffside vegetation. From a distance the island appears to be mountainous as the steep and densely vegetated dunes give an exaggerated impression of height (McArthur 1957). A famous eagle's nest has been on a rock for about 40 years (McArthur pers. comm. 1994).</p>	<p>high</p>
<p>G1. Importance as a place highly valued by a community for reasons of religious, spiritual, symbolic, cultural, educational or social associations.</p>	<p>The island is an important recreational venue for day visitors who arrive by private boat. Natural tree growth to the water's edge provides an attractive and popular setting for picnics and barbecues. Overnight stays are not permitted and few visitors venture inland (McArthur and Bartle 1981). At weekends about 90 boats per day visit the east coast of the island with many more on public holidays in summer (J. Maher pers. comm. 1994).</p>	<p>high</p>

7. STATEMENT OF SIGNIFICANCE

Sulphur Bay near Cliff Head is the site of the first settlement on the west coast of WA on June 5th 1829 by Captain Stirling arriving on the 'Parmelia' and Captain Fremantle on the 'Challenger'. A well still remains at Cliff Head and foundation stones of Stirling's cottage and others are still visible at this historic site. There is no evidence of Aboriginal occupation of the island.

Garden Island is outstanding as a relatively undisturbed site of high ecological integrity compared with the mainland and comparable islands such as Rottnest. Still 86% vegetated, the absence of feral animals such as foxes, rabbits, cats and restricted human use has enabled maintenance of unusual natural habitats for flora and fauna largely intact on the Quindalup landform. Remarkable is the unusual vegetation dominated by very few species often in very dense stands. Dense scrub dominated by *Acacia rostellifera*, *Callitris preissii*, *Melaleuca lanceolata*, and *M. huegelii* covers most of the island often in a single closed layer. There are no eucalypts and no members of the banksia family. The island is renowned for the best example of the now rare *Callitris preissii* low forest communities covering much of the inland northern half of the island. Less extensive but also outstanding are the rare communities of Cheesewood *Pittosporum phylliraeoides*; Rottnest teatree *M. lanceolata* reaching attractively to the waters edge on the eastern side of the island; and coastal heath which is distinctively different in composition from comparable mainland sites.

The island provides an important habitat and is the site of important gene pools for 4 species of fauna which are vulnerable or rare on the mainland: the Tammam wallaby *Macropus eugenii*, the Brush Bronzewing *Phaps elegans*, a ground feeding secretive bird; the Lined Skink *Lerista lineata*; and the Carpet Python *Morelia spilota*. The tammams show distinct differences from other populations in WA and may actually be a different subspecies. The island is now the stronghold of tammams and Brush Bronzewing in WA. The Lined Skink is a species of reptile with a restricted range and is probably now extinct on Rottnest. The Carpet Python and the tammam are listed by CALM as threatened fauna for special protection under the Wildlife Conservation Act 1950.

The island also provides important habitat for the Tiger Snake; the migratory Sanderling which feeds on sandy beaches at the edge of waves; and the Fairy Tern which requires undisturbed nesting periods.

The natural history of the offshore islands is unusually well recorded from earliest European records in 1801. Anecdotal records by early naturalists and botanists give us an idea of the vegetation pre settlement in 1829 to 1850 for Garden Island. Plant collections made by Ludwig Preiss an eminent botanist in 1839 were formally recorded in 'Flora Australiensis' by Bentham (1863-1879) and in 'Plantae Preissianae' by Lehmann (1844-48). Major plant surveys have been recorded in more recent years by Alexander in 1921, McArthur in 1951 and 1957, Loneragan in 1969, Marchant and Abbott in 1981, and by McArthur and Bartle in 1981.

The island is an important research site contributing to the understanding of many branches of science. The island is the first site where detailed quantitative effects of fire are being monitored in 22 permanent quadrats in which every plant has been identified, described and measured commencing in 1990. The biology of the tammam has been studied in detail by many scientists and there have been many bird surveys. The effects of grazing by tammams on plant distribution after disturbance by fire has shown a dramatic impact.

The island has been an important teaching site over the years for students of botany, zoology, and marine biology - particularly reef ecology where outstanding examples occur.

There are 4 plant species found on the island which are outside their usual range: the Mistletoe *Amyema melaleuciae*, *Lepidium pubertum*, *Myosotis australis* and *Acacia truncata*.

The populations of 14 species of reptile and one mammal, the tammam, are of evolutionary importance as they have been isolated from the mainland for 6000-7000 years. The tammams look distinctly different, and the Lined Skink, Carpet Python and Tiger Snake are of particular interest.

The island has important aesthetic value. The dark green vegetation looks very different from the familiar eucalypt woodlands with understorey on the mainland. Approaching the east coast from the water, the island is very attractive with shady trees coming right down to the water's edge. It is a popular venue for day trippers who enjoy picnics and barbecues under the Rottnest teatrees. The western coastline has its own more rugged and exposed beauty with very interesting limestone cliffs and cliffside vegetation. From a distance the island appears to be mountainous as the steep and densely vegetated dunes give an exaggerated impression of height. A famous eagle's nest has been on a rock for about 40 years

8. CONDITION

There is evidence that the island was largely covered by *Callitris preissii*-*Melaleuca lanceolata* communities before European settlement and that the first 100 years of settlement since 1829 have resulted in a change to dominance by *Acacia rostellifera* probably primarily as a result of increased fire frequencies. In addition, changes in food supplies for Tammars since the advent of Europeans have affected the dynamics of native plant communities. The increased grazing pressure of more Tammars on young *Callitris* and *Melaleuca* seedlings have decreased the natural regeneration rate of these species.

Details of the fire history before the turn of the century is not known, but fires were reported this century in the early 1930's, the early 1940's, and in 1956 a large uncontrolled fire burnt most of the island except the northern and southern extremities. There has been no major fire since then and the Navy introduced a 'no burn' policy in the early 1970's. Some *Callitris* in the north are about 80 years old and show no signs of senescence.

Although the distribution and frequency of the dominant species of plant has changed markedly since settlement in 1829, the general condition of the vegetation over most of the island has stayed remarkably good and this is an outstanding feature which must be emphasised. In comparison, other islands such as Rottne, and mainland coastal areas on Quindalup dunes at Woodman Point, Bold Park, and Trigg Dunes have a history of much higher disturbance.

Weed invasion is directly related to disturbance around Naval Base facilities at Colpoys Point and other installations, along roads and tracks, at the old rubbish tip, at sites of former huts along the NE and NW shoreline at Herring Bay and Second Head-Beacon Head. A number of native Australian species which are not native to the island were introduced to gardens around cottages in the Careening Bay area. These include Tuart *Eucalyptus gomphocephala*, WA Peppermint *Agonis flexuosa*, in addition to exotic garden species such as Arum Lilies, Oleander, Cape Lilac, Japanese Pepper, Giant Bamboo. There are now more than 50 species of weed present including trees shrubs herbs and grasses, and numbers have increased sharply since 1969. Some herbs and grasses are creating imbalance in the ecosystem and some are very invasive such as arum lily, asparagus fern, thistles, bridal creeper, *Trachyandra divasicata*, *Arctotheca calendula*, *Ricinus communis*, *Medicago polymorpha*, and Cape Tulip *Homomena miniata*.

10. RATIONALE FOR PROPOSED BOUNDARIES

The boundary proposed includes the whole of the island including the naval base as there is natural vegetation within the base shown on the detailed vegetation map by McArthur (1990). The oval and other grasses areas are part of the feeding grounds for tammars and are therefore part of their habitat although it is modified from the natural state. The littoral zone and the aesthetic value of the coastline as a whole is important under G1 so is included.

Note: Whilst this nomination does not include details of National Estate values for the island's coastal waters and reefs except under C1, they are clearly important and should be documented. The geomorphology of the coastal islands together with the seabed, Cockburn Sound and adjacent mainland coast, and the marine biology of this region should be the subject of National Estate assessment as there is a significant amount of information available.

11. PERSONAL CONTACTS

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10. Neville Green. Historian, active in the Historical Society in the 1970's when the 'Save Garden Island' (especially the north end of the island) movement was active. Telephone 09 384 0075.
11. John Dell, WA Museum, Francis St Perth. Telephone 09 328 4411.

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14. APPENDIX

1. List of plant species by McArthur and Bartle 1981.
2. List of resident land birds by CSIRO 1992.
3. List of bird species recorded on Garden Island by CSIRO 1992.
4. List of reptile species by CSIRO 1992.
5. Vegetation Map of Garden Island by McArthur 1990 (as in CSIRO 1992).

Appendix 1 List of plant species on Garden Island 1978-79 from Marchant and Abbott
(1981) **Source:** McArthur and Bartle 1981

Exotic species are annotated as follows:

† Western Australian species introduced to Garden Island by Europeans.

* Alien species.

CONIFERS

ARAUCARIACEAE

* *Araucaria heterophylla* (Salisb.) Franco

CUPRESSACEAE

Callitris preissii Miq.

MONOCOTYLEDONS

ARACEAE

* *Zantedeschia aethiopica* (L.) Spreng.

CYPERACEAE

Carex preissii Nees

Lepidosperma angustatum R. Br.

Lepidosperma gladiatum Labill.

Scirpus marginatus Thunb.

S. nodosus Rottb.

HAEMODORACEAE

Conostylis candicans Endl.

AMARYLLIDACEAE

* *Narcissus jonquilla* L.

IRIDACEAE

* *Homeria miniata* (Andr.) Sweet

* *Watsonia* sp.

JUNCACEAE

Juncus pallidus R. Br.

JUNCAGINACEAE

Triglochin trichophora Nees ex Endl.

LILIACEAE

* *Allium* sp.

* *Asparagus asparagoides* (L.) W.F. Wight

* *Asphodelus fistulosus* L.

Thysanotus patersonii R. Br.

* *Trachyantra divaricata* (N.J. Jacq.) Kunth

MUSACEAE

* *Musa* sp.

ORCHIDACEAE

Acianthus reniformis (R. Br.) Schlecht.

Caladenia latifolia R. Br.

Eriochilus scaber Lindl.

POACEAE

* *Aira cupaniana* Guss.

* *Avena barbata* Link

* *Bambusa* sp.

Bromus arenarius Labill.

* *B. diandrus* Roth

* *B. rubens* L.

* *Catapodium rigidum* (L.) C.E. Hubbard ex Dony

* *Cynodon dactylon* (L.) Pers.

* *Ehrharta longiflora* Sm.

* *Eragrostis curvula* (Schrad.) Nees

* *Hordeum leporinum* Link

* *H. vulgare* L.

* *Lagurus ovatus* L.

* *Lolium* sp.

* *Parapholis incurva* (L.) C.E. Hubbard

* *Poa annua* L.

Poa poiformis (Labill.) Druce

* *Polygomon monspeliensis* (L.) Desf.

Spinifex hirsutus Labill.

S. longifolius R. Br.

Sporobolus virginicus (L.) Kunth

* *Stenotaphrum secundatum* (Walt.) Kuntze

Stipa flavescens Labill.

* *Vulpia myuros* (L.) C.C. Gmel.

XANTHORRHOACEAE

Acanthocarpus preissii Lehm.

DICOTYLEDONS

AIZOACEAE

Carpobrotus virescens (Haw.) Schwantes

Tetragonia amplexicoma (Miq.) Hook. f.

T. decumbens Miller

APIACEAE

Apium prostratum Labill. ex. Vent.

Daucus glochidiatus (Labill.) Fisch. et al.

Hydrocotyle hispidula Bunge

H. tetragonocarpa Bunge

Trachymene caerulea (Reichb.) Grah.

T. pilosa Sm.

APOCYNACEAE

Alyxia buxifolia R. Br.

* *Nerium oleander* L.

ASCLEPIADACEAE

* *Asclepias fruticosa* L.

ASTERACEAE

Angianthus cunninghamii (DC.) Benth

A. humifusus (Labill.) Benth

* *Arctotheca calendula* (L.) Levyns

* *A. populifolia* (Berg.) T. Nordl.

Athrixia pulverulenta (Lindl.) Druce

Calocephalus brownii (Cass.) F. Muell.

* *Carduus pycnocephalus* L.

* *Conyza bonariensis* (L.) Cronquist

* *Dittrichia graveolens* (L.) W. Greuter

* *Hypochoeris glabra* L.

Olearia axillaris (DC.) F. Muell. ex Benth.

* *Osteospermum clandestinum* (Less.) T. Nordl.

Senecio lautus Forst. f. ex Willd.

* *Sonchus oleraceus* L.

Waitzia citrina (Benth.) Steetz.

BASELLACEAE

* ? *Boussingaultia baselloides* Miers

BORANGINACEAE

Myosotis australis R. Br.

BRASSICACEAE

* *Cakile maritima* Scop.

- Hymenolobus procumbens* (L.) Nutt. ex Shinz et Thell
Lepidium foliosum Desv.
 * *Nasturtium officinale* R. Br.
 * *Sisymbrium orientale* L.
- CARYOPHYLLACEAE
 * *Cerastium glomeratum* Thuill.
 * *Petrorhagia prolifera* (L.) P.W. Ball et Heywood
 * *Polycarpon tetraphyllum* (L.) L.
 * *Sagina apetala* Arduino
 * *Silene* sp.
 * *Stellaria media* (L.) Cyrillo
- CHENOPODIACEAE
Atriplex cinerea Poir.
A. isatidea Moq.
Rhagodia baccata (Labill.) Moq. (Syn. *R. radiata* Nees)
Salsola kali L.
Sarcocornia blackiana (Ulbr.) A.J. Scott
Threlkeldia diffusa R. Br.
- CONVOLVULACEAE
 * *Convolvulus* sp.
Dichondra repens Forst. et Forst f.
- CRASSULACEAE
Crassula colorata (Nees) Ostfeld
C. glomerata Berg.
C. pedicellosa (F. Muell.) Ostfeld
- EPACRIDACEAE
Acrotiche cordata (Labill.) R. Br.
Leucopogon insularis A. Cunn. ex DC.
L. parviflorus (Andr.) Lindl.
- EUPHORBIACEAE
Beyeria viscosa (Labill.) Miq.
 * *Euphorbia pepus* L.
Phyllanthus calycinus Labill.
Poranthera microphylla Brongn.
 * *Ricinus communis* L.
- FRANKENIACEAE
Frankenia pauciflora DC.
- FUMARIACEAE
 * *Fumaria muralis* Sond. ex Koch
- GENTIANACEAE
 * *Centaurium erythraea* Rafn
- GERANIACEAE
 * *Erodium cicutarium* (L.) L'Her. ex Ait.
 * *Geranium molle* L.
Pelargonium capitatum (L.) L'Her ex Ait.
- GOODENIACEAE
Scaevola crassifolia Labill.
- GYROSTEMONACEAE
Tersonia brevipes Moq.
- LAMIACEAE
Westringia dampieri R. Br.
- LAURACEAE
Cassytha glabella R. Br.
- LOBELIACEAE
Lobelia tenuior R. Br.
- LORANTHACEAE
Amyema miraculosum (Miq.) Tiegh. (Syn. *Loranthus miraculosus* Miq. var. *melaleucaei*)
- MALVACEAE
 * *Lavatera arborea* L.
L. plebeia Sims
- MELIACEAE
 * *Melia azedarach* L.
- MIMOSACEAE
Acacia cochlearis (Labill.) H. Wendl.
A. cyclops A. Cunn. ex G. Don.
A. rostellifera Benth.
A. saligna (Labill.) H. Wendl.
- MYOPORACEAE
Eremophila glabra (R. Br.) Ostenfeld
Myoporum adscendens R. Br.
- MYRTACEAE
 † *Agonis flexuosa* (Spreng) Schau.
 † *Eucalyptus gomphocephala* DC.
Melaleuca huegelii Endl.
M. lanceolata Otto
- ONAGRACEAE
Epilobium billardierianum Ser.
- OROBANCHACEAE
Orobanche australiana F. Muell.
- OXALIDACEAE
Oxalis corniculata L.
 * *O. pes-caprae* L.
- PAPAVERACEAE
 * *Argemone mexicana* L.
- PAPILIONACEAE
Hardenbergia comptoniana (Andr.) Benth.
 * *Medicago polymorpha* L. (Syn. *M. denticulata* Willd.)
 * *Melilotus indica* (L.) All.
 * *Trifolium scabrum* L.
- PITTOSPORACEAE
Pittosporum phylliraeoides DC.
- POLYGALACEAE
Comesperma integerrimum Endl.
- POLYGONACEAE
 * *Emex australis* Steinh.
- PORTULACACEAE
Calandrinia brevipedata F. Muell.
- PRIMULACEAE
 * *Anagallis arvensis* L.
Samolus repens (Forst.) Pers.
- RANUNCULACEAE
 * *Clematis microphylla* DC.
- RHAMNACEAE
Spyridium globulosum (Labill.) Benth.
- ROSACEAE
 * *Crataegus* sp.
- RUBIACEAE
 * *Galium murale* (L.) All.
 * *Ixora* sp.
 * *Sherardia arvensis* L.
- RUTACEAE
Boronia alata Sm.
Diplolaena dampieri Desf.

SANTALACEAE

Exocarpos sparteus R. Br.*Leptomeria preissiana* (Miq.) A. DC.

SAPINDACEAE

Dodonaea aptera Miq.

SCROPHULARIACEAE

* *Dischisma arenarium* E. Mey.* *Parentucellia* sp.* *Verbascum virgatum* Stokes

SOLANACEAE

* *Nicotiana glauca* Grah.* *Solanum nigrum* L.*S. symonii* Eichler

STERCULIACEAE

Guichenotia ledifolia J. Gay*Lasioptalum oppositifolium* F. Muell. (Syn. *L. angustifolium* W.V. Fitzg.)*Thomasia cognata* Steud.

THYMELAEACEAE

* *Pimelia rosea* R. Br.

URTICACEAE

Parietaria debilis Forst. f.* *Urtica urens* L.

VALERIANACEAE

* *Centranthus ruber* (L.) DC.

VITACEAE

* *Vitis vinifera* L.

ZYGOPHYLLACEAE

Nitraria billardieri DC. (Syn. *N. schoberi* L.)*Zygophyllum apiculatum* F. Muell.

2. Resident Land Birds on Garden and Rottnest Islands (+ = present; * = exotic species; [] = extinct)

Species		Garden Island	Rottnest Island
Australian Kestrel	<i>Falco cenchroides</i>	+	+
Peafowl*	<i>Pavo cristatus</i>		+
Common Pheasant*	<i>Phasianus colchicus</i>		+
Banded Lapwing	<i>Vanellus tricolor</i>	+	+
Brush Bronzewing	<i>Phaps elegans</i>	+	[+]
Spotted Turtledove	<i>Streptopelia chinensis</i>	+	+
Laughing Turtledove*	<i>Streptopelia senegalensis</i>		+
Sacred Kingfisher	<i>Halcyon sancta</i>	migrant	+
Welcome Swallow	<i>Hirundo neoxena</i>	+	+
Richard's Pipit	<i>Anthus novaeseelandiae</i>	?	+
Red-capped Robin	<i>Petroica goodenovii</i>		+
Golden Whistler	<i>Pachycephala pectoralis</i>	+	+
Rufous Whistler	<i>Pachycephala rufiventris</i>		[+]
Grey Fantail	<i>Rhipidura fuliginosa</i>	+	
Willie Wagtail	<i>Rhipidura leucophrys</i>	+	vagrant
White-browed Scrubwren	<i>Sericornis frontalis</i>		+
Western Gerygone	<i>Gerygone fusca</i>	+	+
Singing Honeyeater	<i>Lichenostomus virescens</i>	+	+
White-fronted Chat	<i>Ephthianura albifrons</i>		+
Silvereye	<i>Zosterops lateralis</i>	+	+
Grey Butcherbird	<i>Cracticus torquatus</i>	+	
Australian Raven	<i>Corvus coronoides</i>	+	+

Source: CSIRO 1992 p32 Table 6.2

Common Name	Scientific Name	Source*										
		A	B	C	D	E	F	G	H	I	J	
Laughing Kookaburra	<i>Dacelo gigas</i>		+									
Sacred Kingfisher	<i>Halcyon sancta</i>			+		+	+	+	+	+	+	+
Rainbow Bee-eater	<i>Merops ornatus</i>						+	+	+	+	+	+
Tree Martin	<i>Cecropis nigricans</i>		+				+	+	+		+	+
Fairy Martin	<i>Cecropis ariel</i>							+			+	+
Welcome Swallow	<i>Hirundo neoxena</i>		+	+	+	+	+	+	+	+	+	+
Richard's Pipit	<i>Anthus novaeseelandiae</i>			+	+	+	+	+	+	+	+	+
Ground Cuckoo-Shrike	<i>Coracina maxima</i>											+
Black-faced Cuckoo-Shrike	<i>Coracina novaehollandiae</i>											+
Golden Whistler	<i>Pachycephala pectoralis</i>			+	+	+	+	+	+	+	+	+
Rufous Whistler	<i>Pachycephala rufiventris</i>											+
Grey Shrike-thrush	<i>Colluricincla harmonica</i>							+	+			
Grey Fantail	<i>Rhipidura fuliginosa</i>										+	
Willie Wagtail	<i>Rhipidura leucophrys</i>	+		+	+	+	+	+	+	+	+	+
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>											+
Western Gerygone	<i>Gerygone fusca</i>		+	+	+	+	+	+	+	+	+	+
Little Wattlebird	<i>Anthochaera chrysoptera</i>											+
Yellow-throated Miner**	<i>Manorina flavigula</i>											+
Singing Honeyeater	<i>Lichenostomus virescens</i>	+	+	+	+	+	+	+	+	+	+	+
White-fronted Chat	<i>Epthianura albifrons</i>	+						+	+			+
Striated Pardalote	<i>Pardalotus striatus</i>								+			
Silvereye	<i>Zosterops lateralis</i>	+	+		+	+	+	+	+	+	+	+
Australian Magpie-Lark	<i>Grallina cyanoleuca</i>								+	+	+	+
Grey Butcherbird	<i>Cracticus torquatus</i>		+	+	+	+	+	+	+	+	+	+
Australian Magpie	<i>Gymnorhina tibicen</i>		+	+	+	+	+	+	+	+	+	+
Australian Raven	<i>Corvus coronoides</i>	+	+	+	+			+	+	+	+	+

* A Alexander (1921b)

B Serventy (1938)

C Sedgwick (1940)

D Buller (1949)

E Calderwood (1953)

F Anon (1979)

G Davies (1980)

H Abbott (1980)

I L. Schmidt (pers comm)

J Present study (1991)

** S.R. Bowler (unpub)

*** P/O Wright (pers comm)

4. List of reptile species

Source: CSIRO 1992 p48 Table 7.3

Table 7.3 A comparison of the herpetofauna of Garden Island and Rottnest Island with an estimate of status based on this survey and Robinson et al. (1987) for Garden Island and Humphries and Storr (1985) for Rottnest Island (C = common; UC = uncommon; R = rare; E = extinct; NR = not recorded)

Species	Rottnest Is.	Garden Is.
Leptodactylidae - Southern Frogs		
<i>Heleioporus eyrei</i>	C	NR
<i>Ranidella insignifera</i>	C	NR
Hylidae - Tree Frogs		
<i>Litoria moorei</i>	UC	NR
Gekkonidae - Geckoes		
<i>Diplodactylus spinigerus</i>	C	C
<i>Phyllodactylus marmoratus</i>	C	UC
Pygopodidae - Legless Lizards		
<i>Aprasia repens</i>	R	NR
<i>Lialis burtonis</i>	C	C
Scincidae - Skink Lizards		
<i>Cryptoblepharus plagiocephalus</i>	NR	C
<i>Ctenotus fallens</i>	C	NR
<i>Egernia kingii</i>	UC	C
<i>Egernia napoleonis</i>	R/E	NR
<i>Hemiergis peronii</i>	C	C
<i>Leiopisma trilineatum</i>	UC	UC
<i>Lerista elegans</i>	UC	NR
<i>Lerista lineata</i>	E?	UC
<i>Lerista lineopunctulata</i>	UC	NR
<i>Lerista praepedita</i>	NR	C
<i>Morethia lineocellata</i>	C	R
<i>Morethia obscura</i>	NR	C
<i>Tiliqua rugosa</i>	C	UC / R
Typhlopidae - Blind Snakes		
<i>Ramphotyphlops australis</i>	R	NR
Elapidae - Front-fanged Snakes		
<i>Notechis scutatus</i>	NR	C
<i>Pseudonaja affinis</i>	C	NR
Boidae - Python Snakes		
<i>Morelia spilota</i>	NR	C

Garden Island - 66 species in SCP survey plots 11/2/94

Family: Anthericaceae

Thysanotus patersonii R. Br.

Family: Apiaceae

Apium annuum P.S. Short

Daucus glochidiatus (Labill.) Fisch., C.A.Mey. & Ave-

Trachymene coerulea Graham

Trachymene pilosa Sm. in Rees

Family: Apocynaceae

Alyxia buxifolia R. Br.

Family: Araceae

* *Zantedeschia aethiopica* (L.) Spreng.

Family: Asparagaceae

* *Myrsiphyllum asparagoides* (L.) Willd.

Family: Asphodelaceae

* *Trachyandra divaricata* (Jacq.) Kunth

Family: Asteraceae

Gnaphalium indutum Hook. f.

Podotheca angustifolia (Labill.) Less.

Senecio lautus G. Forst. ex Willd.

Waitzia citrina (Benth.) Steetz

Family: Boraginaceae

Myosotis australis R. Br.

Family: Campanulaceae

Wahlenbergia preissii de Vriese

Family: Caryophyllaceae

* *Cerastium glomeratum* Thuill.

Family: Chenopodiaceae

Rhagodia baccata (Labill.) Moq.

Family: Crassulaceae

Crassula colorata (Nees) Ostenf.

* *Crassula glomerata* P.J. Bergius

Family: Cupressaceae

Callitris preissii Miq.

Family: Cyperaceae

Lepidosperma angustatum R. Br.

Lepidosperma sp.

Family: Dasypogonaceae

Acanthocarpus preissii Lehm.

Family: Epacridaceae

Acrotriche cordata (Labill.) R. Br.

Leucopogon australis R. Br.

Leucopogon parviflorus (Andrews) Lindl.

Leucopogon racemulosus DC.

Family: Euphorbiaceae

Phyllanthus calycinus Labill.

Poranthera microphylla Brongn.

Family: Haemodoraceae
Conostylis candicans Endl.

Family: Juncaginaceae
Triglochin calcitrapum Hook.

Family: Lamiaceae
Westringia dampieri R. Br.

Family: Lobeliaceae
Lobelia gibbosa Labill.

Family: Loganiaceae
Mitrasacme paradoxa R. Br.

Family: Mimosaceae
Acacia cochlearis (Labill.)H.L.Wendl.
Acacia rossei F.Muell.
Acacia saligna (Labill.)H.L.Wendl.
Acacia sp.

Family: Myoporaceae
Eremophila glabra (R. Br.) Ostenf.

Family: Myrtaceae
Leptospermum erubescens Schauer in Lehm.
Melaleuca lanceolata Otto

Family: Oxalidaceae
Oxalis perennans Haw.

Family: Papilionaceae
Hardenbergia comptoniana (Andrews)Benth.

Family: Poaceae
Agrostis preissii (Nees)Vickery
Bromus sp.
Danthonia caespitosa Gaudich.
Stipa flavescens Labill.
Vulpia sp.
* *Aira caryophyllea* L.
* *Catapodium rigidum* (L.) C.E. Hubb ex Dony
* *Lolium rigidum* Gaudin

Family: Polygalaceae
Comesperma integerrimum Endl.

Family: Polygonaceae
Muehlenbeckia adpressa (Labill.)Meisn.

Family: Primulaceae
* *Anagallis arvensis* L.

Family: Ranunculaceae
Clematis aristata R. Br. ex Dc.
Clematis microphylla DC.

Family: Rhamnaceae
Spyridium globulosum (Labill.) Benth.

Family: Rubiaceae
* *Galium murale* (L.) All.

Family: Santalaceae

Leptomeria preissiana (Miq.) A. DC.

Family: Sapindaceae

Dodonaea viscosa Jacq.

Family: Solanaceae

Solanum symonii H. Eichler

* *Solanum nigrum* L.

Family: Sterculiaceae

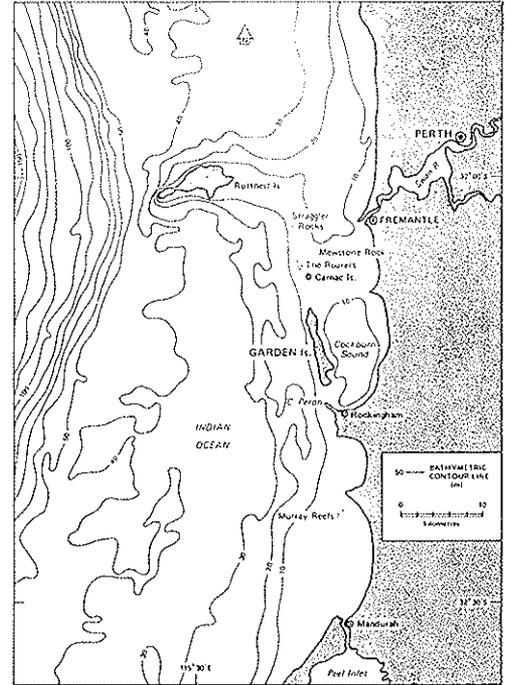
Thomasia triphylla (Labill.) Gay

Family: Urticaceae

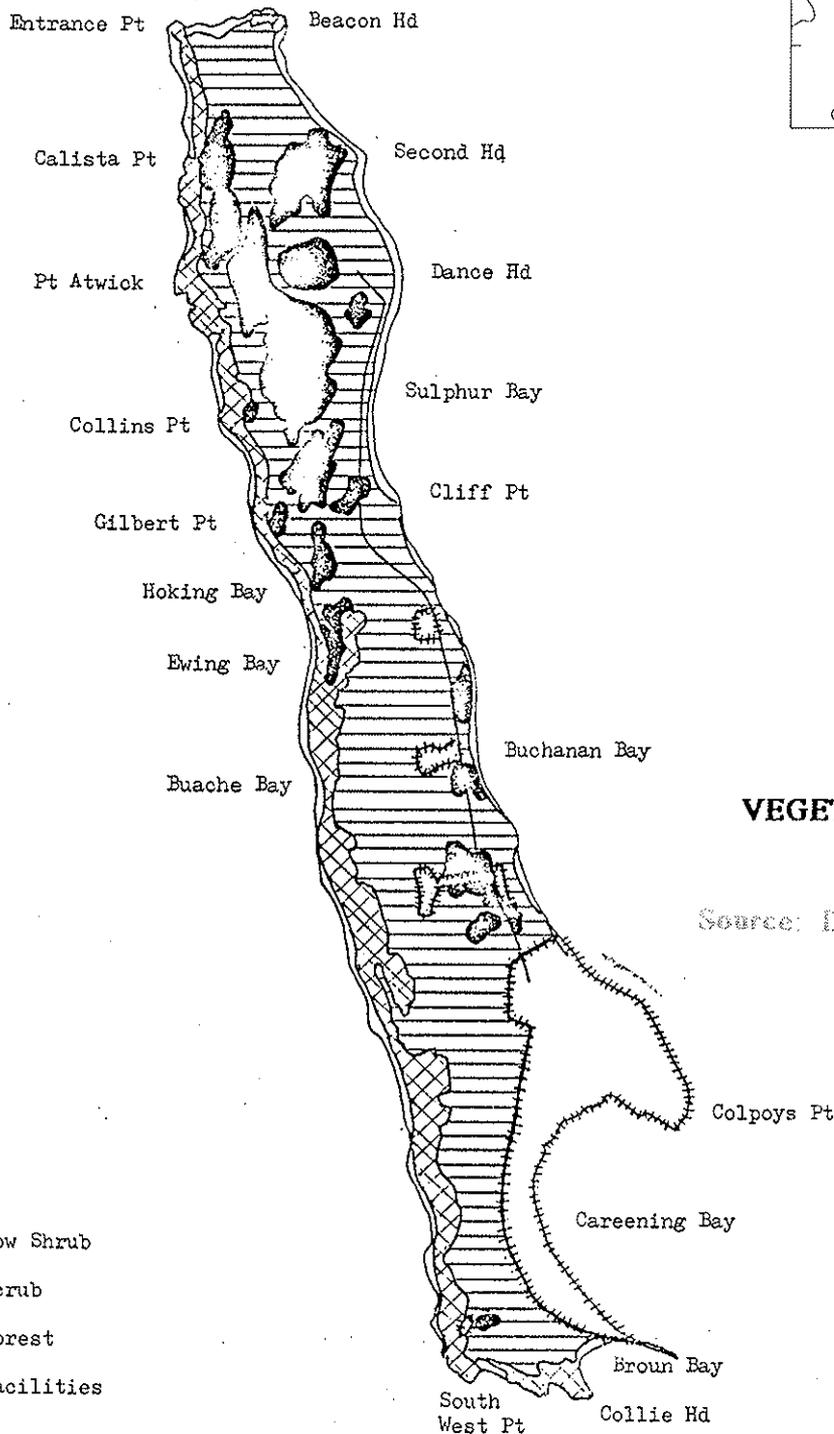
Parietaria debilis G. Forst.

LOCATION MAP

Source: McArthur and Bartle 1981, p2.



Garden Island in relation to the mainland, the adjacent islands, and the configuration of the ocean floor.



VEGETATION - structural grouping

Source: Dept of Defence 1980 Map 5 part 1

Common Name	Scientific Name	Source*										
		A	B	C	D	E	F	G	H	I	J	
Laughing Kookaburra	<i>Dacelo gigas</i>		+									
Sacred Kingfisher	<i>Halcyon sancta</i>			+		+	+	+	+	+	+	+
Rainbow Bee-eater	<i>Merops ornatus</i>						+	+				+
Tree Martin	<i>Cecropis nigricans</i>		+				+	+			+	+
Fairy Martin	<i>Cecropis ariel</i>							+				
Welcome Swallow	<i>Hirundo neoxena</i>		+	+	+	+	+	+	+	+	+	+
Richard's Pipit	<i>Anthus novaeseelandiae</i>			+	+	+	+	+	+	+	+	+
Ground Cuckoo-Shrike	<i>Coracina maxima</i>											+
Black-faced Cuckoo-Shrike	<i>Coracina novaehollandiae</i>										+	+
Golden Whistler	<i>Pachycephala pectoralis</i>			+	+	+	+	+	+	+	+	+
Rufous Whistler	<i>Pachycephala rufiventris</i>							+	+			
Grey Shrike-thrush	<i>Colluricincla harmonica</i>										+	
Grey Fantail	<i>Rhipidura fuliginosa</i>			+	+	+	+	+	+	+	+	+
Willie Wagtail	<i>Rhipidura leucophrys</i>	+		+	+	+	+	+	+	+	+	+
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>							+	+			
Western Gerygone	<i>Gerygone fusca</i>		+	+	+	+	+	+	+	+	+	+
Little Wattlebird	<i>Anthochaera chrysoptera</i>											+
Yellow-throated Miner **	<i>Manorina flavigula</i>											
Singing Honeyeater	<i>Lichenostomus virescens</i>	+	+	+	+	+	+	+	+	+	+	+
White-fronted Chat	<i>Epthianura albifrons</i>	+						+	+			
Striated Pardalote	<i>Pardalotus striatus</i>											+
Silvereye	<i>Zosterops lateralis</i>	+	+		+	+	+	+	+	+	+	+
Australian Magpie-Lark	<i>Grallina cyanoleuca</i>							+	+			+
Grey Butcherbird	<i>Cracticus torquatus</i>		+	+	+	+	+	+	+	+	+	+
Australian Magpie	<i>Gymnorhina tibicen</i>		+	+	+	+	+		+			+
Australian Raven	<i>Corvus coronoides</i>	+	+	+	+			+	+	+	+	+

* A Alexander (1921b)

B Serventy (1938)

C Sedgwick (1940)

D Buller (1949)

E Calderwood (1953)

F Anon (1979)

G Davies (1980)

H Abbott (1980)

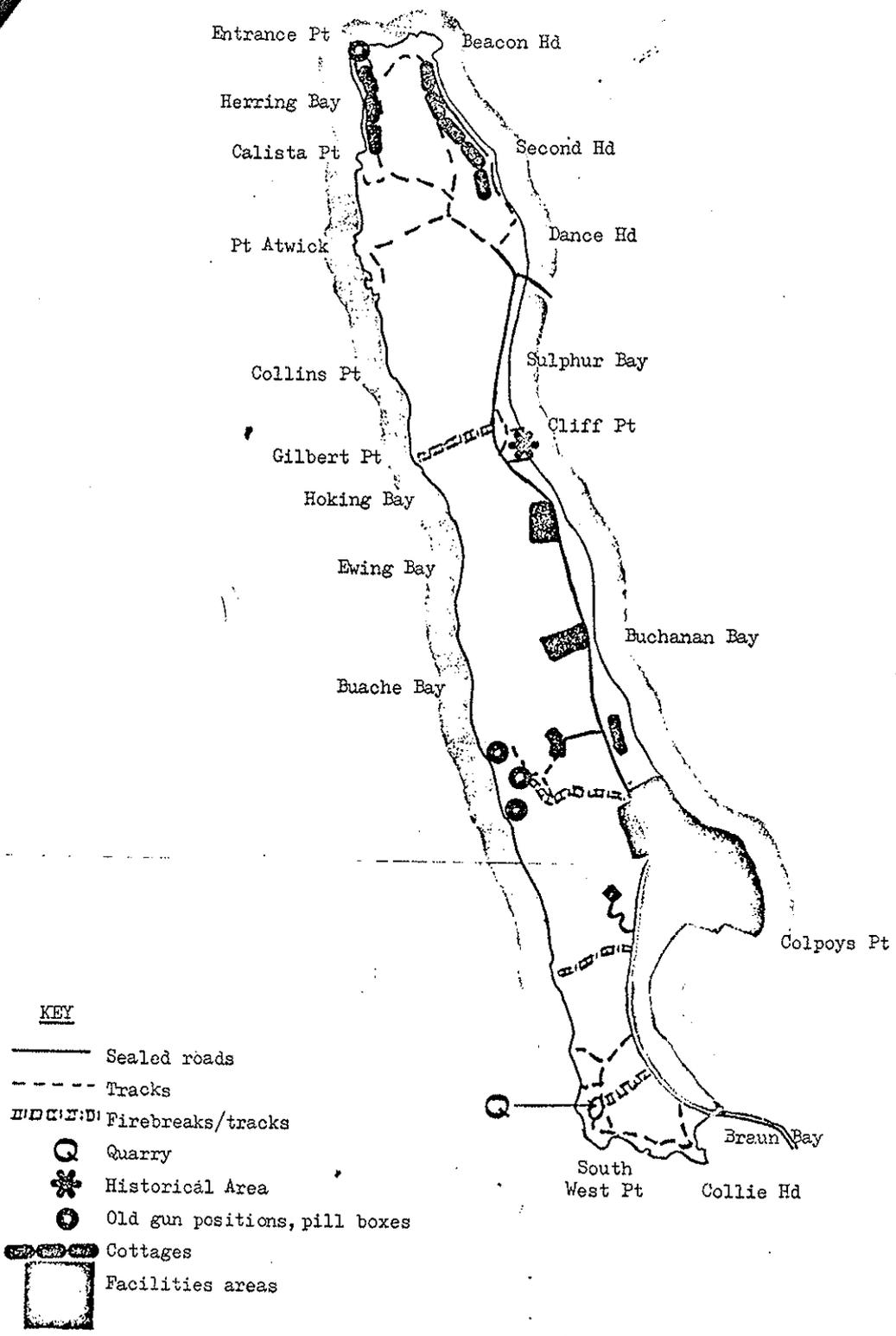
I L. Schmidt (pers comm)

J Present study (1991)

** S.R. Bowler (unpub)

*** P/O Wright (pers comm)

MAP NO 3 PART I
DEVELOPMENTS OUTSIDE THE FACILITIES AREAS



Entrance Pt Beacon Hd
Herring Bay
Calista Pt Second Hd
Pt Atwick Dance Hd
Collins Pt Sulphur Bay
Gilbert Pt Cliff Pt
Hoking Bay
Ewing Bay
Buache Bay Buchanan Bay
Colpoys Pt
South West Pt Collie Hd
Braun Bay

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SANTALACEAE

- Exocarpos sparteus* R. Br.
Leptomeria preissiana (Miq.) A. DC.

SAPINDACEAE

- Dodonaea aptera* Miq.

SCROPHULARIACEAE

- * *Dischisma arenarium* E. Mey.
 * *Parentucellia* sp.
 * *Verbascum virgatum* Stokes

SOLANACEAE

- * *Nicotiana glauca* Grah.
 * *Solanum nigrum* L.
S. symonii Eichler

STERCULIACEAE

- Guichenotia ledifolia* J. Gay
Lasiopetalum oppositifolium F. Muell. (Syn. *L. angustifolium* W.V. Fitzg.)
Thomasia cognata Steud.

THYMELAEACEAE

- * *Pimelia rosea* R. Br.

URTICACEAE

- Parietaria debilis* Forst. f.
 * *Urtica urens* L.

VALERIANACEAE

- * *Centranthus ruber* (L.) DC.

VITACEAE

- * *Vitis vinifera* L.

ZYGOPHYLLACEAE

- Nitraria billardieri* DC. (Syn. *N. schoberi* L.)
Zygophyllum apiculatum F. Muell.

2. Resident Land Birds on Garden and Rottnest Islands (+ = present; * = exotic species; [] = extinct)

Species		Garden Island	Rottnest Island
Australian Kestrel	<i>Falco cenchroides</i>	+	+
Peafowl*	<i>Pavo cristatus</i>		+
Common Pheasant*	<i>Phasianus colchicus</i>		+
Banded Lapwing	<i>Vanellus tricolor</i>	+	+
Brush Bronzewing	<i>Phaps elegans</i>	+	[+]
Spotted Turtle dove*	<i>Streptopelia chinensis</i>	+	+
Laughing Turtle dove*	<i>Streptopelia senegalensis</i>		+
Sacred Kingfisher	<i>Halcyon sancta</i>	migrant	+
Welcome Swallow	<i>Hirundo neoxena</i>	+	+
Richard's Pipit	<i>Anthus novaeseelandiae</i>	?	+
Red-capped Robin	<i>Petroica goodenovii</i>		+
Golden Whistler	<i>Pachycephala pectoralis</i>	+	+
Rufous Whistler	<i>Pachycephala rufiventris</i>		[+]
Grey Fantail	<i>Rhipidura fuliginosa</i>	+	
Willie Wagtail	<i>Rhipidura leucophrys</i>	+	vagrant
White-browed Scrubwren	<i>Sericornis frontalis</i>		+
Western Gerygone	<i>Gerygone fusca</i>	+	+
Singing Honeyeater	<i>Lichenostomus virescens</i>	+	+
White-fronted Chat	<i>Ephthianura albifrons</i>		+
Silvereye	<i>Zosterops lateralis</i>	+	+
Grey Butcherbird	<i>Cracticus torquatus</i>	+	
Australian Raven	<i>Corvus coronoides</i>	+	+

- Hymenolobus procumbens* (L.) Nutt. ex Shinz et Theill
Lepidium foliosum Desv.
 * *Nasturtium officinale* R. Br.
 * *Sisymbrium orientale* L.
- CARYOPHYLLACEAE
 * *Cerastium glomeratum* Thuill.
 * *Petrorhagia prolifera* (L.) P.W. Ball et Heywood
 * *Polycarpon tetraphyllum* (L.) L.
 * *Sagina apetala* Arduino
 * *Silene* sp.
 * *Stellaria media* (L.) Cyrillo
- CHENOPODIACEAE
Atriplex cinerea Poir.
A. isatidea Moq.
Rhagodia baccata (Labill.) Moq. (Syn. *R. radiata* Nees)
Salsola kali L.
Sarcocornia blackiana (Uibr.) A.J. Scott
Threlkeldia diffusa R. Br.
- CONVOLVULACEAE
 * *Convolvulus* sp.
Dichondra repens Forst. et Forst f.
- CRASSULACEAE
Crassula colorata (Nees) Ostfeld
C. glomerata Berg.
C. pedicellosa (F. Muell.) Ostfeld
- EPACRIDACEAE
Acrotriche cordata (Labill.) R. Br.
Leucopogon insularis A. Cunn. ex DC.
L. parviflorus (Andr.) Lindl.
- EUPHORBIACEAE
Beyeria viscosa (Labill.) Miq.
 * *Euphorbia peplus* L.
Phyllanthus calycinus Labill.
Poranthera microphylla Brongn.
 * *Ricinus communis* L.
- FRANKENIACEAE
Frankenia pauciflora DC.
- FUMARIACEAE
 * *Fumaria muralis* Sond. ex Koch
- GENTIANACEAE
 * *Centaurium erythraea* Rafn
- GERANIACEAE
 * *Erodium cicutarium* (L.) L'Her. ex Ait.
 * *Geranium molle* L.
Pelargonium capitatum (L.) L'Her ex Ait.
- GOODENIACEAE
Scaevola crassifolia Labill.
- GYROSTEMONACEAE
Tersonia brevipes Moq.
- LAMIACEAE
Westringia dampieri R. Br.
- LAURACEAE
Cassytha glabella R. Br.
- LOBELIACEAE
Lobelia tenuior R. Br.
- LORANTHACEAE
Amyema miraculosum (Miq.) Tiegh. (Syn. *Loranthus miraculosus* Miq. var. *melaleucaei*)
- MALVACEAE
 * *Lavatera arborea* L.
L. plebeia Sims
- MELIACEAE
 * *Melia azedarach* L.
- MIMOSACEAE
Acacia cochlearis (Labill.) H. Wendl.
A. cyclops A. Cunn. ex G. Don.
A. rostellifera Benth.
A. saligna (Labill.) H. Wendl.
- MYOPORACEAE
Eremophila glabra (R. Br.) Ostenfeld
Myoporum adscendens R. Br.
- MYRTACEAE
 † *Agonis flexuosa* (Spreng) Schau.
 † *Eucalyptus gomphocephala* DC.
Melaleuca huegelii Endl.
M. lanceolata Otto
- ONAGRACEAE
Epilobium billardierianum Ser.
- OROBANCHACEAE
Orobanche australiana F. Muell.
- OXALIDACEAE
Oxalis corniculata L.
 * *O. pes-caprae* L.
- PAPAVERACEAE
 * *Argemone mexicana* L.
- PAPILIONACEAE
Hardenbergia comptoniana (Andr.) Benth.
 * *Medicago polymorpha* L. (Syn. *M. denticulata* Willd.)
 * *Melilotus indica* (L.) All.
 * *Trifolium scabrum* L.
- PITTOSPORACEAE
Pittosporum phylliraeoides DC.
- POLYGALACEAE
Comesperma integerrimum Endl.
- POLYGONACEAE
 * *Emex australis* Steinh.
- FORTULACACEAE
Calandrinia brevipedata F. Muell.
- PRIMULACEAE
 * *Anagallis arvensis* L.
Samolus repens (Forst.) Pers.
- RANUNCULACEAE
 * *Clematis microphylla* DC.
- RHAMNACEAE
Spyridium globulosum (Labill.) Benth.
- ROSACEAE
 * *Crataegus* sp.
- RUBIACEAE
 * *Galium murale* (L.) All.
 * *Ixora* sp.
 * *Sherardia arvensis* L.
- RUTACEAE
Boronia alata Sm.
Diplolaena dampieri Desf.

3. List of bird species

Source: CSIRO 1992 p29-31 Table 6.1

Common Name	Scientific Name	Source*										
		A	B	C	D	E	F	G	H	I	J	
Southern Giant Petrel	<i>Macronectes giganteus</i>											+
Australian Pelican	<i>Pelecanus conspicillatus</i>											+
Australasian Gannet	<i>Morus serrator</i>								+			
Darter	<i>Anhinga melanogaster</i>											+
Black Cormorant	<i>Phalacrocorax carbo</i>								+	+		+
Little Pied Cormorant	<i>Phalacrocorax melanoleucos</i>				+				+	+		+
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>								+	+		
Pied Cormorant	<i>Phalacrocorax varius</i>	+			+				+	+		+
White-faced Heron	<i>Ardea novaehollandiae</i>								+	+		+
Eastern Reef Egret	<i>Egretta sacra</i>				+				+	+		+
Rufous Night Heron	<i>Nycticorax caledonicus</i>											+
Australian Shelduck	<i>Tadorna tadornoides</i>	+									+	+
Pacific Black Duck	<i>Anas superciliosa</i>											+
Osprey	<i>Pandion haliaetus</i>								+	+	+	+
Black-shouldered Kite	<i>Elanus notatus</i>											+
Square-tailed Kite	<i>Lophoictinia isura</i>											+
Collared Sparrowhawk	<i>Accipiter cirrhocephalus</i>											+
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>											+
Little Eagle	<i>Hieraaetus morphnoides</i>											+
Australian Kestrel	<i>Falco cenchroides</i>	+	+	+	+	+	+	+	+	+	+	+
Stubble Quail	<i>Coturnix novaezealandiae</i>											+
Painted Button-quail	<i>Turnix varia</i>											+
Sooty Oystercatcher	<i>Haematopus fuliginosus</i>								+	+		+
Pied Oystercatcher	<i>Haematopus longirostris</i>				+				+	+	+	+
Red-capped Plover	<i>Charadrius ruficapillus</i>				+				+	+		+
Banded Lapwing	<i>Vanellus tricolor</i>					+			+	+		+
Grey Plover	<i>Pluvialis squatarola</i>				+				+	+		+
Large Sand Plover	<i>Charadrius leschenaultii</i>								+			+
Ruddy Turnstone	<i>Arenaria interpres</i>	+							+	+		+
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>				+							+
Sanderling	<i>Calidris alba</i>								+	+		+
Red-necked Stint	<i>Calidris ruficollis</i>				+				+	+		+

SANTALACEAE

Exocarpos sparteus R. Br.*Leptomeria preissiana* (Miq.) A. DC.

SAPINDACEAE

Dodonaea aptera Miq.

SCROPHULARIACEAE

* *Dischisma arenarium* E. Mey.* *Parentucellia* sp.* *Verbascum virgatum* Stokes

SOLANACEAE

* *Nicotiana glauca* Grah.* *Solanum nigrum* L.*S. symonii* Eichler

STERCULIACEAE

Guichenotia ledifolia J. Gay*Lasioptatum oppositifolium* F. Muell. (Syn. *L. angustifolium* W.V. Fitzg.)*Thomasia cognata* Steud.

THYMELAEACEAE

* *Pimelia rosea* R. Br.

URTICACEAE

Parietaria debilis Forst. f.* *Urtica urens* L.

VALERIANACEAE

* *Centranthus ruber* (L.) DC.

VITACEAE

* *Vitis vinifera* L.

ZYGOPHYLLACEAE

Nitraria billardieri DC. (Syn. *N. schoberi* L.)*Zygophyllum apiculatum* F. Muell.

2. Resident Land Birds on Garden and Rottneest Islands (+ = present; * = exotic species; [] = extinct)

Species		Garden Island	Rottneest Island
Australian Kestrel	<i>Falco cenchroides</i>	+	+
Peafowl*	<i>Pavo cristatus</i>		+
Common Pheasant*	<i>Phasianus colchicus</i>		+
Banded Lapwing	<i>Vanellus tricolor</i>	+	+
Brush Bronzewing*	<i>Phaps elegans</i>	+	[+]
Spotted Turtledove*	<i>Streptopelia chinensis</i>	+	+
Laughing Turtledove*	<i>Streptopelia senegalensis</i>		+
Sacred Kingfisher	<i>Halcyon sancta</i>	migrant	+
Welcome Swallow	<i>Hirundo neoxena</i>	+	+
Richard's Pipit	<i>Anthus novaeseelandiae</i>	?	+
Red-capped Robin	<i>Petroica goodenovii</i>		+
Golden Whistler	<i>Pachycephala pectoralis</i>	+	+
Rufous Whistler	<i>Pachycephala rufiventris</i>		[+]
Grey Fantail	<i>Rhipidura fuliginosa</i>	+	
Willie Wagtail	<i>Rhipidura leucophrys</i>	+	vagrant
White-browed Scrubwren	<i>Sericornis frontalis</i>		+
Western Gerygone	<i>Gerygone fusca</i>	+	+
Singing Honeyeater	<i>Lichenostomus virescens</i>	+	+
White-fronted Chat	<i>Ephthianura albifrons</i>		+
Silvereye	<i>Zosterops lateralis</i>	+	+
Grey Butcherbird	<i>Cracticus torquatus</i>	+	
Australian Raven	<i>Corvus coronoides</i>	+	+

Source: CSIRO 1992 p32 Table 6.2

Appendix 1 List of plant species on Garden Island 1978-79 from Marchant and Abbott (1981)

Source: Marchant and Abbott 1981

Exotic species are annotated as follows:

† Western Australian species introduced to Garden Island by Europeans.

* Alien species.

CONIFERS

ARAUCARIACEAE

* *Araucaria heterophylla* (Salisb.) Franco

CUPRESSACEAE

Callitris preissii Miq.

MONOCOTYLEDONS

ARACEAE

* *Zantedeschia aethiopica* (L.) Spreng.

CYPERACEAE

Carex preissii Nees

Lepidosperma angustatum R. Br.

Lepidosperma gladiatum Labill.

Scirpus marginatus Thunb.

S. nodosus Rottb.

HAEMODORACEAE

Conostylis candicans Endl.

AMARYLLIDACEAE

* *Narcissus jonquilla* L.

IRIDACEAE

* *Homeria miniata* (Andr.) Sweet

* *Watsonia* sp.

JUNCEAE

Juncus pallidus R. Br.

JUNCAGINACEAE

Triglochin trichophora Nees ex Endl.

LILIACEAE

* *Allium* sp.

* *Asparagus asparagoides* (L.) W.F. Wight

* *Asphodelus fistulosus* L.

Thysanotus patersonii R. Br.

* *Trachyantra divaricata* (N.J. Jacq.) Kunth

MUSACEAE

* *Musa* sp.

ORCHIDACEAE

Acianthus reniformis (R. Br.) Schlecht.

Caladenia latifolia R. Br.

Eriochilus scaber Lindl.

POACEAE

* *Aira cupaniana* Guss.

* *Avena barbata* Link

* *Bambusa* sp.

Bromus arenarius Labill.

* *B. diandrus* Roth

* *B. rubens* L.

* *Catapodium rigidum* (L.) C.E. Hubbard ex Dony

* *Cynodon dactylon* (L.) Pers.

* *Ehrharta longiflora* Sm.

* *Eragrostis curvula* (Schrad.) Nees

* *Hordeum leporinum* Link

* *H. vulgare* L.

* *Lagurus ovatus* L.

* *Lolium* sp.

* *Parapholis incurva* (L.) C.E. Hubbard

* *Poa annua* L.

Poa poliformis (Labill.) Druce

* *Polypogon monspeliensis* (L.) Desf.

Spinifex hirsutus Labill.

S. longifolius R. Br.

Sporobolus virginicus (L.) Kunth

* *Stenotaphrum secundatum* (Walt.) Kuntze

Stipa flavescens Labill.

* *Vulpia myuros* (L.) C.C. Gmel.

XANTHORRHOEACEAE

Acanthocarpus preissii Lehm.

DICOTYLEDONS

AIZOACEAE

Carpobrotus virescens (Haw.) Schwantes

Tetragonia amplexicoma (Miq.) Hook. f.

T. decumbens Miller

APIACEAE

Apium prostratum Labill. ex. Vent.

Daucus glochidiatus (Labill.) Fisch. et al.

Hydrocotyle hispidula Bunge

H. tetragonocarpa Bunge

Trachymene caerulea (Reichb.) Grah.

T. pilosa Sm.

APOCYNACEAE

Alyxia buxifolia R. Br.

* *Nerium oleander* L.

ASCLEPIADACEAE

* *Asclepias fruticosa* L.

ASTERACEAE

Angianthus cunninghamii (DC.) Benth

A. humifusus (Labill.) Benth

* *Arctotheca calendula* (L.) Levyns

* *A. populifolia* (Berg.) T. Nordl.

Athrixia pulverulenta (Lindl.) Druce

Calocephalus brownii (Cass.) F. Muell.

* *Carduus pycnocephalus* L.

* *Conyza bonariensis* (L.) Cronquist

* *Dittrichia graveolens* (L.) W. Greuter

* *Hypochoeris glabra* L.

Olearia axillaris (DC.) F. Muell. ex Benth.

* *Osteospermum clandestinum* (Less.) T. Nordl.

Senecio lautus Forst. f. ex Willd.

* *Sonchus oleraceus* L.

Waitzia citrina (Benth.) Steetz.

BASELLACEAE

* ? *Bousingaultia baselloides* Miers

BORAGINACEAE

Myosotis australis R. Br.

BRASSICACEAE

* *Cakile maritima* Scop.

4. List of reptile species

Source: CSIRO 1993 p48 Table 7.3

Table 7.3 A comparison of the herpetofauna of Garden Island and Rottnest Island with an estimate of status based on this survey and Robinson et al. (1987) for Garden Island and Humphries and Storr (1985) for Rottnest Island (C = common; UC = uncommon; R = rare; E = extinct; NR = not recorded)

Species	Rottnest Is.	Garden Is.
Leptodactylidae - Southern Frogs		
<i>Heleioporus eyrei</i>	C	NR
<i>Ranidella insignifera</i>	C	NR
Hylidae - Tree Frogs		
<i>Litoria moorei</i>	UC	NR
Gekkonidae - Geckoes		
<i>Diplodactylus spinigerus</i>	C	C
<i>Phyllodactylus marmoratus</i>	C	UC
Pygopodidae - Legless Lizards		
<i>Aprasia repens</i>	R	NR
<i>Lialis burtonis</i>	C	C
Scincidae - Skink Lizards		
<i>Cryptoblepharus plagiocephalus</i>	NR	C
<i>Ctenotus fallens</i>	C	NR
<i>Egernia kingii</i>	UC	C
<i>Egernia napoleonis</i>	R/E	NR
<i>Hemiergis peronii</i>	C	C
<i>Leiopisma trilineatum</i>	UC	UC
<i>Lerista elegans</i>	UC	NR
<i>Lerista lineata</i>	E ?	UC
<i>Lerista lineopunctulata</i>	UC	NR
<i>Lerista praepedita</i>	NR	C
<i>Morethia lineocellata</i>	C	R
<i>Morethia obscura</i>	NR	C
<i>Tiliqua rugosa</i>	C	UC / R
Typhlopidae - Blind Snakes		
<i>Ramphotyphlops australis</i>	R	NR
Elapidae - Front-fanged Snakes		
<i>Notechis scutatus</i>	NR	C
<i>Pseudonaja affinis</i>	C	NR
Boidae - Python Snakes		
<i>Morelia spilota</i>	NR	C

Appendix I List of plant species on Garden Island 1978-79 from Marchant and Abbott
(1981) Source: *McArthur & Bartle 1981*

Exotic species are annotated as follows:

† Western Australian species introduced to Garden Island by Europeans.

* Alien species.

CONIFERS

ARAUCARIACEAE

* *Araucaria heterophylla* (Salisb.) Franco

CUPRESSACEAE

Callitris preissii Miq.

MONOCOTYLEDONS

ARACEAE

* *Zantedeschia aethiopica* (L.) Spreng.

CYPERACEAE

Carex preissii Nees

Lepidosperma angustatum R. Br.

Lepidosperma gladiatum Labill.

Scirpus marginatus Thunb.

S. nodosus Rottb.

HAEMODORACEAE

Conostylis candicans Endl.

AMARYLLIDACEAE

* *Narcissus jonquilla* L.

IRIDACEAE

* *Homeria miniata* (Andr.) Sweet

* *Watsonia* sp.

JUNCACEAE

Juncus pallidus R. Br.

JUNCAGINACEAE

Triglochin trichophora Nees ex Endl.

LILIACEAE

* *Allium* sp.

* *Asparagus asparagoides* (L.) W.F. Wight

* *Asphodelus fistulosus* L.

Thysanotus patersonii R. Br.

* *Trachyandra divaricata* (N.J. Jacq.) Kunth

MUSACEAE

* *Musa* sp.

ORCHIDACEAE

Acianthus reniformis (R. Br.) Schlecht.

Caladenia latifolia R. Br.

Eriochilus scaber Lindl.

POACEAE

* *Aira cupaniana* Guss.

* *Avena barbata* Link

* *Bambusa* sp.

Bromus arenarius Labill.

* *B. diandrus* Roth

* *B. rubens* L.

* *Catapodium rigidum* (L.) C.E. Hubbard ex Dony

* *Cynodon dactylon* (L.) Pers.

* *Ehrharta longiflora* Sm.

* *Eragrostis curvula* (Schrad.) Nees

* *Hordeum leporinum* Link

* *H. vulgare* L.

* *Lagurus ovatus* L.

* *Lolium* sp.

* *Parapholis incurva* (L.) C.E. Hubbard

* *Poa annua* L.

Poa poliformis (Labill.) Druce

* *Polypogon monspeliensis* (L.) Desf.

Spinifex hirsutus Labill.

S. longifolius R. Br.

Sporobolus virginicus (L.) Kunth

* *Stenotaphrum secundatum* (Walt.) Kuntze

Stipa flavescens Labill.

* *Vulpia myuros* (L.) C.C. Gmel.

XANTHORRHOACEAE

Acanthocarpus preissii Lehm.

DICOTYLEDONS

AIZOACEAE

Carpobrotus virescens (Haw.) Schwantes

Tetragonia amplexicoma (Miq.) Hook. f.

T. decumbens Miller

APIACEAE

Apium prostratum Labill. ex. Vent.

Daucus glochidiatus (Labill.) Fisch. et al.

Hydrocotyle hispidula Bunge

H. tetragonocarpa Bunge

Trachymene caerulea (Reichb.) Grah.

T. pilosa Sm.

APOCYNACEAE

Alyxia buxifolia R. Br.

* *Nerium oleander* L.

ASCLEPIADACEAE

* *Asclepias fruticosa* L.

ASTERACEAE

Angianthus cunninghamii (DC.) Benth

A. humifusus (Labill.) Benth

* *Arctotheca calendula* (L.) Levyns

* *A. populifolia* (Berg.) T. Nordl.

Athrixia pulverulenta (Lindl.) Druce

Calocephalus brownii (Cass.) F. Muell.

* *Carduus pycnocephalus* L.

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* *Dittrichia graveolens* (L.) W. Greuter

* *Hypochoeris glabra* L.

Olearia axillaris (DC.) F. Muell. ex Benth.

* *Osteospermum clandestinum* (Less.) T. Nordl.

Senecio lautus Forst. f. ex Willd.

* *Sonchus oleraceus* L.

Waitzia citrina (Benth.) Steetz.

BASELLACEAE

* ? *Bousingaultia baselloides* Miers

BORANGINACEAE

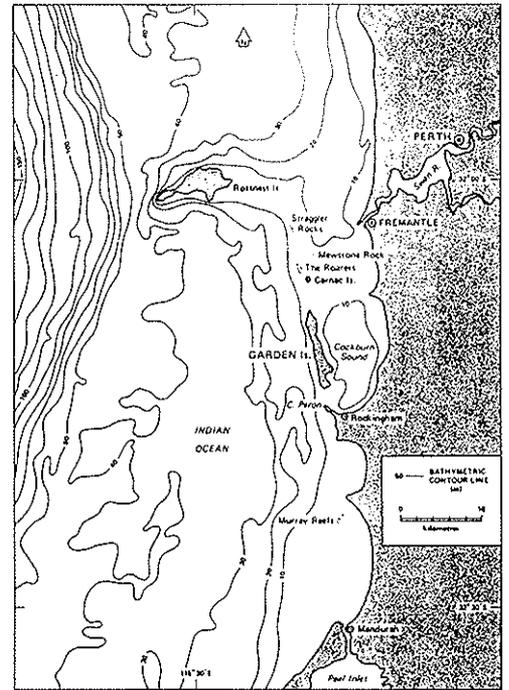
Myosotis australis R. Br.

BRASSICACEAE

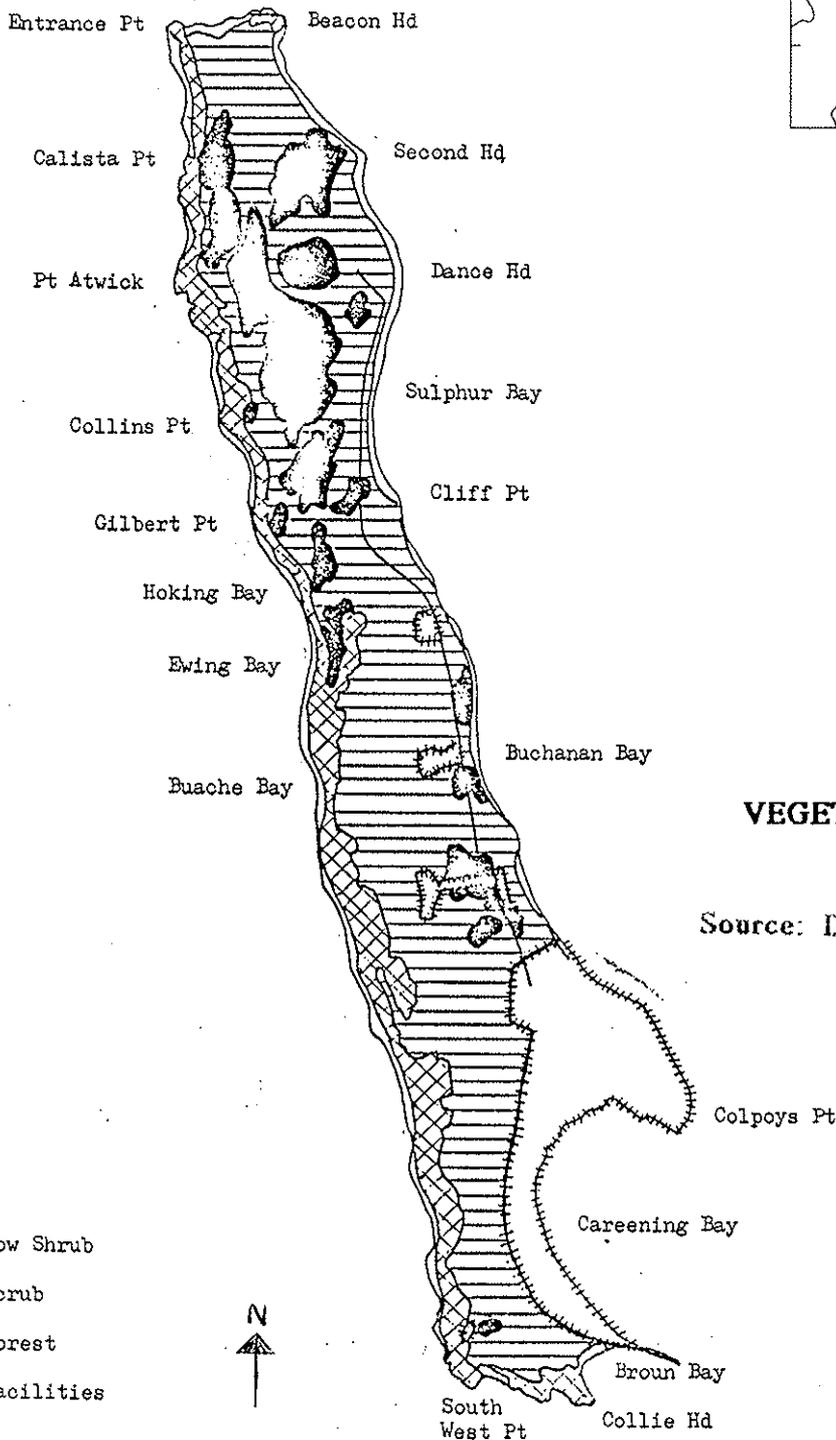
* *Cakile maritima* Scop.

LOCATION MAP

Source: McArthur and Bartle 1981, p2.



Garden Island in relation to the mainland, the adjacent islands, and the configuration of the ocean floor.



VEGETATION - structural grouping

Source: Dept of Defence 1980 Map 5 part I

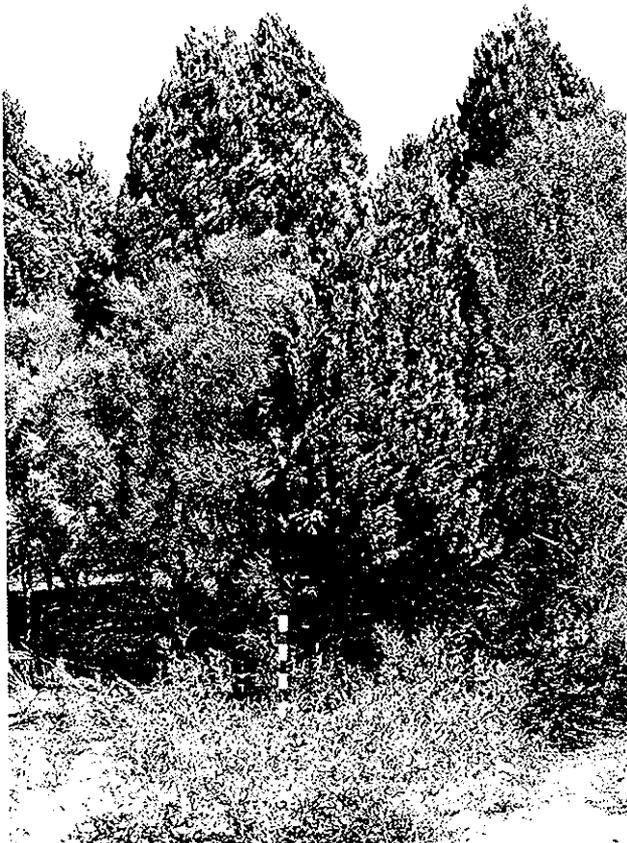


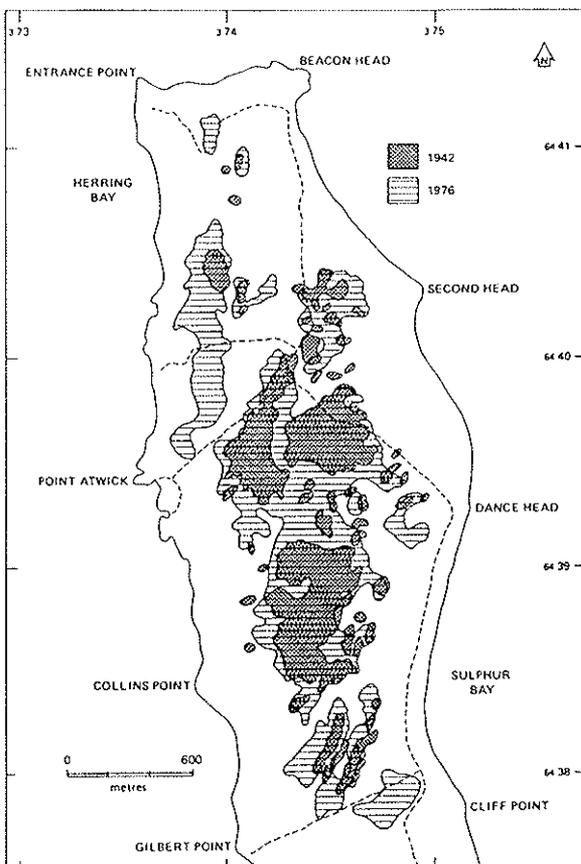
Fig. 5. Immature *Callitris preissii* trees in association with *Melaleuca lanceolata* (left) and *Acacia rostellifera* (right); the scale is marked in 10 cm intervals (grid ref. 74883794).



Fig. 13. Mature *Callitris Preissii* - *Melaleuca lanceolata* forest showing tall straight boles and the foliage making a closed canopy (grid ref. 74853915).

CALLITRIS PREISSII COMMUNITIES

Source: McArthur and Bartle 1981



Northern part of Garden Island showing the increase in area of the *Callitris preissii* - *Melaleuca lanceolata* community between 1942 and 1976.

VEGETATION COMMUNITIES

Source: McArthur and Bartle 1981

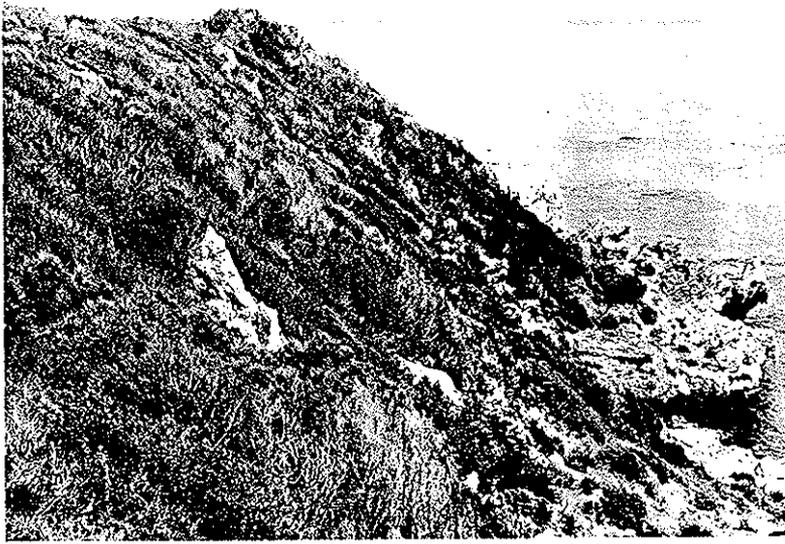


Fig. 16. Heath community on cliffs and cliff tops near Pt Atwick (grid ref. 73663930). Shrubs have been prostrated and shaped by wind action.



Fig. 14. *Pittosporum phylliracoides* community near Goodwin Bay (grid ref. 75803160). This community and the littoral vegetation fringing the bay have been shaped by the prevailing south-westerly winds.

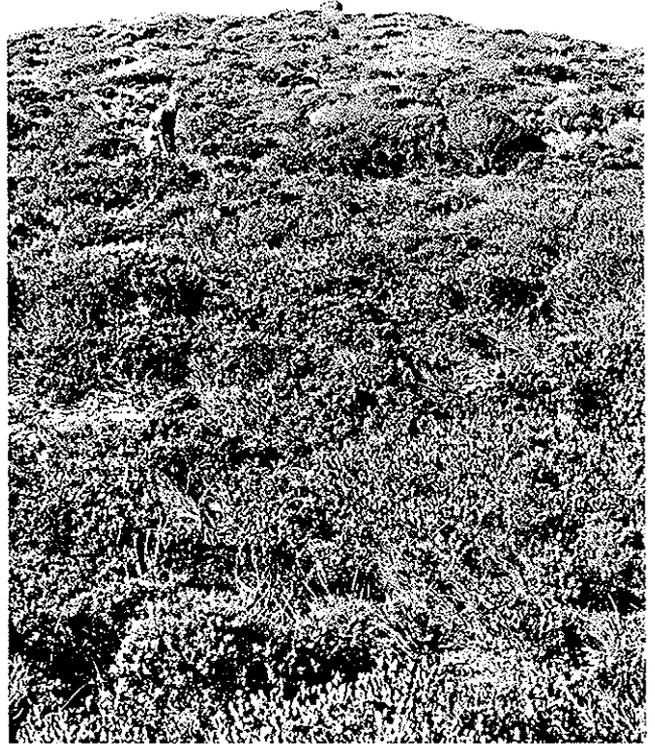


Fig. 15. *Acacia rostellifera* - *A. cochlearis* heath community near Pt Atwick (grid ref. 73753945).



Fig. 12. Open stand of *Acacia rostellifera* showing some dead trees and development of an understory (grid ref. 77913780).



Fig. 11. Dense stand of *Acacia rostellifera*; the scale is marked in 10 cm intervals (grid ref. 75243726)

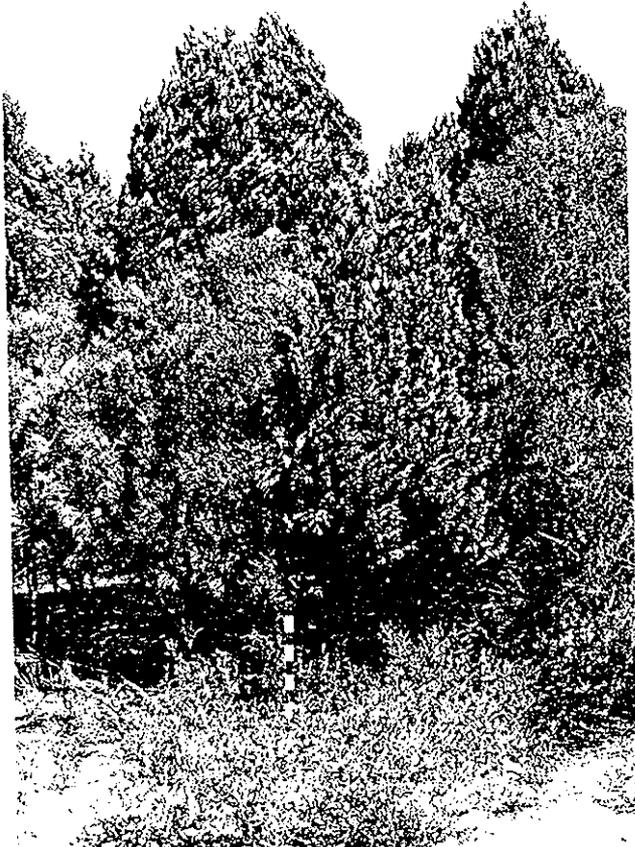


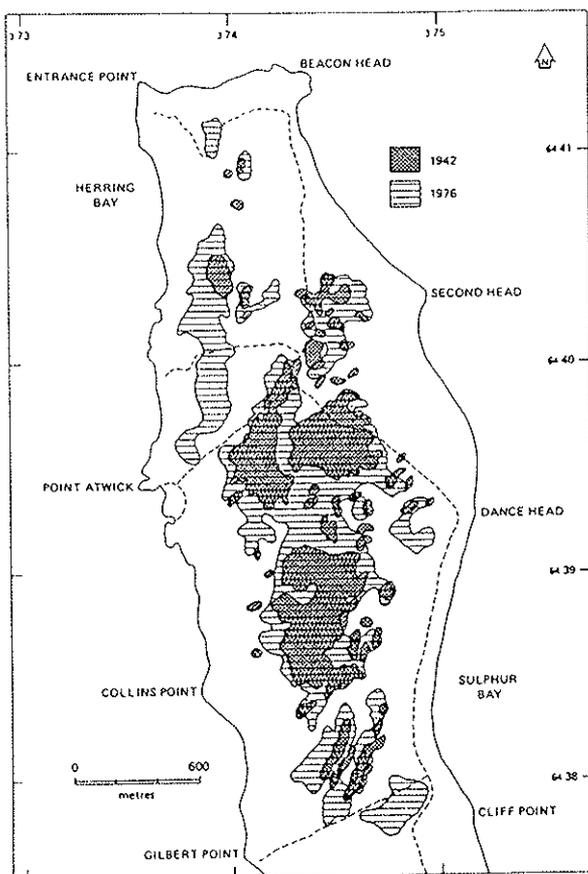
Fig. 5. Immature *Callitris preissii* trees in association with *Melaleuca lanceolata* (left) and *Acacia rostellifera* (right); the scale is marked in 10 cm intervals (grid ref. 74883794).



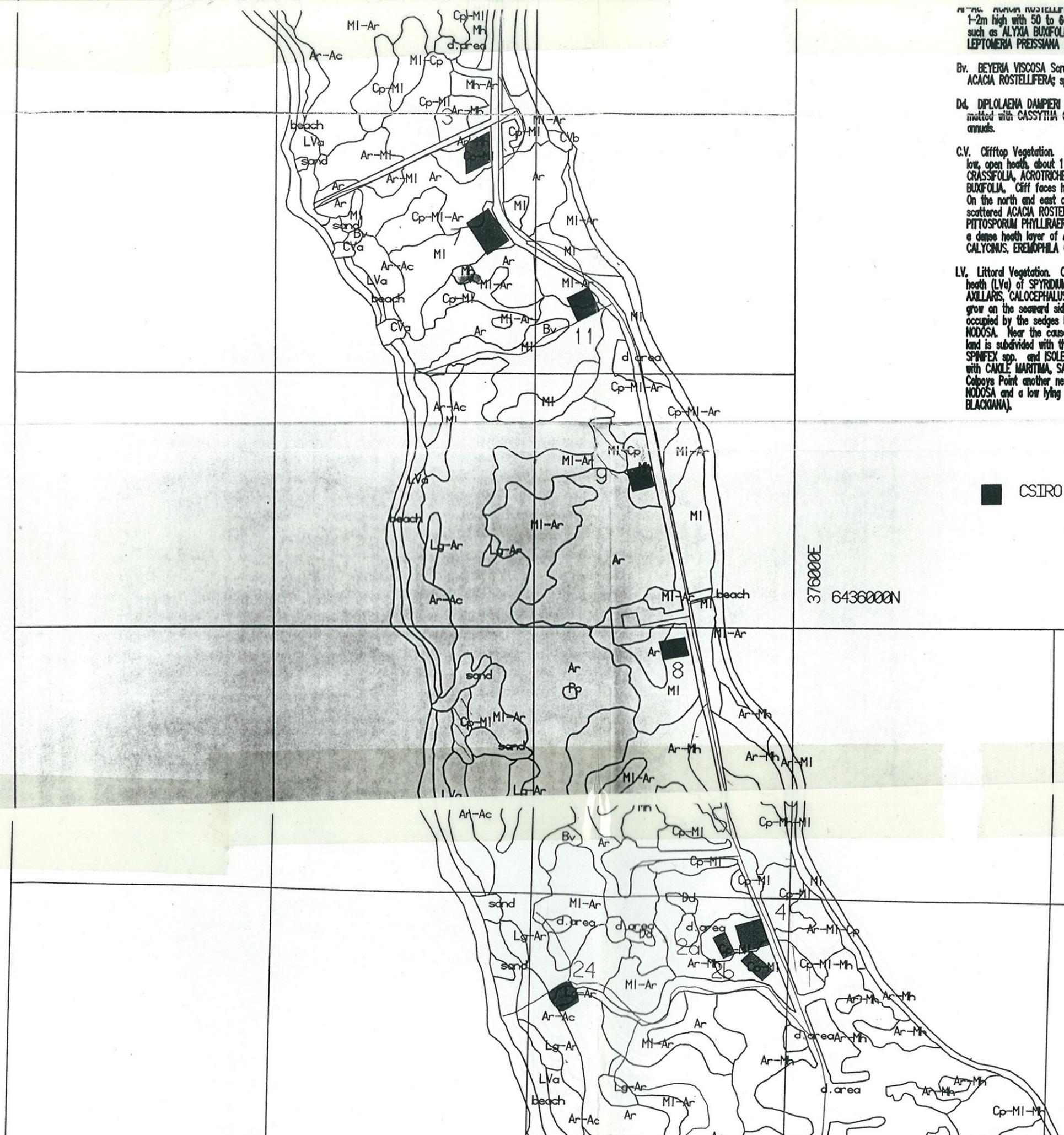
Fig. 13. Mature *Callitris Preissii* - *Melaleuca lanceolata* forest showing tall straight boles and the foliage making a closed canopy (grid ref. 74853915).

CALLITRIS PREISSII COMMUNITIES

Source: McArthur and Bartle 1981



Northern part of Garden Island showing the increase in area of the *Callitris preissii* - *Melaleuca lanceolata* community between 1942 and 1976.



MI-Ar. *ACACIA ROSTELLIFERA* - A. COVILLEANUS Low scrub. This unit is 1-2m high with 50 to 60 percent cover. It includes many species such as *ALYXIA BUXIFOLIA*, *SPYRIDUM GLOBULOSUM*, *LEUCOPOGON* spp., *LEPTOMERIA PREISSIANA* and *WESTRINGIA DAMPERI*.

Bv. *BEYERIA VISCOSA* Scrub. Dense scrub 2-4m high occasional *ACACIA ROSTELLIFERA*; sparse undergrowth of small annuals.

Dd. *DIPLOLAENA DAMPERI* Scrub. Dense scrub 2-3m high, often matted with *CASSYTHA GLABELLA*. Sparse undergrowth of small annuals.

C.V. Cliff-top Vegetation. On the south and west coasts (C.Va) this is low, open heath, about 1 m high, and includes *SCAEVOLA CRASSIFOLIA*, *ACROTRICHE CORDATA*, *BORONIA ALATA*, and *ALYXIA BUXIFOLIA*. Cliff faces have succulent bushes and creepers. On the north and east coasts the vegetation is open scrub with scattered *ACACIA ROSTELLIFERA*, *MELALEUCA LANCEOLATA*, *PITIOSPORUM PHYLLAERODES*, and *LEUCOPOGON INSULARIS*. There is a dense heath layer of *ACANTHOCARPUS PREISSI*, *PHYLLANTHUS CALYCNUS*, *EREMOPHILA GLABRA* and *LEUCOPOGON PARVIFLORUS*.

LV. Littoral Vegetation. On the west coast this is a coastal heath (LVa) of *SPYRIDUM GLOBULOSUM*, *ALYXIA BUXIFOLIA*, *OLEARIA AXILLARIS*, *CALOCEPHALUS SERRONI* and sedges. *SPINFEX* spp. grow on the seaward side. In Brown Bay a narrow bench (LVb) is occupied by the sedges *LEPIDOSPERMA GLADIATUM* and *ISOLEPIS NODOSA*. Near the causeway on the west side a new area of land is subdivided with the older part (LVc) having dense *SPINFEX* spp. and *ISOLEPIS NODOSA* and the younger part (LVd) with *CAKLE MARITIMA*, *SALSOLA KALI* and *CARPOROTUS VIRESCENS*. On Cobaya Point another new land area (LVe) has mainly *ISOLEPIS NODOSA* and a low lying saline patch has samphire (*SARCOCORNA BLACKIANA*).

CSIRO FAUNA SITES

376000E
6436000N

378000E

AT GEOGRAPHY DEPARTMENT
WESTERN AUSTRALIA

VERSE
ARCATOR PROJECTION
P GRID - ZONE 50

373000E

6431000N

374000E

Location Map



GARDEN IS. PERTH

not to scale

SCALE

5000



6431000N

6431000E

Handwritten notes on a yellow sticky note at the bottom left.

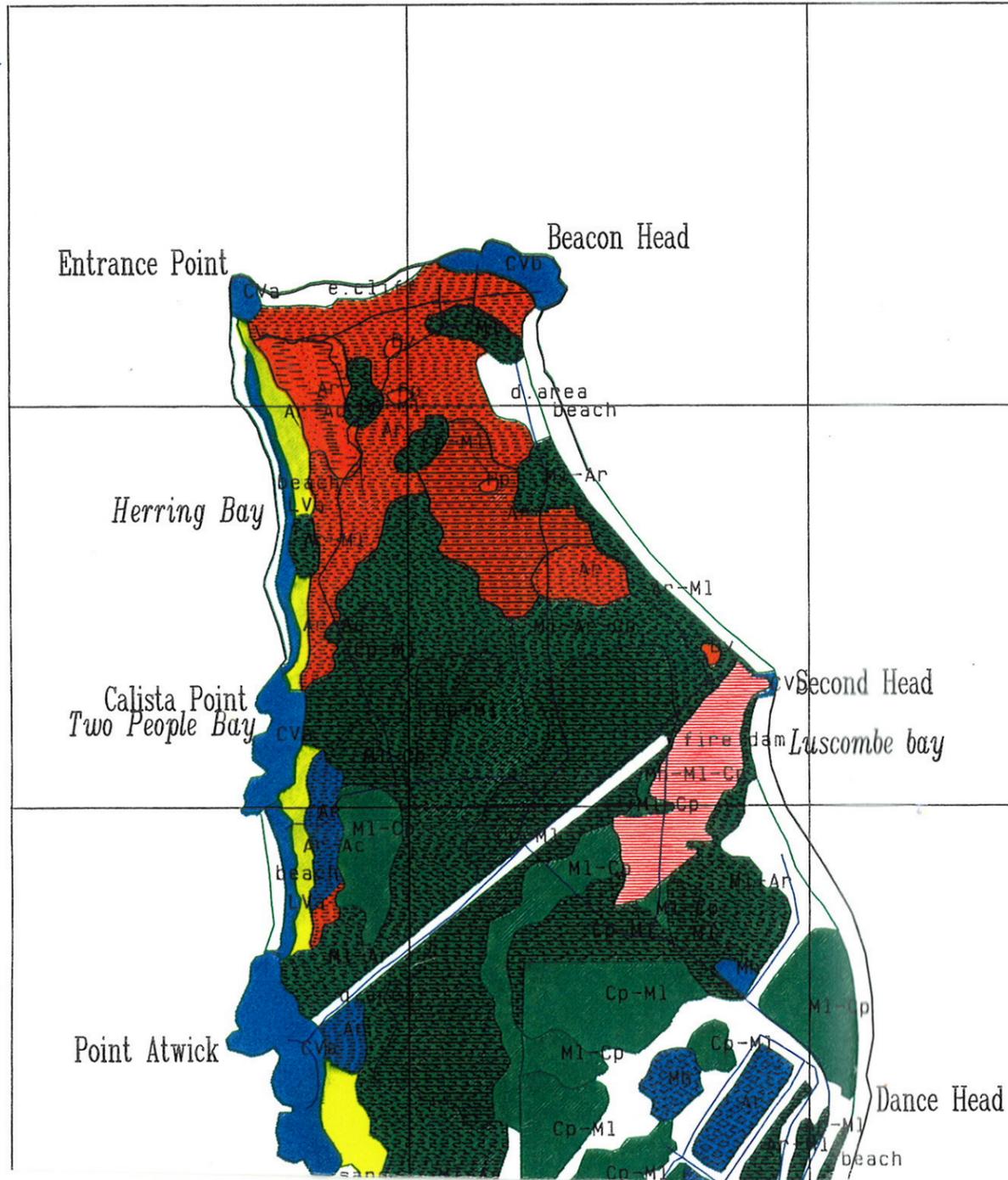
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VEGETATION OF GARDEN ISLAND

PERTH - AUSTRALIA

6442000N

373000E



legend

The mapping units represent groupings of trees or shrubs. The vegetation is classified firstly on the basis of structure into LOW FORREST, SCRUB, LOW SCRUB and HEATH. These classes, depicted by different colours, are then subdivided, on species composition, to form mapping units. Composition is indicated by the initial letters of the main tree or shrub species with the first-named being dominant when more than one species is involved. Some coastal communities, where many species are present are identified by their topographic position. The low forest communities may be mature or relatively immature. Communities may be dense, open, or very open; some have been partly cleared by stripping. The height in metres and the diameter at breast height (dbh) are given for some tree species.

LOW FORREST COMMUNITIES

M1. MELALEUCA LANCEOLATA Low Forest. Mature stands are about 10m high with a dbh of 30 to 40cm. Immature stands are 6 to 8m with a dbh of 5 to 10cm. Undergrowth depends on density of the canopy; dense stands have mainly annual growth while open stands have a heath layer of ACANTHOCARPUS PREISSII and PHYLLANTHUS CALYCINUS with TRACHYMENE COERULEA in spring.

Cp-M1. CALLITRIS PREISSII - MELALEUCA LANCEOLATA Low Forest. Mature stands are 8 to 10m high with dbh 15-20cm. Immature stands are 6 to 8m high with dbh 5-10cm. In dense stands undergrowth is moss with many small annuals including orchids. ACANTHOCARPUS PREISSII, EREMOPHILA GLABRA, and LEUCOPOGON PARVIFLORUS form a dense heath in open stands and along cleared strips.

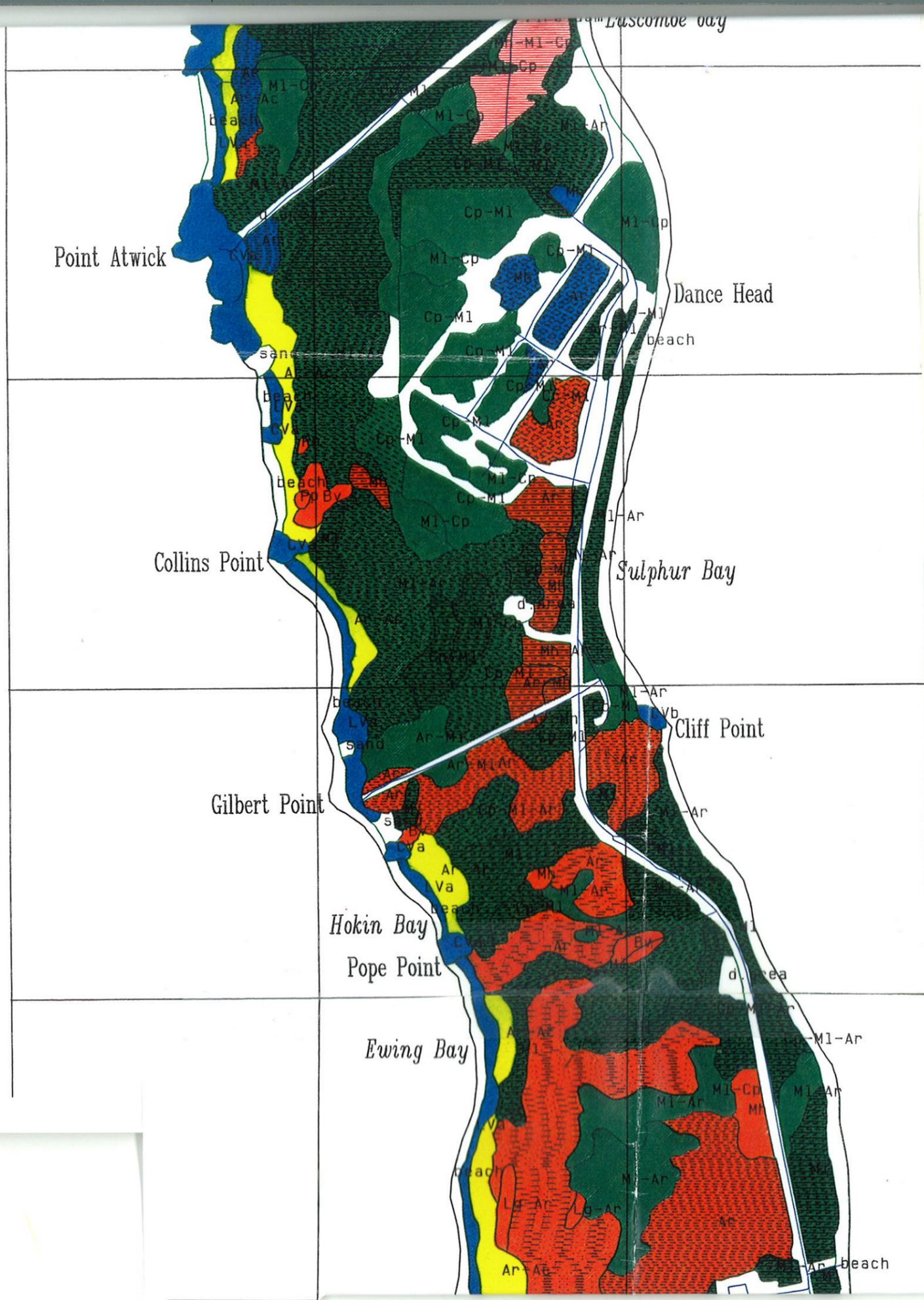
Cp-M1-Mh CALLITRIS PREISSII - MELALEUCA LANCEOLATA - MELALEUCA HUEGE Low Forest. A variable unit in terms of composition and density. Each of the trees may be dominant locally; ACACIA ROSTELLIFERA may be present. The undergrowth in dense stands is mainly moss and small annuals. ACANTHOCARPUS PREISSII PHYLLANTHUS CALYCINUS form a dense heath in open stands and along cleared strips. TRACHYMENE COERULEA is common in spring.

M1-Ar MELALEUCA LANCEOLATA - ACACIA ROSTELLIFERA low forest. In dense stands this has little undergrowth other than annuals. Open stands form a woodland with scattered M.LANCEOLATA at 8 to 10m and A.ROSTELLIFERA and other species forming a layer at 3 to 4m; ACANTHOCARPUS PREISSII forms a dense heath layer at about 1m.

M1-Ar-Cp. MELALEUCA LANCEOLATA - ACACIA ROSTELLIFERA - CALLITRIS PREISSII Low Forest. This unit consists of a scattered tree layer at 8 to 10m, a sparse layer of A. ROSTELLIFERA at 3 to 4m, and a dense tangled heath layer of ACANTHOCARPUS PREISSII. TRACHYMENE COERULEA is common in spring.

SCRUB COMMUNITIES

Ar associated with ACACIA ROSTELLIFERA Scrub - Tangled scrub, 3 to 4m high, DIPLOLAENA DAMPIERI. In dense stands it has sparse undergrowth including annuals. The open and very open stands have a dense heath layer of ACANTHOCARPUS PREISSII, EREMOPHILA GLABRA and LEUCOPOGON PARVIFLORUS.



PHYLLANTHUS CALYCINUS form a dense heath in open stands and along cleared strips. TRACHYMENE COERULEA is common in spring.

M1-Ar MELALEUCA LANCEOLATA - ACACIA ROSTELLIFERA low forest. In dense stands this has little undergrowth other than annuals. Open stands form a woodland with scattered M.LANCEOLATA at 8 to 10m and A.ROSTELLIFERA and other species forming a layer at 3 to 4m; ACANTHOCARPUS PREISSII forms a dense heath layer at about 1m.

M1-Ar-Cp. MELALEUCA LANCEOLATA - ACACIA ROSTELLIFERA - CALLITRIS PRE Low Forest. This unit consists of a scattered tree layer at 8 to 10m, a sparse layer of A. ROSTELLIFERA at 3 to 4m, and a dense tangled heath layer of ACANTHOCARPUS PREISSII. TRACHYMENE COERULEA is common in spring.

SCRUB COMMUNITIES

- Ar ACACIA ROSTELLIFERA Scrub - Tangled scrub, 3 to 4m high, associated with MELALEUCA HUEGELII, SPYRIDIUM GLOBULOSUM and DIPOLOAENA DAMPIERI. In dense stands it has sparse undergrowth including annuals. The open and very open stands have a dense heath layer of ACANTHOCARPUS PREISSII, EREMOPHILA GLABRA and LEUCOPOGON PARVIFLORUS.
- Mh. MELALEUCA HUEGELII Scrub. Dense tangled scrub, about 3 m high, often with some ACACIA ROSTELLIFERA. The undergrowth is mainly of annual species. Creepers are often present in the canopy.
- Ar-Mh. ACACIA ROSTELLIFERA - MELALEUCA HUEGELII Scrub. This is a dense community, at 3 to 4m, often tangled with creepers, and with a sparse undergrowth mainly of annuals.
- Lg-Ar LEPIDOSPERMA GLADIATUM - ACACIA ROSTELLIFERA Scrub. This occurs in valleys and depressions and consists of scattered A. ROSTELLIFERA and a dense tangled heath of L.GLADIATUM, ISOLEPIS NODOSA, and ACANTHOCARPUS PREISSII.
- Pp. PITTOSPORUM PHYLLIRAEOIDES Scrub. Small isolated dense thickets, 2 to 3 m high, and less than 1ha in extent; mainly annuals and some EREMOPHILA GLABRA below.
- Bv. BEYERIA VISCOSA Scrub. Dense scrub 2-4m high; occasional ACACIA ROSTELLIFERA; sparse undergrowth of small annuals.
- Dd. DIPOLOAENA DAMPIERI Scrub. Dense scrub 2-3m high, often matted with CASSYTHA GLABELLA. Sparse undergrowth of small annuals.

LOW SCRUB

- Ar-Ac. ACACIA ROSTELLIFERA - A. COCHLEARIS Low Scrub. This unit is 1-2m high with 50 to 60 percent cover. In addition to the ACCACIA it includes many species such as ALYXIA BUXIFOLIA, SPYRIDIUM BUXIF, SPYRIDIUM GLOBULOSUM, LEUCOPOGON sp., LEPTOMERIA PREISSIANA, and WESTRINGIA DAMPIERI. Sparse undergrowth of small annuals.

HEATH COMMUNITIES

- C.V. Clifftop Vegetation. On the south and west coasts (CVa) this low, open heath, about 1 m high, and includes SCAEVOLA CRASSIFOLIA, ACROTRICHE CORDATA, BORONIA ALATA, and ALYXIA BUXIFOLIA. Cliff faces have succulent bushes and creepers. On the north and east coasts the vegetation is open scrub with scattered ACACIA ROSTELLIFERA, MELALEUCA LANCEOLATA, PITTOSPORUM PHYLLIRAEOIDES, and LEUCOPOGON INSULARIS. There is a dense heath layer of ACANTHOCARPUS PREISSII, PHYLLANTHUS CALYCINUS, EREMOPHILA GLABRA and LEUCOPOGON PARVIFLORUS.
- LV. Littoral Vegetation. On the west coast this is a coastal heath (LVa) of SPYRIDIUM GLOBULOSUM, ALYXIA BUXIFOLIA, OLEARIA AXILLARIS, CALOCEPHALUS SBROWNII and sedges. SPINIFEX spp. grow on the seaward side. In Broun Bay a narrow bench (LVb) is occupied by the sedges LEPIDOSPERMA GLADIATUM and ISOLEPIS NODOSA. Near the causeway on the west side a new area of land is subdivided with the older part (LVC) having dense SPINIFEX spp. and ISOLEPIS NODOSA and the younger part (LVd) with CAKILE MARITIMA, SALSOLA KALI and CARPOBROTUS VIRESCENS. On Colpoys Point another new land area (LVE) has mainly ISOLEPIS NODOSA and an associated low lying saline patch has samphire (SARCOCORNIA BLACKIANA).

MAP COMPILED AT GEOGRAPHY DEPARTMENT
UNIVERSITY OF WESTERN AUSTRALIA
By Philip Drayson

TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN MAP GRID - ZONE 50

373000E

6434000N

374000E

Location Map

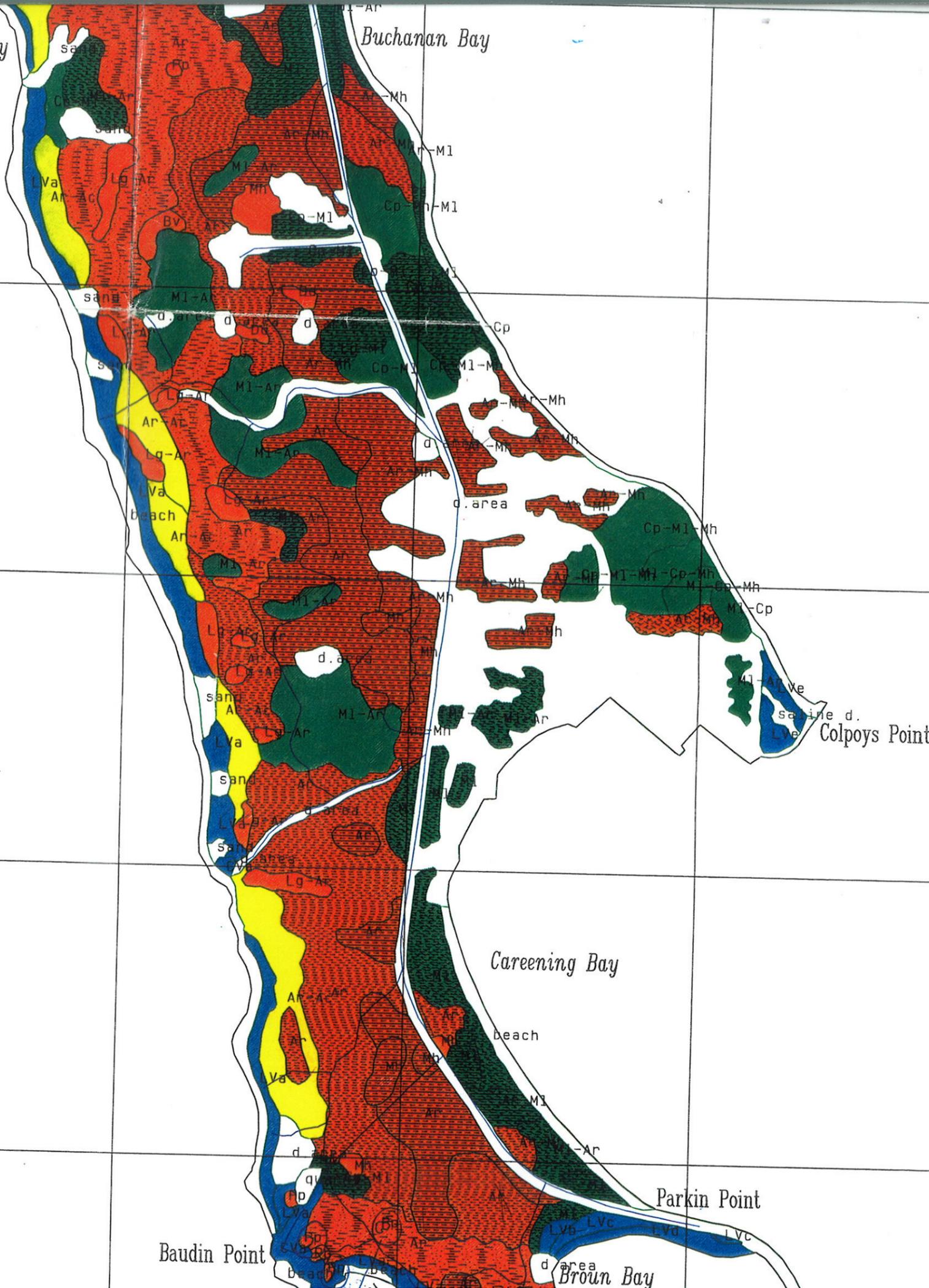


not to scale

scale 1:15000

Bauche Bay

Buchanan Bay



Colpoys Point

Careening Bay

Parkin Point

Boudin Point

Brown Bay

**THE REGIONAL SIGNIFICANCE OF
THE FLORA AND VEGETATION OF
GARDEN ISLAND**

Bronwen Keighery¹, Neil Gibson² and Gregory Keighery²

- 1. Department of Environmental Protection**
- 2. Department of Conservation and Land Management**

**Full document
available
on request**



ROYAL AUSTRALIAN NAVY
ENVIRONMENT
AND ENERGY
CONFERENCE

Submarine Training & Support Centre
Auditorium
HMAS STIRLING
Garden Island, WA

14 & 15 April 1997

Convened by Director, Environmental
Management - Navy

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GARDEN
Q
BS 63

BS 63
Quind



Royal Australian Navy

Environment and Energy Conference Papers



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HMAS Stirling
Garden Island, WA

14 and 15 April 1997

Convened by Director-Environment Management - Navy

Further Naval Facility Development
at HMAS Stirling
Garden Island, Western Australia
Department of Defence

Advice prepared by the
Environmental Protection Authority

**Full document
available
on request**

GARDEN

BS 63^Q

PENGUIN
ETC ISLANDS

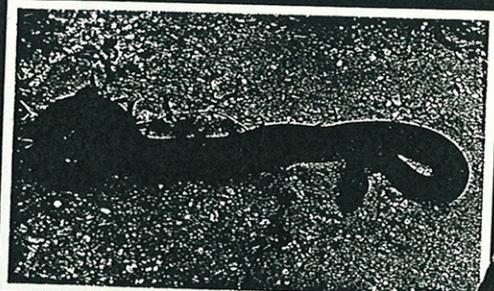
BS367

GARDEN
ISLAND

BS63

POINT
PERON

BS355

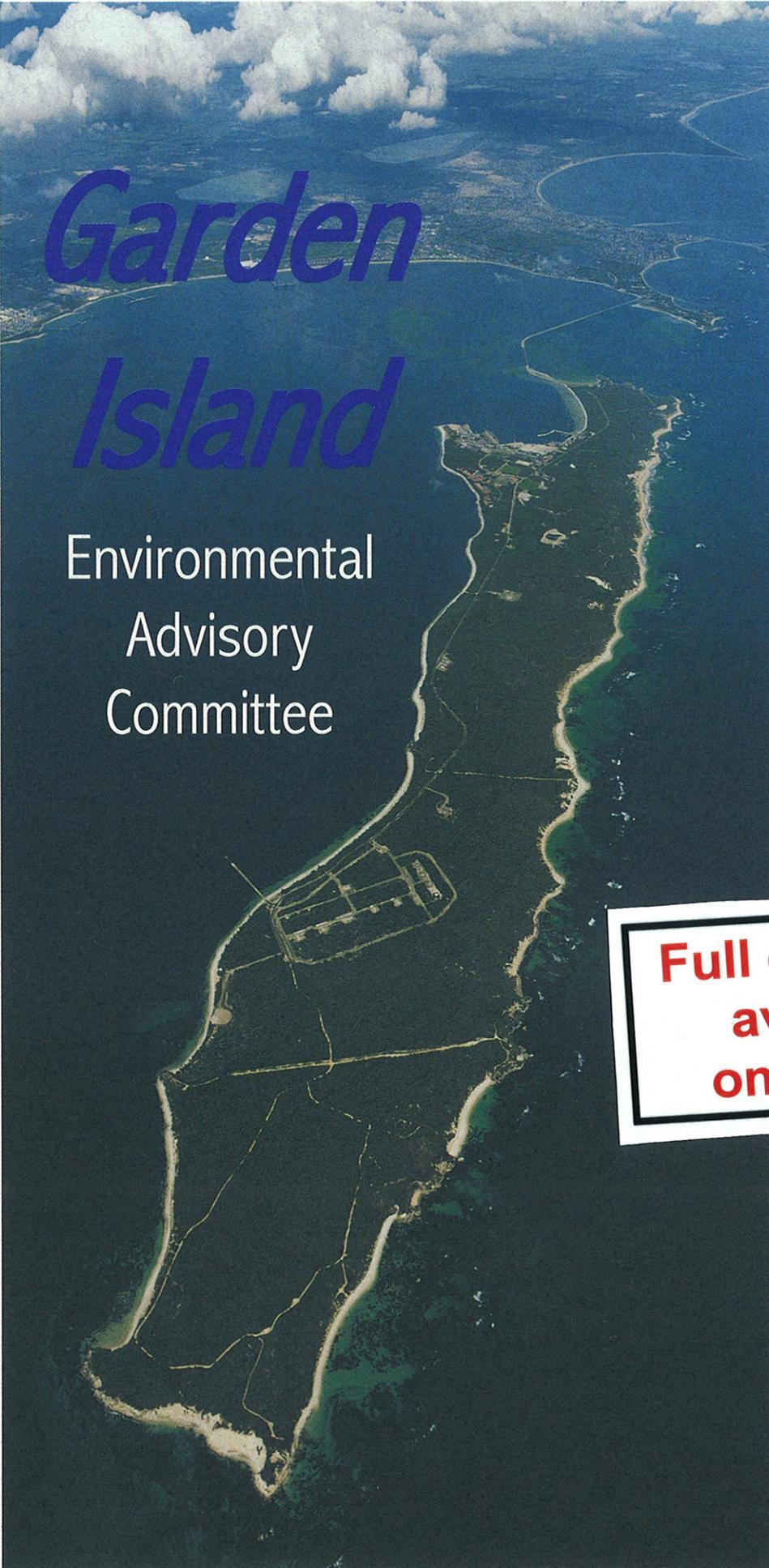


Full document
available
on request

A guide to the flora and fauna of the Rockingham Offshore Islands and Cape Peron.

Kwinana, Rockingham and Mandurah Branch
of the WA Naturalists' Club.

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Garden Island

Environmental
Advisory
Committee



**Full document
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1997 - 98
Report of
Activities

WILD 15/40AGA
Nr 13037 152.72

000127

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WILD 1574 UAGA
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