A FLORISTIC SURVEY OF THE SHARK BAY WORLD HERITAGE AREA

An interim report on surveys of Peron Peninsula, Edel Land, Bernier Island and Dorre Island.

by

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March 1999

Conducted by the Western Australian Department of Conservation and Land Management (Biodiversity Conservation) with funding assistance from the World Heritage Commission.

Acknowledgments

The project was funded by Commonwealth World Heritage Funding to Greg Keighery and Payl Brown in the1996/97 financial year, and by CALM in the 1997/98 financial year. Adrienne Markey was employed as a consultant to conduct the field survey of Peron Peninsula and Edel Land in 1996/97. Sally Claymore was employed in 1997/98 to continue the project and conduct the field survey of Bernier and Dorre Islands.

The following people are acknowledged for valuable assistance with the project:

CALM District staff based in Denham.

Peter Speldewinde of CALM, for incorporating provision of transport and accommodation for Botanists while conducting Shark Bay Mouse Recovery Plan monitoring work on Bernier and Dorre Islands Nature Reserves.

The Western Australian Herbarium (CALM), including Chang Sha Fang and Phil Spencer for providing work and freezer space during plant identification work, Meriel Falconer, Kaye Veryard and Sue Carroll (as well as Neil Gibson of CALM Woodvale) for assistance with databasing and the lodging of voucher specimens.

Brendon Lepschi, Greg Keighery, Paul Wilson, Barbara Rye, Nick Lander, Rob Davis, Terena Lally, Stan Webster, Karina Knight, Andrew Mitchell, Malcolm Trudgen, Carol Wilkins, Arthur Weston, Barry Conn (NSW), Barbara Wiecek (NSW), Phillip Short (NT), and Robin Barker (SA) for assistance with plant identification.

Arthur Weston (consultant), Andy Williams (CALM), Terry Rose (CALM), Robin Westlake (volunteer) and Margot Black (volunteer) who worked as a team with Sally Claymore to conduct the field survey of Bernier and Dorre Islands. Anne Smith who assisted with the reconnaissance survey of the islands, and Lea McQuillan who assisted Adrienne Markey with the field survey of the peninsulas.

Arthur Weston for the use of field equipment including plant drier, backpacks, GPS and camera. Bob Prince (CALM) for the use of aerial photographs and old monitoring data and reports for Dorre Island. The Communications Branch, the Wanneroo District Office, and Andrew Burbidge (CALM) for the use of portable communications equipment.

Jesse and Craig Shanklind for providing transport, meals, accommodation and general assistance on the 'James Shearer' during field survey of Bernier and Dorre Islands.

Clough's Resources and the Shark Bay Salt Joint Venture for permitting access to Carrarang Station. Resident managers of the Carrarang, Nanga, and Tamala Stations for assistance with property access.

Melissa White and Roy Fieldgate of CALM's GIS Section for providing map for report.

CALM Widlife Research Centre provided accomodation and computer facilities.

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SUMMARY

A floristic survey of the Shark Bay World Heritage Area was initiated with the field survey of Peron and Edel Land Peninsulas in 1997, and Bernier and Dorre Islands in 1998. The project was funded by Commonwealth World Heritage Funding in the1996/97 financial year, and by CALM in the 1997/98 financial year. At the time of writing, the progress of the project was reliant on further funding, requiring: (1) field surveys of Dirk Hartog Island and Faure Island to complete data collection and site-plot establishment throughout the study area; (2) the statistical analysis of data on completion of the data collection, and; (3) vegetation mapping, reliant on completion of aerial photography and data collection. Interim results of the partial field survey are presented in this report.

In total 127 (30x30m) square site-plots (quadrats) were established, with 90 located on the peninsulas, 21 located on Bernier Island, and 16 located on Dorre Island. A total of 383 vascular plant taxa were recorded, with 373 of these represented in one or more site-plots. Approximately 920 voucher specimens were lodged in the herbarium.

Of the recorded taxa, 347 were native species and 37 were weeds. The best represented families were Asteraceae (45 taxa), Poaceae (31 taxa), Chenopodiaceae (28 taxa), Papillionaceae (18 taxa), Myrtaceae (15 taxa), and Mimosaceae (15 taxa). The most common genera were Acacia (16 taxa), Eremophila (12 taxa), Ptilotus (11 taxa), and Atriplex (8 taxa). Weeds were most abundant in the Poaceae (12 taxa), and Asteraceae (8 taxa).

Sixteen of the recorded taxa appear to be endemic to the World Heritage Area, and 1 taxa appears to be endemic to the immediate region. Forty two taxa were at their northern range end, and 12 were at their southern range end in the area. Twenty two listed Priority taxa were recorded, and a new southern limit to the distribution of one priority species, *Acanthocarpus rupestrus,* was established.

Eight taxa were new records for the World Heritage Area and five were also new records for the Carnarvon Basin. Seventy three new taxa were recorded for Bernier Island, representing a 149% increase in the previous number of records on the herbarium database (49), and 28 new taxa were recorded for Dorre Island, representing an 24% increase in the previous number (117).

1. INTRODUCTION

1.1 Background

Shark Bay is an area of shallow sea surrounding Peron Peninsula and bounded to the west by Dirk Hartog Island, Bernier Island, Dorre Island, and Edel Land Peninsula. The peninsulas form the western-most point of Australia, about 750 km north of Perth. The region lies between latitudes 25°S and 27°S and longitudes 112° 50'E and 114°E.

On the basis of it's substantial natural heritage values, the Shark Bay Region was inscribed on the World Heritage List in December 1991. A significant value identified for it's nomonation was it's location at the transition zone between the South West and the Eremaean (or arid) Botanical Provinces. An overlap between major botanical provinces is unusual in Australia and is of great scientific value in determining (1) how species adapt to different environments, and (2) factors which limit distribution and abundance (Hancock *et al.* 1998). Another important feature of the transition zone is the tree heath vegetation which is unique to the State. In addition, the Bernier and Dorre Island Nature Reserves provide extremely significant refuge habitat for five species of endangered mammalian fauna (Morton *et al.* 1995) as well as breeding sites for sea birds.

The Shark Bay World Heritage Property covers approximately 2.2 million hectares of land and water(Map 1). The total area of CALM-managed terrestrial reserves in the property is approximately 122,000 hectares. The region supports a range of industries and its economy is largely based on tourism, fishing, agriculture, salt production and pastoral activities. While existing land use activities and new developments put pressure on natural resources, many of these industries are dependent on the maintenance of the area's unique biological and geological features.

The Shark Bay Terrestrial Reserves Draft Management Plan (Hancock *et al.* 1998) cites the objective of management for conservation of vegetation and flora (Section 7.0) as "to protect and conserve native plant communities and species, especially threatened or other priority species". The plan provides 'High Priority' recommendations in relation to this project, namely to:

- Complete a detailed flora survey of the World Heritage Property, and determine and map plant community types.

- Promote research on changes to flora composition caused by the removal of feral herbivores on Peron Peninsular, and the effects of fire and other factors affecting survival and regeneration.

1.2 Objectives

The objectives of this project are to:

1. Record the flora on permanently marked quadrats throughout the World Heritage Area, that can be reassessed (a) after a periods of time, in order to determine long term changes in floristic composition, or (b) after catastrophic events (eg fire);
2. Determine the plant communities present based on floristics and correlate their distribution to selected environmental characteristics (eg landform, soil), and:
3. Map in detail the vegetation communities throughout the World Heritage Area, including: Peron Peninsula, Edel Land Peninsula, Dirk Hartog Island, Bernier Island, Dorre Island and Faure Island.

The results will provide a basis for regional conservation management planning. This report

presents the interim results of two field survey and data collection components of the partially completed project.

1.3 The Study Area

1.3.1 Climate

The Shark Bay World Heritage Area straddles the southern margin of the semi-desert Mediterranean climatic zone, and the northern margin of the temperate, warm dry Mediterranean zone (Beard 1976,b). Summers are hot and dry with an average maximum temperature of around 37° recorded in January. Most rain falls in the winter months between May and July, with the average lowest temperatures of around 10° recorded in June. Average annual rainfall ranges between 200 mm and 300 mm, while annual evaporation is around 2000 mm. Prevailing winds are southerly and are consistently strong for much of the year, particularly in the summer months (Beard 1976,b Butcher *et al.* 1984). Payne *et al.* (1980) described plant growth in this zone as limited primarily by a lack of soil moisture, with growth confined to limited periods of available soil moisture that follow rainfall events.

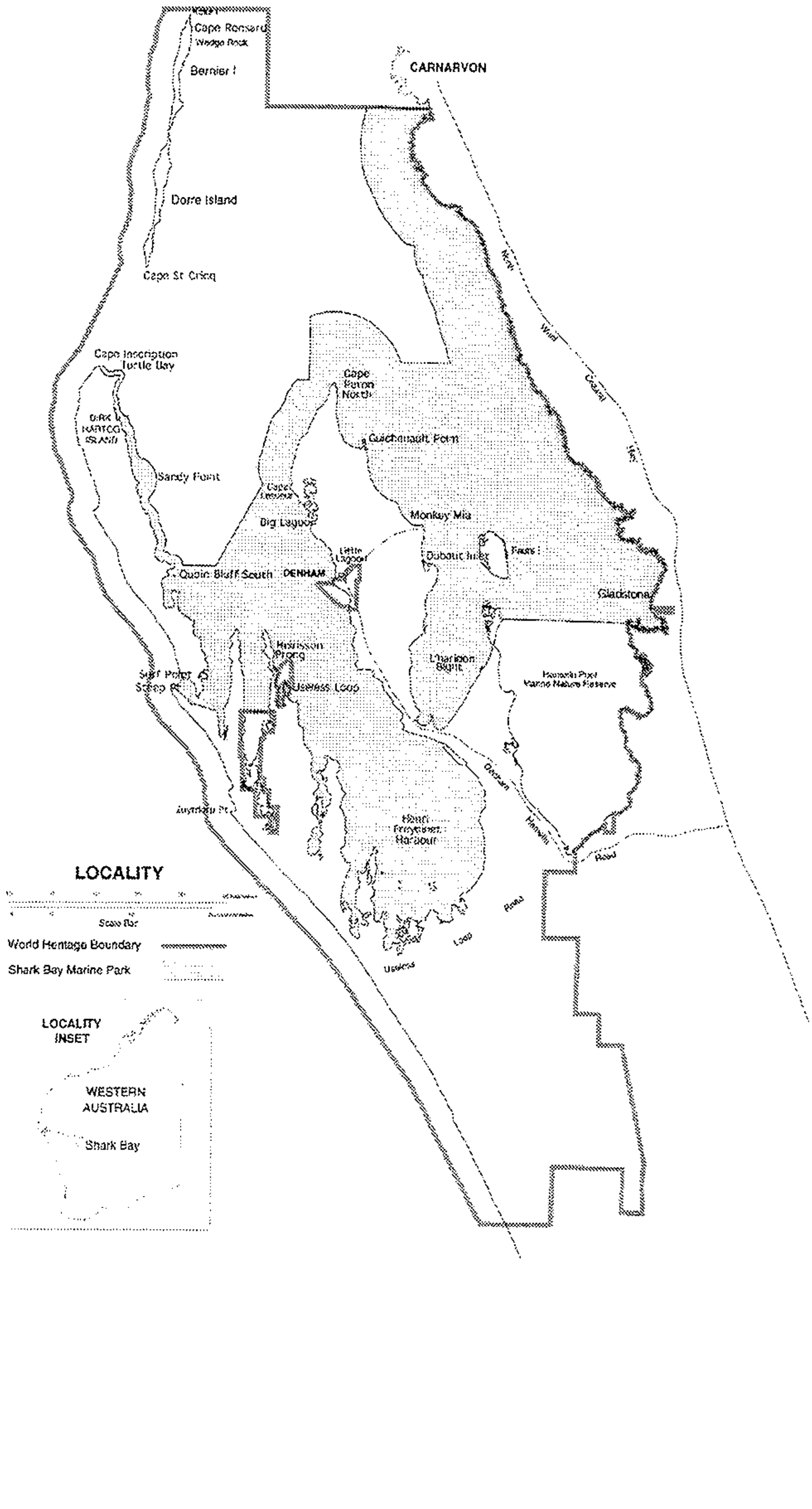
1.3.2 Geology and geomorphology

The Shark Bay region lies within the southern Carnarvon Basin. The geological history of the basin has been dominated by intermittent regression and transgression of the sea, and a complex tectonic setting from the Silurian to the Tertiary. The peninsulas and islands consist of Pleistocene and Holocene dune deposits, which are thought to have accumulated on anticlinal ridges of Tertiary limestone. Bernier and Dorre Islands separated from the mainland with a rise in sea level around 8000 years ago, and are believed to have separated from each other between 3000 and 6000 years ago (Payne *et al.* 1989, Butcher *et al.* 1984)..

The surface geology of the Shark Bay World Heritage Area comprises limestone and sandstone which is largely covered by superficial sand (Playford 1990). Four distinct geomorphological provinces are recognised. The Edel Province which comprises Bernier Island, Dorre Island, Dirk Hartog Island and Edel Land, and is a landscape of calcareous dunes formed over lithologically similar, but indurated, eolianite with fairly well-preserved dune shapes (Butcher *et al.* 1984). Evaporite pans known locally as 'birridas' occur in the form of circular or elliptical depressions ranging from around 100 m in diameter to several kilometers in length; most are isolated from the sea (Butcher *et al.* 1984). On the mainland, the province is bounded along its western edge by the Zuytdorp Cliffs, which are comprised of Pleistocene limestone and attain a maximum height of nearly 300 m above sea level (Butcher *et al.* 1984). The deeply embayed eastern coastline of Edel Land is of fairly low relief and the southern ends of inlets are occupied by broad, intertidal and supratidal flats (Hancock *et al.* 1998). Four major landforms occur on Bernier and Dorre Islands, including limestone rock travertine, sand plain, consolidated dunes and unconsolidated dunes.

Peron Province consists of Peron Peninsula, Nanga Peninsula and Faure Island, and is an area of red sand dunes underlain by relict Pleistocene dunes of red and yellow quartz sandstone. While relict dunes are up to around 50 m above sea level in height, interdune depressions are rarely more than a few metres above sea level. These depressions commonly contain birridas, or where closer to the coast, marine lagoons. Special coastal features unique to this area include the coquina deposits comprising lithified shell beds, which occur as beach ridges and benches at Lharidon Bight and Hamelin Pool, and stromatolites which grow in hypersaline conditions (Butcher *et al.* 1984; Payne *et al.* 1980).

The Yaringa Province comprises the eastern shores and hinterland of Hamelin Pool, and the Gascoyne-Wooramel Province forms the coastal strip along the eastern margin of the World Heritage Area property.


Cape Ronsard
Bernier I
CARNARVON
Dorre Island
Cape St Cricq
Cape Inscription
Turtle Bay
Sandy Point
Cape Peron North
Guichenault Point
Big Lagoon
Monkey Mia
Little Lagoon
Dubaut Inlet
Faure I
Quoin Bluff South
DENHAM
Gladstone
Herisson Prong
Useless Loop
L'haridon Bight
Hamelin Pool Marine Nature Reserve
Surf Point
Steep Pt
Denham
Hamelin
Road
Useless
Loop
LOCALITY
Scale Bar
World Heritage Boundary
Shark Bay Marine Park
LOCALITY INSET
WESTERN AUSTRALIA
Shark Bay

1.3.3 Vegetation

Due to the occurrence of much early botanical exploration in the Shark Bay area, it is a major concentration of type localities for Western Australian plants. Dampier made the first plant collections in the region in 1699, only two years after the earliest Australian collections were made by Vlamingh at the Swan River (Keighery 1990). The next extensive botanical collections were made in 1803 when the French Leschenault de La Tour collected with the Baudin Expedition, and in 1818 when Quoy and Gaimard collected with the Freycinet Expedition. These collections were studied by Decaisne and Gaudichaud in 1824. Later significant collectors in the region were British, including Cunningham (with King) in 1827, and Denham and Milne in 1850. These collections were studied by Bentham in compiling Flora Australiensis. Mueller (1883) gave accounts of the region using these early studies as well as collections made by himself and Forrest (as detailed in Keighery 1990).

Beard mapped the dominant vegetation of the Carnarvon District at a scale of 1:250,000. These maps were subsequently compiled into single maps published at a scale of 1:1,000,000 (Beard 1976,a). The Shark Bay Region was mapped and documented separately at a scale of 1:250,000 (Beard 1976,b). For rangeland management purposes, Payne *et al.* (1980) mapped the Carnarvon Basin at a scale of 1:250,000, on a land system basis combining vegetation and geomorphology. Of the 89 systems described, 19 occurred in the Shark Bay Region. Seven of these were confined to the region, including Birrida, Cullawarra, Edel, Inscription, Peron, Taillifer and Tamala.

Burbidge and George (1978) described five major structural formations in their description of the vegetation of Dirk Hartog Island. Royce (1962) published species lists with vegetation descriptions for Bernier and Dorre Islands. CALM recorded unpublished data on the effects of the 1973 wildfire, on the vegetation and flora of Dorre Island (RIT Prince & AS Weston pers comm., 1998), and established four monitoring transects with numerous exclosures. Detailed site-based floristic studies were undertaken on three small islets in Shark Bay by Abbot (1981).

Trudgen and Keighery (1995) presented a baseline listing of the vascular plants of the Shark Bay World Heritage Area, resulting from field survey of the peninsulas and extensive background study in the Western Australian Herbarium. They distinguished seven geographic zones for flora records and listed 855 taxa from the area, including 53 endemics, 229 taxa at their northern range limits, and 56 taxa at their southern range limits. Results of a floristic survey of the Carnarvon Basin, conducted by CALM, are currently in production (GJ Keighery, N Gibson and M Lyons pers comm., 1999).

In a report of the France-Australe Bicentenary Expedition Committee, Keighery (1990) discussed the vegetation and flora of Shark Bay, and pointed to the need for detailed floristic studies to enable a clearer understanding of the composition, relationships and phytogeographical placement of the area. He described the area as of immense significance in both Australian and a world contexts due to the high concentrations of species at the limits of their ranges.

2. METHODS

Peron and Edel Land Peninsulas were surveyed during September and October 1997. Bernier and Dorre Islands were surveyed between late August and early September 1998, following a reconnaissance survey conducted between late June and early July 1998. Surveys were timed to coincide with the flowering of the majority of plants. Due to low rainfall, 1997 was a poor year for annuals, and it could be expected that species richness would increase in most site-plots if revisited during a good season. Conversely, 1998 was a particularly good year for

annuals.

In total, 127 (30x30m) square quadrats or site-plots were established during the two surveys, with 90 located on the peninsulas, 21 located on Bernier Island, and 16 located on Dorre Island. Site-plots were strategically placed with the aim of sampling as much of the major geological, geomorphological and floristic variation as possible. Site selection in each of the two surveys was independent of site selection and placement in the other, allowing some replication between areas. Similarly, in the 1998 survey, Bernier and Dorre Islands were sampled with the aim of achieving as much representation on each island as feasible within the scope and constraints of the survey. To facilitate future comparative studies, several of the Dorre Island site-plots were located on transect lines established and monitored by CALM in the early 1970's. Care was taken to locate all site-plots in what was judged to be the least disturbed and most representative vegetation in sampling areas. Sites were selected from field survey observations in combination with interpretation of 1:20 000 colour aerial photographs.

Mainland site-plots were accessed by a two-person team in one four-wheel-drive vehicle. Access was by sealed and unsealed roads as well as station tracks and fence-lines. Access to the northwestern part of Edel Land was slow and difficult due to the presence of steep-sided sand dunes. Island site-plots were accessed on foot in conjunction with boat transport between suitable landings. All available landings were located on the eastern side of the islands. Boat travel was restricted by maritime conditions dictated by prevailing winds. Consequently, daily field survey itineraries were limited by access constraints and flexibility was a necessary component of planning.

The survey of the islands was conducted by six people in two teams. Initially, one team selected, marked and described sites, ahead of the other team which recorded site-plot data and collected specimens. Once all the sites for site-plots were established, both teams completed data recording and specimen collection at different sites. While large areas of each island were traversed in reconnaissance, the site-plots were clustered in areas that could be accessed with minimum effort for future resampling. No site-plots were located on Koks Island off the north end of Bernier Island, as repeated attempts at landing proved unsuccessful due to rough sea conditions.

All site-plots were permanently marked with a galvanised steel fencing dropper at each corner, and the positions were determined using a GPS in the centre of the plot. At each of the island site-plots, one of the four droppers was tagged and painted yellow to enhance visibility and help distinguish the site-plot among survey pegs associated with fauna monitoring programs. The metal tags were labelled with a site-plot number and 'CALM FLORA 1998'.

Within each site-plot, all vascular plant taxa were recorded. Species nomenclature followed Green (1985) and current usage at the Western Australian Herbarium in Perth. Specimens were collected to allow identification or confirmation of identification, and to lodge as voucher specimens in the herbarium. Selected voucher specimens included one or more specimens of each taxa, where specimens of the taxa collected were fertile and intact.

Data on slope, aspect, topographic position, type of rock outcrop, and vegetation structure and condition were recorded at each site-plot. Slope was scored on a scale of from one to three, representing flat to steep. Aspect was recorded as one of 16 cardinal directions. Vegetation structure was recorded using Muir's (1977) classification. Vegetation condition was scored on a five point scale with a score of one indicating vegetation in near natural condition, and five indicating highly disturbed sites with significant weed invasion. Cause of disturbance was also recorded, eg grazing. Visual estimates were made of leaf litter cover, area of bare ground, area of exposed rock, and soil texture and colour. Soil depth was measured by

probing the soil with a dropper and a range of depths was recorded for the site-plot if the soil was under 0.5m deep, otherwise it was recorded as >0.5m. Ten soil samples of the upper 10 cm were collected from each site. These were bulked for analysis of electrical conductivity, pH, total N, total P, percentage sand, silt and clay, exchangeable Ca, exchangeable Mg, and exchangeable K. Soil samples from the peninsulas had been chemically analysed at the time of writing, while those from the islands were in storage pending further project funding.

Data sheets are archived at CALM and have been databased. WoodvaleData analyses are to be conducted at the completion of the survey of the entire Shark Bay World Heritage Area. Intended future analyses would follow the methodology outlined in Gibson *et al* (1994), including: (i) classification of site-plots according to similarities in species composition using the Czekanowski coefficient and 'unweighted pair-group mean average' fusion method (UPGMA); (ii) classification of species into groups according to their occurrences at the same sites using the TWOSTEP similarity algorithm followed by UPGMA fusion; (iii) alternate classifications using ALOC algorithm; (iv) semi-strong hybrid (SSH) ordination of the environmental data from each site-plot, to show spatial relationships between groups and to elucidate possible environmental correlates with the classification, and; (v) Kruskal-Wallis non-parametric analysis of variance and Mann Whitney U-tests to explore differences in various environmental variables for groups of site-plots.

3. RESULTS AND DISCUSSION

3.1 The Flora

3.1.1 Floristics

A total of 383 vascular plant taxa (species, subspecies and varieties) were recorded in the two areas surveyed to date, with 373 of these represented in one or more site-plots and 10 recorded only outside of site-plots (Table 1). Three hundred and thirty four taxa were recorded on Peron Peninsula and Edel Land, and 150 were recorded on Bernier and Dorre Islands. Approximately 920 voucher specimens were lodged in the herbarium, with almost 600 of these collected from the peninsulas and over 320 collected from the two islands.

Of the recorded taxa, 347 were native species and 37 were weeds. The best represented families were Asteraceae (45 taxa), Poaceae (31 taxa), Chenopodiaceae (28 taxa), Papillionaceae (18 taxa), Myrtaceae (15 taxa), and Mimosaceae (15 taxa). The most common genera were *Acacia* (16 taxa), *Eremophila* (12 taxa), *Ptilotus* (11 taxa), and *Atriplex* (8 taxa). Weeds were most abundant in the Poaceae (12 taxa), and Asteraceae (8 taxa).

Of the taxa recorded on Peron Peninsula and Edel Land, 305 were native and 29 were weeds. On Bernier Island, 124 taxa were recorded, including 112 native taxa and 12 weeds. Of the 115 recorded taxa on Dorre Island, 106 were natives and 9 were weeds. Thirty three of the taxa recorded on Bernier Island were not recorded on Dorre Island (Table 1). Twenty five species recorded on Dorre Island were not recorded on Bernier Island. The best represented families on Bernier Island were Asteraceae (14 taxa), Poaceae (13), and Chenopodiaceae (9 taxa). The best represented families on Dorre Island were Poaceae (12 taxa), Chenopodiaceae (11 taxa), and Asteraceae (8 taxa). On the peninsulas the best represented families were Asteraceae (43 taxa), Poaceae (29 taxa), and Chenopodiaceae (25 taxa).

Six vascular taxa previously recorded on the herbarium database for Bernier Island, and 20 taxa previously recorded for Dorre Island, were not found on the survey. Of these, one of the database records was found to include a locational error (*Halosarcia halocnamoides*) which was confirmed by the original collector, and at least one taxa was re-identified (*Arthropodium* sp was redetermined as *Dichopogon tyleri*).

3.1.2 Endemics

Of the vascular plants recorded, 16 taxa appear to be endemic to the World Heritage Area, and 1 taxa appears to be endemic to the immediate region. Four taxa that were taxonomically complex were described as potential endemics (Table 1).

3.1.3 Range ends

Of the taxa recorded in the World Heritage Area, 42 were at their northern range end, and 12 were at their southern range end. A new southern limit to the distribution of *Acanthocarpus rupestrus* was established in the World Heritage Area. For several taxa previously recorded as at their northern range end in the World Heritage Area, their discovery on Bernier Island extended their northern range ends within the Area.

The new record of *Stackhousia clementii* added a western limit to a highly disjunct distribution between Eremaean, Northern and Southwest Botanical Provinces.

3.1.4 New records

Eight of the recorded taxa had not been previously recorded in the World Heritage Area study area (based on the herbarium database, the Carnarvon Basin Flora Survey by CALM and other CALM reports). These taxa included: *Cyperus bulbosus*, *Zygophyllum eremaeum* and *Acanthocarpus humilis*. Five of the six taxa were also new records for the Carnarvon Basin, including: *Erymophyllum ramosum* subspecies *ramosum*, *Stackhousia clementii*, *Trichodesma zeylanicum* subspecies *macroflorum*, *Acanthocarpus rupestris*, and *Calocephalus aervoides*. While *C.aervoides* was recorded as occurring on Dorre Island in Trudgen and Keighery (1995), it was not in the herbarium collection and database for the islands.

One unidentified taxon, a very small shrub or perennial herb from Bernier and Dorre Islands, is a potential newly recognised taxon and is currently being examined by taxonomists (possibly *Xanthosia* sp; not included in Table 1). A sterile specimen of an *Atriplex* species with crinate leaves was collected from the mainland; it is a potential new record for the World Heritage Area, and could also be a newly recognised taxon. *Thryptomene* spp are taxonomically complex and are currently being revised by ME Trudgen. Specimens collected in this survey include potential new records or endemics.

Unusual specimens of *Rhagodia preissii* subspecies *obovata* with very green, broadly ovate to hastate leaves, were collected on the mainland and islands. These collections may represent a new form of the taxon and require further study (Paul Wilson pers comm. 1998). On Bernier and Dorre Islands, two distinct forms of *Olearia axillaris* were recognisable in the field. Flowering specimens of both were lodged in the herbarium. *Olearia dampieri* subspecies *dampieri* was also collected in flower on the peninsulas. Flowering specimens of these taxa have been poorly collected in the area, and these specimens are an important addition to the herbarium collection.

73 new taxa were recorded for Bernier Island, representing a 149% increase in the previous number of records (49) on the herbarium database. Twenty eight new taxa were recorded for Dorre Island, representing an 24% increase in the previous number of records (117) on database. Two hundred and nine of the specimens collected from Bernier Island, and 102 of those collected from Dorre Island, were lodged in the herbarium as vouchers.

3.1.5 Priority taxa

Twenty two taxa listed as Priority (poorly known) taxa on the Declared Rare And Priority Flora List (*Wildlife Conservation Act 1950*) for Western Australia, were recorded during the surveys, including one Priority 1 taxon, ten Priority 2 taxa, eight Priority 3 taxa and three

Priority 4 taxa (Table 1).

Priority 1 and 2 taxa are defined as under consideration for declaration as 'rare flora', but are in urgent need of further survey. Priority 3 taxa are described as in need of further survey and Priority 4 species as requiring monitoring every 5-10 years (Atkins 1998).

Two priority species *Acanthocarpus rupestris* and *Calocephalus aervoides*, were among the range extensions and new records for the World Heritage Area and Carnarvon Basin. Previously collected only from Dirk Hartog Island, *Olearia occidentissima* was found to have a widespread distribution over Peron Peninsula and Edel Land. *Triodia bromoides*, until recently presumed extinct (Trudgen and Keighery 1995), was found to be widespread as a dominant component of the grassland steppes on Peron Peninsula and Edel Land (A. Markey pers com. 1997).

3.2 Vegetation

Analysis of vegetation (and vegetation maps) will not be conducted until the field survey is completed and data is available for the entire World Heritage Area study area. At the time of reporting, Dirk Hartog Island and Faure Island required survey. Some general observations on vegetation and flora are presented in the photographs.

3.3 Soils

Results of soil sampling within site-plots on Peron Peninsula and Edel Land are presented in Table 5. The lowest proportion of sand in any site sample was 82.5% (CARA02). Soil samples from Bernier and Dorre islands were had not been analysed and were in storage at the time of writing.

4. CONCLUSION

At the time of writing, the floristic survey and mapping of the Shark Bay World Heritage Area was incomplete. Field surveys of Dirk Hartog Island and Faure Island are required to complete data collection and site-plot establishment. Once data collection and processing is complete, analysis of the flora and vegetation can be conducted.

The analysis of a completed survey data set would enhance our understanding of the major floristic gradients across the study area and permit the description of vegetation communities, as well as patterns in the distribution of significant taxa. This information is required for assessment of the conservation status of taxa and communities, and designation of areas of importance for threatened taxa. It would also provide a basis for vegetation mapping, for monitoring changes over time, and for the comparison of flora and vegetation outside the transition zone.

Table 1. Flora list for Shark Bay World Heritage Area.

Family /taxon	Bernier	Dorre	Peninsulas	Con. status	Comments
Aizoaceae					
Carpobrotus candidus MS	X	X	X		
* *Mesembryanthemum crystallinum*	X				
Sesuvium portulacustrum	X	X			
Tetragonia diptera			X		
Tetragonia implexicoma			X		
Amaranthaceae					
Amaranthus pallidiflorus			X		
Hemichroa diandra			X		
Ptilotus alexandri			X	P2	endemic to WHA
Ptilotus divaricatus			X		
Ptilotus divaricatus var. divaricatus			X		
Ptilotus exaltatus			X		
Ptilotus exaltatus var. exaltatus			X		
Ptilotus gaudichaudii			X		
Ptilotus gaudichaudii var. parviflorus			X		
Ptilotus obovatus			X		
Ptilotus obovatus var. obovatus	X	X	X		
Ptilotus polystachyus var. polystachyus			X		
Ptilotus villosiflorus	X	X	X		
Anthericaceae					
Corynotheca micrantha			X		
Dichopogon tyleri	X	X			
Thysanotus manglesianus			X		
Thysanotus patersonii	X		X		
Thysanotus speckii	X	X			

Family */taxon*	**Bernier**	**Dorre**	**Peninsulas**	**Con. status**	**Comments**
Apiaceae					
Daucus glochidiatus	X	X	X		
Neosciadium glochidiatum			X		northern limit in WHA
Trachymene elachocarpa	X	X	X		
Trachymene pilosa	X		X		
Apocynaceae					
Alyxia buxifolia			X		
Asclepiadaceae					
Marsdenia australis			X		
Marsdenia graniticola	X		X		northern limit in WHA (new limit BINR)
Rhyncharrhena linearis			X		
Sarcostemma viminale subsp. australe		X			
Asteraceae					
Actinobole condensatum	X		X		
Angianthus cornutus			X		
Angianthus cunninghamii	X	X	X		
Angianthus milnei		X	X		
* *Bidens bipinnata*	X		X		
Brachyscome cheilocarpa			X		
Brachyscome ciliaris	X		X		
Brachyscome ciliocarpa			X		
Brachyscome iberidifolia	X	X	X		
Brachyscome latisquamea			X		
Calocephalus aervoides	X	X		P3	new record for WHA and C'von Basin.
Calocephalus francisii			X		
* *Centaurea melitensis*	X		X		
Cephalipterum drummondii			X		
Chthonocephalus tomentellus			X	P2	
Erymophyllum ramosum subsp. ramosum			X		new record for WHA
Gnephosis arachnoidea			X		

Family /taxon	Bernier	Dorre	Peninsulas	Con. status	Comments
Gnephosis tenuissima	X		X		
* *Hypochaeris glabra*			X		
Lawrencella davenportii			X		
Millotia myosotidifolia	X	X	X		
Olearia axillaris sens lat.	X	X	X		green & grey forms; flowering specimens
Olearia dampieri MS			X		
Olearia dampieri subsp. dampieri MS			X		
Olearia occidentissima			X	P3	endemic to WHA
Podolepis canescens			X		
Podolepis microcephala			X		
Podotheca angustifolia			X		
Podotheca gnaphalioides			X		
* *Pseudognaphalium luteoalbum*	X		X		
* *Reichardia tingitana*			X		
Rhodanthe citrina			X		
Rhodanthe condensata	X		X		
Rhodanthe humboldtiana			X		
Rhodanthe oppositifolia subsp. oppositifolia			X		northern limit in WHA
Rhodanthe polycephala			X		
Schoenia ayersii			X		
Senecio lautus	X	X			
Senecio lautus subsp. dissectifolius			X		
* *Sonchus oleraceus*	X	X	X		
* *Sonchus tenerrimus*			X		
Trichanthodium scarlettianum			X		
* *Urospermum picroides*			X		
Waitzia corymbosa			X		
Waitzia podolepis			X		

Family /taxon	Bernier	Dorre	Peninsulas	Con. status	Comments
Avicenniaceae					
Avicennia marina			X		
Boraginaceae					
Halgania littoralis			X		
Trichodesma zeylanicum	X				herb
Trichodesmia zeylanicum subsp. macroflorum MS	X		X		new record for WHA and C'von Basin; perennial shrub
Brassicaceae					
* *Brassica tournefortii*			X		
Cakile maritima		X			
* *Hornungia procumbens*		X			
Lepidium biplicatum			X	P2	
Lepidium lyratogynum			X		
Lepidium puberulum	X	X	X	P4	northern limit in WHA (new limit BINR)
Stenopetalum pedicellare			X		
Caesalpiniaceae					
Labichea cassioides			X		
Senna artemisioides subsp. filifolia			X		
Senna glutinosa subsp. chatelainiana			X		
Senna pleurocarpa			X		
Campanulaceae					
Wahlenbergia gracilenta	X				northern limit WHA (new limit BINR)
Capparaceae					
Capparis spinosa	X	X	X		
Caryophyllaceae					
* *Polycarpon tetraphyllum*		X	X		
* *Silene nocturna*			X		
Chenopodiaceae					
Atriplex amnicola			X		

Family */taxon*	**Bernier**	**Dorre**	**Peninsulas**	**Con. status**	**Comments**
Atriplex bunburyana			X		
Atriplex isatidea			X		
Atriplex paludosa			X		
Atriplex paludosa subsp. moquiniana	X	X	X		
Atriplex sp.(crinate leaf)			X		potential new record.
Atriplex vesicaria			X		
Atriplex vesicaria subsp. incompta			X		
Chenopodium gaudichaudianum			X		
Chenopodium melanocarpum	X	X			
* *Chenopodium murale*		X			
Dysphania sphaerosperma	X	X	X		
Enchylaena tomentosa var. tomentosa	X	X	X		
Eremophea aggregata			X		
Halosarcia halocnemoides			X		
Halosarcia halocnemoides ssp "Shark Bay" shark			X		
Halosarcia indica subsp. bidens			X		
Halosarcia pterygosperma			X		
Maireana stipitata			X		
Maireana tomentosa			X		
Neobassia astrocarpa		X			southern limit WHA (DINR)
Rhagodia latifolia subsp. latifolia	X	X	X		
Rhagodia preissii subsp. obovata	X	X	X		
Salsola kali	X	X	X		
Sarcocornia quinqueflora			X		
Sclerolaena diacantha			X		
Sclerolaena uniflora	X	X	X		
Threlkeldia diffusa	X	X	X		
Chloanthaceae					
Dicrastylis maritima MS		X	X		endemic to WHA
Physopsis chrysophylla		X	P3		endemic to WHA

Family /taxon	Bernier	Dorre	Peninsulas	Con. status	Comments
Pityrodia atriplicina			X		
Pityrodia cuneata			X		
Colchicaceae					
Wurmbea monantha			X		
Wurmbea odorata	X	X			northern limit in WHA (new limit BINR)
Convolvulaceae					
Porana sericea			X		
Crassulaceae					
Crassula colorata	X	X	X		northern limit in WHA
Crassula colorata var. colorata			X		northern limit in WHA
Cucurbitaceae					
Cucumis sp.	X				
Cunoniaceae					
Aphanopetalum clematideum			X		northern limit in WHA
Cuscutaceae					
* *Cuscuta epithymum*			X		
* *Cuscuta planiflora*	X	X	X		
Cyperaceae					
Bulbostylis barbata			X		
Cyperus bulbosus		X			new record for WHA
Isolepis nodosa			X		northern limit in WHA
Dasypogonaceae					
Acanthocarpus humilis			X		new record for WHA
Acanthocarpus preissii	X	X	X		
Acanthocarpus robustus	X	X	X		southern limit in WHA
Acanthocarpus rupestris			X	P2	new S. limit; new record for WHA and C' Basin
Lomandra maritima			X		northern limit in WHA
Dioscoreaceae					
Dioscorea hastifolia			X		northern limit in WHA

Family /taxon	Bernier	Dorre	Peninsulas	Con. status	Comments
Euphorbiaceae					
Beyeria cinerea	X	X	X		
Euphorbia boophthona			X		
Euphorbia drummondii			X		
Euphorbia sharkoensis	X	X			southern limit in WHA
Euphorbia tannensis subsp. eremophila	X	X			
Phyllanthus calycinus	X	X	X		northern limit in WHA (new limit BINR)
Phyllanthus fuernrohrii	X	X			
Phyllanthus scaber			X		
Poranthera microphylla	X	X	X		
Frankeniaceae					
Frankenia cinerea			X		
Frankenia pauciflora			X		
Frankenia pauciflora var. pauciflora	X	X			
Gentianaceae					
* *Centaurium erythraea*			X		
Centaurium spicatum	X	X	X		
Geraniaceae					
Erodium angustilobum	X				
* *Erodium aureum*	X				
* *Erodium cicutarium*		X	X		
Erodium cygnorum subsp. cygnorum			X		
Goodeniaceae					
Dampiera incana var. incana	X	X	X		
Goodenia berardiana			X		
Goodenia ochracea	X	X	X		southern limit in WHA
Lechenaultia linarioides			X		northern limit in WHA
Lechenaultia subcymosa		X			southern limit in WHA

Family /taxon	Bernier	Dorre	Peninsulas	Con. status	Comments
Scaevola anchusifolia			X		
Scaevola chrysopogon			X	P2	northern limit in WHA
Scaevola crassifolia	X	X	X		
Scaevola repens var. erecta MS	X				
Scaevola spinescens			X		
Scaevola tomentosa	X		X		
Gyrostemonaceae					
Gyrostemon ramulosus	X		X		
Haemodoraceae					
Conostylis candicans subsp. flavifolia			X		northern limit in WHA
Haloragaceae					
Haloragis gossei		X			
Haloragis trigonocarpa	X	X	X		
Juncaceae					
* *Juncus bufonius*			X		
Juncus kraussii subsp. australiensis			X		
Juncaginaceae					
Triglochin calcitrapum		X	X		
Triglochin centrocarpum			X		
Triglochin trichophorum	X		X		
Lamiaceae					
Westringia dampieri	X	X	X		northern limit in WHA (new limit BINR)
Lauraceae					
Cassytha aurea var. aurea			X		
Cassytha nodiflora			X		northern limit in WHA
Cassytha pomiformis			X		northern limit in WHA
Lobeliaceae					
Lobelia heterophylla			X		
Loranthaceae					
Amyema preissii			X		

Family /taxon	Bernier	Dorre	Peninsulas	Con. status	Comments
Malvaceae					
Abutilon cryptopetalum			X		
Abutilon cunninghamii	X	X			
Abutilon geranioides	X		X		southern limit in WHA
Abutilon sp.Hamelin(A.M.Ashby 2196) PN			X	P2	
Alyogyne cuneiformis	X	X	X		
Alyogyne pinoniana	X	X			
Alyogyne pinoniana var. pinoniana			X		
Hibiscus sturtii var. grandiflorus	X	X			
Hibiscus sturtii var. truncatus			X		
Lawrencia densiflora			X		
Lawrencia viridigrisea			X		
Sida calyxhymenia	X		X		
Sida fibulifera	X	X			southern limit in WHA
Mimosaceae					
Acacia bivenosa		X			
Acacia chartacea			X		
Acacia coriacea	X	X			
Acacia didyma			X	P3	endemic to WHA
Acacia drepanophylla			X	P3	endemic to region
Acacia galeata			X		
Acacia idiomorpha			X		
Acacia ligulata/rostellifera complex	X	X	X		
Acacia microcalyx			X		
Acacia ramulosa			X		
Acacia sclerosperma			X		
Acacia sclerosperma subsp. glaucescens			X	P3	
Acacia sclerosperma subsp. sclerosperma		X	X		
Acacia spathulifolia			X		

Family /taxon	Bernier	Dorre	Peninsulas	Con. status	Comments
Acacia synchronicia	X				
Acacia tetragonophylla			X		
Moraceae					
Ficus platypoda		X	X		
Myoporaceae					
Eremophila aff.occidens			X	P2	S. limit in WHA, disjunct dist'n with NW Cape
Eremophila clarkei			X		
Eremophila deserti		X	X	X	
Eremophila glabra				X	
Eremophila glabra subsp. albicans				X	
Eremophila glabra subsp. psammophora MS			X	X	P2 southern limit WHA
Eremophila glabra subsp. tomentosa MS		X	X	X	
Eremophila latrobei subsp. latrobei MS				X	
Eremophila maitlandii				X	
Eremophila oldfieldii				X	
Eremophila oldfieldii subsp. oldfieldii				X	
Eremophila splendens MS				X	P1 endemic to WHA
Myoporum acuminatum		X			
Myoporum insulare		X	X	X	
Myrtaceae					
Beaufortia dampieri		X	X	X	northern limit in WHA (BINR)
Calothamnus formosus subsp. formosus				X	
Calytrix strigosa				X	northern limit in WHA
Eucalyptus eudesmioides				X	
Eucalyptus fruticosa				X	
Eucalyptus obtusiflora		X	X	X	
Eucalyptus oraria		X	X		northern limit in WHA (BINR)
Eucalyptus prominens				X	

Family /taxon	Bernier	Dorre	Peninsulas	Con. status	Comments
Eucalyptus selachiana			X		endemic to WHA
Lamarchea hakeifolia var. hakeifolia			X		endemic to WHA
Melaleuca cardiophylla		X	X		
Melaleuca huegelii subsp. pristicensis			X	P2	endemic to WHA
Melaleuca sp 2 (aff nesophila) (Beard 6768) carn			X		endemic to WHA
Pileanthus limacis	X	X			southern limit in WHA
Thryptomene sp.	X	X	X		taxonomically complex; potential endemics
Nyctaginaceae					
Commicarpus australis	X		X		
Oleaceae					
Jasminum calcarium	X	X	X		
Jasminum didymum subsp. lineare var. 'grey			X		endemic to WHA
Orobanchaceae					
Orobanche minor var. australiana carn			X		
Oxalidaceae					
Oxalis perennans	X		X		
Papilionaceae					
Bossiaea spinescens			X		
Bossiaea walkeri			X		
Chorizema racemosum			X		
Daviesia purpurascens			X	P4	northern limit in WHA; highly disjunct distribut'n
Glycine canescens			X		
Indigofera boviperda			X		
Indigofera georgei	X	X			
Kennedia prostrata			X		northern limit WHA
Leptosema macrocarpum MS			X		
Lotus australis			X		
Lotus cruentus	X	X			
* *Medicago polymorpha*			X		
Mirbelia ramulosa		X	X		

Family */taxon*	**Bernier**	**Dorre**	**Peninsulas**	**Con. status**	**Comments**
Mirbelia sp.Denham(W.E.Blackall 556) PN			X		endemic to WHA
Swainsona longicarinata			X		emdemic to WHA
Swainsona pterostylis			X		
Swainsona sp.Shark Bay(M.E.Trudgen 7588) PN			X		endemic to WHA
Templetonia retusa			X		northern limit in WHA
Phormiaceae					
Dianella divaricata			X		
Dianella revoluta	X		X		
Pittosporaceae					
Pittosporum phylliraeoides			X		
Pittosporum phylliraeoides caperg var. phylliraeoides			X		
Pittosporum phylliraeoides var. phylliraeoides	X	X	X		
Plantaginaceae					
Plantago drummondii			X		
Plumbaginaceae					
Muellerolimon salicorniaceum			X		
Poaceae					
Aristida contorta			X		
Austrodanthonia caespitosa			X		northern limit in WHA
Austrostipa crinita	X	X	X		
Austrostipa elegantissima			X		
Austrostipa nitida	X	X	X		
* *Avena barbata*			X		
* *Avena fatua*			X		
Bromus arenarius			X		
* *Bromus diandrus*			X		
* *Bromus japonicus var. japonicus*	X				
* *Cenchrus ciliaris*	X		X		

Family /taxon	Bernier	Dorre	Peninsulas	Con. status	Comments
Cymbopogon ambiguus	X	X	X		
* *Ehrharta brevifolia*			X		
* *Ehrharta longiflora*			X		
* *Eragrostis barrelieri*	X	X	X		
Eragrostis dielsii	X	X	X		
Eulalia aurea	X		X		
Paractaenum novae-hollandiae	X	X	X		
Paractaenum refractum			X		
Paspalidium constrictum			X		
* *Pentaschistis airoides*			X		
Poa drummondiana			X		northern limit in WHA
* *Rostraria cristata*			X		
* *Rostraria pumila*	X	X	X		
* *Setaria verticillata*	X	X			
Spinifex longifolius	X	X	X		
Sporobolus virginicus		X	X		
Triodia bromoides			X	P4	northern limit in WHA
Triodia danthonioides			X		northern limit in WHA
Triodia plurinervata	X	X	X		highly disjunct distribution
Triraphis mollis		X	X		
Polygalaceae					
Comesperma integerrimum			X		northern limit in WHA
Polygonaceae					
* *Emex australis*			X		
Portulacaceae					
Calandrinia balonensis			X		
Calandrinia corrigioloides			X		
Calandrinia eremaea	X				
Calandrinia polyandra			X		
Calandrinia sp. 2			X		potential endemic

Family */taxon*	**Bernier**	**Dorre**	**Peninsulas**	**Con. status**	**Comments**
Calandrinia sp.1			X		potential endemic
Primulaceae					
* *Anagallis arvensis*			X		
* *Anagallis arvensis var. caerulea FPR*			X		
Samolus repens var. paucifolius			X		
Proteaceae					
Banksia ashbyi			X		
Conospermum microflorum			X		
Grevillea eriostachya subsp. eriostachya			X		
Grevillea gordoniana			X		
Grevillea rogersoniana			X	P2	endemic to WHA
Grevillea stenobotrya			X		
Hakea stenophylla		X	X		
Persoonia bowgada			X		
Ranunculaceae					
Clematis linearifolia			X		northern limit in WHA
Restionaceae					
Desmocladus asper MS			X		northern limit in WHA
Rhamnaceae					
Cryptandra mutila		X	X		northern limit in WHA (DINR)
Stenanthemum complicatum			X		northern limit in WHA
Stenanthemum divaricatum		X	X	P3	southern limit in WHA
Stenanthemum emarginatum			X		northern limit in WHA
Rubiaceae					
Opercularia aff. spermacocea ahb 4502 carn			X		potential endemic
Opercularia spermacocea			X		
Rutaceae					
Diplolaena grandiflora	X	X	X		

Family /taxon	Bernier	Dorre	Peninsulas	Con. status	Comments
Santalaceae					
Anthobolus foveolatus			X		northern limit in WHA
Exocarpos aphyllus	X		X		
Santalum acuminatum			X		
Santalum spicatum	X	X	X		
Sapindaceae					
Alectryon oleifolius subsp. oleifolius	X	X	X		
Diplopeltis intermedia			X		
Diplopeltis intermedia var. incana			X		
Diplopeltis intermedia var. intermedia			X		
Dodonaea aptera			X		northern limit in WHA
Dodonaea bursariifolia	X	X			
Dodonaea inaequifolia			X		
Dodonaea viscosa subsp. angustissima		X	X		
Solanaceae					
Anthocercis intricata			X	P3	northern limit in WHA
Anthocercis littorea			X		
Anthocercis sp. Trig-1 scps			X		endemic to WHA
Duboisia hopwoodii			X		
* *Lycopersicon esculentum*	X				
Nicotiana occidentalis			X		
Nicotiana occidentalis subsp. hesperis	X	X	X		
Solanum hesperium		X	X		
Solanum lasiophyllum	X		X		
Solanum orbiculatum			X		
Solanum orbiculatum subsp. orbiculatum	X	X	X		
Stackhousiaceae					
Stackhousia clementii	X	X			new record for WHA highly, disjunct distribution
Stackhousia muricata			X		

Family /taxon	Bernier	Dorre	Peninsulas	Con. status	Comments
Sterculiaceae					
Brachychiton gregorii			X		
Commersonia gaudichaudii			X		
Hannafordia quadrivalvis			X		
Hannafordia quadrivalvis subsp. quadrivalvis		X			
Keraudrenia hermanniifolia			X		
Lasiopetalum angustifolium		X			northern limit in WHA (DINR)
Rulingia densiflora			X		northern limit in WHA
Rulingia malvifolia var. borealis			X		northern limit in WHA
Surianaceae					
Stylobasium spathulatum	X	X	X		
Thymelaeaceae					
Pimelea gilgiana			X		
Pimelea microcephala			X		
Pimelea microcephala subsp. microcephala	X	X			northern limit in WHA
Tiliaceae					
Corchorus crozophorifolius	X	X			
Urticaceae					
Parietaria cardiostegia	X	X	X		
Zygophyllaceae					
Nitraria billardierei	X		X		
Zygophyllum aurantiacum			X		
Zygophyllum eremaeum	X	X			new record for WHA
Zygophyllum fruticulosum	X	X	X		
Zygophyllum ovatum			X		
Zygophyllum simile	X	X	X		

PHOTOGRAPHIC OBSERVATIONS:

Figure 1: Heirisson Prong, Shark Bay, showing salt mining in background.

Figure 2: Birridas on Peron Peninsula.

Figure 3: The spectacular Zuytdorp cliffs.

Figure 4: Shark Bay stromatolites are a major tourist attraction.

Figure 5: Sea spray drifting over Dorre Island Nature Reserve. Saline conditions influence plant distribution.

Figure 6: Koks island off the northern tip of Bernier Island Nature Reserve. Rough seas can restrict accessibility.

Figure 7: The dense shrub *Melaleuca cardiophylla* provides habitat for endangered fauna such as hare wallabies.

Figure 8: A boodie rat *(Bettongia leseuer)* on Bernier Island Nature Reserve, captured by CALM staff during a fauna monitoring survey.

Figure 9: Site-plot BI12; remnant habitat for the endangered Shark Bay mouse includes *Olearia axillaris* Dwarf Scrub C over *Spinifex longifolius* Mid-Dense Hummock Grass.

Figure 10: Pressed plant specimens on top of a portable plant drier used during the field survey of Bernier and Dorre Island Nature Reserves.

Figure 11: Monitoring plot established by CALM on Dorre Island in 1973 to monitor post-fire regeneration. *Triodia plurinervata*, and *Acacia ligulata* are the dominant species shown.

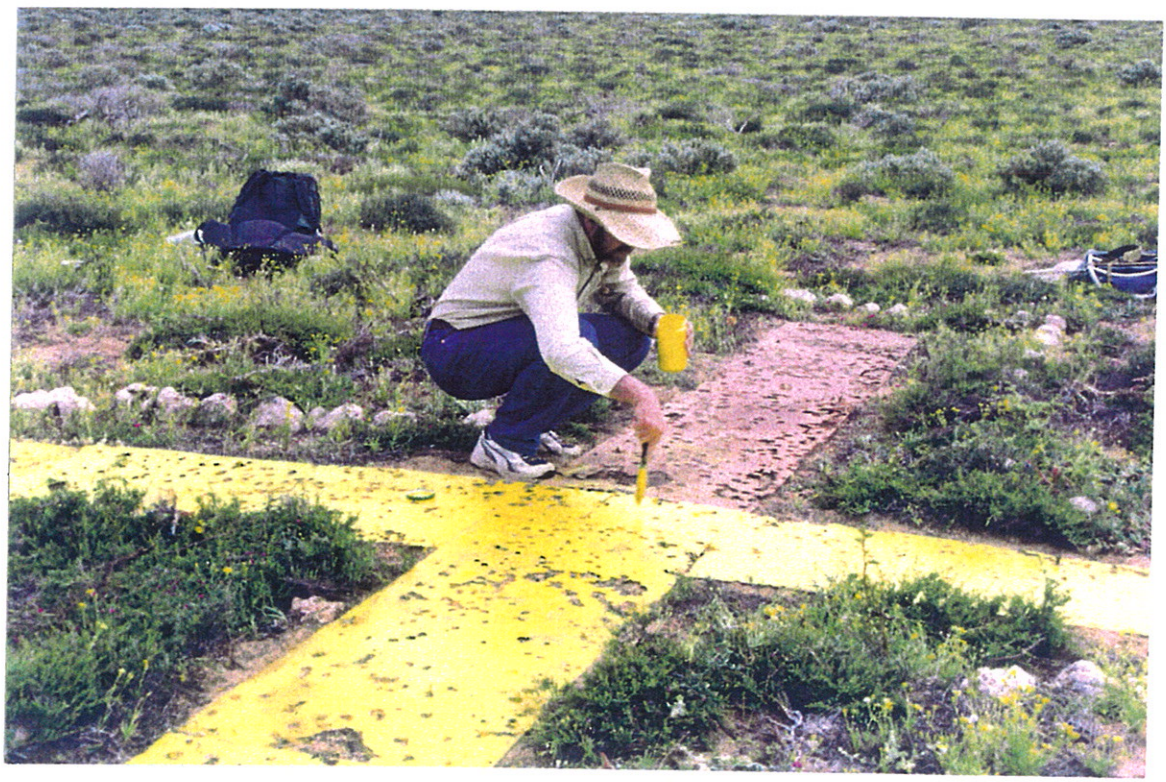


Figure 12: Maintaining a 1973 transect marker, designed to show on aerial photographs. Dorre Island Nature Reserve.

Figure 13: *Calocephalus aervoides* (centre), a Priority species found on Dorre Island Nature Reserve.

Figure 14: *Eremophila glabra* subspecies *psammophora*, a Priority species found on Dorre Island Nature Reserve.

Figure 15: *Triodia bromiodes* at Shark Bay. Until recently the species was considered extinct.

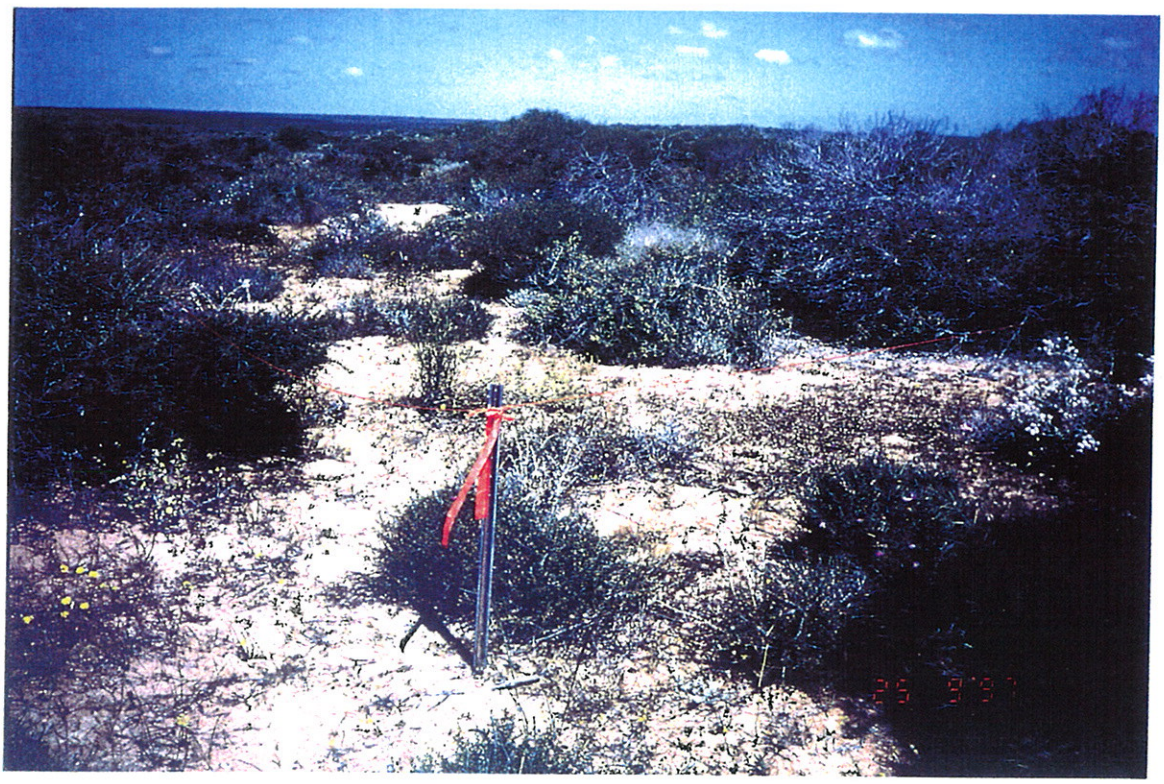


Figure 16: Low shrubland with *Olearia occidentissima*, a Priority species endemic to Shark Bay.

Figure 17: *Sarcostemma viminale* subspecies *australe,* was recorded at only one site during survey of Peron Penisula, Edel Land and Berneir and Dorre Islands.

Figure 18: *Trichodesma zeylanicum* subspecies *macroforum* was a new record for the World Heritage area. Specimens on Bernier Island occurred as small herbs and perennial shrubs.

Figure 19: *Alyogyne pinoniana* ('hibiscus'), a common shrub in the Malvaceae family.

Figure 20: *Avicennia marina* Low Forest (mangroves) fringing a tidal inlet at Steep Point; site-plot Stpt03. Ground layer genera include *Halosarcia*, *Sarcocornia* and *Muellerolimon*.

Figure 21: Dense interdunal vegetation near Steep Point. Stabilised dunes in foreground and mobile dunes in background.

Figure 22: Sandalwood *Santalum spicatum* Open Low Woodland at Edel Land.

Figure 23: Wind-pruned *Eucalyptus oraria* tree mallee on Bernier Island Nature Reserve.

Figure 24: *Eulalia aurea* tussock grassland on Bernier Island.

Figure 25: Site-plot DI17, *Frankenia pauciflora* Low Heath D over *Senecio lautus*, *Eragrostis dielsii* Low Grass & Herbs in a depression on sandplain, Dorre Island NR.

Figure 26: *Thryptomene* sp Low Heath D with *Brachyscome iberidifolia* (Shark Bay daisy).

Figure 27: *Diplolaena grandiflora* shrubs are less than 30cm high on travertine on Dorre Island. On sandplain the species grows to 2m tall.

Figure 28: *Ficus platypoda* (fig) and *Alyogyne cuneiformis* on limestone pavement on Dorre Isand.

Figure 29: *Eremophila oldfieldii* subsp *olfieldii* Open Scrub over *Acacia sclerosperma-Exocarpus aphylla* Low Scrub on coquina formation, Site-plot Nang09.

Figure 30: *Juncus kraussii* Dense Tall Sedges in dune swales at Steep Point, Site-plot Stpt10.

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APPENDIX 1: Locations of Site-plots for floristic survey of Peron Peninsular and Edel Land, 1997.

Location	site code	latitude d	m	s	longitude d	m	s
Denham Townsite	DENH01	25	53	52	113	32	37
approx. 20 km south of Denham townsite	DENH02	25	57	56	113	33	56
Cape Rose	CPRS01	25	45	1	113	39	26
Peron Peninsular (FPNP), adj 10 mile tank	PERN01	25	47	58	113	32	21
Peron Peninsular	PERN02	25	46	3	113	31	43
Peron Peninsular	PERN03	25	38	56	113	29	35
Peron Peninsular	PERN04	25	33	59	113	28	48
Peron Peninsular, Guichenault Point	PERN05	25	38	15	113	34	57
Peron Peninsular, Herald Bluff	PERN06	25	38	32	113	34	57
Peron Peninsular, Guichenault Point	PERN07	25	38	14	113	34	39
Peron Peninsular, track east of 10-mile tank	PERN08	25	39	56	113	31	24
Peron Peninsular, 'W' trap-line	PERN09	25	46	3	113	32	45
Peron Peninsular, 'W' trap line	PERN10	25	47	32	113	34	53
Monkey Mia	MMIA01	25	47	22	113	41	12
Monkey Mia	MMIA02	25	47	46	113	42	9
Fencline east of Eagle Bluff Well	EBWE01	26	5	21	113	39	56
Fencline east of Eagle Bluff Well	EBWE02	26	5	30	113	41	47
Fencline east of Eagle Bluff Well	EBWE03	26	6	19	113	41	55
East coastline, north of shell beach	EBWE04	26	6	19	113	41	52
west coastline near Eagle Bluff well	EABF01	26	6	9	113	37	8
Eagle Bluff Well	EABL02	26	5	41	113	36	53
South of Whalebone Bay	WHAL01	26	9	0	113	39	18
Nanga Peninsular (Nanga Station)							
Nanga Peninsular, near central bore	NANG01	26	14	7	113	50	55
Nanga Peninsular, near central bore	NANG02	26	12	2	113	53	12
Nanga Peninsular	NANG03	26	8	35	113	56	28
Nanga Peninsular	NANG04	26	11	57	113	48	14
Nanga Peninsular	NANG05	26	6	38	113	51	25
Nanga Peninsular	NANG06	26	6	47	113	53	51
Nanga Peninsular	NANG07	26	13	9	113	55	50
Nanga Peninsular	NANG09	26	17	50	113	53	49
Edel Land (Cararang Station)							
14 km S False Entrance, on Zuytdorp cliffs	FSEN01	26	27	7	113	20	51
False Entrance access track	FSEN02	26	22	40	113	18	48
False Entrance access track	FSEN03	26	23	27	113	20	5
False Entrance access track	FSEN04	26	26	2	113	25	42
False Entrance access track	FSEN05	26	26	10	113	26	12
Steep Point	STPT01	26	12	53	113	15	36
Steep Point	STPT02	26	12	56	113	15	25
Steep Point	STPT03	26	11	25	113	15	18
Steep Point	STPT04	26	12	52	113	15	38
Steep Point	STPT05	26	9	3	113	9	36
Steep Point	STPT06	26	9	33	113	10	3
Steep Point	STPT07	26	9	35	113	10	47
Steep Point	STPT08	26	10	39	113	12	19
Steep Point access track	STPT09	26	15	26	113	17	51
Steep Point access track	STPT10	26	14	52	113	18	1
Thunderbay Access Track, Edel Land	TBAT01	26	15	14	113	16	31
Thunderbay Access Track, Edel Land	TBAT02	26	16	5	113	16	30
Steep Point access track	STPT11	26	15	13	113	17	39
Steep Point access track	STPT12	26	15	6	113	17	25
Cloughs Bar access track	CLBR01	26	15	32	113	21	40
Cloughs Bar access track	CLBR02	26	14	35	113	22	30
Cloughs Bar access track	CLBR03	26	14	40	113	22	29

Cloughs Bar access track	CLBR04	26	14	40	113	22	34
Cloughs Bar access track	CLBR05	26	14	35	113	22	55
Cararang Peninsular	CARA01	26	18	36	113	29	37
Cararang Peninsular	CARA02	26	19	3	113	30	25
Cararang Peninsular	CARA03	23	19	5	113	30	20
Cararang Peninsular	CARA04	26	19	16	113	30	52
Cararang Peninsular	CARA05	26	22	8	113	32	46
Cararang Peninsular	CARA06	26	24	6	113	33	25
Cararang Peninsular	CARA07	26	24	10	113	33	25
Cararang Peninsular	CARA08	26	25	42	113	33	30
'Rubberneck' road, south of Herisson Prong	HEPR01	26	7	11	113	22	59
'Rubberneck' road, south of Herisson Prong	HEPR02	26	7	30	113	23	2
'Rubberneck' road, south of Herisson Prong	HEPR03	26	7	58	113	22	45
'Rubberneck' road, south of Herisson Prong	HEPR04	26	10	19	113	23	16
'Rubberneck' road, south of Herisson Prong	HEPR05	26	9	57	113	22	41
Birrida adjacent to Boral Contruction Site	BORA01	26	13	22	113	22	32
Birrida adjacent to Boral Contruction Site	BORA02	26	13	9	113	22	17
Mangrove adjacent to Boral Contruction Site	BORA03	26	12	20	113	22	37
Epineux Bay	EPBY01	26	19	21	113	17	12
Tamala Station	TAMA01	26	40	9	113	39	22
Tamala Station	TAMA02	26	35	46	113	36	52
Tamala Station	TAMA03	26	36	32	113	34	49
Useless Loop Townsite	USLP01	26	10	5	113	26	27
Useless Loop Townsite	USLP02	26	9	52	113	25	31
Birrida adjacent to rehab. Gypsum minesite	USLP03	26	14	1.	113	24	10
Birrida adjacent to rehab. Gypsum minesite	USLP04	26	13	59	113	24	8
Useless Loop Townsite	USLP05	26	8	57	113	25	10
South of Useless Loop Townsite	USLP06	26	12	29	113	25	9
South of Useless Loop Townsite	USLP07	26	22	33	113	24	22
South of Useless Loop Townsite	USLP08	26	25	31	113	26	37
Crayfish Bay (Epineux Bay), Edel Land	CRBY01	26	20	16	113	17	49
Crayfish Bay (Epineux Bay), Edel Land	CRBY02	26	20	38	113	17	56
Crayfish Bay (Epineux Bay), Edel Land	CRBY03	26	20	36	113	17	59
Crayfish Bay (Epineux Bay), Edel Land	CRBY04	26	21	10	113	17	42
Crayfish Bay (Epineux Bay), Edel Land	CRBY05	26	21	5	113	17	47
Crayfish Bay (Epineux Bay), Edel Land	CRBY06	26	21	2	113	17	56
Crayfish Bay (Epineux Bay), Edel Land	CRBY07	26	19	50	113	17	41
Crayfish Bay Well	CBWL01	26	21	6	113	18	35
Crayfish Bay Well	CBWL02	26	21	23	113	18	39

APPENDIX 2: Site-plot flora survey locations for Bernier and Dorre Islands, 1998

SITE NO	LATITUDE	LONGITUDE
BI01	245542S	1130830E
BI02	245540S	1130828E
BI03	244758S	1130927E
BI04	244748S	1130904E
BI05	244735S	1130909E
BI06	244746S	1130904E
BI07	244739S	1130909E
BI08	244738S	1130918E
BI09	245548S	1130836E
BI10	245558S	1130808E
BI11	245557S	1130732E
BI12	245542S	1130830E
BI13	245623S	1130739E
BI14	245609S	1130738E
BI15	244626S	1130931E
BI16	244717S	1130930E
BI17	244738S	1130921E
BI18	244645S	1130938E
BI19	244624S	1130931E
BI20	245256S	1130818E
BI21	245258S	1130816E
DI01	251045S	1130605E
DI02	251035S	1130523E
DI03	251034S	1130527E
DI04	250407S	1130710E
DI05	250359S	1130660E
DI06	251031S	1130559E
DI07	250354S	1130642E
DI08	250352S	1130633E
DI09	250351S	1130627E
DI10	251225S	1130504E
DI11	251225S	1130459E
DI12	251224S	1130457E
DI13	251226S	1130452E
DI14	251036S	1130535E
DI15	251032S	1130540E
DI17	251023S	1130600E

APPENDIX 3: Site descriptions for Peron and Edel Land Peninsulas

bora01, near western edge of large birrida approximately 11 km SSW of Useless Loop township. south of Boral bar construction site on eastern side of Rubberneck Rd and western side of sidetrack through birrida, 0.9 km from birrida edge. Anthocercis littorea-Acacia tetragonophylla Open Low Scrub B over Atriplex paludosa subspecies moquiniana-Olearia spp-Scaevola spp Dwarf Scrub C over Thryptomene sp-Melaleuca cardiophylla Dense Low Heath D over Very Open Herbs, on pale orange-red sandy silt with shell grit and 30% surface cover of litter on NE-facing gentle lower slope on limestone fringing birrida.

bora03, approximately 9 km SSW of Useless Loop township. Near Boral bar construction site at north end of large birrida accessible by four-wheel-drive track. Avicennia marina Heath A to Dense Heath B over Halosarcia halocnemoides and Sarcocornia quinqueflora Very Open Succulents, on deep, cream sandy silt with greater than 2% surface cover of litter on tidal flat

cara01, 1.2 km NNW of Kangaroo Island, on north-western point of Cararang Peninsula, Shark Bay. On eastern side of west track. Acacia ligulata/rostellifera complex-Exocarpus aphylla-Pimelea microcephala Low Scrub B over Scaevola spp-Rhagodia sp Edel Land - Olearia spp Low Heath C over Thryptomene sp Dense Low Heath D over Open Grass over Open Herbs, on white to cream sand and coquina with 50% surface cover of litter on flat to gently sloping beach with NW aspect.

cara02, at north-western end of Cararang Peninsular, Shark Bay, approximately 2 km south of North Kangaroo Island. On eastern side of west track. Emergent Acacia ligulata/rostellifera over Diplolaena grandiflora-Scaevola tomentosa Dwarf Scrub C over Diplolaena grandiflora-Atriplex bunburyana Low Heath D over annual Open Grass over annual Herbs, on cream silt with exposed limestone and 10% surface cover of litter on gently sloping, SW facing, upper slope of hill.

cara03, at north-western end of Cararang Peninsular, Shark Bay, approximately 2 km south of North Kangaroo Island. On eastern side of west track. , Pimelea microcephala-Atriplex cf paludosa subspecies moquiniana-Scaevola spp Open Dwarf Scrub C over Enchylaena tomentosa var tomentosa-Ptilotus obovatus subspecies obovatus-Frankenia pauciflora-Salsola kalis Low Heath D over Open Grass and Dense Herbs, on cream silt with 10% surface cover of litter on west-facing flat to gently sloping upland

cara04, at north-western end of Cararang Peninsular, Shark Bay, approximately 2.5 km SSE of North Kangaroo Island. On western side of west track. , Acacia sp Low Scrub B over Atriplex cf paludosa-Stylobasium spathulatum-Pimelea microcephala-Olearia axillaris Low Heath C over Olearia axillaris-Thryptomene sp-Scaevola spp-Threlkeldia diffusa Dense Low Heath D over Open Herbs, on white sand on flat to gently sloping, SSW-facing beach.

cara05, near eastern coast of Cararang Peninsular, Shark Bay, approximately 2.2 km west of Charlie Island. North of track and fenceline. Pittosporum phylliraeoides Open Low Scrub A over Acacia sp-Exocarpus aphylla Low Scrub B over Atriplex paludosa subspecies moquiniana-Stylobasium spathulatum-Scaevola spp Low Heath C over Enchylaena tomentosa Low Heath D over Herbs and Open Grass, on cream to grey silty sand in upland swale.

cara06, near eastern coast of Cararang Peninsular, Shark Bay, approximately 8.5 km north-east of Cararang Station Homestead. On eastern side of east coast track, north of fenceline. Melaleuca huegelii subspecies pristicensis-Melaleuca cardiophylla Dense Low Heath C over Olearia spp-Threlkeldia diffusa Dwarf Scrub D over Brachycome latisquamea-Crassula

colorata var colorata-Calandrinia sp Very Open Herbs, on cream to white sand with shell grit and 5% surface cover of litter on north-east facing, flat to very gently sloping beach front.

cara07, near eastern coast of Cararang Peninsular, Shark Bay, approximately 8.5 km north-east of Cararang Station Homestead. On eastern side of east coast track, north of fenceline. Acacia spp Low Scrub A over Acacia sp-Scaevola spp-Pimelea microcephala Low Scrub B over Scaevola spinescens-Atriplex paludosa Low Heath C over Ptilotus obovatus var obovatus Dwarf Scrub D over Herbs and Austrostipa spp Open Grass, on pale red silty sand with 30% surface cover of litter on ENE-facing, flat to gently sloping upland.

cara08, near eastern coast of Cararang Peninsular, Shark Bay, approximately 6.5 km north-east of Cararang Station Homestead. On eastern side of east coast track, south of fenceline. , Melaleuca cardiophylla-Acacia spp Heath B over Melaleuca cardiophylla-Atriplex paludosa subspecies moquiniana-Senna glutenosa subspecies chatelainiana Dense Low Heath C over Ptilotus obovatus var obovatus Low Heath D over Open Herbs, on yellow silty sand with 5% surface cover of litter on flat to gently sloping midslope above east-facing beach front.

cbwl01, Approximately 100m north of Crayfish Bay Well, Edel Land, Shark Bay. , Acacia ligulata/rostellifera Low Scrub A over A. ligulata/rostellifera-Olearia axillaris-Rhagodia latifolia subspecies latifolia Dense Heath B over O. axillaris-Anthobolous foveolatus Dwarf Scrub C over Juncus-Isolepis Open Tall Sedges, on white to grey sand to sandy loam with 60% surface cover of litter, in swale.

cbwl02, Approximately 100m SSE of Crayfish Bay Well, Edel Land, Shark Bay. , Acacia didyma Dense Thicket over Myoporum insulare Low Scrub A over Rhagodia preissii subspecies obovata Dwarf Scrub C over Acanthocarpus preissii Low Heath D over Cassytha aurea-Zygophyllum fruticulosum Dense Herbs , on deep grey sand with 80% surface cover of litter on steep midslope of ridge

clbr01, Heirisson Prong, Shark Bay. Approximately 0.5 km ESE of third salt evaporation pond bar, on eastern side of Clough's Bar access track 4.8 km along track from junction with Useless Loop Rd. , Acacia sclerosperma Scrub to Low Scrub A over Melaleuca cardiophylla-Scaevola spp-Rhagodia spp Low Heath C over Frankenia pauciflora-Enchylaena tomentosa-Ptilotus obovatus var obovatus-Threlkeldia diffusa-Salsola kalis Low Heath D , on deep sand with 30% surface cover of litter on flat upland plateau.

clbr02, Approximately 10 km north of Bibby Giddy Outcamp on Herston Prong, Shark Bay. 30 m SSE of Clough's Bar access track at approximately 2.4 km along track from junction with Useless Loop Rd. , Diplolaena grandiflora-Ptilotus obovatus-Atriplex paludosa-Dodonea inequifolia-Acacia tetragonophylla Low Heath C to Dwarf Scrub D over Crassula colorata-Dioscorea hastifolia Herbs and Austrostipa spp Grass. On shallow red silty clay with 75% surface cover of limestone pavement and 20 % surface cover of litter on NE facing, gently sloping upland.

clbr03, Approximately 10 km north of Bibby Giddy Outcamp on Herston Prong, Shark Bay. 30 m SSE of Clough's Bar access track at approximately 2.5 km along track from junction with Useless Loop Rd. Scaevola spinescens-Pimelea microcephala Low Scrub B over Eremophila spp-Melaleuca cardiophylla-S. tomentosa-Acacia tetragonophylla Low Heath C over Solanum orbiculatum-Ptilotus obovatus-Thryptomene sp Dense Low Heath D over Herbs , on pale red silty sand with 35 % surface cover of litter on flat upland plateau.

clbr04, Approximately 10 km north of Bibby Giddy Outcamp on Herston Prong, Shark Bay. 50m SSE of Clough's Bar access track at approximately 2.5 km along track from junction with Useless Loop Rd. Acacia sp-Exocarpus aphylla Low Scrub A over Scaevola spp-Solanum orbicufolium-Exocarpus aphylla-Atriplex spp Low Heath C over Enchylaena

tomentosa-Ptilotus obovatus-Zygophyllum fruticulosum Dwarf Scrub D over Grass and Dense Herbs, on pale red deep silty sand with 20% surface cover of litter on flat upland plateau.

clbr05, Approximately 10 km north of Bibby Giddy Outcamp on Herston Prong, Shark Bay. South of Clough's Bar access track at approximately 1.5 km along track from junction with Useless Loop Rd. , Acacia spp Open Low Scrub B over Acacia tetragonophylla-Stylobasium spathulatum Open Dwarf Scrub C over Melaleuca cardiophylla-Calytrix strigosa Low Heath D over Triodia Dense Hummock Grass over Podolepis candescens and other Open Herbs , on red sand with 5 % surface cover of litter on very gentle, north-facing slope within shallow depression around birrida.

cprs01, Cape Rose, Peron Peninsular, Shark Bay, 14 km NE of Peron. Approximately 1.5 km north of eastern end of Cape Rose Track. , Spinifex longifolius Mid-Dense Hummock Grass, on deep, white sand on very gently sloping lower dune slope above beach front.

crby01, Approximately 2 km NW of Crayfish Bay Well, north Epineux Bay, Shark Bay Edel Land. Near first cross track on track south of Crayfish Bay Campsite. , Acacia didymus-Atriplex spp-Scaevola crassifolia-Swainsonia sp Shark Bay-Senecio lautus Dense Low Heath C to D over Spinifex longifolius Open Hummock Grass over Calandrinia polyandra-Crassula colorata Very Open Herbs , on white sand with 10% surface cover of litter on flat to very gently sloping, west-facing foredune.

crby02, Approximately 1.5 km NW of Crayfish Bay Well, Epineux Bay, Shark Bay Edel Land. Off four-wheel-drive access track between Crayfish Bay Campsite and False Entrance. Acacia sp-Atriplex cf paludosa-Scaevola crassifolia Low Heath C over Rhagodia spp-Eremophila glabra-Frankenia pauciflora-Acanthocarpus preissii Low Heath D over Senecio lautus-Calandrinia polyandra Open Herbs, on white sand with less than 2% surface cover of litter, in swale.

crby03, Approximately 1.5 km NW of Crayfish Bay Well, Epineux Bay, Shark Bay Edel Land. Off four-wheel-drive access track between Crayfish Bay Campsite and False Entrance. Acacia spp Heath B over Acacia sp-Rhagodia cf preissii subspecies obovata Low Heath C over Senecio lautus subspecies dissectifolius-Acanthocarpus preissii Low Heath D over S. lautus-Calandrinia sp Open Herbs, on white sand with 30% surface cover of litter, on west-facing, gently sloping midslope of dune.

crby04, Approximately 1.5 km west of Crayfish Bay Well, south Epineux Bay, Shark Bay Edel Land. To east of 4WD access track south of Crayfish Bay Campsite. , Acacia ligulata/rostellifera Open Low Scrub B over Diplolaena grandiflora-Rhagodia spp-Scaevola crassifolia-Thryptomene sp-Senecio lautus-Atriplex paludosa-Olearia axillaris Dense Low Heath D over Very Open Herbs, on cream sand with limestone outcrop at the base of foredune.

crby05, Approximately 1.5 km west of Crayfish Bay Well, south Epineux Bay, Shark Bay Edel Land. To east of 4WD access track south of Crayfish Bay Campsite. , Melaleuca cardiophylla-Alyogyne cuneifolia-Acacia sp Open Low Scrub B over Rhagodia spp-Diplolaena grandiflora-Scaevola crassiflora-Threlkeldia diffusa-Frankenia pauciflora Low Heath D over Very Open Grass and Herbs, on cream sand with less than 2% surface cover of litter, in swale.

crby06, Approximately 1 km WNW of Crayfish Bay Well, south Epineux Bay, Shark Bay Edel Land. To east of 4WD access track south from Crayfish Bay campsite. , Melaleuca cardiophylla Low Scrub B over M. cardiophylla-M. huegelii Low Heath C over Frankenia pauciflora-Acanthocarpus preissii Dwarf Scrub C over Lobelia heterophylla-Brachycome

latisquamea-Calandrinia sp Very Open Herbs, on cream sand with shellgrit and limestone outcrop in swale.

crby07, Approximately 3 km NNW of Crayfish Bay Well, north Epineux Bay, Shark Bay Edel Land. To east of Crayfish Bay campsite access track. , Acacia didymus-Myoporum insulare-Acacia ligulata/rostellifera Open Low Scrub A over A. didymus-M. insulare Low Heath C over Diplolaena grandiflora-Olearia axillaris Low Heath D over Spinifex Mid-Dense Hummock Grass over Open Herbs, on white sand with 15 % surface cover of litter on steep west-facing duneslope.

denh01, Approximately 6.5 km south of Peron Homestead, Peron Peninsular, Shark Bay. 100 m west of car park at Little Lagoon north of Denham Township. , Acacia ligulata/rostellifera-Diplolaena grandiflora Low Scrub B over Solanum orbiculatum subspecies orbiculatum-Melaleuca cardiophylla-Thryptomene sp Low Heath C over Brachycome latisquamea-Ptilotus divaricatus var divaricatus Open Herbs , on deep, red and white sand with 10% surface cover of litter, on west-facing gentle lower slope above birrida.

denh02, Approximately 14 km south of Peron Homestead, Peron Peninsular, Shark Bay. South of sidetrack off Denham-Hamelin Road south of Denham opposite Town Bluff. , Acacia spp-Pimelea microcephala Open Low Scrub B over Senna glutenosa-Atriplex cf paludosa-Rhagodia spp Dense Low Heath C over Solanum spp-Thryptomene sp-Maireana tomentosa-Ptilotus spp Low Heath D over Herbs, on deep, red sand with 15% surface cover of litter, on west-facing gently sloping midslope.

eabf01, South of Eagle Bluff, Peron Peninsular, Shark Bay. Approximately 3.5 km SSE of intersection of Eagle Bluff Rd and Denham Hamelin Rd. Acacia ligulata/rostellifera-Alyogyne cuneiformis Open Dwarf Scrub C to Dwarf Scrub D over Spinifex longifolia-Sporobolus virginicus Mid-Dense Hummock Grass over Very Open Herbs , on white sand with exposed limestone and 30% surface cover of litter, on SW-facing, gently sloping lower slope of foredune.

eabf02, South of Eagle Bluff, Peron Peninsular, Shark Bay. Approximately 2.5 km south of intersection of Eagle Bluff Rd and Denham Hamelin Rd. , Alyogyne cuneiformis-Exocarpus aphylla-Acacia ligulata/rostellifera Heath B over Pimelea microcephala-Scaevola spp-Stylobasium spathulatum Dense Low Heath C over Stylobasium spathulatum-Ptilotus divaricatus Open Dwarf Scrub D, on cream sand with limestone outcrop and 20% surface cover of litter on SE-facing slope of upland.

ebwe01, Peron Peninsular, Shark Bay. Approximately 6 km ESE of junction of Eagle Bluff Rd and Denham Hamelin Rd. , Acacia ligulata/rostellifera-Pimelea microcephala Open Low Scrub B over P. microcephala-Atriplex sp-Solanum orbiculatum-Stylobasium spathulatum Dwarf Scrub C over Triodia plurinervata Dense Hummock Grass over Very Open Herbs , on pale red sand on upland plain.

ebwe02, Peron Peninsular, Shark Bay. Approximately 9 km ESE of junction of Eagle Bluff Rd and Denham Hamelin Rd. Exocarpus aphylla Open Low Scrub B over Acacia ligulata/rostellifera-Pimelea microcephala-Rhagodia preissii subspecies obovata Dwarf Scrub C over Thryptomene sp-Melaleuca cardiophylla Low Heath D over Very Open Herbs. , on red sand with 15% surface cover of litter, on very gently inclined upper slope.

ebwe03, Peron Peninsular, Shark Bay. Approximately 9.5 km ESE of junction of Eagle Bluff Rd and Denham Hamelin Rd. Acacia sclerosperma-Alyogyne cuneiformis Low Scrub A and B over Atriplex cf paludosa-Rhagodia latifolia-Pimelea microcephala Dwarf Scrub C over Scaevola tomentosa-Threlkeldia diffusa Open Dwarf Scrub D , on white to cream coquina with shell grit and limestone outcrop on limestone bench above shore line.

ebwe04, Peron Peninsular, Shark Bay. Approximately 9.5 km ESE of junction of Eagle Bluff Rd and Denham Hamelin Rd. Exocarpus aphylla-Dodonea viscosa Open Dwarf Scrub C over Thryptomene sp-Atriplex paludosa Low Heath D over Very Open Herbs, on white sand with 5% surface cover of litter on blowout.

epby01, North Epineux Bay, Shark Bay Edel Land. Approximately 4 km NNW of Crayfish Bay well, west of west track. , Thryptomene sp-Dampiera incana var incana-Senecio lautus subspecies dissectifolius-Atriplex cf paludosa subspecies moquiniana-Rhagodia cf preissii subspecies obovata Dense Low Heath D over Very Open Grass over Carpobrotus candida-mixed Open Herbs, on yellow soil with 3% surface cover of limestone outcrop and greater than 3% surface cover of litter, on SW-facing, gently sloping upland.

fsen01, Zuytdorp Cliffs, Shark Bay Edel Land. Approximately 2.5 km SSE of Mt Dorrigo, east of 4WD track. Frankenia pauciflora-Acanthocarpus preissii-Thryptomene sp-Diplolaena grandiflora-Olearia axillaris Dense Low Heath D over Calandrinia polyandra-Carpobrotus candida-Swainsonia sp Shark Bay (Trudgen 7588)-Crassula colorata Very Open Herbs, on cream sand with 20% surface cover of litter, on gently sloping, upland with westerly aspect

fsen02, Approximately 6.5 km NNW of Mt Dorrigo, Shark Bay Edel Land. 10 m west of road to Steep Point approximately 0.5 km from cross road to False Entrance Well, Acacia spp-Diplolaena grandiflora Heath B over Atriplex paludosa subspecies moquiniana-Thryptomene sp-Melaleuca cardiophylla-Olearia spp Low Heath C over Frankenia sp-Salsola kalis Dwarf Scrub D over Triodia bromioides Mid-Dense Hummock Grass, on white to grey sand with 40% surface cover of litter, on very gently sloping upland.

fsen03, Approximately 5 km N of Mt Dorrigo, Shark Bay Edel Land. South of Birrida and track to False Entrance Well. Melaleuca cardiophylla Dwarf Scrub C over Thryptomene sp-Olearia dampieri subspecies dampieri-Opercularia aff spermacocae-Threlkeldia diffusa-M. cardiophylla Dense Low Heath D over Triodia bromioides Dense Hummock Grass over Open Herbs, on white sand with 10% surface cover of litter, on steep, east-facing midslope of dune.

fsen04, Approximately 2 km WSW of Foster Outcamp, Edel Land, Shark Bay. North of False Entrance Public Access Road, 1.9 km from junction with Useless Loop Rd. , Templetonia retusa Dwarf Scrub C over Ptilotus obovatus var obovatus-Acanthocarpus preissii-Dodonea aptera-Diplolaena grandiflora-Atriplex bunburyana-A. vesicaria subspecies incompta Low Heath D over Austrostipa spp Open Grass over Herbs , on grey to orange-brown sandy silt with 95% surface cover of limestone pavement and 10% surface cover of litter, on SW-facing, steep upper slopes and hill crest.

fsen05, Approximately 1.5 km SW of Foster Outcamp, Edel Land, Shark Bay. South of False Entrance Public Access Road, approximately 1 km from junction with Useless Loop Rd. , Acacia didymus Heath A over A. didymus-Exocarpus aphylla Low Scrub B over Atriplex paludosa subspecies moquiniana-Pimelea microcephala Low Heath C over Frankenia pauciflora-Salsola kalis-Threlkeldia diffusa Low Heath D over Open Herbs, on deep, grey sand with 60% surface cover of litter, on NW-facing, very gently inclined dune crest

hepr01, Approximately 2 km SW of Trig Station Spit, Heirisson Prong, Shark Bay. West of Rubberneck Rd. , Melaleuca huegelii subspecies pristicensis-Thryptomene sp Dense Low Heath C over Atriplex paludosa subspecies moquiniana-Threlkeldia diffusa Open Dwarf Scrub D, on deep, white sand with shell grit and 10% surface cover of litter, on beach.

hepr02, Approximately 2.5 km SW of Trig Station Spit, Heirisson Prong, Shark Bay. East of Rubberneck Rd. , Pimelea microcephala-Acacia tetragonophylla-Alectryon oleifolia-Santalum acuminatum Heath B over Thryptomene sp-Melaleuca cardiophylla-Threlkeldia diffusa-

Enchylaena tomentosa Low Heath D over Austrostipa spp Grass over Herbs, on pale red silty sand with 40% surface cover of litter on upland.

hepr03, Approximately 3 km SW of Trig Station Spit, Heirisson Prong, Shark Bay. West of Rubberneck Rd. , Nitraria billardierei-Templetonia retusa-Acacia ligulata/rostellifera Low Scrub B over Diplolaena grandiflora-Olearia axillaris-Rhagodia spp Dwarf Scrub C over Acanthocarpus preissii-Thryptomene sp Dwarf Scrub D over Mid-Dense Hummock Grass, on deep white sand with 20% surface cover of litter, on lower slope of foredune.

hepr04, Approximately 5.5 km SSW of Trig Station Useless, Heirisson Prong, Shark Bay. , Alyogyne cuneiformis Open Low Scrub A over Melaleuca cardiophylla-Scaevola tomentosa-Eremophila oldfieldii subspecies oldfieldii Dwarf Scrub C over Threlkeldia diffusa Dwarf Scrub D over Triodia plurinervata Dense Hummock Grass, on deep, pale red silty sand with 5% limestone pebble surface cover and 20% surface cover of litter, on upland with westerly aspect.

hepr05, Approximately 7 km SW of Trig Station Useless, Heirisson Prong, Shark Bay. On side track off Rubberneck RD. , Atriplex cf paludosa subspecies moquiniana-Pittosporum phylliraeoides Dwarf Scrub C over Frankenia pauciflora-Sclerolaena uniflora Dwarf Scrub D over Cephalipterum drummondii Dense Herbs, on pale red sandy silt on upland.

mmia01, Approximately 3 km west of Monkey Mia Jetty, Peron Peninsular, Shark Bay. West of track to water front north from Monkey Mia RD. , Acacia spp-Santalum spicatum Open Scrub over Dodonea inaequifolia-Exocarpus aphylla-Acacia tetragonophylla Heath B over Rhagodia latifolia subspecies latifolia-Ptilotus spp Dwarf Scrub over Enchylaena tomentosa-Maireana tomentosa Low Heath D , on red sand with limestone pavement and 30% surface cover of litter, on upland with ENE aspect.

mmia02, Approximately 1.5 km west of Monkey Mia Jetty, Peron Peninsular, Shark Bay. North of Monkey Mia RD. Acacia sclerosperma Open Scrub over Rhagodia preissii subspecies obovata-Thryptomene sp Low Heath C over Crassula colorata var colorata Very Open Herbs , on white sand with 20% surface cover of litter, on very gently inclined lower slope of foredune/beach.

nang01, 5 km ENE of Nanga Station Homestead. East of Nanga Bore and Yards, south of track. Acacia ligulata/rostellifera-A. ramulosa-Eremophila maitlandii-Grevillea stenobotrya Low Scrub A over Stylobasium spathulatum-Lechenaultia linarioides-Pimelea microcephala-A. tetragonophylla Heath B over Triodia Dense Hummock Grass, on deep, red sand with 40% surface cover of litter, on upland.

nang02, 10.5 km NE of Nanga Station Homestead. Off side track to birrida off South of Sandlewood track. , Santalum spicatum Open Low Woodland B over Acacia ramulosa-A. sclerosperma-A. tetragonophylla-Dodonea viscosa subspecies angustifolia Dense Heath A over A. ramulosa-A. tetragonophylla Heath B over Open Grass over Herbs, on deep, red sand with 60% surface cover of litter on gently sloping, SSW-facing lower slope above birrida.

nang03, Approximately 9 km ESE of Point Petit Bore, Nanga Station, Peron Peninsular Shark Bay. Acacia sclerosperma Open Low Scrub A to B over Scaevola crassifolia-Thryptomene sp-Lechenaultia linarioides Low Heath C over Very Open Herbs, on white coquina/sand with shell grit and 20% surface cover of litter, on very gently inclined, west-facing slope on beach

nang04, Approximately 6.5 km north of Nanga Station, Peron Peninsular, Shark Bay. South of track between beach and bore/yards. Acacia ligulata/rostellifera-Grevillea eriostachya subspecies eriostachya Heath A over Low Scrub B Stylobasium spathulatum-Scaevola

tomentosa Dwarf Scrub C over Triodia danthonioides Mid-Dense Hummock Grass, on deep, red sand with 30% surface cover of litter on upland between birrida and beach.

nang05, Approximately 100m south of Point Petit Bore, Nanga Station, Peron Peninsular, Shark Bay. Acacia sclerosperma Scrub over Diplolaena grandiflora-A. sclerosperma Low Scrub A over Dodonea inaequifolia-D. viscosa-Diplolaena grandiflora-Olearia dampieri Heath B over Acanthocarpus sp-Ptilotus spp Dwarf Scrub D, on pale red sand with 50% surface cover of litter, on footslope.

nang06, Approximately 4 km east of Point Petit Bore, Nanga Station, Peron Peninsular, Shark Bay. 10 m south of track. , Acacia ramulosa-A. sclerosperma-A. tetragonophylla Thicket over Pimelea microcephala-Exocarpus aphylla Low Scrub B over Ptilotus obovatus var obovatus-Scaevola tomentosa Dwarf Scrub C over Very Open Grass and Very Open Herbs, on deep, red sand with 60% surface cover of litter, on east-facing, gently sloping upland.

nang07, Approximately 13.5 km ENE of Nanga Station Homestead, Peron Peninsular, Shark Bay. 2.2 km east of bore, south of fenceline and track. Eremophila oldfieldii subspecies oldfieldii Open Scrub over Acacia sclerosperma-Exocarpus aphylla-Dodonea viscosa subspecies angustissima Low Scrub A over Stylobasium spathulatum Low Scrub B over Austrostipa spp Grass over Herbs, on grey coquina and sand with shell grit and 15% surface cover of litter, on gently inclined slope.

nang09, Approximately 2 km NW of No 3 Bore, Nanga Station, Peron Peninsular Shark Bay. Banksia ashbyii-Grevillea stenobotrya-Eucalyptus eudesmoides subspecies sellachiana Low Woodland B over Calothamnus formosus Scrub over C. formosus-Acacia ligulata/rostellifera Heath B over Triodia danthonioides Dense Hummock Grass, on red sand on NE-facing very gently inclined upland.

pern01, Approximately 5 km NNW of Peron Homestead, Peron Peninsular, Shark Bay. , Lamarchea hakeifolia var hakeifolia-Olearia dampieri subspecies dampieri-Rhagodia preissii subspecies obovata-Rhagodia latifolia subspecies latifolia-Ptilotus obovatus var obovatus-Acanthocarpus robustus Dense Low Heath C, on red sand with 40% surface cover of litter on upland.

pern010, Approximately 5.5 km NNE of Peron Homestead, Peron Peninsular, Shark Bay. , Brachychiton gregorii Open Low Woodland B over Acacia ramulosa-A. tetragonophylla Dense Thicket over A. ramulosa Heath A over Ptilotus obovatus-Thryptomene sp Dwarf Scrub D over Brassica tournefourtii-Podolepis candescens Dense Herbs , on red sand with 60% surface cover of litter, on very gently inclined, NE-facing lower slope.

pern02, Approximately 8.5 km NNW of Peron Homestead, Peron Peninsular, Shark Bay. Near road from homestead to Cape Peron. Lamarchea hakeifolia-Hakea stenophylla Low Scrub A over Acacia ligulata/rostellifera-Olearia dampieri-L. hakeifolia Heath B over Thryptomene sp-Acanthocarpus robustus Dwarf Scrub C over Triodia plurinervata Mid-Dense Hummock Grass, on red sand with 20% surface cover of litter, on upland.

pern03, Approximately 22 km NNW of Peron Homestead, Peron Peninsular, Shark Bay. 400 m south of fork in road to Herald Bight and Cape Peron, on western side of road. , Acacia sclerosperma Open Low Scrub A over A. sclerosperma-A. ramulosa-A. tetragonophylla-Dodonea viscosa Dense Heath B over Scaevola spp-Stylobasium spathulatum Dwarf Scrub C over Acanthocarpus robustus-Ptilotus obovatus Dwarf Scrub D , on red sand with 40% surface cover of litter, on gentle, NE-facing lower slope above birrida

pern04, Approximately 18.5 km NNE of Cape Lesueur/Peron Hills Trig Point. SW of Birrida. Acacia tetragonophylla-A. ligulata/rostellifera-A. ramulosa-Eremophila sp Low Scrub B over Scaevola spinescens-A. tetragonophylla-Melaleuca cardiophylla Low Heath C over M. cardipophylla-Thryptomene sp Dense Low Heath D over Very Open Herbs , on red sand with 20% surface cover of litter, on upland.

pern05, Approximately 22.5 km N of Peron Homestead, Peron Peninsular, Shark Bay. East of 4WD beach track to Herald Bluff. Avicennia marina Low Forest B over Sporobolis virginicus Open Grass over Halosarcia spp Herbs, on deep, white sand on beach.

pern06, Approximately 22 km N of Peron Homestead, Peron Peninsular, Shark Bay. Accessed by 4WD track between Herald Bluff and Herald Bluff Campsite. Acacia spp Scrub over Acacia ramulosa-A. tetragonophylla-Exocarpus aphylla Low Scrub A over Atriplex paludosa Low Scrub B over Maireana tomentosa-Eremophila latrobei-Ptilotus obovatus-Enchylaena tomentosa Dwarf Scrub D over Open Herbs , on red sand with 20% surface cover of litter, on upland near cliffs.

pern07, Approximately 22.5 km N of Peron Homestead, Peron Peninsular, Shark Bay. Accessed by 4WD track between Herald Bluff and Herald Bight. Acacia sclerosperma subspecies sclerosperma Scrub over Exocarpus aphylla Open Low Scrub A over Thryptomene sp-Rhagodia preissii subspecies obovata Dense Low Heath C, on deep, white sand with 20% surface cover of litter, on very gently inclined, north-facing lower slope on beach front.

pern08, Approximately 19.5 km N of Peron Homestead, Peron Peninsular, Shark Bay. 50m south of track between 10 Mile Tank and Birrida, off main track to Point Peron, Acacia ramulosa-A. ligulata/rostellifera-Lamarchea hakeifolia Thicket over Scaevola spinescens-Persoonia bowgada Low Scrub B over Ptilotus obovatus-Scaevola spinescens-Dianella revoluta Dwarf Scrub C over Brassica tournefortii Open Herbs, on deep, red sand with 30% surface cover of litter, on very gently inclined, north-facing upper slope.

pern09, Approximately 8.5 km N of Peron Homestead, Peron Peninsular, Shark Bay. East of Peron Homestead-Cape Peron Rd. Eucalyptus aff prominens Low Forest A over Acacia ligulata/rostellifera-Exocarpus aphylla Heath A over Pimelea microcephala-Scaevola spp Low Scrub B over Ptilotus obovatus-P. divaricatus-Thryptomene sp Low Heath D, on deep, red sand with 40% surface cover of litter, on SW-facing gentle slope on upland.

stpt01, Steep Point, Shark Bay. Approximately 2.5 km SE of Mt Direction. Thryptomene sp-Melaleuca cardiophylla-Atriplex spp-Rhagodia latifolia-Frankenia pauciflora-F. cinerea-Angianthus cunninghamii Low Heath D over Sporobolis sp Open Grass over Senecio lautus and other Herbs, on cream clayey sand, with 10% surface cover of litter, on edge of birrida.

stpt02, Steep Point, Shark Bay. Approximately 2.5 km SSE of Mt Direction. Melaleuca cardiophylla-M. huegelii-Thryptomene sp Low Heath D over Triodia bromioides Mid-Dense Hummock Grass over Podolepis candescens-Carpobrotus candida Open Herbs over Desmocladus asper Very Open Low Sedge, on cream sand with 10% surface cover of limestone, on gently inclined, west-facing slope.

stpt03, Steep Point, Shark Bay. Approximately 1 km NE of Mt Direction. Avicennia marina Low Forest B over Halosarcia halocnemoides-Sarcocornia quinqueflora-Muellerolimon salicorniaceum, on deep, brown mud on fringe of tidal inlet

stpt04, Steep Point, Shark Bay. Approximately 2.5 km SE of Mt Direction. Alyogyne cuneiformis Open Low Scrub A over Melaleuca cardiophylla-M. huegelii-Diplolaena grandiflora Low Scrub B over Dense Low Heath C over Threlkeldia diffusa-Rhagodia

preissii-R. latifolia-Thryptomene sp Low Heath D, on deep, cream sand with 30% surface cover of litter, on dune crest.

stpt05, Steep Point, Shark Bay. Approximately 1 km SW of Monkey Rock. Thryptomene sp-Olearia axillaris Dense Low Heath D over Lomandra maritima-Senecio lautus-Calandrinia polyandra-Carpobrotus sp Herbs, on cream sand on gently sloping, SW-facing duneslope.

stpt06, Steep Point, Shark Bay. Approximately 1.5 km south of Monkey Rock. Frankenia pauciflora-Diplolaena grandiflora-Scaevola crassifolia-Thryptomene sp Dense Low Heath D over Sporobolus virginicus-Austrostipa crinita Open Grass over Open Herbs, on deep, white sand with 10% surface cover of litter, on gently sloping, NE-facing upland slope.

stpt07, Steep Point, Shark Bay. Approximately 2 km SE of Monkey Rock. Frankenia pauciflora-Melaleuca cardiophylla-Thryptomene sp-Rhagodia preissii-R. latifolia Dense Low Heath D over Triodia bromioides-Austrostipa crinita-Eragrostis barrelieri Hummock Grass over Open Herbs, on cream sand with 5% surface cover of litter, on east-facing lower slope .

stpt08, Steep Point, Shark Bay. Approximately 5 km SE of Monkey Rock. Melaleuca cardiophylla-Thryptomene sp Low Heath D over Triodia bromioides Mid-Dense Hummock Grass over Waitzia podolepis-Senecio lautus Open Herbs, on deep, cream sand to silty sand on lowland plain

stpt09, Steep Point, Shark Bay. Approximately 8.5 km SE of Mt Direction. Acacia ligulata/rostellifera Heath A over Olearia axillaris-O. dampieri-Rhagodia latifolia-A. ligulata/rostellifera Low Heath C over Acanthocarpus preissii-Frankenia pauciflora-R. latifolia-Threlkeldia diffusa Low Heath D over Herbs , on cream to white sand with 5% surface cover of limestone cobbles and 40% surface cover of litter on gentle slope of upland.

stpt10, Steep Point, Shark Bay. Approximately 8 km SE of Mt Direction. Acacia ligulata/rostellifera Heath A over Olearia axillaris Open Dwarf Scrub C over Swainsonia sp Shark Bay (Trudgen 7588)-Scaevola anchusifolia-Senecio lautus Open Herbs over Juncus krausii Dense Tall Sedges, on white soil with 8% limestone pavement surface cover and 75% surface cover of litter, in swale

stpt11, Steep Point, Shark Bay. Approximately 8 km SE of Mt Direction. Acacia ligulata/rostellifera-Melaleuca huegelii-A. didymus Heath A over A. ligulata/rostellifera-M. huegelii Dense Heath A over Anthocercis littorea Dwarf Scrub C over Austrostipa spp Very Open Grass over Clematis linearifolia/other Herbs, on deep, grey to brown loamy sand with 80% surface cover of litter, in valley.

stpt12, Steep Point, Shark Bay. Approximately 7.5 km SE of Mt Direction. South of Steep Point Track and old fenceline. Acacia ligulata/rostellifera-Alyogyne cuneiformis Low Scrub A over Beaufortia dampieri-Melaleuca cardiophylla-Pimelea microcephala-Thryptomene sp-Rhagodia spp Low Heath C over Threlkeldia diffusa Dwarf Scrub C over Grass over Herbs, on deep, white sand with 60% surface cover of litter, on steep upper duneslope.

tama01, Approximately 6.5 km WNW of Tamala Station Homestead, Shark Bay. On eastern side of new Useless Loop-Perth Rd. Pittosporum phylliraeoides-Santalum acuminatum-Exocarpus aphylla Open Low Scrub B over Atriplex paludosa-Melaleuca cardiophylla-Thryptomene sp-Olearia dampieri Dense Low Heath D over Austrostipa Open Grass over Open Herbs, on white sand with less than 2% limestone rock surface cover and 20% surface cover of litter, on gently sloping, E-facing upper dune slope.

tama02, Approximately 15 km NW of Tamala Station Homestead, Shark Bay. North of saline coastal flats on road to Boorabuggatta Well, off Useless Loop Rd. Acacia

ligulata/rostellifera Low Scrub A over Melaleuca huegelii-Olearia axillaris-Rhagodia latifolia-Atriplex paludosa Dense Low Heath C over Threlkeldia diffusa-Maireana stipitata-Frankenia sp Dwarf Scrub D over Open Herbs , on pale grey silty sand with 50% surface cover of litter, on valley plain between dune ridges.

tama03, Approximately 16.5 km NW of Tamala Station Homestead, Shark Bay. North of Useless Loop Rd, immediately west of coastal saline flats. Melaleuca cardiophylla-Atriplex paludosa Dwarf Scrub C over Thryptomene sp-Scaevola crassifolia-M. cardiophylla Dense Low Heath D over Very Open Grass over Very Open Herbs over Very Open Low Sedges, on deep, white sand with 10% surface cover of litter, on W-facing, steep upper dune slope

tbat01, Edel Land, Shark Bay. Approximately 8.5 km SSE of Mt Direction, accessed by 4WD track to Thunder Bay, Blowholes and Crayfish (Epineux) Bay. Acacia ligulata/rostellifera-Melaleuca cardiophylla Open Low Scrub B over M. cardiophylla-Atriplex paludosa-Rhagodia latifolia-R. cf preissii-Thryptomene sp Dense Low Heath D over Triodia bromioides-Austrostipa spp Mid-Dense Hummock Grass, on cream sand with shell grit and 20% surface cover of litter, on very gently inclined, ENE-facing lower duneslope/swale.

tbat02, Edel Land, Shark Bay. Approximately 8.5 km SSE of Mt Direction, accessed by 4WD track to Thunder Bay, Blowholes and Crayfish (Epineux) Bay. Melaleuca cardiophylla Low Heath C over Rhagodia latifolia-R. cf preissii-Atriplex paludosa-Thryptomene sp-Frankenia pauciflora Low Heath D over Triodia bromioides-Eragrostis barrelieri Mid-Dense Hummock Grass over Dense Herbs, on deep, pale grey sand with less than 10% surface cover of litter, in swale

uslp01, Approximately 5 km SSE of Useless Loop Township and Trig Station, Shark Bay. N of access road along beach. Acacia ligulata/rostellifera-Santalum acuminatum Open Low Scrub A over A. ligulata/rostellifera-Pittosporum phylliraeoides Low Scrub B over Thryptomene sp-Scaevola crassifolia-Atriplex paludosa-Olearia axillaris Low Heath D, on cream to grey sand with shell grit and 30% surface cover of litter, on beach front.

uslp02, 4 km S to SSE of Useless Loop Township and Trig Station, Shark Bay. N of access road along beach. Acacia tetragonophylla-Pimelea microcephala Dwarf Scrub C over Diplolaena grandiflora-Atriplex bunburyana-Rhagodia latifolia-R. preissii-Ptilotus obovatus Low Heath D over Crassula colorata-Sonchus tennerimus and other Herbs , on red silty clay with 90% surface cover of limestone outcrop, on gently sloping upland.

uslp03, Approximately 12 km S to SSW of Useless Loop Township and Trig Station, Shark Bay. S of Useless Loop-Perth Rd, between two birridas near turnoff to Clough's Bar. Acacia ramulosa Heath A over A. ramulosa-Dodonea inaequifolia Dense Heath B over Senna glutinosa-Scaevola tomentosa-D. inaequifolia Dwarf Scrub C over Brassica tournefortii-Porana sericea-Dioscorea hastifolia-Zygophyllum sp and other Herbs , on red sand with 40% surface cover of limestone pavement and 60% surface cover of litter, on upland.

uslp04, Approximately 12 km S to SSW of Useless Loop Township and Trig Station, Shark Bay. S of Useless Loop-Perth Rd, between two birridas near turnoff to Clough's Bar. Pimelea microcephala-Acacia tetragonophylla Low Scrub B over Melaleuca cardiophylla-Eucalyptus fruticosa-Atriplex paludosa Dense Low Heath C over Scaevola spinescens-S. tomentosa-Enchylaena tomentosa Low Heath D over Herbs , on pale red silty sand with 10% surface cover of limestone pebbles and 30% surface cover of litter, on very gently inclined, SE-facing upper slope above birrida.

uslp05, 2.5 km approximately S of Useless Loop Township and Trig Station, Shark Bay. On E side of Useless Loop-Perth Rd. Acacia tetragonophylla open Dwarf Scrub C over Melaleuca cardiophylla-Thryptomene sp Low Heath D over Triodia plurinervata Dense

Hummock Grass over Podolepis candescens-Lobelia heterophylla Very Open Herbs, on cream sandy silt with greater than 5% surface cover of litter, on gently inclined, W-facing footslope at the back of dune.

uslp06, Approximately 8.5 km S of Useless Loop Township and Trig Station, Shark Bay. N of gypsum minesite on E side of road. Acacia sp Low Scrub A over Pimelea microcephala-A. tetragonophylla-Stylobasium spathulatum Low Scrub B over Pittosporum phylliraeoides-Scaevola spp-Atriplex paludosa Low Heath C over Enchylaena tomentosa-Maireana tomentosa Low Heath D, on cream silt on very gently inclined midslope of undulating uplands, above birrida.

uslp07, Approximately 5.5 km SSE of Bibby Giddy Outcamp, Edel Land, Shark Bay. Near trig point NM/F /530, on W side of Useless Loop-Perth Rd. Acacia ligulata/rostellifera-Melaleuca cardiophylla-Atriplex paludosa-Pimelea microcephala Low Scrub B over M. cardiophylla-Thryptomene sp-Atriplex paludosa Low Heath C over Frankenia pauciflora Low Heath D over Open Grass over Dense Herbs, on sandy silt on very gently inclined upland swale.

uslp08, Approximately 0.5 km NNW of Foster Outcamp, Edel Land, Shark Bay. On E side of Useless Loop-Perth Rd. Acacia didyma-Pittosporum phylliraeoides-A. ligulata/rostellifera Open Scrub over P.phylliraeoides-A. didyma-Exocarpus aphylla Heath A over Scaevola spp-Atriplex paludosa Low Heath C over Grass over Rhodanthe humboldtiana and other Herbs , on grey sandy silt with 30% surface cover of litter, on very gently sloping, W-facing upland depression.

whal01, Taillefer Isthmus, Shark Bay. Approximately 6 km NNW of repeater station site near Goulet Bluff. Bossiaea walkerii-Diplolaena grandiflora Low Heath C over Sida calyxhymeniana-Frankenia pauciflora-Ptilotus obovatus-Rhagodia latifolia Dwarf Scrub D over Austrostipa spp-Austrodanthonia caespitosa Very Open Grass , on orange sand with 90% of surface cover limestone/sandstone cobbles and stones, on moderately steep upper slope of limestone bluff.

APPENDIX 4: Descriptions for floristic survey site-plots on Bernier and Dorre Islands, 1998.

Site	Location	Vegetation	Sitedesc
BI01	approximately 700 m west of Red Cliff Point, Bernier Island, Shark Bay WA.	Rhagodia preissii, Atriplex paludosa Open Dwarf Scrub C over Sclerolaena uniflora Dwarf Scrub D over Triodia plurinervata Mid-Dense Hummock Grass over Paractaenum novae-hollandiae Open Low Grass over Brachycome iberidifolia Open Herbs	On pale orange-brown sand on east-facing sandplain slope, 200m from coastline.
BI02	approximately 750 m west of Red Cliff Point, Bernier Island, Shark Bay WA.	Dampieri incana, Sclerolaena uniflora, Frankenia pauciflora Low Heath D over Eulalia aurea Open Low Grass over Paractaenum novae-hollandiae Low Grass over Brachycome iberidifolia Herbs	On pale orange-brown sand on gentle north-facing sandplain slope, 200m from coastline.
BI03	approximately 1 km W to WSW of Wedge Rock, Hospital Landing area, Bernier Island, Shark Bay WA.	Eucalyptus oraria Tree Mallee over Beyeria cinerea Dwarf Scrub D	On pale yellow-brown sand on low east-facing rise in sandplain, 600m from coastline.
BI04	approximately 1.7 km west of Wedge Rock, Hospital Landing area, Bernier Island, Shark Bay WA	Diplolaena grandiflora, Acacia coriacea, Alyogyne cuneiformis Open Dwarf Scrub C over Thryptomene baeckeacea, capparis spinosa Low Heath D over Wurmbea odorata Very Open Herbs	In pockets of skeletal soil on limestone outcrop on gentle east-facing sandplain slope, 1 km from coastlines.
BI05	approximately 1.6 km WNW of Wedge Rock, Hospital Landing area, Bernier Island, Shark Bay WA.	Acacia ligulata/rostellifera Open Low Scrub A over A.ligulata/rostellifera Dense Heath B over Ptilotus obovatus var obovatus, Acanthocarpus robustus Open Dwarf Scrub D	On orange-brown sand on east-facing, gently sloping sandplain, less than 1 km from coastline.
BI06	approximately 1.7 km west of Wedge Rock, Hospital Landing area, Bernier Island, Shark Bay WA.	Alyogyne cuneiformis, Ficus platypoda Scrub over A.cuneiformis, Diplolaena grandiflora, Acacia coriacea Heath A over Pimelea microcephala, Rhagodia preissii Low Scrub B over Dodonea bursariifolia, Marsdenia graniticola Dwarf Scrub C	On orange sand on sandplain fringing a limestone outcrop, 1 km from coastline.
BI07	approximately 1.6 km WNW of Wedge Rock, Hospital Landing area, Bernier Island, Shark Bay WA.	Alyogyne pinoniana Open Low Scrub A over A.pinoniana Open Low Scrub B over Thryptomene baeckeacea, Beyeria cinerea Low Heath D over Nicotiana occidentalis, Stackhousia clementii Very Open Herbs	On orange sand on very gently sloping, NNE-facing sandplain, 1 km from coastline.
BI08	approximately 1.35 km WNW of Wedge Rock, Hospital Landing area, Bernier Island, Shark Bay WA.	Alectryon oleifolius, Jasminum calcarium, Alyogyne pinoniana Low Scrub A over Acacia coriacea, A.pinoniana Heath B over A.pinoniana Open Dwarf Scrub C over Calocephalus aervoides Open Herbs	On orange-brown sand on undulating sandplain, 700 m from coastline.

Site	Location	Vegetation	Sitedesc
BI09	approximately 450 m WSW of Red Cliff Point, Bernier Island, Shark Bay WA.	Rhagodia preissii Open Dwarf Scrub C over Olearia axillaris sens lat., Dampieri incana Low Heath D over Triodia plurinervata Mid-Dense Hummock Grass over Eulalia aurea Low Grass over Senecio lautus, Brachycome iberidifolia Open herbs	On cream-coloured sand on very gently sloping sandplain between two vegetated dunes, 250 m from coastline.
BI10	approximately 1.4 km WSW of Red Cliff Point, in picket line running east-west from south of point, Bernier Island, Shark Bay WA.	Rhagodia sp. Open Dwarf Scrub C over Thryptomene baeckeacea, Acanthocarpus robustus Dense Low Heath D	On pale orange-brown sand on east-facing, gently sloping sandplain, 1 km from coastline.
BI11	approximately 2.35 km W-WSW of Red Cliff Point, Bernier Island, Shark Bay WA.	Frankenia pauciflora Low Heath D over Carpobrotus candidus, Senecio lautus Open Herbs	Above low cliffs on western coast, on travertine limestone with skeletal soil.
BI12	in bay, approximately 500m west of Red Cliff Point, Bernier Island, Shark Bay WA.	Olearia axillaris sens lat., Pileanthus limacis Dwarf Scrub C over Spinifex longifolius Mid-Dense Hummock Grass over Ptilotus villosiflorus Very Open Herbs	On white to pale yellow/grey sand on vegetated beach front above washline.
BI13	approximately 2.5 km WSW-SW of Red Cliff Point, Bernier Island, Shark Bay WA.	Alyogyne cuneiformis, Diplolaena grandiflora Low Scrub B over Rhagodia preissii, Pimelea microcephala, Atriplex paludosa Open Dwarf Scrub C over Olearia axillaris sens lat., Scaevola spp., Dodonea bursariifolia Low Heath D	On shallow and skeletal pale orange-brown sand over outcropping limestone, less than 400 m from coastline.
BI14	approximately 2.3 km WSW of Red Cliff Point, Bernier Island, Shark Bay WA.	Diplolaena grandiflora Low Scrub B over Olearia axillaris sens lat., Stylobasium spathulatum Low Heath C over Frankenia pauciflora, Threlkeldia diffusa Open Dwarf Scrub D over Carpobrotus candidus Very Open Herbs	On cream to pale reddish-brown sand on crest of tall dune overlying sandplain, 150 m from coastline.
BI15	approximately 700 m WNW of Wedge Point, northern Bernier Island, Shark Bay WA.	Exocarpos aphyllus Open Low Scrub A over Acacia ligulata/rostellifera Open Low Scrub B over A.ligulata/rostellifera, Westringia dampieri Low Heath C over Acanthocarpus preissii, Westringia dampieri, Commicarpus australis Low Heath D	On cream-coloured sand on plain at the base of low dune and adjacent to limestone outcrop, 400 m from coastline.
BI16	approximately 1.4 km NW of Wedge Rock, Bernier Island, Shark Bay WA.	Pittosporum phylliraeoides, Acacia coriacea Open Low Scrub A over Atriplex paludosa, Rhagodia preissii, Trichodesma zeylanicum Heath B over Acanthocarpus preissii, A.robustus Dwarf Scrub D over Spinifex longifolius Hummock Grass	On white sand on crest of NNW-SSE running dune, 500 m from coastline.
BI17	approximately 1.3 km WNW of Wedge Rock, Bernier Island, Shark Bay WA.	Eucalyptus oraria Tree Mallee over Alyogyne pinoniana Low Scrub B over Beyeria cinerea Dwarf Scrub D	On pale orange-brown sand with 20% surface cover of limestone pebbles, on crest of gentle east-facing sandplain slope, 650 m from coastline.

Site	Location	Vegetation	Sitedesc
BI18	approximately 600 m WSW of Wedge Point, northern Bernier Island, Shark Bay WA.	Alyogyne cuneiformis Open Low Scrub A over Pimelea microcephala, Acacia ligulata/rostellifera, Rhagodia sp. Low Scrub B over Olearia axillaris sens lat., Open Dwarf Scrub C over Frankenia pauciflora, Acanthocarpus preissii Dwarf Scrub D	On white sand in narrow swale behind coastal foredune.
BI19	approximately 750 m WNW of Wedge Point, northern Bernier Island, Shark Bay WA.	Pileanthus limacis, Acacia ligulata/rostellifera Open Dwarf Scrub C over P.limacis, Westringia dampieri Dwarf Scrub D over Eulalia aurea Very Open Low Grass over Carpobrotus candidus Very Open Herbs	In sand-filled pockets in limestone pavement, 400 m from coastline.
BI20	approximately 250 m WNW of the middle of Digby Point, Bernier Island, Shark Bay WA.	Eucalyptus obtusiflora Tree Mallee over Atriplex paludosa, Acacia coriacea Dwarf Scrub C over Eremophila desertii, Thryptomene baeckeacea Low Heath D over Brachycome iberidifolia, Nicotiana occidentalis Very Open Herbs	On pale yellow-white sand on sandplain at base of vegetated coastal dune, 150 m from coastline.
BI21	approximately 300 m WNW of the middle of Digby Point, Bernier Island, Shark Bay WA.	Eucalyptus oraria Tree Mallee	On orange-brown sand on sandplain, 250 m from coast.
DI01	on Guano Point at north end of White Beach, Dorre Island, Shark Bay WA.	Frankenia pauciflora Dwarf Scrub D over Eragrostis dielsii Very Open Low Grass over Calocephalus aervoides, Chenopodium murale Dense Heath	On shallow grey and yellow sand over limestone platform on coastline.
DI02	NE of White Beach, approximately 900 m north of Boulder Cliff, Dorre Island, Shark Bay WA.	Thryptomene baeckeacea, Scaevola crassifolia, Olearia axillaris sens lat. Low Heath D over Carpobrotus candidus, Angianthus cunninghamii Very Open Herbs	On travertine limestone with skeletal soil to shallow pale yellow-brown sand, above cliffs on western coastline.
DI03	NE of White Beach, approximately 950 m north of Boulder Cliff, Dorre Island, Shark Bay WA.	Thryptomene baeckeacea, Scaevola crassifolia, Acacia ligulata, Zygophyllum fruticulosum Dense Low Heath D	On very pale brown sand on very gently inclined, ESE-facing sandplain, 200 m from coastline.
DI04	approximately 950 m SW of Quoin Bluff, Dorre Island, Shark Bay WA.	Acacia ligulata/rostellifera, Alyogyne cuneiformis Open Dwarf Scrub C over Melaleuca cardiophylla, Beyeria cinerea Low Heath D over Triodia plurinervata Mid-Dense Hummock Grass over Stackhousia clementii Very Open Herbs	On orange-brown sand on very gently sloping, ESE-facing sandplain, 250 m from coastline.
DI05	approximately 1 km WSW of Quoin Bluff, Dorre Island, Shark Bay WA.	Acacia ligulata/rostellifera Dwarf Scrub C over Beyeria cinerea, Acanthocarpus robustus, Thryptomene baeckeacea Dwarf Scrub D over Triodia plurinervata Dense Hummock Grass	On orange-brown sand on gently inclined, west-facing sandplain, 600 m from coastline.

Site	Location	Vegetation	Sitedesc
DI06	approximately 450 m NNW of Guano Point at White Beach, Dorre Island, Shark Bay WA.	Eremophila glabra subspecies psammophora, E.glabra subspecies tomentosa Dwarf Scrub C over Thryptomene baeckeacea, Threlkeldia diffusa, Dicrastylis maritima Dense Low Heath D over Triodia plurinervata Open Hummock Grass	On pale yellow-brown sand on crest of low dune, 300 m from coastline.
DI07	approximately 1.4 km WSW-W of Quoin Bluff, Dorre Island, Shark Bay WA.	Eremophila glabra Open Low Scrub A over Pimelea microcephala, Alyogyne cuneiformis, Rhagodia preissii Low Scrub B over Acacia ligulata, Solanum orbiculatum Open Dwarf Scrub C over Olearia axillaris sens lat. Open Dwarf Scrub C	On red-brown sand on very low rise in sandplain, with >70% bare ground. More than 1 km from coastline.
DI08	approximately 1.6 km W-WSW of Quoin Bluff, Dorre Island, Shark Bay WA.	Pittosporum phylliraeoides Open Low Scrub B over Eucalyptus obtusiflora Tree Mallee over Beyeria cinerea Dwarf Scrub D over Triodia plurinervata Mid-Dense Hummock Grass	On orange sand on very gently inclined, west-facing sandplain, 1.5 km from coastline.
DI09	approximately 1.75 km W-WSW of Quoin Bluff, Dorre Island, Shark Bay WA.	Alyogyne pinoniana Open Low Scrub B over Acacia ligulata/rostellifera, Stylobasium spathulatum Open Dwarf Scrub C over Hakea stenophylla, Beyeria cinerea Low Heath D over Triodia plurinervata Mid-Dense Hummock Grass	On orange-brown sand on very gently inclined, east-facing sandplain, more than 1.5 km from coastline.
DI10	approximately 6.25 km north of Observation Hillock, Dorre Island, Shark Bay WA.	Diplolaena grandiflora, Acacia coriacea Heath A over Pimelea microcephala Low Scrub B over Atriplex paludosa, Rhagodia preissii, Solanum orbiculatum Low Heath C over Olearia axillaris sens lat., Frankenia pauciflora Dwarf Scrub D	On cream-coloured sand in dune swale, 300 m from coast.
DI11	approximately 6.25 km north of Observation Hillock, Dorre Island, Shark Bay WA.	Acacia coriacea, Diplolaena grandiflora, Eremophila glabra Low Scrub B over Olearia axillaris sens lat., Atriplex paludosa Low Heath C over Phyllanthus sp., Frankenia pauciflora Low Heath D	On cream-coloured sand on crest and east-facing upper slope of dune, 350 m from coast.
DI12	approximately 6.25 km north of Observation Hillock, Dorre Island, Shark Bay WA.	Diplolaena grandiflora Low Scrub A over Acacia bivenosa Low Scrub B over Atriplex paludosa, Sarcostemma viminale, Pimelea microcephala Low Heath C over Solanum orbiculatum, Dicrastylis maritima, Frankenia pauciflora Open Dwarf Scrub D	On cream-coloured sand on west-facing, mid-lower slope of dune, 500 m from coast.
DI13	approximately 6.25 km north of Observation Hillock, Dorre Island, Shark Bay WA.	Diplolaena grandiflora Open Low Scrub A over Alyogyne cuneiformis, Acacia coriacea Open Low Scrub B over Ficus platypoda, Stylobasium spathulatum, Solanum orbiculatum Low Heath C over Frankenia pauciflora Dwarf Scrub C	On limestone and pale orange-brown sand in gully in travertine limestone pavement, 650 m from coastline.

Site	Location	Vegetation	Sitedesc
DI14	approximately 600 m NNW-NW of the middle of White Beach, Dorre Island, Shark Bay WA.	Eremophila glabra Open Low Scrub B over Rhagodia preissii Open Dwarf Scrub C over Thryptomene baeckeacea, Acacia rostellifera, Beyeria cinerea Low Heath D over Triodia plurinervata Mid-Dense Hummock Grass	On pale brown sand on very gentle, SE-facing slope of undulating sandplain, 350 m from coastline.
DI15	approximately 700 m NNW of the middle of White Beach, Dorre Island, Shark Bay WA.	Acacia ligulata/rostellifera, Atriplex paludosa, Rhagodia preissii Low Scrub B over Threlkeldia diffusa Low Heath C over Frankenia pauciflora Dwarf Scrub D over Triodia plurinervata Mid-Dense Hummock Grass	On very pale brown sand on low rise (old dune) of undulating sandplain, 450 m from coastline.
DI17	approximately 700 m north of Guano Point at White Beach, Dorre Island, Shark Bay WA.	Frankenia pauciflora Low Heath D over Senecio lautus, Eragrostis dielsii Low Grass & Herbs	On grey to pale brown sandy clay loam in slight depression, 200 m from coastline.

APPENDIX 5: Results of soil sample analysis, Peron Peninsula and Edel Land, 1997.

labno	sample	sand	silt	clay	stones	ec	phh20	phcacl	CaCO3	OrgC	NTOT	PTOT	PHCO3	KHCO3	Ca	Mg	Na	Kex
1168_001	BORA01	96	1.5	2.5		6	9.1	8	11.3	0.33	0.028	98	8	34	2.16c	0.21c	0.06c	0.04c
1168_002	BORA02	94.5	1	3.5		15	9	8	88.5	0.52	0.048	691	29	23	2.54c	0.43c	0.16c	0.04c
1168_003	BORA03	88.5	5	6.5	34	940	9.2	8.9	59.8	0.82	0.074	250	20	478	2.75c	5.25c	3.95c	0.68c
1168_004	CARA01	95	1.5	3.5	10	19	9.1	8.2	73.6	0.70	0.059	369	24	44	2.86c	0.50c	0.39c	0.09c
1168_005	CARA02	82.5	12.5	5	21	24	8.3	7.7	25.3	4.93	0.453	3316	176	242	12.91c	2.92c	0.57c	0.65c
1168_006	CARA03	0	0	0		81	8.7	7.9	81.2	0.70	0.071	697	34	302	2.37c	0.80c	0.84c	0.21c
1168_007	CARA04	97	1	2		11	9.3	8.3	74.4	0.59	0.051	408	10	29	2.03c	0.33c	0.25c	0.07c
1168_008	CARA05	93.5	1.5	5		16	9	8	74.3	0.58	0.059	712	49	49	2.39c	0.28c	0.34c	0.11c
1168_009	CARA06	98	0.5	1.5	7	8	9.1	8.2	21.3	0.55	0.034	111	10	25	1.81c	0.32c	0.11c	0.04c
1168_010	CARA07	93	2	5		7	9	8	22.2	0.39	0.034	187	20	57	2.34c	0.26c	0.12c	0.12c
1168_011	CARA08	93	2	5		8	9	8.1	34.6	0.42	0.041	233	14	35	2.40c	0.21c	0.08c	0.05c
1168_012	CBWL01	98.5	0.5	1		11	9.1	8.1	55.2	0.28	0.028	397	21	11	1.52c	0.29c	0.16c	0.03c
1168_013	CBWL02	98.5	0.5	1		11	8.8	8	59.3	0.88	0.077	567	54	28	3.38c	0.73c	0.05c	0.06c
1168_014	CLBR01	93.5	2	4.5		8	9.1	8.1	77.3	0.65	0.066	618	30	21	2.59c	0.26c	0.11c	0.07c
1168_015	CLBR02	88.5	5.5	6	9	15	8.6	7.9	4.0	1.02	0.126	457	11	133	4.40c	0.69c	0.36c	0.30c
1168_016	CLBR03	90	3.5	6.5		9	8.9	8	30.9	0.74	0.068	196	10	57	3.55c	0.47c	0.06c	0.14c
1168_017	CLBR04	91.5	2.5	6		9	9	8	30.6	0.54	0.053	216	23	46	2.75c	0.29c	0.21c	0.14c
1168_018	CLBR05	92.5	2.5	5		8	9	8	7.5	0.45	0.035	104	4	69	2.95c	0.21c	0.07c	0.16c
1168_019	CPRS01	99		1		6	9.2	8.2	3.9	0.10	0.006	<35	4	<10	0.88c	0.10c	0.11c	0.03c
1168_020	CRBY01	98.5	0.5	1		16	9.1	8	56.9	0.42	0.038	370	33	14	1.59c	0.67c	0.43c	0.05c
1168_021	CRBY02	97.5	1	1.5		22	9	8.1	61.8	0.77	0.066	417	23	27	2.74c	0.93c	0.38c	0.06c
1168_022	CRBY03	98	0.5	1.5		12	9.1	8.1	67.9	0.83	0.073	491	28	17	2.24c	0.58c	0.19c	0.04c
1168_023	CRBY04	97.5	1	2.5		35	8.9	8.1	74.4	0.97	0.074	606	44	16	2.67c	1.18c	0.67c	0.08c
1168_024	CRBY05	96	1.5	2.5		17	9.1	8.2	57.1	0.66	0.056	500	40	18	2.93c	0.65c	0.26c	0.04c
1168_025	CRBY06	95.5	2	2.5		14	9	8.1	57.6	0.74	0.063	372	13	20	2.78c	0.65c	0.19c	0.05c
1168_026	CRBY07	99		1		12	9.4	8.3	68.4	0.24	0.025	442	29	13	1.25c	0.38c	0.44c	0.07c
1168_027	DENH01	97.5	0.5	2		7	9.2	8.2	4.6	0.31	0.023	69	7	29	1.79c	0.19c	0.04c	0.06c
1168_028	DENH02	94	1.5	4.5		34	8.9	8.1	5.8	0.34	0.029	107	15	64	1.88c	0.36c	0.66c	0.16c
1168_029	EABF01	98	0.5	1.5		7	9.5	8.4	8.8	0.08	0.005	62	6	<10	1.57c	0.24c	0.09c	0.04c
1168_030	EABF02	96.5	1	2.5		7	9.2	8.1	12.9	0.26	0.022	87	6	18	1.87c	0.15c	0.09c	0.04c

labno	sample	sand	silt	clay	stones	ec	phh20	phcacl	CaCO3	OrgC	NTOT	PTOT	PHCO3	KHCO3	Ca	Mg	Na	Key
1168_031	EBWE01	92.5	2.5	5		70	8.8	8	16.9	0.50	0.044	139	12	83	2.74c	0.54c	0.54c	0.15c
1168_032	EBWE02	97	1	2		10	9.1	8.2	3.4	0.28	0.019	57	7	30	2.17c	0.26c	<0.02	0.04c
1168_033	EBWE03	97.5	1	1.5	36	7	9.3	8.3	29.0	0.44	0.034	66	5	18	1.77c	0.22c	0.02c	0.02c
1168_034	EBWE04	98	1	1		5	9.2	8.2	2.3	0.28	0.018	50	4	17	1.15c	0.12c	<0.02	<0.02
1168_035	EPBY01	96	1.5	2.5		19	9.1	8.2	67.5	0.49	0.040	478	24	23	2.16c	0.73c	0.40c	0.07c
1168_036	FSEN01	0	0	0		45	8.9	8.1	83.5	0.98	0.077	834	48	38	2.73c	1.35c	0.67c	0.09c
1168_037	FSEN02	93	2	5		10	9.1	8.1	81.0	0.59	0.054	547	16	17	2.82c	0.37c	0.39c	0.09c
1168_038	FSEN03	92.5	2.5	5		11	9	8	93.9	0.72	0.065	649	25	20	2.92c	0.40c	0.16c	0.06c
1168_039	FSEN04	0	0	0		20	8.2	7.6	9.4	4.27	0.487	3271	142	143	14.02c	1.71c	0.49c	0.40c
1168_040	FSEN05	95	1.5	3.5		11	9	8.1	79.6	0.77	0.078	762	44	23	3.40c	0.39c	0.05c	0.04c
1168_041	HEPR01	97	1	2	3	9	9	8.1	27.1	0.48	0.044	199	11	15	1.80c	0.35c	0.12c	0.04c
1168_042	HEPR02	90	4.5	5.5		9	9	8	41.0	0.48	0.051	317	28	54	2.47c	0.32c	0.06c	0.10c
1168_043	HEPR03	97	1	2		7	9.4	8.2	33.1	0.12	0.013	178	5	11	1.45c	0.21c	<0.02	<0.02
1168_044	HEPR04	90.5	3	6.5		11	9	8	36.8	0.70	0.073	219	18	70	3.27c	0.40c	0.18c	0.16c
1168_045	HEPR05	87	5.5	7.5		11	9	8	70.2	0.79	0.093	479	30	94	2.96c	0.61c	0.10c	0.22c
1168_046	MNMA01	94	1.5	4.5	5	42	7.9	7.3		0.23	0.024	74	8	170	1.63c	0.80c	0.34c	0.26c
1168_047	MNMA02	99.5		0.5		6	9	8.1		0.12	0.009	<32	2	<10	0.60c	0.08c	0.10c	0.02c
1168_048	NANG01	97	0.5	2.5		2	6.8	5.9		0.23	0.016	<39	3	45	0.79c	0.18c	0.02c	0.05c
1168_049	NANG02	95.5	1	3.5		3	7.3	6.6		0.20	0.017	53	4	56	1.01a	0.27a	0.05a	0.10a
1168_050	NANG03	96.5	1.5	2	14	9	9	8.1	11.6	0.71	0.056	57	4	22	2.19c	0.30c	0.07c	0.04c
1168_051	NANG04	96	1	3		5	7.4	6.6		0.20	0.016	<41	3	39	1.33a	0.26a	0.23a	0.07a
1168_052	NANG05	98	0.5	1.5		7	9.1	8.1	3.6	0.20	0.016	<48	5	37	1.60c	0.14c	0.05c	0.04c
1168_053	NANG06	93	2	5		5	7.4	6.6		0.30	0.025	79	7	98	1.89a	0.49a	0.11a	0.17a
1168_054	NANG07	93.5	3	3.5	46	9	8.9	8.1	18.4	0.83	0.082	94	8	42	4.34c	0.31c	0.12c	0.08c
1168_055	NANG09	95	2	3		5	7.1	6.5		0.17	0.011	<38	2	31	1.16a	0.23a	0.02a	0.04a
1168_056	PERN01	96.5	0.5	3		5	7.7	7		0.27	0.015	<39	4	46	1.68a	0.32a	0.02a	0.06a
1168_057	PERN02	96.5	1	2.5		6	8.4	7.5		0.23	0.018	53	4	37	1.78c	0.19c	0.04c	0.08c
1168_058	PERN03	96.5	1	2.5		3	7.2	6.5		0.19	0.013	50	5	51	0.90a	0.18a	0.03a	0.07a
1168_059	PERN04	96	1	3		7	9.1	8.1	5.1	0.28	0.023	68	5	28	1.87c	0.14c	0.10c	0.06c
1168_060	PERN05	99		1	9	582	8.8	8.3	<2.0	0.38	0.030	<43	4	175	1.58c	2.86c	0.42c	0.22c
1168_061	PERN06	95	0.5	4.5		4	7.9	6.9		0.25	0.022	98	10	93	1.74a	0.48a	0.06a	0.17a
1168_062	PERN07	97.5	1	1.5		26	8.9	8.1	12.2	0.83	0.068	127	27	28	2.26c	0.74c	0.36c	<0.02

labno	sample	sand	silt	clay	stones	ec	phh20	phcacl	CaCO3	OrgC	NTOT	PTOT	PHCO3	KHCO3	Ca	Mg	Na	Kex
1168_063	PERN08	94	1	5		3	7.2	6.5		0.20	0.017	71	5	57	0.88c	0.24c	<0.02	0.09c
1168_064	PERN09	91	5	4		8	8.9	8.1	<2.0	0.30	0.025	64	7	58	2.87c	0.24c	0.13c	0.12c
1168_065	PERN10	95	2	3		6	8.7	7.8		0.19	0.015	<57	5	46	1.45c	0.18c	0.22c	0.10c
1168_066	STPT01	95.5	1.5	3		57	9.1	8.3	93.3	0.63	0.053	587	20	34	3.01c	1.22c	0.69c	0.05c
1168_067	STPT02	92.5	2	5.5		10	9	8	85.4	0.61	0.065	605	17	20	2.87c	0.45c	0.07c	0.04c
1168_068	STPT03				67	5890	7.1	7	8.4	23.36	1.810	1851	310	5347	3.95c	63.82c	129.64c	20.30c
1168_069	STPT04	97.5	0.5	2		18	9	8.2	94.6	0.78	0.069	609	13	17	2.97c	0.61c	0.20c	0.03c
1168_070	STPT05	97	0.5	2.5		22	9	8.1	83.5	0.63	0.057	730	41	16	1.92c	0.76c	0.65c	0.03c
1168_071	STPT06	96.5	1	2.5		32	8.9	8.1	83.9	0.92	0.072	768	82	25	3.59c	1.67c	0.62c	0.07c
1168_072	STPT07	94	1.5	4.5		19	9	8.1	78.7	0.96	0.078	526	35	28	3.24c	0.69c	0.17c	0.04c
1168_073	STPT08	91.5	2.5	6		13	9	8	75.8	0.81	0.075	442	18	29	3.01c	0.59c	0.45c	0.07c
1168_074	STPT09	97.5	0.5	2		7	9.3	8.2	55.1	0.28	0.023	335	10	<10	1.44c	0.15c	0.11c	0.03c
1168_075	STPT10	99		1		8	9.5	8.4	55.0	0.24	0.024	291	7	<10	1.13c	0.37c	0.03c	<0.02
1168_076	STPT11	94.5	2	3.5	11	20	8.6	7.8	51.0	1.97	0.189	364	18	40	5.29c	1.20c	<0.02	0.06c
1168_077	STPT12	97.5	1	1.5		9	9	8.1	60.6	0.82	0.077	478	29	22	2.44c	0.42c	0.04c	0.02c
1168_078	TAMA01	93.5	1.5	5		12	9	8	74.6	0.64	0.055	524	28	35	2.83c	0.52c	0.14c	0.07c
1168_079	TAMA02	95.5	1	3.5		15	9	8.1	96.5	0.96	0.090	563	14	20	3.50c	0.63c	0.19c	0.04c
1168_080	TAMA03	95.5	1	3.5		8	9.2	8.2	86.4	0.42	0.043	682	20	10	2.07c	0.30c	0.04c	<0.02
1168_081	TBAT01	95	1.5	3.5		21	9	8.1	91.0	1.04	0.094	601	50	19	3.34c	0.66c	0.11c	0.03c
1168_082	TBAT02	93.5	1.5	5		20	8.8	8	90.9	0.96	0.095	640	37	23	3.34c	0.69c	0.10c	0.04c
1168_083	USLP01	97	0.5	2.5	6	17	9	8.2	40.9	0.69	0.057	218	15	16	3.40c	0.44c	0.21c	0.05c
1168_084	USLP02	86.5	6.5	7	13	16	8.5	7.8	6.7	1.65	0.191	2790	154	183	6.10c	1.39c	0.29c	0.43c
1168_085	USLP03	96.5	0.5	3		6	8	7.3		0.31	0.030	127	6	48	1.28c	0.20c	0.10c	0.08c
1168_086	USLP04	92	3	5		8	9.1	8.2	22.8	0.55	0.054	152	16	44	2.68c	0.37c	0.05c	0.07c
1168_087	USLP05	93	1.5	5.5		10	9.1	8	43.2	0.56	0.055	250	7	71	2.46c	0.41c	0.15c	0.15c
1168_088	USLP06	92	2.5	5.5		15	8.8	8	67.9	0.62	0.067	481	31	41	2.87c	0.23c	0.30c	0.09c
1168_089	USLP07	92.5	1.5	6		8	9.1	8	82.9	0.66	0.061	664	25	20	2.76c	0.32c	0.07c	0.04c
1168_090	USLP08	90	2.5	7.5		10	8.9	7.9	76.2	0.88	0.088	637	41	34	3.61c	0.36c	0.07c	0.06c
1168_091	WHAL01	93	3	4	10	17	8.7	7.9	21.7	1.25	0.126	412	27	79	4.79c	1.02c	0.31c	0.17c