VEGETATION AND FLORA OF THE LOWENDAL ISLANDS, WESTERN AUSTRALIA

by Ralf Buckley

The Lowendal Islands are a group of small limestone islands between Barrow Island and the adjacent mainland of north western Western Australia (Figure 1). They lie between 20°34´30"S and 20°41´11"S and between 115°30´17"E and 115°34´43"E. Since the islands do not have individual names, they are designated by letters in Fig.1. They comprise eroded remnants of Pleistocene reefs, with caps, dunes or beaches of Holocene calcareous sand in some cases. In area, they range from bare pinnacles of a few hundred square metres or less to a relatively complex island of 0.77 km^2. This is named island B in Figure 1: no particular significance attaches to the order of naming. There are two main limestone terraces, the lower presumably of Holocene age: their precise elevations above mean sea level have not been ascertained. The climate corresponds to that of Barrow Island (Buckley 1983): a monsoonal climate with mean annual rainfall 200 mm, peaking in February-March and May-June. The only previous botanical record for the Lowendal islands appears to be that of Serventy and Marshall (1964), who recorded five species, namely Ptilotus exaltatus, Scaevola spinescens, Myoporum acuminatum, Spinifex longifolius and Triodia sp. from "Lowendall Island", presumably island B of Fig.1, in September 1958.

According to Serventy and Marshall (1964), "Lowendall Island" was named by the French Baudin expedition in March 1803. The official account of the expedition made no mention of the island´s natural history, and it appears that Serventy and Marshall were in fact the first naturalists to visit the main island, and Mr W.H. Butler and myself the first to visit the smaller islands. The British atomic weapons expedition in 1952 visited the island, but it is not included in the resulting natural history report by Hill (1955). Serventy and Marshall (1964) described the main island as follows: "The island has a more picturesque appearance than Barrow Island, with a higher and steeper coastline and an attractive beach on the east side which affords an easy landing. Much of the island is of "pipey" bare limestone but there are vegetated depressions of deep red-brown soil. Dunes of white sand have built up at the north end. The flora of the island has not the barren aspect that characterises Barrow Island". The main aim of their visit was to record the fauna. They found two reptile species, namely Physignathus gilberti and Varanus sp.; no mammals, despite a nocturnal search for likely species; and 16 bird species, listed in Table 1. Only the first and last of the bird species listed were recorded as nesting.

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The vegetation of the nearby and much larger Barrow Island (233 km² in area), was mapped and described by Buckley (1983) in terms of 7 main vegetation types and 29 subtypes. Five of these subtypes occur on the Lowendal Islands, as follows.

Type 4: Coastal sand assemblages

Subtype 4a: strandline assemblage; characterised by Ipomoea pescaprae and Salsola kali.

Subtype 4b: white aeolian foredune areas: open vegetation dominated by Spinifex longifolius and also characterised by Ptilotus villosiflorus and Cynanchum floribundum.

Type 5: Coastal rock assemblages

Subtype 5a: limestone or conglomerate cliffs, scarps and headlands bearing Triodia wiseana, and also characterised by Sarcostemma australe and Capparis spinosa.

Subtype 5b: low limestone areas bearing Frankenia, Sclerolaena, Neobassia and Halosarcia species.

Type 6: Mangroves

Subtype 6b: old stands of Avicennia marina swamped by sand, with ground cover of halophytes toward inland margin: Neobassia astrocarpa, Sclerolaena spinosa, Halosarcia spp., Frankenia pauciflora, Threlkeldia diffusa, Enchylaena tomentosa and Sporobolus virginicus.

On the Lowendal Islands, the primary substrate and vegetation division is between limestone and sand. Limestone areas, which correspond approximately to the coastal rock assemblages on Barrow Island (vegetation types 5a and 5e of Buckley 1983) may be subdivided into low terrace, high terrace cliff-tops, and in the larger islands, high terrace areas further from the sea. The vegetation of white sands corresponds approximately to the coastal sand assemblages on Barrow Island (vegetation types 4a, 4b), and may be divided into beaches, small dunes, and thin caps over limestone. There are also stands of the mangrove Avicennia marina (type 6b) on several islands.

The plants present on 12 of the islands were recorded during visits in September 1980; these records are summarised in Table 2. Collections are held in the West Australian Herbarium, Perth. Island biogeographical interpretations are given by Buckley (1982). The overall flora is a subset of the Barrow Island flora, with the addition of six species not recorded from Barrow Island itself: Capparis sp. (RB 7155), Crotalaria medicaginea, Dicladanthera forrestii, Launaea sarmentosa, Lawrencia sp. (RB 7137), and the unidentified sterile species RB 7144 (Dolichandrone sp.?)

Additional differences from corresponding Barrow Island vegetation types include the following. Firstly, the showy pink-flowered Ptilotus exaltatus is conspicuous on the higher limestone terraces of the Lowendal Islands but extremely scarce on Barrow Island, even in directly comparable habitats. Its abundance on the Lowendal Islands, which was also noted for the largest island by Serventy and Marshall (1964), is perhaps due to the absence of herbivorous macropods, which might also account for the greater frequency of Sesuvium portulacastrum, Tribulus cistoides, Atriplex semilunaris, Setaria dielsii, Commelina ensifolia, Ipomoea pes-caprae, Indigofera trita and Portulaca intraterranea on the Lowendal Islands (Buckley 1983).

Secondly, individuals of Nicotiana occidentalis, Chamaesyce australis, Calandrinia balonensis and Portulaca intraterranea on the Lowendal Islands are more succulent than those on Barrow Island or the mainland: this might be due to greater salinity, lower grazing pressure or the greater frequency of seabird colonies with associated disturbance and input of nitrogen and phosphorus.

Thirdly, defoliation of Capparis spinosa by Caper White butterfly larvae is more severe on the Lowendal Islands than on Barrow Island or the mainland. On such small islands, the relative magnitude of fluctuations in the host and herbivore populations may be greater, with 1980 perhaps a year when the herbivore/host ratio was high.

Fourthly, the mangrove patches on island A and one of the patches on island C (Fig.1) are now isolated from the sea by extensive sand barriers, and the individual plants are all large trees, their trunks partially sand-swamped. Since Avicennia marina seedlings establish only in tidal mud, this indicates that the sand barriers formed after the Avicennia populations established. It is possible that mature Avicennia trees cut off from the sea by a sand barrier could still propagate from seedlings whilst a mud patch remained around the roots, fed with seawater by percolation through the sand, but once the mud was swamped with sand further seedling establishment would be very unlikely. Hence an age on the mangroves would give a minimum age for the sand barriers. Such an age would be obtainable by radiocarbon dating if possible anomalies due to the past detonation of atomic bombs on the nearby Montebello Islands could be assessed and allowed for.

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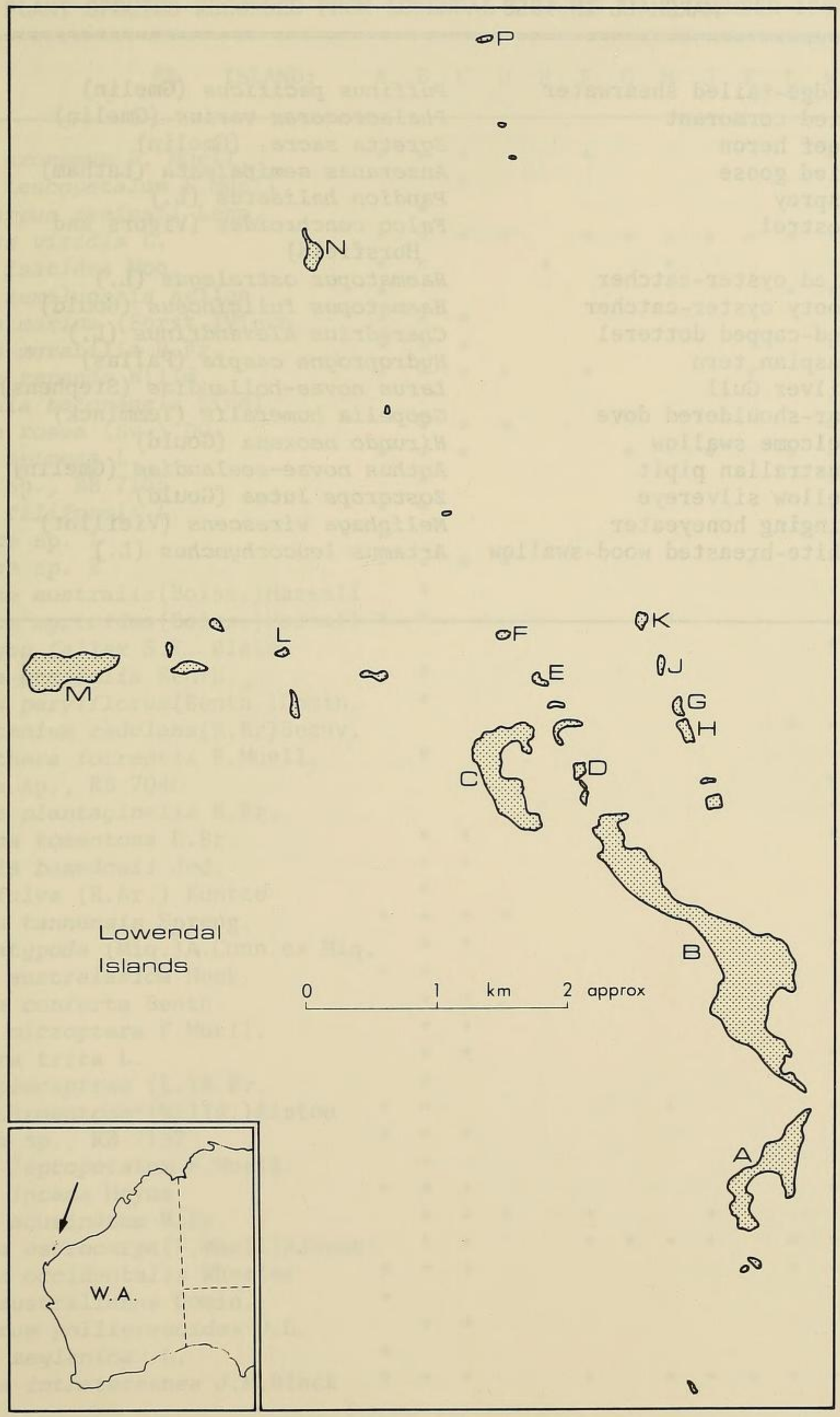

Fig. 1. The LowendaL Islands and their location

TABLE 1: BIRDS RECORDED FROM LOWENDAL ISLANDS BY SERVENTY AND MARSHALL IN 1958

Wedge-tailed shearwater	*Puffinus pacificus* (Gmelin)
Pied cormorant	*Phalacrocorax varius* (Gmelin)
Reef heron	*Egretta sacra* (Gmelin)
Pied goose	*Anseranas semipalmata* (Latham)
Osprey	*Pandion haliaetus* (L.)
Kestrel	*Falco cenchroides* (Vigors and Horsfield)
Pied oyster-catcher	*Haematopus ostralegus* (L.)
Sooty oyster-catcher	*Haematopus fuliginosus* (Gould)
Red-capped dotterel	*Charadrius alexandrinus* (L.)
Caspian tern	*Hydroprogne caspia* (Pallas)
Silver Gull	*Larus novae-hollandiae* (Stephens)
Bar-shouldered dove	*Geopelia humeralis* (Temminck)
Welcome swallow	*Hirundo neoxena* (Gould)
Australian pipit	*Anthus novae-seelandiae* (Gmelin)
Yellow silvereye	*Zosterops lutea* (Gould)
Singing honeyeater	*Meliphaga virescens* (Vieillot)
White-breasted wood-swallow	*Artamus leucorhynchus* (L.)

TABLE 2: PLANT SPECIES RECORDED FROM LOWENDAL ISLANDS IN SEPTEMBER 1980

SPECIES	ISLAND: A	B	C	D	E	F	G	H	J	K	L	M
Abutilon exonemum F. Muell.	*	*	*			*						*
Abutilon leucopetalum F.Muell.			*									
Acanthocarpus preissii Lehm.		*										
Amaranthus viridis L.	*	*	*	*		*	*	*	*	*	*	*
Atriplex isatidea Moq.	*	*			*			*				*
Atriplex semilunaris Aellen	*										*	*
Avicennia marina (Forst.)Vierh.	*	*	*									
Boerhavia mutabilis R.Br.	*	*	*									*
Boerhavia repanda Willd.	*	*	*	*		*				*		
Calandrinia balonensis Lindl.												*
Canavalia rosea (Sw.) DC.		*	*	*								*
Capparis spinosa L.	*	*	*				*		*		*	*
Capparis sp., RB 7155		*										*
Cassytha filiformis L.	*	*										*
Chamaesyce sp. 1	*											*
Chamaesyce sp. 2	*	*	*	*						*		
Chamaesyce australis(Boiss.)Hassall		*										*
Chamaesyce myrtoides(Boiss.)Hassall	*	*						*				
Chrysopogon fallax S.T. Blake												*
Commelina ensifolia Benth.		*										
Corchorus parviflorus(Benth.)Domin.		*										
Dactyloctenium radulans(R.Br)Beauv.											*	*
Dicladanthera forrestii F.Muell.		*										
Digitaria sp., RB 7040												*
Dysphania plantaginella R.Br.												*
Enchylaena tomentosa R.Br.		*	*									*
Eragrostis basedowii Jed.		*	*									
Eulalia fulva (R.Br.) Kuntze		*										
Euphorbia tannensis Spreng.	*	*	*	*								*
Ficus platypoda (Miq.)A.Cunn.ex Miq.		*	*									*
Flaveria australasica Hook.	*	*										
Gomphrena conferta Benth.		*	*									*
Goodenia microptera F.Muell.		*	*									
Indigofera trita L.		*	*									*
Ipomoea pescaprrae (L.)R.Br.		*										
*Launaea sarmentosa**(Willd.)Alston	*	*						*				*
Lawrencia sp., RB 7137	*	*	*									
Lepidium leptopetalum F.Muell.		*										
Melhania incana Heyne	*	*	*								*	*
Myoporum acuminatum R.Br.		*	*	*		*			*			
Neobassia astrocarpa(F.Muell)AJScott		*	*			*	*	*	*		*	*
Nicotiana occidentalis Wheeler	*	*	*								*	*
Panicum australiense Domin.	*											
Pittosporum phillyraeoides D.C.		*	*									
Plumbago zeylanica L.	*											
Portulaca intraterranea J.M.Black	*	*	*			*		*	*	*	*	*

TABLE 2: PLANT SPECIES RECORDED FROM LOWENDAL ISLANDS IN SEPTEMBER 1980

SPECIES	ISLAND: A	B	C	D	E	F	G	H	J	K	L	M
Portulaca pilosa L.												*
Ptilotus exaltatus Nees.	*	*	*	*		*			*	*	*	*
Ptilotus villosiflorus F.Muell.	*	*						*				*
Rhagodia obovata Moq.	*	*	*									*
Rhynchosia minima (L.) D.C.	*	*	*	*					*			*
Ruellia primulacea Nees	*	*	*									
Salsola kali L.	*	*	*	*		*	*	*	*	*	*	*
Sarcostemma australe R.Br.	*	*	*									*
Scaevola crassifolia Labill.	*	*										*
Scaevola cunninghamii Labill.		*										*
Scaevola spinescens R.Br.	*	*	*	*	*	*			*	*	*	*
Sclerolaena spinosa (Ewart et Davies) A.J. Scott	*	*	*	*				*	*	*		*
Sesuvium portulacastrum L.	*	*	*	*	*		*	*	*	*	*	*
Setaria dielsii Herm.	*	*	*	*		*	*			*	*	*
Solanum esuriale Lindl.	*	*										
Sorghum plumosum (R.Br.) Beauv.		*	*									
Spinifex longifolius (R.Br.)	*	*		*			*	*	*	*		*
Sporobolus australasicus Domin.												*
Sporobolus virginicus (L.) Kunth	*	*	*	*	*	*						
Threlkeldia diffusa R.Br.	*	*	*	*				*				
Triodia angusta N.T. Burb.		*										
Triraphis mollis R.Br.		*	*									
?*Dolichandrone* sp., RB 7144		*										