Mapping the distribution and assessing the condition of the Priority Two Ecological Community[1] *Melaleuca lanceolata* (Moonah) forests, Leeuwin Naturaliste Ridge .

Melaleuca lanceolata or Moonah at Bunker Bay

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[1] Proposed for Inclusion on the Threatened Ecological Community Database

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Introduction

Melaleuca lanceolata (or Moonah), which forms a shrub or small tree generally 1 – 8 metres tall (but growing as high as 15 metres) has a wide distribution within the south-west of Western Australia, ranging along the coast from Shark Bay to the border with South Australia and inland to Kalgoorlie (Map 1). In coastal areas it is associated with limestone-derived soils. In a classification of south-west Australian limestone heaths Bridgewater and Zammit, *M. lanceolata* was found in the phyllanthetosum sub-association of the Acacietum rostelliferae association[i]. The differential species of the phyllanthetosum sub-association, which is found on sand over limestone, are; *Phyllanthus calycinus, Patersonia occidentalis, Conostylis preissii, Jacksonia furcellata, Melaleuca lanceolata* and *Austrodanthonia racemosa* (called *Danthonia penicillata* in the paper).

It has been proposed for listing as a Threatened Ecological Community (TEC) by CALM under the Commonwealth Environmental Protection and Biodiversity Bill 1999. At present it is classified as a Priority Two proposed TEC and requires field survey to determine its extent and level of threat. This paper reports on an assessment of the definition of the ecological community proposed, its distribution and apparent level of threat.

A survey of vegetation of the coastal strip from Forrest Beach near Capel to Woodlands south of Yallingup by Keating and Trudgeon (1986)[ii] identified three units where *M. lanceolata* was an important part of the vegetation. These were;

1. *Melaleuca lanceolata* Low Closed Forest to Closed Forest (M1)

This vegetation unit occurred near the beach below cliffs, above cliffs and down steeply sloping rock slopes on dark-grey, brown or, less commonly, pale-grey sands, often with outcropping limestone. The Moonah varies from 2 to 15 metres, reflecting depth of soil and wind pruning. Typical understorey shrubs were *Tetragonia implexicoma, Rhagodia baccata, Leucopogon propinquus*, and *Suaeda australis*. The authors noted that the unit occurred in a number of places from Dunsborough to the southern end of the study area, with "good stands" occurring between Bunker Bay and the tip of Cape Naturaliste, near Sugarloaf Rock and at Yallingup. Disturbed stands occurred at Bunker Bay, Cape Clairault and Gannet Rock.

Keating and Trudgeon commented that because of the shade value of the Moonah and its open understorey it has been favoured as a site for carparks and picnic areas and that this had resulted in a significant impact in several locations. In their opinion the conservation value of the remaining stands was very high, especially those that had escaped disturbance. Good stands usually occurred in less accessible areas, such as that inland and slightly north of Yallingup.

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[2] Proposed for Inclusion on the Threatened Ecological Community Database by A. Weston and N. Gibson

2. *Melaleuca lanceolata* Low Closed Heath (LH2)

This vegetation unit occurred on the lower windward slopes of the Naturaliste Ridge, on creamy-yellow to yellow-coloured sands, often with out-cropping limestone and had a height range of 1.5-2.5 metres. It occurred from south of Sugarloaf to the southern limits of the study area. Typical associated species were *Templetonia retusa, Diplolaena dampieri, Leucopogon propinquus* and *Acacia divergens*.

3. *Melaleuca lanceolata – M. huegelii* Closed Heath (LH1)

This type was an intergrade between *M. lanceolata* (LH2) and *M. huegelii* (LH4) heaths, where the dominance is shared. It occurs in creamy-yellow to creamy-brown sands and has a height range of 1.5-2.5 metres. Associated species in the upper stratum included *Leucopogon propinquus, Hibbertia cuneiformis, Spyridium globulosum* and *Olearia axillaris*.

Stands of this unit occurred in patches on the lower windward slopes of the Naturaliste ridge between Sugarloaf Rock and the southern boundary of the study area.

A survey of coastal vegetation within the Warren Interim Biogeographic Region (Keighery and Gibson[iii], unpublished) found *M. lanceolata* in 8 quadrats among the 65 sited on the Leeuwin-Naturaliste ridge. Species it was most often associated with included *Leucopogon parviflorus, Olearia axillaris, Rhagodia baccata, Pimelea ferruginea, Poa poiformis, Isolepis nodosa*, and *Spyridium globulosum*.

Defining the *Melaleuca lanceolata* forests proposed Threatened Ecological Community

From the vegetation studies summarised above and observations in the field as part of the study reported here, it is doubtful that the *M. lanceolata forests* proposed TEC, which appears to be equivalent to the *Melaleuca lanceolata* Low Closed Forest to Closed Forest (M1) unit of the Keating and Trudgeon survey is a clearly distinguishable ecological community in the sense that it has a consistently occurring set of indicator species that set it apart from other vegetation communities on the Leeuwin-Naturaliste ridge. It appears to be a structural formation, rather than an ecological community. However, when Moonah, which is fire-sensitive, escapes fire and is protected from the prevailing wind and grows to a large size it appears to "shade out" many other species that would normally co-occur with it. Therefore the understorey takes on a typically "open" appearance with only a small number of shade-tolerant species occurring in the understorey (Figure 1). The frequent association of the tallest stands of Moonah with rock outcrops and cliffs probably indicates the importance of these in protecting the plant from fire (Figures 2 and 3).

For the purposes of this survey the areas mapped as *M. lanceolata* forest proposed TEC are those where the species is generally more than 3 metres tall, and dominates the overstorey (Maps 2 and 3). The method used for mapping was to identify stands of Moonah in the field which fitted the description above and record their location using one or more GPS waypoints. These points were used to produce a shapefile in ArcView and then approximate outlines of stands using orthophotos as a guide were captured with a polygon tool. Each of the stands was rated for degree of disturbance (heavy, moderate and light) based on field observations and using the aerial orthophotos. This rating was primarily based on the

proportion of the stand that was disturbed by roads, tracks, trails and campgrounds. The results are presented in Table 1.

Table 1. *Melaleuca lanceolata* low forest occurrences identified during this survey

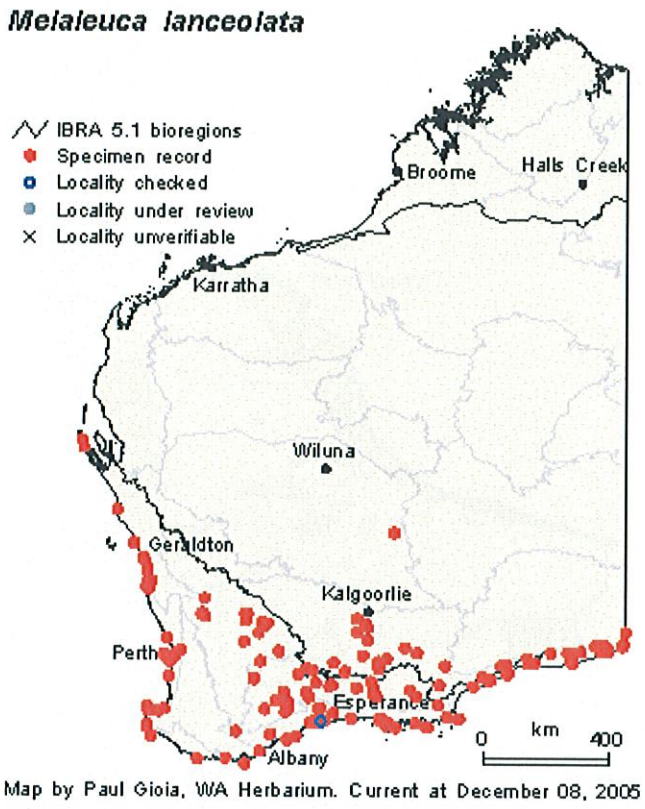
NUMBER	SITE	HECTARES
1	Bob's Hollow North	1.425
2	Bob's Hollow South	0.924
3	Bunker Bay 1	0.660
4	Bunker Bay 2	6.734
5	Cape Naturaliste 1	1.274
6	Cape Naturaliste 2	5.392
7	Injidup	7.899
8	Injidup	32.718
9	Joey's Nose 1	6.570
10	Joey's Nose 2	0.337
11	Kilcarnup 1	15.745
12	Kilcarnup 2	0.438
13	Point Piquet	0.222
14	Point Road	0.738
15	Round Rock	4.079
16	Smiths Beach 1	4.348
17	Smiths Beach 2	1.258
18	Sugar Loaf	0.597
19	Yallingup 1	4.833
20	Yallingup 2	24.854
21	Yallingup 3	3.176
22	Yallingup 4	3.020
23	Yallingup 5	3.826
24	Yallingup 6	8.778
25	Yallingup 7	2.073
26	Yallingup 8	2.127
27	Yallingup Road	2.637
	TOTAL	146.682

Of the 146 ha of Moonah mapped during this survey about 45% have a low level of disturbance, with a further 25% being moderately disturbed. The heavily disturbed areas had been bisected by roads or tracks, and some of them had been used as camping areas in the past. In these former camping areas recovery of the vegetation has been slow, partly because of soil compaction, erosion and the low light levels under the Moonah canopy. Perimeter to area ratios for the patches of Moonah are given in Table 1, with low ratios indicating relatively compact occurrences.

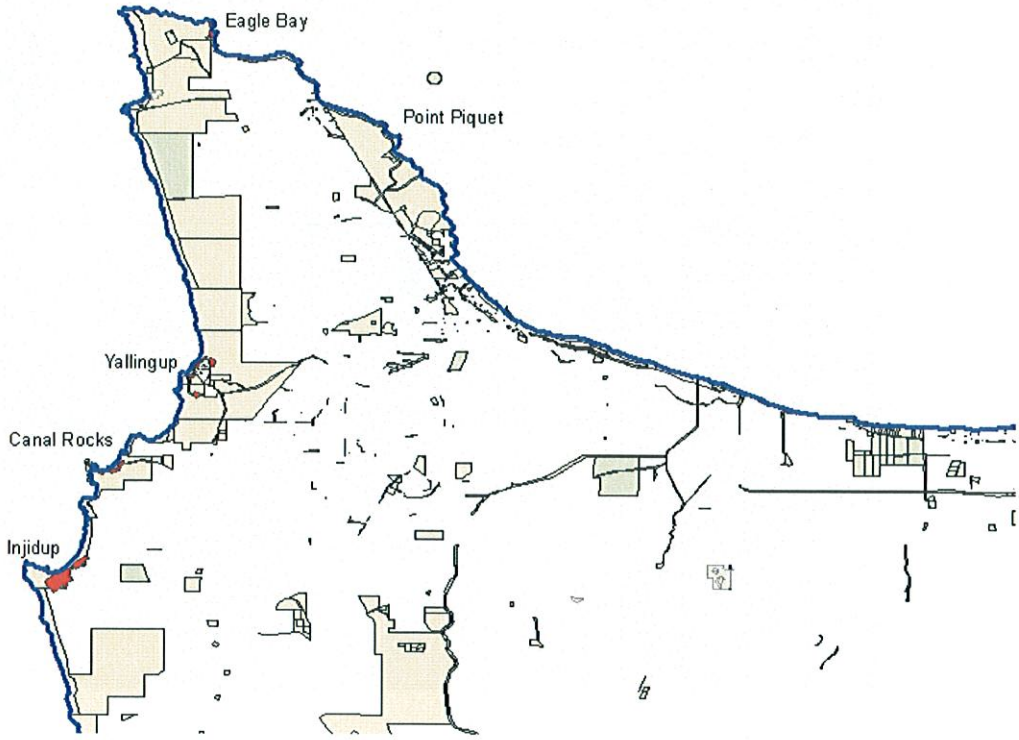
Conclusions

While Moonah low forests are probably not a distinct vegetation community in that they have a species composition that is consistently different to other vegetation types occurring on limestone on the Leeuwin-Naturaliste Ridge they are certainly distinct structurally. The provide a picturesque back drop to the rocky coast at places like Bunker's Bay, and have been much valued as sites for campgrounds in times past. Their use for camping plus the

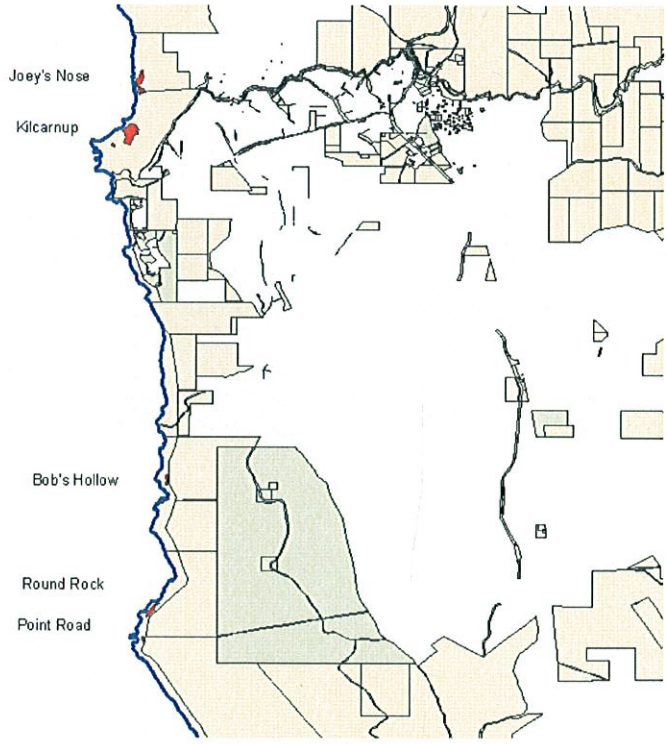
frequency with which they are bisected by roads or tracks has led to a high proportion (30%) being heavily disturbed with consequent invasion of exotic species, lack of regeneration and in some instances erosion of soil. They should be protected from further disturbance as much as practicable and consideration should be given to protecting the most intact and larger occurrences from fire.



Map 1. *Distribution of Melaleuca lanceolata* specimen records in Western Australia



Map 2. Moonah sites in the northern part of the study area.



Map 3. Moonah sites in the southern part of the study area.

Figure 1. *Melaleuca lanceolata* 1 km south of Yallingup showing typically sparse understorey of some even-aged stands.

Figure 2. A stand of tall *Melaleuca lanceolata* on the top of Joey's Nose north of Kilcarnup.

Figure 3. *Melaleuca lanceolata* at Bunker bay

References

[i] Bridgewater, P.B. and Zammit, C.A. (1979). Phytosociology of S.W. Australian limestone heaths. *Phytocoenologia*, 6, pp. 327-343.
[ii] Keating, C. and Trudgeon, M. (1986). A Flora and vegetation Survey of the Coastal Strip from Forrest Beach-Cape Naturaliste-Woodlands. Department of Conservation and Environment, Western Australia.
[iii] Scientists with the Department of CALM.