PLANT COMMUNITIES OF MT ARTHUR, NORTH-EAST TASMANIA

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Foreword

This survey was carried out by Andrew Hingston and is the third of a series describing the vegetation of mountains in the north-east massif. It has been funded by the Plomley Foundation and the Queen Victoria Museum and Art Gallery.

Introduction

The study area was planned to take in all that land above the 900 m contour (ca. 420 hectares), but after inspection it was considered impractical to survey the cliffs and steep rock scree on the north and east so that these areas were excluded.

Mt Arthur, at latitude 41°17', longitude 147° 17' is composed of dolerite rising to 1 188 m in altitude. It lies about 20 km north-east of Launceston and is lower and smaller in area than both Ben Lomond and Mt Barrow, which were the objects of the previous studies by Davies and Davies. The average annual rainfall is approximately 1 500 mm.

Acknowledgements

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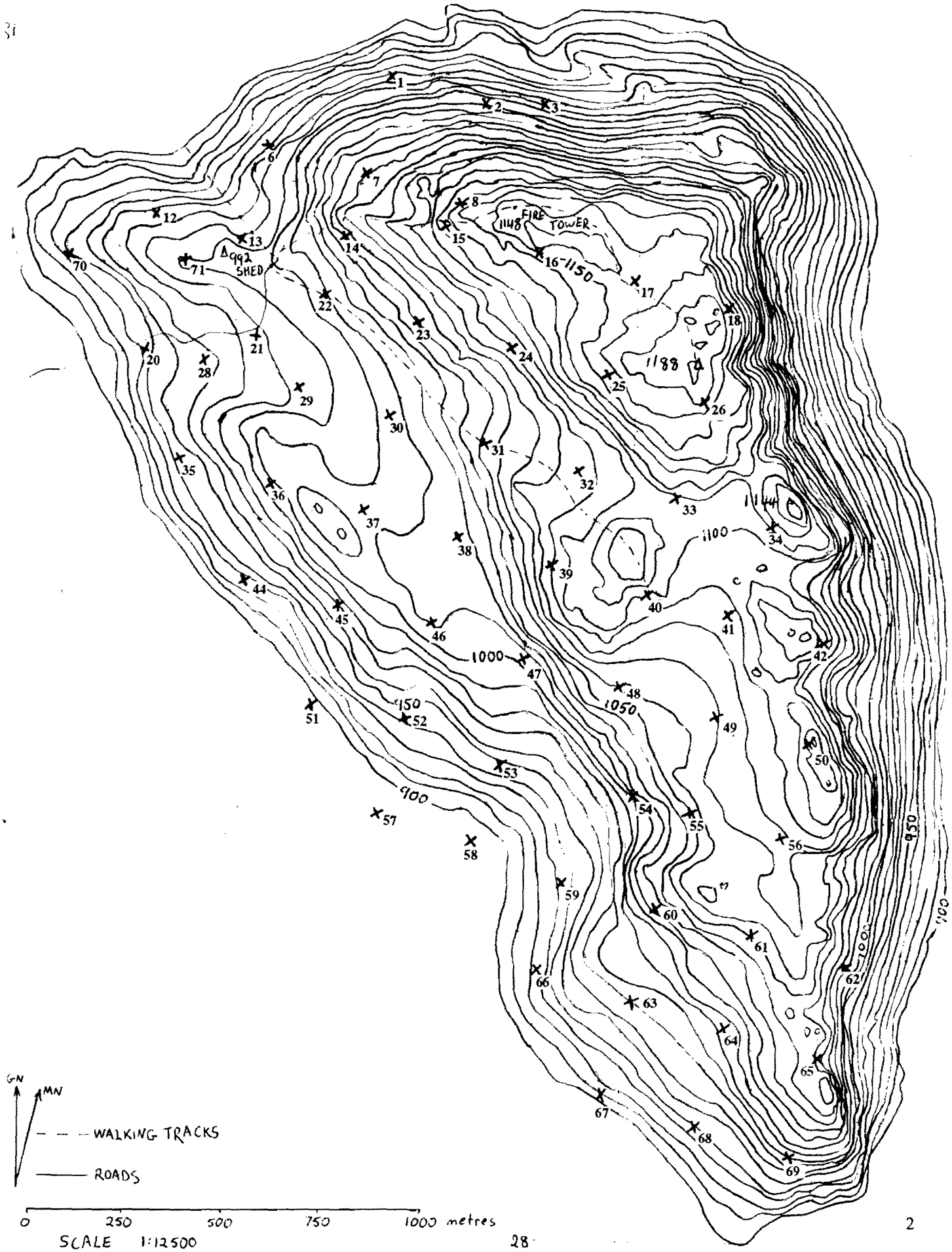
Professor Jamie Kirkpatrick from the Department of Geography and Environmental Studies at the University of Tasmania for the use of his DECODA computer programme, and patient assistance with the analysis. Kerry Bridle from the Department of Geography and Environmental Studies who also provided assistance in the use of DECODA when Jamie was unavailable.

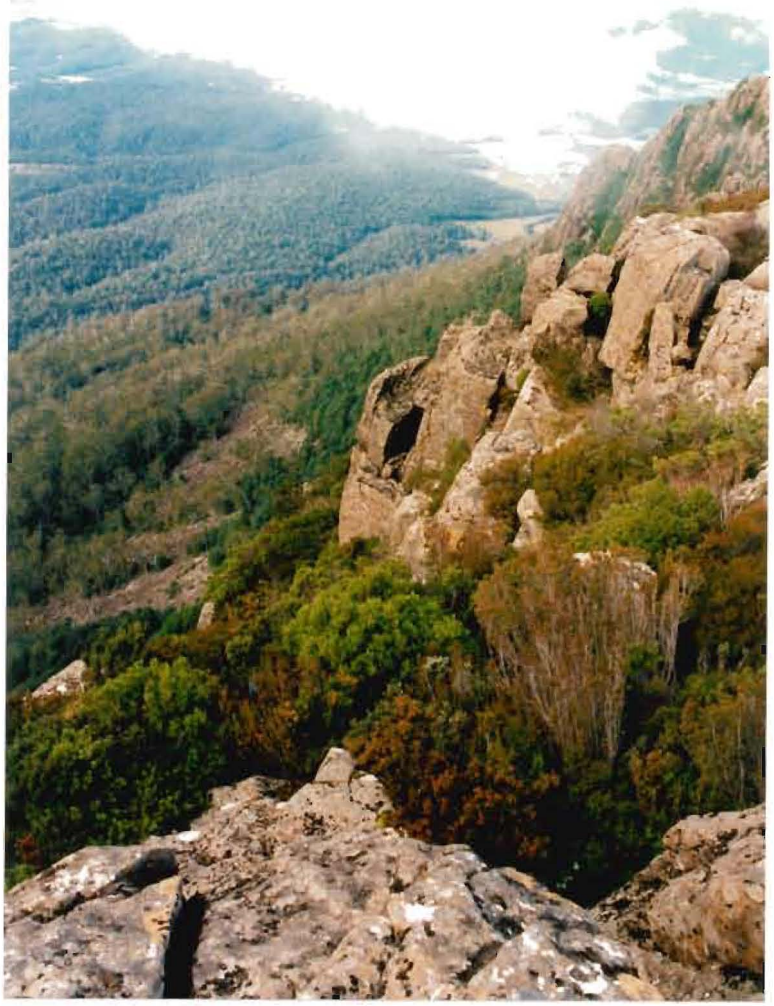
Cover illustration: Mt Arthur,
Photograph John Leeming, Queen Victoria Museum and Art Gallery

Map (i) **Mt Arthur study area showing locations and numbers of plot sites**



Method

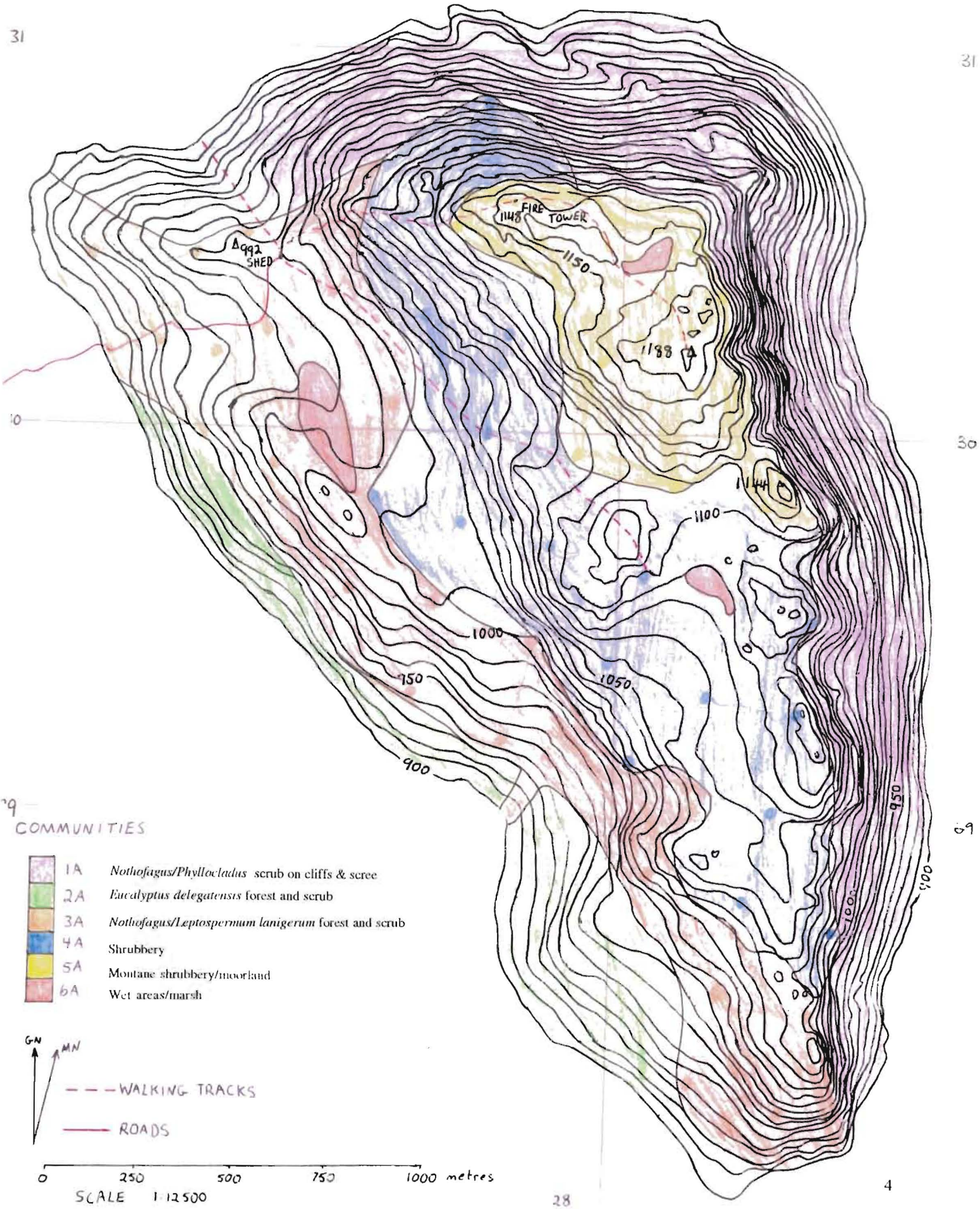
That part of Mt Arthur which exceeded 900 m above sea level was surveyed using a randomly sited systematic design involving a 250 m grid system, with lines running both north-south and east-west. Twenty metre diameter quadrats were surveyed at the points of intersection on the grid, after initially being marked on an aerial photograph. These were located in the field with the aid of a compass, with distances being stepped out. The boundaries of the quadrats were determined by tying a 10 m string to a stem at the quadrat centre, and then marked with surveyor's tape. As the north-eastern edge of the area studied comprised steep cliffs, this area could not be surveyed by this method because of the difficulty associated with locating the sites designated by the grid. Hence, quadrats 4, 5, 9, 10, 11, 19, 27, 43 have been omitted. However, a species list was compiled for the more accessible portion at the northern end of this section.



Community 1A
Dwarf celery-top pine occurs in similar scattered pockets of vegetation on the eastern face of Mt Arthur's cliffs

23 24

Map (ii) Vegetation Map of Mt Arthur



The survey involved recording every species of tracheophyte within the quadrat, its abundance as a percentage of the area covered, and its average height. The aspect, slope, rock cover and drainage on each quadrat was also recorded. Grid positions and altitudes were determined from the 1:25 000 maps Lisle and Patersonia. The centre of each quadrat was marked with surveyor's tape so that it could be relocated at a later date, to allow species which were not yet flowering to be identified. Species which could not be identified in the field were keyed out with the aid of a dissecting microscope at the Queen Victoria Museum and Art Gallery, and checked against herbarium specimens at the Queen Victoria Museum and the Tasmanian Herbarium.

The data was analysed, both qualitatively and quantitatively, using the computer programme DECODA. The former involved ordination of the quadrats using the divisive programme TWINSPAN, based on the presence or absence of each vascular plant species. As this only produced six communities, some of which contained substantial variation in their structure, it was decided to also generate a dissimilarity matrix for the quadrats based on the percentage cover of each species.

Changes in the vegetation types between quadrats were noted, as were any additional plant species. Specimens of all plants observed in the area, including non-vascular species, were collected and subsequently lodged with the herbarium of the Queen Victoria Museum in Launceston.

Results

The area surveyed contained 127 vascular plant species, comprising 77 dicotyledons, 32 monocotyledons, 17 pteridophytes and one gymnosperm.

Global non-metric multi-dimensional scaling, using Bray-Curtis dissimilarity coefficients based on the presence or absence of each species, demonstrated that most of the qualitative variation in the vegetation between the quadrats was along two axes of the ordination plot. Vector fitting using DECODA showed that the sample variables altitude, rock cover and drainage were all highly significantly ($p=0.000$) correlated with these axes. However there was only weak evidence ($p=0.030$) of a correlation with slope, and no evidence ($p=0.16$) of a correlation with aspect.

Qualitative analysis of the data using TWINSPAN suggested that the area surveyed comprised six communities. These were clearly segregated geographically (see map (ii)) with the exception of Community 6A which occupied poorly-drained areas (see table 1) surrounding quadrats 17, 41 and 29. This community was dominated by *Baeckea gunniana* and *Empodisma minus*, with *Astelia alpina, Carpha alpina, Epacris serpyllifolia* and *Micrantheum hexandrum* also present on all three sites.

Communities 1A and 2A both occurred on rocky, well-drained areas at lower altitude (see table 1). However, they differed in their slopes and aspects (see map (ii) and table 1), with the former being more exposed. Hence, Community 2A was *Eucalyptus delegatensis* forest while Community 1A was rainforest, occurring above the eucalypt-line. Eucalypts may also have been excluded from Community 1A through low fire frequencies resulting from the protection afforded by the surrounding areas of bare rock scree. *Aristotelia peduncularis, Coprosma nitida, Cyathodes parvifolia, Olearia phlogopappa, Pimelea drupacea* and *Tasmannia lanceolata* were common in the understoreys of both of these communities. *Bedfordia salicina, Persoonia gunnii* and *Pultenaea juniperina* were also common in 2A, while *Pittosporum bicolor* occurred frequently in 1A. The groundcover in 2A was dominated by *Acaena novae-zelandiae, Asplenium flabellifolium, Cardamine tenuifolia, Chiloglottis cornuta, Deyeuxia frigida, Geranium potentilloides* and *Polystichum proliferum*, while that of 1A was dominated by the ferns *Grammitis billardierei, Phymatosorus pustulatus* and *Polystichum proliferum.*

Community 1A
The boundary between Eucalyptus delegatensis forest community 2A and *Nothofagus* rain forest, 3A, is well marked in this photograph.

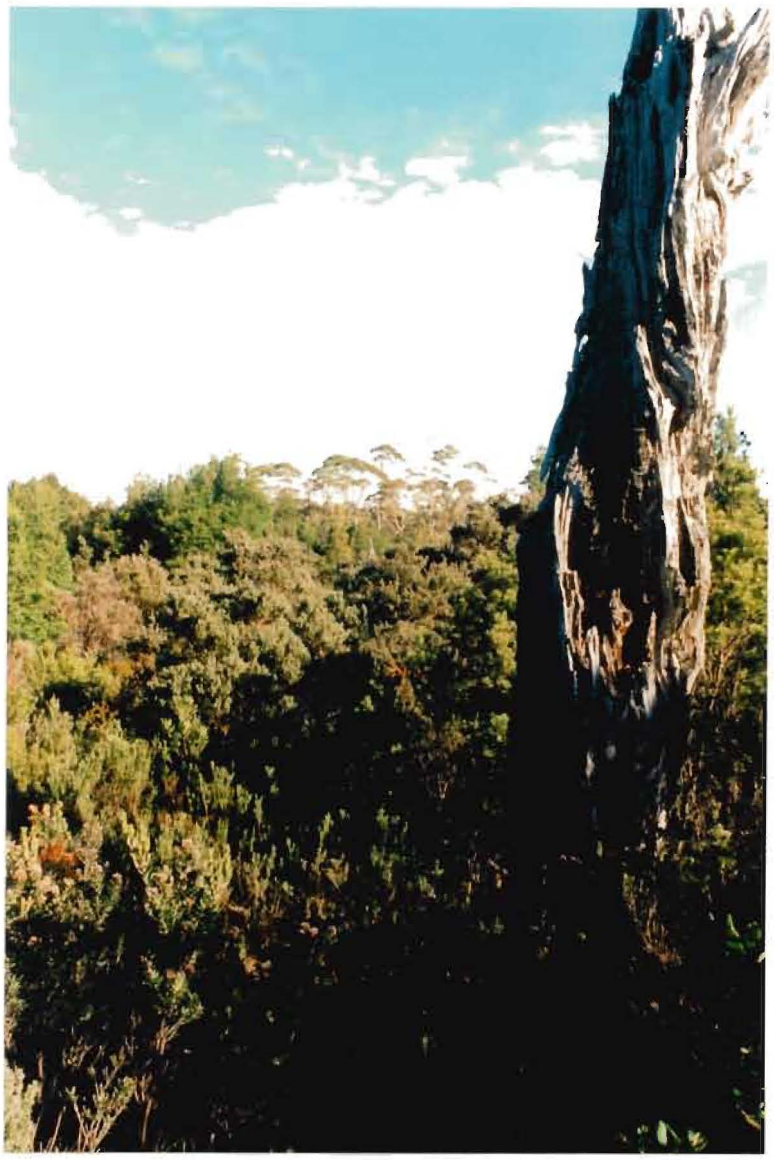
In contrast, Communities 3A, 4A and 5A were more varied in their edaphic conditions than the previous two, and included some poorly-drained sites (see table 1). Hence, there was much variation in the vegetation within each of these communities. The segregation of these communities appeared to reflect an altitudinal gradient (see table 1), and therefore exposure levels. *Coprosma nitida, Cyathodes parvifolia, Micrantheum hexandrum, Nothofagus cunninghamii, Tasmannia lanceolata, Telopea truncata* and *Lycopodium fastigiatum* were common in all of these communities. *Gaultheria hispida, Leptospermum lanigerum, Pimelea drupacea* and *Polystichum proliferum* also occurred frequently in 3A, with *Leptospermum lanigerum, Monotoca empetrifolia, Orites revoluta* and *Oxylobium ellipticum* being common in 4A. *Bellendena montana, Celmisia asteliifolia, Epacris serpyllifolia, Helichrysum scorpioides, Monotoca empetrifolia, Orites revoluta, Oxylobium ellipticum, Richea scoparia* and *R. sprengelioides* were all common throughout 5A.

Table 1
Mean conditions for quadrats in each community described by qualitative vegetation analysis. Standard deviations (S.D.) are in brackets.
(Drainage: 1=poor; 5=sharp)

Community	rock cover		drainage index		altitude		slope	
	%	S.D.			m	S.D.	degrees	S.D.
1A	97.5	(5.0)	5.0	(0.0)	968	(15)	28.8	(23.2)
2A	93.3	(8.7)	4.6	(0.7)	917	(28)	15.6	(11.0)
3A	61.4	(27.3)	3.7	(1.1)	990	(38)	16.4	(17.1)
4A	63.9	(33.7)	3.5	(1.5)	1063	(36)	19.8	(18.7)
5A	62.4	(39.9)	3.7	(1.1)	1126	(24)	22.6	(18.8)
6A	26.7	(30.6)	1.0	(0.0)	1073	(86)	2.7	(2.5)

Quantitative analysis of the data based on the percentage cover of each species using the computer program DECODA, involving linking all quadrats with dissimilarities less than 0.5, suggested that the area surveyed comprised 11 communities. As this technique placed greater importance on the more abundant species, the derived community boundaries were based on physiognomy as well as the species present. This allowed those original communities which were varied in their structure to be further divided.

This technique still showed the *Eucalyptus delegatensis* dominated community to be clearly distinct from the remainder of the survey area, although quadrats 68 and 69 were linked with 2A to form Community 11B. It also confirmed the unique nature of the vegetation in the water-logged areas, but divided Community 6A into Communities 5B and 6B. The problem of the diverse composition of 5A was overcome by its division into Communities 1B, 7B, 8B and 9B. Quantitative analysis demonstrated the continuous variation across the remaining quadrats, which appeared to be due to a range of seral stages in the succession to *Nothofagus cunninghamii* rainforest. However, it was possible to separate these into four different communities. Quadrats 15 and 33 from 5A were linked with 14 and 48 from 4A to form Community 3B. Community 1A was linked with other Nothofagus *cunninghamii* dominated communities from 3A and 4A to form Community 2B. The *Leptospermum lanigerum* dominated quadrats in 3A and 4A formed Community 4B, while quadrats 28, 64 and 65 in 3A, and 32 in 5A linked with the remaining *Micrantheum hexandrum* dominated quadrats in 4A to form Community 10B. Quadrats 34, 40 and 62 were categorized as intermediate between Communities 3B and 10B, while quadrat 61 was intermediate between Communities 4B and 10B.



Community 1A
The effect of fire is shown by the fire-scarred *Nothofagus* trunk, a remnant of tall rain forest, which is now surrounded by regrowth *Leptospermum lanigerum* shrubbery

Key to Map (iii)

	1B	Mosaic of *Phyllocladus asplenifolius* scrub and *Nothofagus* on bare rock and scree slopes
	2B	*Nothofagus cunninghamii* Rain forest
	3B	*Nothofagus/Leptospermum langierum/Orites revoluta* scrub
	4B	*Leptospermum lanigerum* shrubbery
	5B	*Leptospermum lanigerum/Empodisma minus/Baeckea gunniana/Epacris serpyllifolia* marsh
	6B	*Empodisma minus/Baeckea gunniana* marsh
	7B	*Baeckea gunniana* scrub
	8B	*Richea sprengelioides/Richea scoparia* scrub
	9B	*Leptospermum rupestre/Micrantheum hexandrum/Richea sprengelioides* scrub
	10B	*Micrantheum hexandrum* scrub
	11B	*Eucalyptus delegatensis* forest

Map (iii) Vegetation Map of Mt Arthur

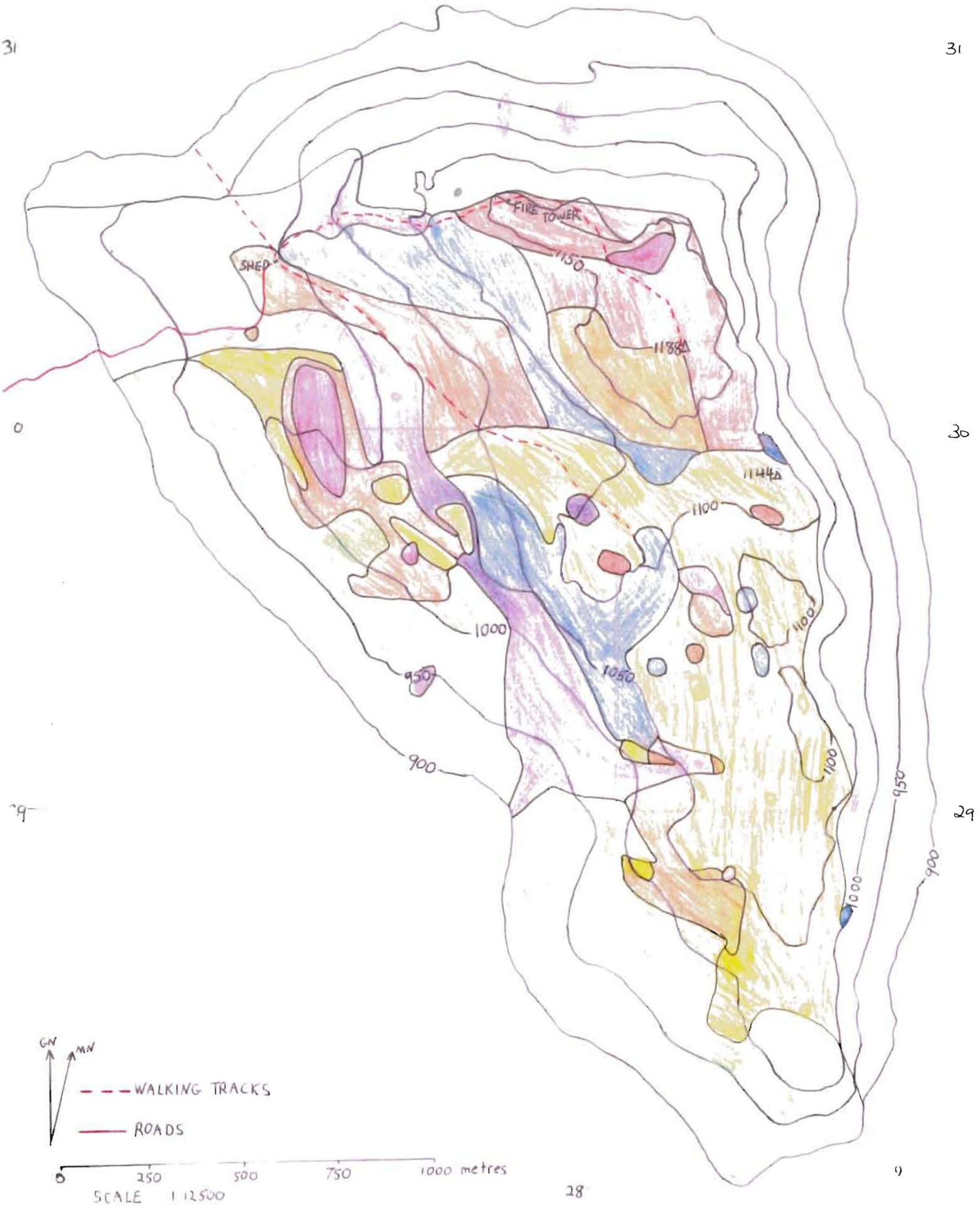


Table 2

Mean conditions for quadrats in each community described by quantitative vegetation analysis based on percentage cover of each species. Standard deviations are in brackets. (Drainage: 1=poor; 5=sharp)

Community	Rock cover %	S.D	Drainage		Altitude m	S.D.	Slope degrees	S.D.
1B	100.0	(0.0)	5.0	(0.0)	1130	(0)	60.0	(0.0)
2B	75.3	(26.9)	4.1	(1.2)	987	(50)	19.9	(18.8)
3B	82.5	(15.0)	4.2	(1.0)	1086	(37)	32.5	(17.1)
4B	49.2	(34.6)	2.7	(1.4)	1014	(37)	11.8	(15.3)
5B	60.0	(0.0)	1.0	(0.0)	1090	(0)	3.0	(0.0)
6B	10.0	(14.1)	1.0	(0.0)	1065	(120)	2.5	(3.5)
7B	20.0	(0.0)	3.0	(0.0)	1160	(0)	10.0	(0.0)
8B	46.0	(62.3)	2.5	(0.7)	1150	(0)	10.0	(14.1)
9B	70.0	(0.0)	3.0	(0.0)	1100	(0)	20.0	(0.0)
10B	53.3	(31.1)	3.6	(0.9)	1052	(46)	18.0	(19.0)
11B	89.1	(18.1)	4.5	(0.7)	925	(32)	16.8	(12.9)

Community 1B: *Phyllocladus asplenifolius* scrub on rock scree
This community was represented by Quadrat 8 which faced WNW at 1130 m above sea level, and was also observed on the inaccessible steep cliffs on the north-eastern edge of the survey area. It was characterised by 100% rock cover, and was the steepest of all the quadrats. Consequently the vegetation was very sparse, covering only 7% of the quadrat. The *Phyllocladus asplenifolius* was very stunted, being 4m high on Quadrat 8, due to the exposed nature of the area. Other shrubs recorded were *Monotoca empetrifolia, Olearia ledifolia, Tasmannia lanceolata, Richea sprengelioides, Cyathodes parvifolia* and *Orites revoluta.* The most frequent monocotyledons were *Poa gunnii* and *Luzula densiflora*, which occurred in rock crevices.

Community 2B: *Nothofagus cunninghamii* rainforest
This community occurred on rocky, well-drained areas between 930 and 1 110 m above sea level, across a wide range of slopes and aspects. It comprised low scrub 5-6 m high on the north-facing rock scree and north-east facing cliffs, through to callidendrous rainforest 20 m high in the more sheltered flat at the base of the south and west faces of the mountain-top. *Tasmannia lanceolata, Ozothamnus antennaria, Phyllocladus asplenifolius, Cyathodes parvifolia, Coprosma nitida, Aristotelia peduncularis, Pimelea drupacea* and *Olearia phlogopappa* were common understorey species in the low scrub. The more common understorey species in the taller forest were *Telopea truncata, Pittosporum bicolor, Tasmannia lanceolata, Coprosma nitida,* and *Polystichum Telopea truncata, Oxylobium ellipticum* and *Cyathodes parvifolia* common in the understorey.*proliferum.* Rainforest of intermediate height typically also contained *Leptospermum lanigerum* in its canopy, with *Tasmannia lanceolata,*

Community 2B
Dwarf *Nothofagus cunninghamii* on rock scree contrasts with next photograph of the tall callidendrous *Nothofagus* rain forest in more favourable conditions

Community 3B
***Nothofagus cunninghamii/Leptospermum lanigerum* scrub**

Community 3B: *Nothofagus cunninghamii / Leptospermum lanigerum / Orites revoluta* scrub

This community also occurred on rocky, well-drained areas, but at a slightly higher altitude of 1 050-1 125 m. The vegetation attained a height of no more than 5 m and also contained *Telopea truncata, Tasmannia lanceolata, Richea sprengelioides, Coprosma nitida, Oxylobium ellipticum* and *Cyathodes parvifolia* as subdominants. The most common species in the groundcover were *Gonocarpus montanus,* Lycopodium *fastigiatum, Monotoca empetrifolia, Geranium potentilloides* and *Polystichum proliferum.*

Community 4B
On this poorly-drained site *Leptospermum lanigerum* can shade out other shrubs

Community 4B
With better drainage many other species can compete with the shorter *Leptospermum*

Community 4B: *Leptospermum lanigerum* shrubbery
This community occurred between 970 and 1 090 m a.s.l. over a wide range of conditions, including water-logged sites. The height of *Leptospermum lanigerum* ranged from 2.5 to 12 m in this community. *Nothofagus cunninghamii, Persoonia gunnii, Tasmannia lanceolata, Cyathodes parvifolia, Coprosma nitida, Gonocarpus montanus, Lycopodium fastigiatum* and *Telopea truncata* were also common species. *Eucalyptus delegatensis, Micrantheum hexandrum,* and *Pultenaea juniperina* also occurred in this community at lower altitude, where the *Leptospermum lanigerum* was often shorter. In the wetter areas, *Leptospermum lanigerum* grew taller and frequently had an open understorey carpeted with mosses, with Quadrat 46 being in a *Sphagnum cristatum* bog.

Community 5B
Although this site is wet its rocky nature keeps the vegetation open allowing many shrubs and sedges to grow in the shallow soil

Community 5B
The sedges *Carpha alpina* with tall stems, and the darker green *Oreobolus oxycarpus* are conspicuous along the watercourse

Community 5B: *Leptospermum lanigerum / Epacris serpyllifolia / Baeckea gunniana / Empodisma minus* marsh

This community was unique to Quadrat 41 being situated in a poorly drained flat at 1090 m a.s.l.. Mats of *Carpha alpina* and *Oreobolus oxycarpus* also occurred here, as did occasional *Astelia alpina*, *Sprengelia incarnata*, *Almaleea subumbellata* and *Senecio pectinatus*. Several species from the surrounding better drained area (Community 10B) also managed to grow here, with *Orites revoluta*, *Bellendena montana* and *Micrantheum hexandrum* being the most prevalent.

Community 6B
This small pool near the mountain summit is bordered by *Astelia alpina* and surrounded by *Baeckia gunniana* and *Empodisma minus*. *Richea scoparia* and *Tasmannia lanceolata* can be seen in the right and left foreground respectively.

Community 6B
At a lower altitude the fern *Gleichenia alpina, Empodisma minus* are growing in the marsh.

Community 6B: *Empodisma minus / Baeckea gunniana* marsh
This community also occurred in poorly drained flats, but was less rocky than Community 5 (mean 10% rock cover cf. 60% cover). This resulted in a much greater cover of *E. minus* (>80% cf. 10%), and much less of the species typical of the better-drained areas. While *Epacris serpyllifolia, Carpha alpina* and *Astelia alpina* were present in this community, as they were in Community 5, Quadrat 17 differed from Quadrat 41 in the absence of *Leptospermum lanigerum*, and Quadrat 29 differed from Quadrat 41 in having 50% cover of *Gleichenia alpina*. *Erigeron gunnii* also occurred in this community, but not in Community 5.

Community 7B
Baeckea gunniana and a mosaic of the shrubs *Micrantheum hexandrum, Richea sprengelioides* and *Richea scoparia* near the summit of Mt Arthur.

Community 7B: *Baeckea gunniana* scrub
This community was unique to the moderately drained, south-facing slope at 1 160 m a.s.l. which encompassed Quadrat 25. It comprised many species of shrubs growing to 1-1.5 m in height, with *Micrantheum hexandrum, Richea scoparia, R. sprengelioides* and *Tasmannia lanceolata* as subdominants. *Nothofagus cunninghamii* occurred as a sporadic emergent 3.5 m in height. The groundcover was dominated by *Celmisia longifolia, Exocarpos humifusus* and *Phebalium montanum.*

Community 8B
***Richea sprengelioides* and low bushes of *Richea scoparia* are the dominant plants in the montane vegetation on a bench south-east of the fire tower.**

Community 8B: *Richea sprengelioides / Richea scoparia* scrub
This community also occurred on moderately drained areas at the northern end of the mountain-top at 1 150 m a.s.l., and also contained numerous species of shrubs 1-3 m in height. Along with *Micrantheum hexandrum* and *Tasmannia lanceolata, Coprosma nitida, Orites revoluta, Bellendena montana* and *Olearia pinifolia* were also common in the shrub layer. There was also a dense ground cover dominated by *Blechnum penna-marina, Celmisia longifolia, Helichrysum scorpioides* and *Lycopodium fastigiatum.*

Community 9B
Rounded green bushes of *Leptospermum rupestre* with *Richea scoparia* above the rocks at left and *R. sprengelioides* in left foreground grow in the montane shrubbery.

Community 9B: *Leptospermum rupestre / Micrantheum hexandrum / Richea sprengelioides* shrubbery

This community was unique to the exposed area around Quadrat 18 at the northern end of the mountain-top, and comprised many species of shrubs of 1-2 m in height. Of these, *Oxylobium ellipticum, Orites revoluta* and *Tasmannia lanceolata* occurred as subdominants. It was therefore closely related to the more abundant Community 10B, the major differences being the replacement of *Leptospermum lanigerum* by *L. rupestre,* and the absence of emergents, in the more exposed conditions present at higher altitude.

Community 10B
While the dominant plant is *Micrantheum hexandrum* many other shrub species are present. This community covers much of the eastern surface of the plateau.

Community 10B: *Micrantheum hexandrum* scrub

This community was widespread across the moderately-drained flats on the southern half of the mountain top up to 1 110 m a.s.l., and also occurred in isolated pockets as low as 960 m a.s.l. It comprised a dense shrub layer of 1-1.5 m in height, with *Oxylobium ellipticum* and *Orites revoluta* present as subdominants. Other frequent species in this layer were *Cyathodes parvifolia, Epacris serpyllifolia, Gaultheria hispida* and *Tasmannia lanceolata.* The most common species in the sparse groundcover were *Monotoca empetrifolia* and *Deyeuxia monticola.*, which grew in rock crevices. *Leptospermum lanigerum* was a common emergent up to 5 m in height, with *Nothofagus cunninghamii, Telopea truncata* and *Hakea lissosperma* being less frequent emergents. This community persisted at lower altitude beneath a *Eucalyptus delegatensis* canopy of up to 20% cover, and *L. lanigerum* up to 10 m tall.

Community 11B
Eucalyptus delegatensis forest has an understorey of *Hakea lissosperma, Tasmannia lanceolata, Bedfordia salicina* and many other species.

Community 11B
***Eucalyptus delegatensis* forest in a more open situation**

Community 11B: *Eucalyptus delegatensis* forest

This community was present below an altitude of 980 m on the southern face of the mountain. *Eucalyptus delegatensis* grew up to 40 m in height over a shrub layer dominated by *Bedfordia salicina, Hakea lissosperma, Tasmannia lanceolata, Olearia phlogopappa, Pultenaea juniperina* and *Micrantheum hexandrum. Cyathodes parvifolia, Coprosma nitida, Aristotelia peduncularis* and *Pimelea drupacea* occurred as frequent subdominants. The most common groundcover species were *Polystichum proliferum, Geranium potentilloides, Acaena novae-zelandiae* and *Chiloglottis cornuta.*

Comparison of the flora of Mt Arthur with those of Ben Lomond and Mt Barrow

Both the normal green form and a grey form of *Leptospermum rupestre* occur on Mt Arthur, as on Ben Lomond (Davies 1989). As the grey form occurred at the interface between *L. rupestre* and *L. lanigerum*, and the two species exhibit overlapping flowering phenologies, speculation by Davies (1989) that the grey form of *L. rupestre* is the result of hybridisation between these two species is supported.

The flora of Mt Arthur was depauperate in comparison to Ben Lomond and Mt Barrow with 124, 166, and 188 native vascular species respectively. Notable absentees were *Eucalyptus archeri, Richea acerosa, Epacris gunnii, Pentachondra pumila, Grevillea australis , Orites acicularis, Westringia rubiaefolia*, and *Gentianella diemensis*, which all occurred on both other mountains at similar altitudes and in similar situations. As Mt Arthur is smaller, and does not reach as high an altitude as the other two, this may be the result of species being lost during warmer periods, due to the absence of refugia at high altitude. This highlights the importance of designing reserves to allow species to migrate during periods of climatic change.

Despite the depauperate nature of the Mt Arthur flora, numerous species were recorded here but not on the other two mountains. These include the abundant species *Micrantheum hexandrum, Craspedia glauca, Cardamine tenuifolia, Uncinia flaccida, and Deyeuxia frigida.* While Davies did not record *Micrantheum hexandrum* within the areas surveyed on either of the other two higher mountains, a specimen was collected by him from the west of the Mt Barrow plateau. The presence of *Micrantheum hexandrum* at this altitude is very unusual in Tasmania, being more typical of the situation in Victoria (Jamie Kirkpatrick pers. comm.). Species with restricted ranges on Mt Arthur which were not recorded on either Mt Barrow or Ben Lomond include *Phyllocladus aspleniifolius, Veronica notabilis, Leptinella reptans, Drosera pygmaea, Callistemon pallidus, Carex chlorantha, Oreobolus oxycarpus, Pterostylis dubia, Danthonia setacea, Deyeuxia benthamiana, Asplenium bulbiferum, Asplenium terrestre* and *Huperzia varia.*

Much of the area appears to be covered in disclimax communities, probably as the result of fire. In well-drained areas this is the *Micrantheum hexandrum* dominated shrubberies (Communities 9B and 10B), while *Leptospermum lanigerum* predominates in the wetter areas (Communities 4B and 5B). In the absence of disturbance, the scattered *Nothofagus cunninghamii* within these communities would almost certainly expand to form extensive rainforests, as occur in the shaded areas along the south-western edge of the peak, and amongst the rock scree on the northern and eastern faces. The other rainforest species, *Atherosperma moschatum* and *Phyllocladus aspleniifolius*, were only recorded amongst the rock screes where maximum protection against fire was afforded. This suggests that they are more fire-sensitive than *N. cunninghamii*. As specimens of *A. moschatum* and *P. aspleniifolius* were only small, and both species produce seeds with the capacity for long-distance dispersal, these may both have recently colonised the area.

APPENDIX 1
SPECIES RECORDED AT MT ARTHUR

	Mt Barrow	Ben Lomond	Mt Arthur
DICOTYLEDONS			
Apiaceae			
Hydrocotyle hirta R.Br. ex A.Rich.	+		+
Asteraceae			
Bedfordia salicina (Labill.) DC.	+		+
Cassinia aculeata (Labill.) R.Br.	+		+
Celmisia asteliifolia Hook.f.	+	+	+
Craspedia glauca (Labill.) Sprengel		+	+
Erigeron gunnii (Hook.f.) F.Muell.			+
Euchiton traversii (Hook.f.) A.Anderb.		+	+
Euchiton umbricola (J.H.Willis) A.Anderb.	+		+
Ewartia planchonii (Hook.f.) P.Beauv.	+	+	+
Helichrysum scorpioides Labill.	+	+	+
Hypochoeris radicata L.		+	+
Leptinella reptans (Benth.) D.Lloyd & C.Webb			+
Olearia argophylla (Labill.) Benth.	+		+
Olearia ledifolia (DC.) Benth.	+	+	+
Olearia lirata (Sims) Hutch.	+		+
Olearia phlogopappa (Labill.) DC.	+	+	+
Olearia pinifolia (Hook.f.) Benth.	+		+
Ozothamnus antennaria (DC.) Hook.f.	+		+
Senecio gunnii (Hook.f.) Belcher	+	+	+
Senecio lautus Forst.f. ex Willd.	+	+	+
Senecio linearifolius A.Rich.			+
Senecio pectinatus DC. var. *pectinatus*		+	+
Brassicaceae			
Cardamine tenuifolia Hook.			+
Crassulaceae			
Crassula sieberana (Schultes & Schultes f.) Druce			+
Cunoniaceae			
Bauera rubioides Andrews			+
Droseraceae			
Drosera arcturi Hook.	+	+	+
Drosera pygmaea DC.			+
Elaeocarpaceae			
Aristotelia peduncularis (Labill.) Hook.f.	+		+

	Mt Barrow	Ben Lomond	Mt Arthur
DICOTYLEDONS			
Epacridaceae			
Cyathodes glauca Labill.	+		+
Cyathodes parvifolia R.Br.	+	+	+
Epacris serpyllifolia R.Br.	+	+	+
Monotoca empetrifolia R.Br.	+	+	+
Monotoca glauca (Labill.) Druce			+
Richea scoparia Hook.f.	+	+	+
Richea sprengelioides (R.Br.) F.Muell.	+	+	+
Sprengelia incarnata Smith var. *montana* R.Br.		+	+
Ericaceae			
Gaultheria hispida R.Br.	+		+
Escalloniaceae			
Tetracarpaea tasmanica Hook.f.	+		+
Euphorbiaceae			
Micrantheum hexandrum Hook.f.			+
Poranthera microphylla Brongn.	+	+	+
Fabaceae			
Almaleea subumbellata (Hook.) Crisp & P. Weston	+	+	+
Oxylobium ellipticum (Labill.) R.Br.	+	+	+
Pultenaea juniperina Labill.	+	+	+
Fagaceae			
Nothofagus cunninghamii (Hook.) Oersted	+		+
Geraniaceae			
Geranium potentilloides L'Herit. ex DC.	+	+	+
Goodeniaceae			
Scaevola hookeri (Vriese) F.Muell. ex Hook.f.	+	+	+
Haloragaceae			
Gonocarpus montanus (Hook.f.) Orch.	+	+	+
Monimiaceae			
Atherosperma moschatum Labill.	+		+
Myrtaceae			
Baeckea gunniana Schauer	+	+	+
Callistemon pallidus (Bonpl.) DC.			+
Eucalyptus delegatensis R.Baker ssp. *tasmaniensis* Boland	+		+
Leptospermum lanigerum (Aiton) Smith	+	+	+
Leptospermum rupestre Hook.f.	+	+	+

	Mt Barrow	Ben Lomond	Mt Arthur
DICOTYLEDONS			
Oleaceae			
Notelaea ligustrina Vent.	+		+
Onagraceae			
Epilobium sarmentaceum Hausskn.	+	+	+
Pittosporaceae			
Billardiera longiflora Labill. var. *longiflora*	+	+	+
Pittosporum bicolor Hook.	+	+	+
Plantaginaceae			
Plantago daltonii Decne.		+	+
Proteaceae			
Bellendena montana R.Br.	+	+	+
Hakea lissosperma R.Br.	+	+	+
Orites revoluta R.Br.	+	+	+
Persoonia gunnii Hook.f.		+	+
Telopea truncata (Labill.) R.Br.	+		+
Rosaceae			
Acaena novae-zelandiae Kirk	+	+	+
Rubiaceae			
Coprosma hirtella Labill.	+		+
Coprosma nitida Hook.f.	+	+	+
Galium australe DC.	+	+	+
Rutaceae			
Correa lawrenciana Hook. var. *lawrenciana*	+		+
Phebalium montanum Hook.	+	+	+
Phebalium squameum (Labill.) Engl. ssp. *retusum* (Hook.) Paul G. Wilson	+		+
Santalaceae			
Exocarpos humifusus R.Br.	+	+	+
Scrophulariaceae			
Veronica calycina R.Br.	+	+	+
Veronica notabilis F.Muell. ex Benth.			+
Stackhousiaceae			
Stackhousia monogyna Labill.		+	+
Thymelaeaceae			
Pimelea drupacea Labill.	+		+
Pimelea ligustrina Labill. ssp. *ligustrina*	+		+
Winteraceae			
Tasmannia lanceolata (Poiret) A.C. Smith	+	+	+

	Mt Barrow	Ben Lomond	Mt Arthur
MONOCOTYLEDONS			
Cyperaceae			
Carex breviculmis R.Br.		+	+
Carex chlorantha R.Br.			+
Carpha alpina R.Br.	+	+	+
Gahnia grandis (Labill.) S.T.Blake	+		+
Oreobolus oxycarpus S.T.Blake ssp. *brownii* Seberg			+
Oreobolus pumilio R.Br. ssp. pumilio	+	+	+
Uncinia flaccida S.T.Blake			+
Uncinia nervosa Boott		+	+
Juncaceae			
Juncus curtisiae L.Johnson			+
Luzula densiflora (Nordensk.) Edgar	+	+	+
Liliaceae			
Astelia alpina R.Br. var. *alpina*	+	+	+
Dianella tasmanica Hook.f.			+
Drymophila cyanocarpa R.Br.	+		+
Orchidaceae			
Caladenia alpina Rogers		+	+
Chiloglottis cornuta Hook.f.	+		+
Pterostylis dubia R.Br.			+
Poaceae			
Agrostis parviflora R.Br.		+	+
Agrostis sp. aff. *parviflora* R.Br.			+
Agrostis venusta Trin.	+	+	+
Aira caryophyla L.			+
Aira praecox L.			+
Danthonia diemenica D.I. Morris	+	+	+
Danthonia setacea R.Br.			+
Deyeuxia benthamiana Vick.			+
Deyeuxia frigida F.Muell. ex Benth.			+
Deyeuxia monticola (Roemer & Schultes) Vick.	+	+	+
Hierochloe redolens (Vahl) Roemer & Schultz		+	+
Poa costiniana Vick.	+	+	+
Poa gunnii Vick.	+	+	+
Poa hiemata Vick.		+	+
Trisetum spicatum (L.) Richter ssp. *australiense* Hulten	+	+	+
Restionaceae			
Empodisma minus (Hook.f.) L.Johnson & Cutler	+	+	+

	Mt Barrow	Ben Lomond	Mt Arthur
GYMNOSPERMS			
Phyllocladaceae			
Phyllocladus aspleniifolius (Labill.) Rich. ex Hook.f.			+
PTERIDOPHYTA			
Aspleniaceae			
Asplenium bulbiferum Forst.f.			
subsp. *gracillimum* (Colenso) Brownsey			+
Asplenium flabellifolium Cav.	+		+
Asplenium terrestre Brownsey			+
Blechnaceae			
Blechnum fluviatile (R.Br.) E.J.Lowe ex Salomon	+		+
Blechnum nudum (Labill.) Mett. ex Luerss.	+		+
Blechnum penna-marina (Poiret.) Kuhn	+	+	+
Blechnum wattsii Tind.	+		+
Dennstaedtiaceae			
Histiopteris incisa (Thunb.) J.Smith	+		+
Hypolepis rugulosa (Labill.) J.Smith	+		+
Dicksoniaceae			
Dicksonia antarctica Labill.	+		+
Dryopteridaceae			
Polystichum proliferum (R.Br.) C.Presl	+	+	+
Gleicheniaceae			
Gleichenia alpina R.Br.	+	+	+
Grammitidaceae			
Grammitis billardierei Willd.			+
Hymenophyllaceae			
Hymenophyllum peltatum (Poiret) Desv.	+	+	+
Lycopodiaceae			
Huperzia varia (R.Br.) Trev.			+
Lycopodium fastigiatum R.Br.	+	+	+
Polypodiaceae			
Phymatosorus pustulatus (Forst.f.)	+		+

Appendix 2

Community Number	Community Name	Site Number
1B	*Phyllocladus asplenifolius* on rock scree	1, 2, 3, 6, 7, 8, 9
2B	*Nothofagus cunninghamii* rain forest	12, 13, 20, 25, 30, 47,52, 53, 54, 55, 70, 71
3B	*Nothofagus cunninghamii/Leptospermum lanigerum/Orites revoluta* scrub	14, 15, 33, 34, 39, 40, 48, 62
4B	*Leptospermum lanigerum* shrubbery	21, 22, 23, 24, 36, 37, 45, 46, 60, 61
5B	*Leptospermum lanigerum/Epacris serpyllifolia/Baeckea gunniana/Empodisma minus* marsh	41
6B	*Empodisma minus/Baeckea gunniana* marsh	17, 29
7B	*Baeckea gunniana* scrub	25
8B	*Richea sprengelioides/Richea scoparia* scrub	16, 26
9B	*Leptospermum rupestre/Micrantheum hexandrum/Richea sprengelioides* scrub	18
10B	*Micrantheum hexandrum* scrub	28, 31, 32, 38, 39, 42, 49, 50, 56, 65
11B	*Eucalyptus delegatensis* forest	35, 44, 51, 57, 58, 59, 63, 64, 66, 67, 68, 69
	Transitional between 3B and 10B	39

Appendix 3

List of sites, grid references, altitudes, aspects drainage classes and slopes for Mt Arthur. All sites fall within the Grid Zone 55GEQ. Since the sites are close together (250 m) a fourth figure has been added to the standard easting and northing.

Cliffs and steep terrain prevented study in sites 4, 5, 9, 10, 11, 19, 27 and 43, which are omitted from the table below.

Site	Grid Reference	Altitude (m)	Aspect	Rock Cover	Notes	Drainage Class	Slope
1	2338.3092	960	340°	100%		5	20°
2	2361.3085	1110	345°	100%		5	45°
3	2376.3086	990	340°	100%		5	60°
6	2307.3074	960	260°	100%	large boulders	5	30°
7	2331.3067	1050	350°	75%	boulders	5	5°
8	2355.3059	1130	300°	100%		5	60°
12	2279.3056	960	340°	90%	boulders	5	5°
13	2301.3050	980	320°	20%		5	5°
14	2327.3051	1050	240°	90%	rock scree	5	50°
15	2352.3054	1125	250°	90	rock scree	4	30°
16	2376.3048	1150	190°	2%	boulders	2	0°
17	2399.3041	1150	260°	20%	pools, boulders	1	5°
18	2422.3035	1100	290°	70%		3	20°
20	2277.3021	940	280°	40%		2	10°
21	2305.3025	980	260°	60%		3	5°
22	2322.3036	1010	210°	3%		4	5°
23	2346.3030	1050	260°	10%	wet, moss	4	5°
24	2370.3024	1090	200°	90%		2	30°
25	2392.3018	1160	200°	20%	boulders	3	10°
26	2417.3010	1150	190°	90%		3	20°
28	2292.3020	960	340°	20%		3	10°
29	2316.3013	980	n/a	0%	flat	1	0°
30	2340.3006	1000	270°	90%		4	5°
31	2364.3000	1050	310°	70%		3	5°
32	2386.2993	1090	270°	10%		3	5°
33	2411.2988	1110	200°	90%		5	40°
34	2435.2981	1120	210°	90%		5	20°
35	2287.2994	940	270°	100%		5	5°
36	2309.2989	990	180°	90%		4	45°
37	2333.2983	1010	300°	3%	mossy	1	<5°

Site	Grid Reference	Altitude (m)	Aspect	Rock Cover	Notes	Drainage Class	Slope
38	2351.2976	1020	230°	40%		3	10°
39	2380.2970	1090	250°	60%		4	30°
40	2404.2963	1100	100°	90%		5	45°
41	2424.2958	1090	180°	60%		1	<5°
42	2449.2951	1100	60°	90%	boulders	4	50°
44	2303.2964	920	220°	80%		4	20°
45	2327.2959	970	180°	80%		4	<5°
46	2351.2955	1010	n/a	10%	sphagnum bog	1	0°
47	2375.2946	1000	200°	100%		5	50°
48	2398.2940	1060	140°	60%		3	10°
49	2422.2932	1070	220°	40%		3	<5°
50	2445.2926	1110	280°	80%	flat rock sheet	5	5°
51	2320.2933	890	180°	100%	in rock scree	5	5°
52	2351.2930	940	200°	60%	boulders	4	15°
53	2369.2919	945	170°	80%		4	5°
54	2401.2911	1010	220°	100%	on rock sheet	5	50°
55	2416.2908	1050	250°	75%	boulders, springs	2	30°
56	2439.2902	1080	n/a	10%	subject to flooding	2	0°
57	2339.2906	880	180°	100%		5	40°
58	2362.2900	890	220°	100%		5	10°
59	2384.2890	930	250°	90%		5	10°
60	2408.2884	1020	230°	50%		4	10°
61	2431.2878	1050	140°	90%		5	10°
62	2456.2870	1010	160°	90%		5	15°
63	2402.2861	970	190°	90%		3	10°
64	2426.2854	1000	180	40%		4	10°
65	2449.2847	1040	80°	80%		4	40°
66	2379.2868	920	280°	80%		4	20°
67	2396.2836	910	190°	100%		5	20°
68	2419.2829	940	220°	40%		4	5°
69	2443.2822	980	210°	100%		5	40°
70	2257.3045	930	200°	30%		2	<5°
71	2287.3044	990	180°	70%		3	10°