

DISTRIBUTION AND CONSERVATION STATUS OF Eucalyptus brockwayi

WITH PARTICULAR REFERENCE TO BROCKWAY TIMBER RESERVE

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Albany Office, Dept. CALM

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15/2/89.

2 copies to Mines

Frank Batini
Environmental Protection Branch
Dept. CALM

Dear Frank,

enclosed is a copy of my report on Eucalyptus brockwayi, and the relevant aerial photographs. I am sorry for the delay, but the office typing facilities were overloaded and I only had time to type the report and not compile it all, before leaving for Victoria.

I have not bound the report as I am unsure of your filing processes. The site locations, where information on the various vegetation associations is missing from Map 1. Unfortunately I left the relevant information in WA, but I will forward this as soon as I return (18/3/89).

I would appreciate any comments as it is always difficult in short survey work knowing how much detail to provide. If there is any queries or additional information you require, please do not hesitate to contact me. I am in Victoria until 18/3/89 (c/o 45 Fulton Rd, Mt. Eliza 3930, Ph (03) 787 2419),

Yours Sincerely,

Libby Sandiford

Libby Sandiford.

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1 INTRODUCTION

Eucalyptus brockwayi (C.A.Gardner) is found only in a small area around Norseman W.A. Its distribution coincides with soils derived from high mineral bearing greenstones. Mineral claims are pegged intensively throughout its range. The only reserve in the state containing E. brockwayi - Brockway Timber Reserve is no exception. Mining developments in the area have the potential to conflict with the conservation requirements of E. brockwayi. A two week field survey was conducted to determine the distribution of E. brockwayi and to determine areas of high conservation value. Field work concentrated on Brockway Timber Reserve.

1.1 Eucalyptus brockwayi

Commonly known as Dundas Mahogany, E. brockwayi is named after George Ernest Brockway - a former Divisional Forest Officer in Kalgoorlie.

E. brockwayi is an erect tree distinguished by a white/grey (or occasionally cream/pink) bark which peels in patches revealing salmon to red-brown new bark (Figure 1). The buds have a blunt conical operculum on a cylindrical to urn-shaped hypanthium. The fruit is small and globular, with a short cylindrical neck and depressed disc. Trees are usually distinctive in the field, though E. brockwayi can be confused with E. flocktoniae, E. aff. pileata and E. salmonophloia at sapling stage or when new bark is not evident.

E. brockwayi is found on slopes and flats on greenstone derived soils, growing with E. dundasii (Dundas Blackbutt), E. flocktoniae (Merrit/White Gum), E. lesouefii (Goldfields Blackbutt) and E. aff. pileata.

1.2 Brockway Timber Reserve

Situated 12 km south of Norseman this 3724 ha reserve was gazetted on 31/12/1975 for the purposes of Conservation of Flora, Fauna and Landscape Management. The ecological diversity of the reserve and presence of E. brockwayi and E. dundasii were prime reasons for reservation.

The reserve is dominated by the undulating hills of the southern end of the Dundas Hills. The eastern border of the reserve is along the northern drainage channel of Lake Dundas. Mt. Deans (441 metres) is the highest point in the reserve.

Since gazettal in 1975 no legal timber cutting has occurred though the area had been extensively cut prior to this date. Mineral claims are pegged throughout the reserve and there are currently two active deep mining sites.

1.3 rvey brief

1. Map broad vegetation associations with reserve (Muir's system)
2. Determine areas of high conservation value within the reserve.
3. Assess distribution of E. brockwayi (within and outside the reserve). Recommend any high value additions to the reserve system.
4. Determine CALM preference for land swap porposals by Australis.
5. Record any illegal activity (eg, timber cutting) or active mining for follow-up by District and Environmental Protection Branch.



FIGURE 1: New bark - Eucalyptus brockwayi

2 METHODS

2.1 Vegetation mapping

In order to predict the presence of E. brockwayi on the basis of vegetation type, vegetation associations within Brockway Timber Reserve were mapped. It was not possible to map the main vegetation associations on a systematic basis given the limited time and manpower available. A vegetation map generated from aerial photography interpretation was used as a base map, with field checking to confirm boundaries.

2.2 Vegetation classification

Vegetation associations were classified according to Muir (1977). Within each association the structure, dominant species and ecological notes were recorded at one or more sites. All plant specimens collected for identification were checked against specimens in the Perth Herbarium.

2.3 Eucalyptus brockwayi distribution

The distribution and status of E. brockwayi outside the reserve was surveyed opportunistically by traversing tracks in and around the known distribution area. Likely habitat for which there were no previous records of E. brockwayi were specifically targeted. Voucher specimens collected will be lodged in the Perth Herbarium with duplicates lodged in the Albany Regional Herbarium.

2.4 Mining leases

Active and inactive mine sites within the reserve were visited to assess the extent of disturbance, and whether any breaches of regulations had occurred.

The presence and status of E. brockwayi, the diversity of vegetation and the potential susceptibility for degradation following mining activity was assessed for mining leases held by Australis Mining NL within Brockway Timber Reserve. This was done in order to determine the conservation value of each lease and determine preferences of land swap proposals.

3 RESULTS

3.1 Vegetation mapping

The vegetation map derived from aerial photograph interpretation proved limited. The majority of the reserve is covered in Woodland associations which generally differ only in the dominant Eucalyptus species present. Aerial photograph interpretation failed to differentiate these floristic differences. The patchiness of the vegetation and the lack of clearly defined topographical or soil preferences by the major tree species compounded the difficulties in using such maps. Thus the distribution of vegetation associations was determined by traversing all tracks within the reserve and checking major boundaries on the aerial photographs.

The major associations mapped are broad distributions only and variation within these associations occurs. Map 1 shows the distribution of the major vegetation associations in Brockway Timber Reserve.

3.2 Vegetation associations

The majority of the reserve is covered by open woodland associations with low open woodland and shrubland associations found on shallow, skeletal soils such as on hill tops and ridges. The two Low Forest associations and Low Woodland (12) recorded are seral associations representing sapling and pole growth of the relevant Eucalyptus species, it is assumed these will thin to woodlands with age.

Sixteen plant associations were recorded:

Open Woodland

- 1 *E. brockwayi*

Woodland

- 2 *E. dundasii*
- 3 *E. brockwayi/E. salubris*
4. *E. dundasii/ E.lesouefii/ E. flocktoniae/ E.brockwayi* over scattered *Melaleuca sheathiana* and *Atriplex vesicaria*
- 5 *E. dundasii/ E.lesouefii/ E. flocktoniae/ E. brockwayi* over scattered *M. sheathiana* and mixed shrubs
- 6 *E. flocktoniae*
- 7 *E. salubris*
- 8 *E. salmonophloia*

Low Woodland

- 9 *E. lesouefii/E.longicornis/E. flocktoniae*
- 10 *E. torquata*
- 11 *E. stricklandii*
- 12 *E. dundasii/E. flocktoniae/E. lesouefii*

Low Forest A

- 13 *E. flocktoniae/E.transcontinentalis/E. longicornis*
- 14 *E.dundasii/E. flocktoniae/E. longicornis*

Shrubland

- 15 *Allocasuarina huegelliana/Calothalmus gilesii*
- 16 *Allocasuarina huegelliana/mixed shrubs.*

Summaries of these associations are provided below. Muir's classification code is recorded in brackets for the site/sites marked on the Map 1 (and identified by the association number)(Muir 1977). Species recorded for each association are listed in Appendix 1.

MAP 1: Vegetation Associations - Brockway Timber Reserve

KEY

Open Woodland

- 1 *E. brockwayi*

Woodland

- 2 *E. dundasii*
3 *E. brockwayi*/*E. slaubris*
4 *E. dundasii*/*E. lesouefii*/*E. flocktoniae*/*E. brockwayi* over
scattered *Melaleuca sheathiana* and *Atriplex vesicaria*
4l *E. lesouefii* dominant
4d *E. dundasii* dominant
4x *E. brockwayi* absent or scattered
5 *E. dundasii*/*E. lesouefii*/*E. flocktoniae*/*E. brockwayi* over
scattered *M. sheathiana* and mixed shrubs
6. *E. flocktoniae*
7 *E. salubris*
8 *E. salmonophloia*

Low Woodland

- 9 *E. lesouefii*/*E. longicornis*/*E. flocktoniae*
10 *E. torquata*
11 *E. stricklandii*
12 *E. dundasii*/*E. flocktoniae*/ *E. lesouefii*

Low Forest A

- 13 *E. flocktoniae*/*E. transcontinentalis*/*E. longicornis*
14 *E. dundasii*/ *E. flocktoniae*/*E. lesouefii*

Shrubland

- 15 *Allocasuarina huegelliana*/*Calothalmus gilesii*
16 *A. huegelliana*/mixed shrubs
s unsurveyed shrubland

- x Very Open Mallee over shrubland - Containing *Allocasuarina* sp. nov

..... Approximate boundaries of pure *E. brockwayi* Woodland

——— Uncertain boundaries

- Site locations for Muir Classification per association

MAP 1: Vegetation Associations - Brockway Timber Reserve

KEY

Open Woodland

- 1 *E. brockwayi*

Woodland

- 2 *E. dundasii*
- 3 *E. brockwayi*/*E. slaubris*
- 4 *E. dundasii*/*E. lesouefii*/*E. flocktoniae*/*E. brockwayi* over scattered *Melaleuca sheathiana* and *Atriplex vesicaria*
 - 4l *E. lesouefii* dominant
 - 4d *E. dundasii* dominant
 - 4x *E. brockwayi* absent or scattered
- 5 *E. dundasii*/*E. lesouefii*/*E. flocktoniae*/*E. brockwayi* over scattered *M. sheathiana* and mixed shrubs
- 6 *E. flocktoniae*
- 7 *E. salubris*
- 8 *E. salmonophloia*

Low Woodland

- 9 *E. lesouefii*/*E. longicornis*/*E. flocktoniae*
- 10 *E. torquata*
- 11 *E. stricklandii*
- 12 *E. dundasii*/*E. flocktoniae*/ *E. lesouefii*

Low Forest A

- 13 *E. flocktoniae*/*E. transcontinentalis*/*E. longicornis*
- 14 *E. dundasii*/ *E. flocktoniae*/*E. lesouefii*

Shrubland

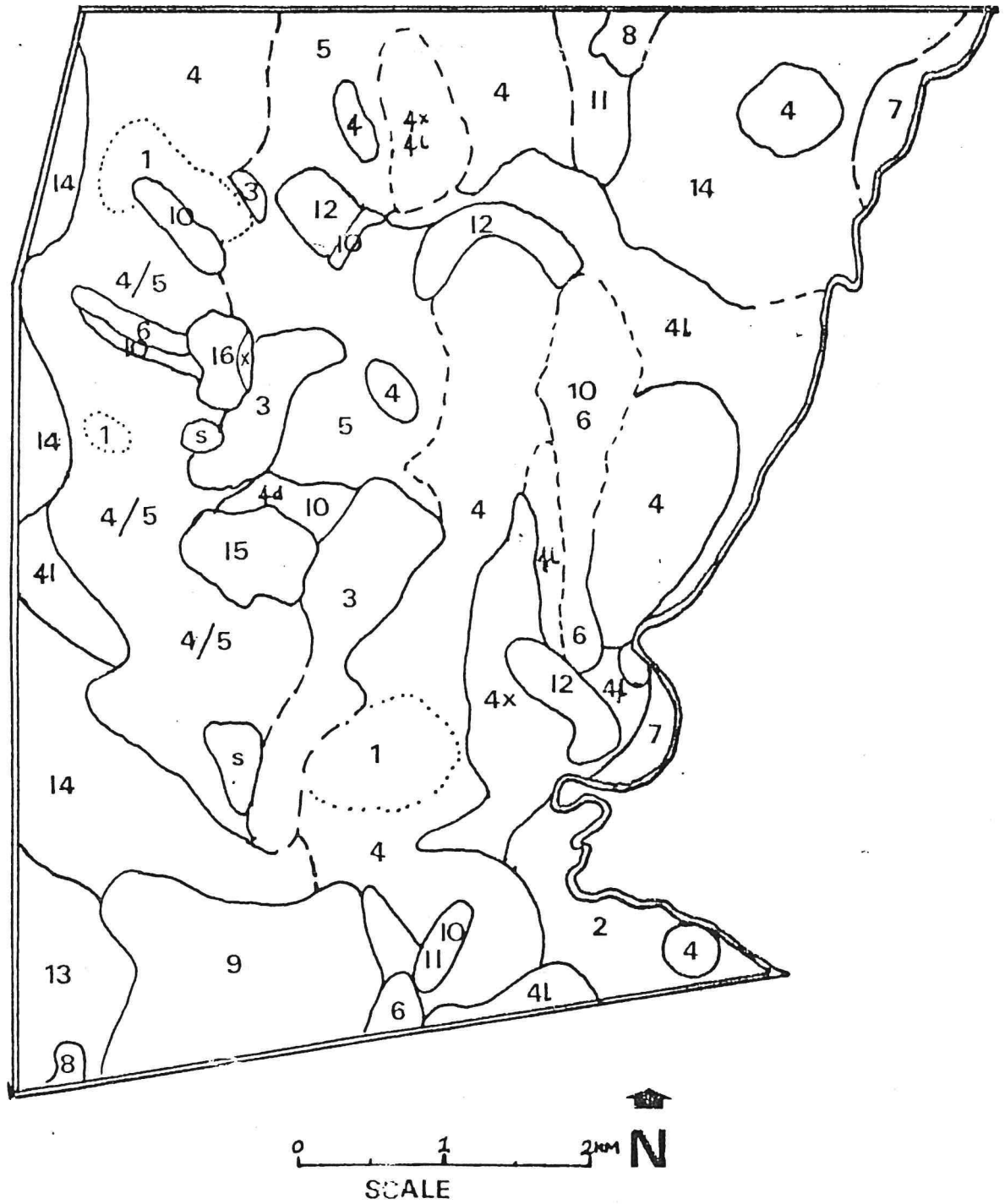
- 15 *Allocasuarina huegelliana*/*Calothalmus gilesii*
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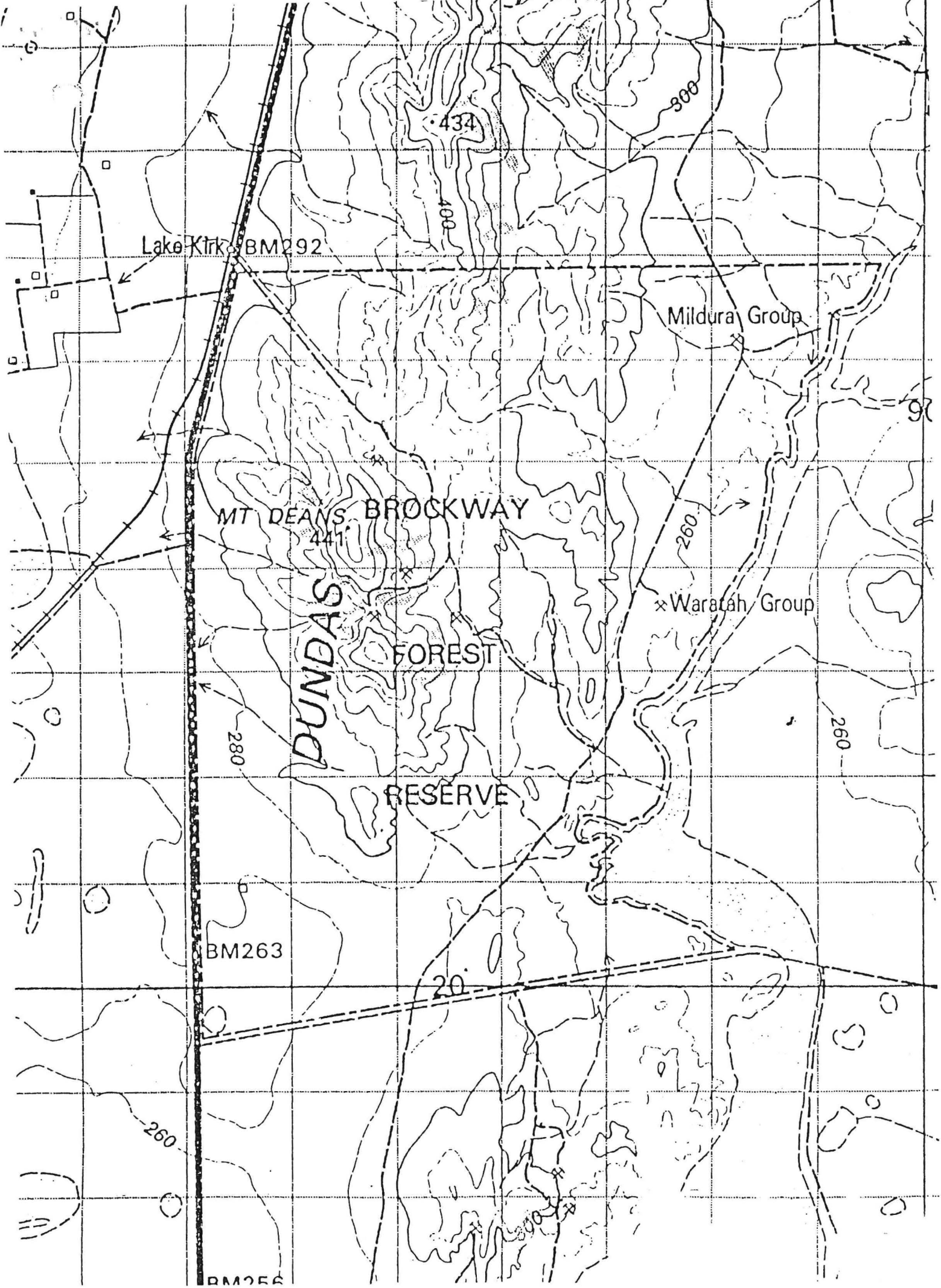
**MAP 1 Vegetation Associations
Brockway Timber Reserve**



PTO for Overlay

OVERLAY MAP 3
Major routes traversed





Lake Kirk BM292

Mildura Group

MT DEANS BROCKWAY

DUNDAS

FOREST

RESERVE

Waratah Group

BM263

BM256

1 E. brockwayi Open Woodland

[1a: M.Si.SAr.SCi.]

[1b: Mi.Sr.SBr.SDr]

Relatively small stands of pure E. brockwayi over either scattered Melaleuca sheathiana (2-5m) and Atriplex vesicaria (0.2-1m) or over M. sheathiana and mixed shrubs. Found on slopes, ridges and valley flats in the central and north west areas of the reserve. E. brockwayi mature to senescent trees, moderate stands.

2. E. dundasii Woodland

[Mi.Si.SCi.]

Mature E. dundasii over scattered M. sheathiana and A. vesicaria generally found on flat to gentle slopes on red sandy clay soils in the eastern and southern areas of reserve. E. salubris may be present as a sub dominant species. E. brockwayi absent to low

3. E. brockwayi/E. salubris Woodland

[Mr.LAi.SAi.SBr.SDr]

Pole to mature E. brockwayi over sapling E. salubris and occasional sapling E. brockwayi. Understorey dominated by Eremophila dempsteri (1.5-2.5m) over scattered mixed shrubs. E. dundasii may occur as a sub-dominant species. Occurs on red/brown clay loams on gentle to moderate mid slopes and creek valleys in the central areas of the reserve. E. brockwayi - good stands.

4. E. dundasii/E. lesouefii/E. flocktoniae/E. brockwayi over M. sheathiana and A.vesicaria.

[4a: Mi.Si.Scr]

[4b: Mi.Si.SCi.SDr]

Pole to mature trees over scattered layer M. sheathiana and layer of A. vesicaria. Commonly found on the lower slopes and valley flats in the north, central and eastern areas of the reserve. Eucalyptus sp. aff pileata and E. sp. aff annulata may be present, E. brockwayi - good stands.

This is one of the most extensive and variable of the associations mapped. All or any combination of the Eucalyptus species may be co-dominant. Some indication of this variation is delineated on the Map 1 by dotted lines and suffixes

4 l E. lesouefii dominant with E. flocktoniae, E. dundasii sub dominant. E. brockwayi low - absent.

4 d E. dundasii dominant with other species subdominant

4 x E. dundasii, E. flocktoniae, E. lesouefii co-dominant, E. brockwayi generally absent.

5. E. dundasii/E. brockwayi/E. flocktoniae/E. lesouefii over M. sheathiana and mixed shrubs.

[Mi.Sr.SBi.SDr]

Like association 4, this woodland association is common and variable. It differs from the former by the presence of a scattered shrub layer usually dominated by Eremophila dempsteri. Other common shrubs include Santalum acuminatum, Dodonea stenozyga and Halgania rigida. It is intermediate in floristics and topographical distribution between associations 3 and 4. Generally found on gentle to mid slopes in the central and north - western ares of the reserve. E. brockwayi - good stands.

6. E. flocktoniae Woodland

[Mi.Si.SAr.SDr]

The stands of E. flocktoniae with an understorey of M. sheathiana over A. vesicaria or scattered mixed shrubs. Scattered E. dundasii, E. brockwayi, or E. torquata may be present. Generally restricted to ridge lines on shallow skeletal soils. E. brockwayi generally absent.

7. E. salubris

[7a: Mr.Sr.SCi.SDi]

Mature woodland of E. salubris with very scattered understorey of M. sheathiana and A. vesicaria. Restricted orange brown sandy clays along the eastern boundary. Contains the only extensive mature E. salubris in the reserve. E. brockwayi: absent.

8. E. salmonophloia

[8a: Mr.LAr.Sr.SAi.SCi]

[8b: Mi,Sr,SAr,Scr.VLi]

Restricted to the north east boundary on clay soils where it occurs over a scattered layer E. lesoueffii/E. stricklandii and mixed shrub layer. In the south east corner E. salmonophloia [8b] occurs on sandy soils with scattered shrub layer. Here E. salmonophloia has a very spreading deep crown. E. brockwayi: low-absent.

9. E. lesoueffii/E. longicornis /E. flocktoniae Low Woodland -

[LAi.Sr,SAi.SCr,SDr]

Pole to mature co-dominant Eucalyptus species over a scattered M. sheathiana/M. pauperiflora and mixed shrub layer (Cassia nemophila var.nemophila, Alyxia buxifolia, Eremophila scoparia, E. pachyphylla, E. ionantha and Acacia merrallii). Restricted to orange sandy loam soils on the flats in the south and south west of reserve. Scattered E. aff pileata, E. salubris and E. transcontinentalis may be present. E. brockwayi absent.

10 E. torquata Low Woodland

[LAi.SArSBrSCi]

A common though locally restricted association found on rocky outcrops, ridges and creek-sides throughout the reserve. Mature E. torquata over a mixed shrub layer (Dodonea stenozyga, D. microzyga, Eremophila saligna, Scaevola spinescens.) E. lesoueffii is occasionally a sub-dominant species. Only some locations are mapped on Map 1.

11 E. stricklandii Low Woodland

[LAi.Si.SBi.SCi]

E. stricklandii with scattered E. lesoueffii over a mixed shrub layer. Restricted to the northern boundary on ridges and slopes, with a small outcrop in the south. The latter has a depauperate understorey.

12 E. dundasii/E. flocktoniae/E. lesoueffii

[LAi.Si.SDr]

Sapling to pole mixed low woodland over scattered M. sheathiana and scattered low shrubs. Canopy cover of the trees may over 30% in some parts. Found scattered throughout the reserve within or adjacent Mixed Woodland (4 and 5). E. brockwayi; low-absent.

1² E. transcontinentalis/E. flocktoniae/E. longicornis Low Forest A
[LAc.Si.SBr.SCrSDr]

Co-dominant pole eucalypts over a scattered M. sheathiana/M. pauperiflora and mixed shrub layer. Occurs on orange sandy loams along the south eastern boundary of the reserve. Differs from association 8 by a denser upper storey and more common occurrence of Melaleuca species. E. brockwayi - absent.

14 E. dundasii/E. flocktoniae/E. longicornis. [LAc.Sr.Sai.SCi]

Pole to mature mixed low Woodland found on grey-brown sandy clay loams in the north east and western areas of the reserve. Understorey dominated by M. sheathiana/M. pauperiflora over a variable and mixed low shrub layer.

15 Allocasuarina huegelliana/Calothalmus gilesii Shrubland.
[SAC.SCi.SDr.VLr]

Shrubland to 2-3m, Found on the hill south of Mt Deans. E. brockwayi absent.

15 Allocasuarina huegelliana /mixed shrubland
[KSr.Sc.SBi.SCi.SDi.VLi]

Shrubland to 2-3m found on Mt Deans with scattered emergent Eucalyptus oleosa var. oleosa.

3.3 Distribution of E. brockwayi

3.3.1 Brockway Timber Reserve

The presence of E. brockwayi within the reserve was qualitatively assessed into three grades :

- 1 Dominant species - pure stands,
- 2 Co-dominant species - moderate to good stands
- 3 Scattered individuals.

Map 2 provides a distribution of E. brockwayi in the reserve. Moderate to good stands of E. brockwayi are found throughout the reserve on clay loams and gentle to moderate slopes. The major stands occur in the central and north western areas of the reserve.

3.3.2 Total range

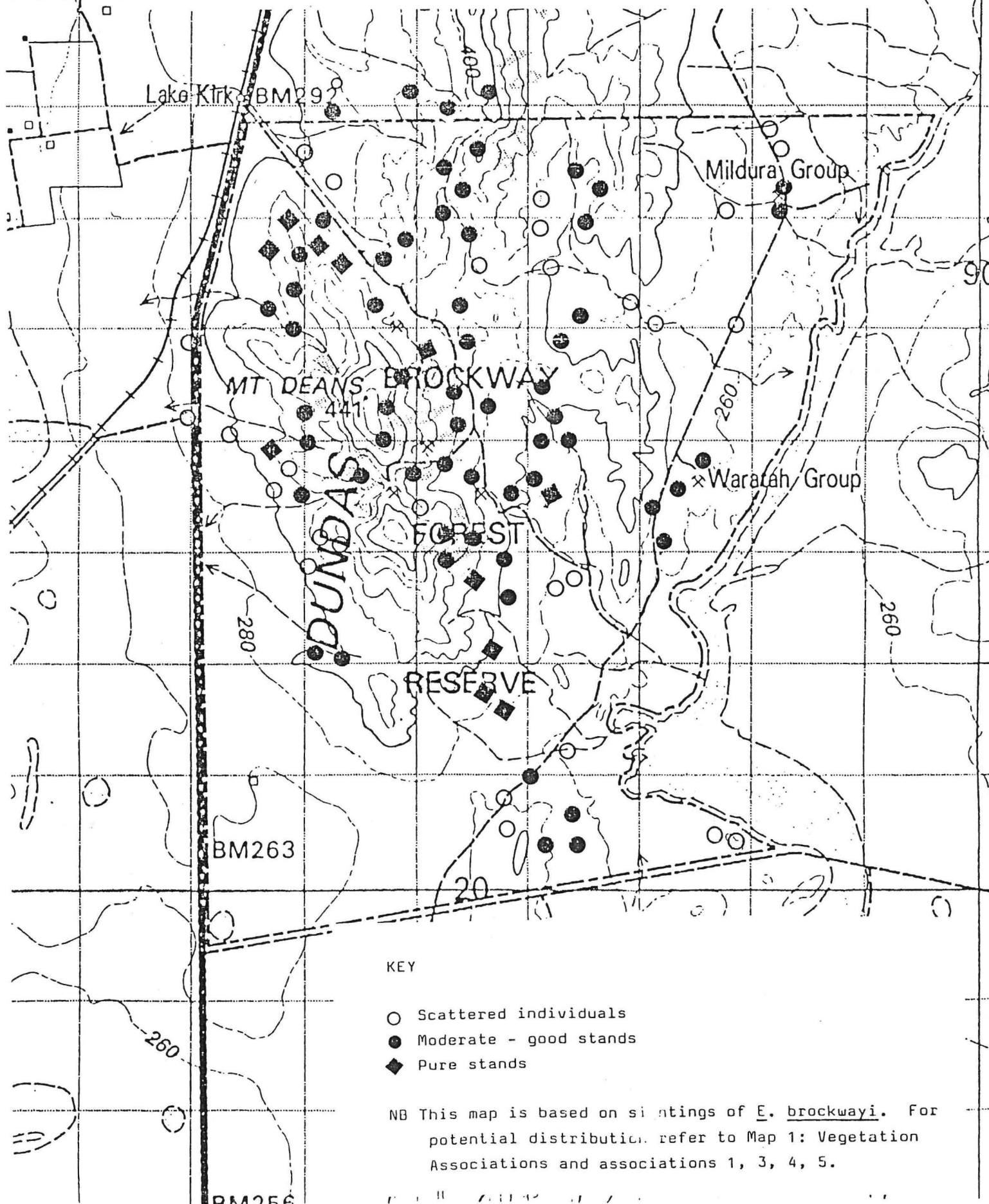
The overall distribution of E. brockwayi is shown on Map 3, together with the routes traversed.

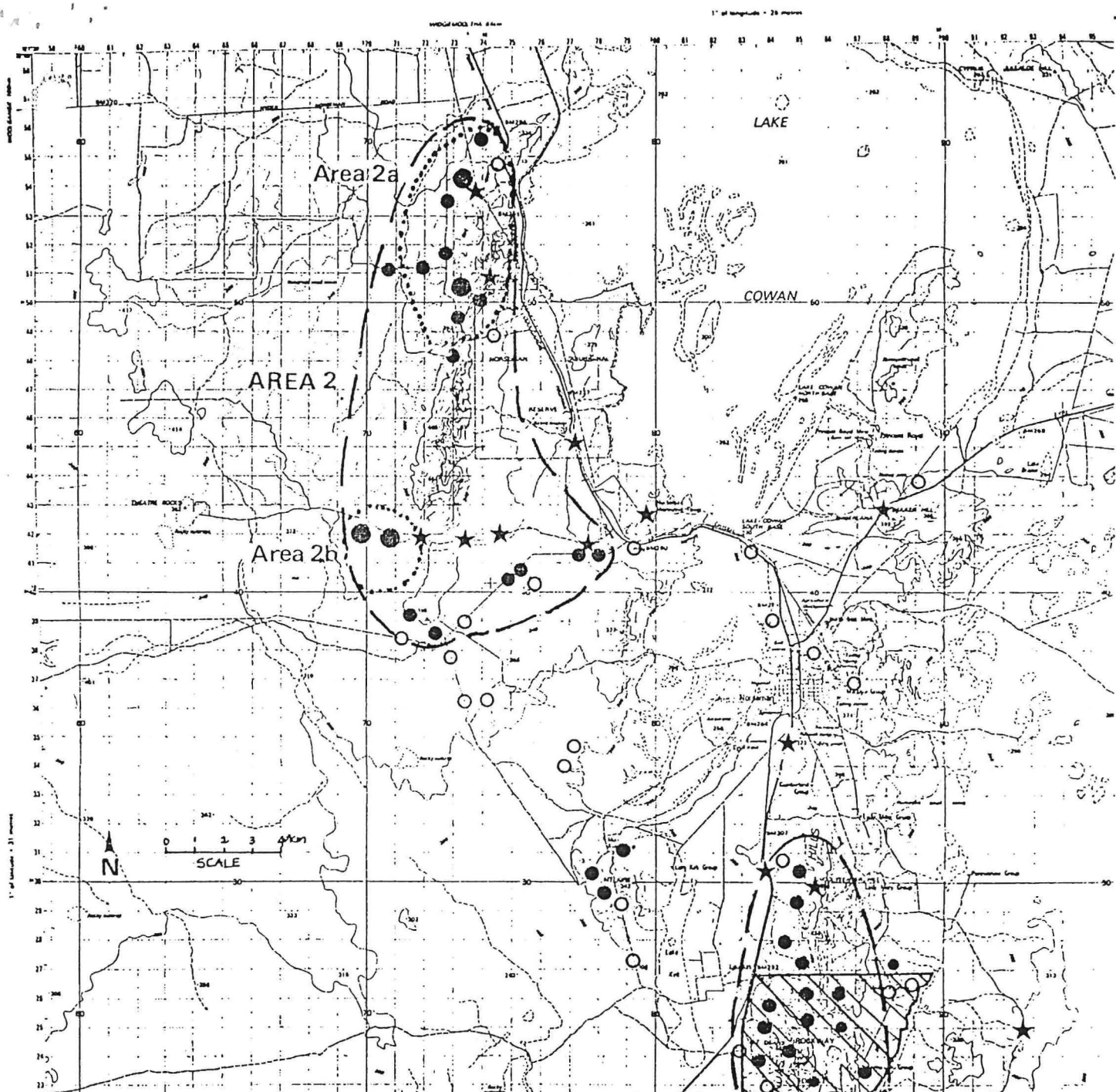
E. brockwayi occurs in a 40 km band from the Hyden Norseman Road south to the southern end of the Dundas Hills. The western limit of E. brockwayi is a few kilometres west of the northern range containing Mt Thirsty. Only scattered individuals are found east of the Lake Dundas drainage line (Stan Jones, Norseman timber cutter, pers. comm).

Two major concentrations of E. brockwayi occur at the south eastern and north western limits of its range (Area 1 and 2 Map 3).

Two areas of exceptional stands of E. brockwayi occur in area 2 (Area 2a and 2b Map 3).

MAP 2: Distribution of Eucalyptus brockwayi in
Brockway Timber Reserve





MAP 3: Distribution of Eucalyptus brockwayi

KEY

- ★ Rare Eucalypt Survey Records (Wildlife Research, CALM)
- Scattered individuals
- Moderate - good stands
- Excellent stands
- /// Brockway Timber Reserve

NB See Map 2 for the distribution of E. brockwayi in Brockwayi Timber Reserve, this area was more intensively surveyed than other areas.

3.4 Mining - Brockway Timber Reserve.

Two active and eight inactive/old mining sites are present in the reserve. At all sites there has been extensive removal of soil (surface and sub-surface). Little regeneration was observed.

No major breaches of regulations were observed at the active sites. As previously reported (CALM Albany F 197/25) the area covered by Prospecting Lease 63/304 has scattered litter, mostly confined to a pit and dead trees associated with pumping outlets.

Figure 2 shows leases controlled by Australis Mining NL in Brockway Timber Reserve (An overlay is provided in Appendix 2).

Summaries of topography, vegetation associations, E. brockwayi occurrence, mining activity and conservation value in each lease are provided in Appendix 3.

Australis Mining NL leases of highest conservation value are P63/131, P63/133 and P63/132 respectively.

4 DISCUSSION

4.1 Brockway Timber Reserve

4.1.1 Vegetation

This scenic reserve contains a diverse flora dominated by Woodland associations. E. dundasii, E. lesouefii, E. brockwayi, E. flocktoniae and E. longicornis are the most common tree species. No intensive plant collection was made during the survey, however 73 species were recorded.

This is the only reserve known to contain the geographically restricted species - E. brockwayi.

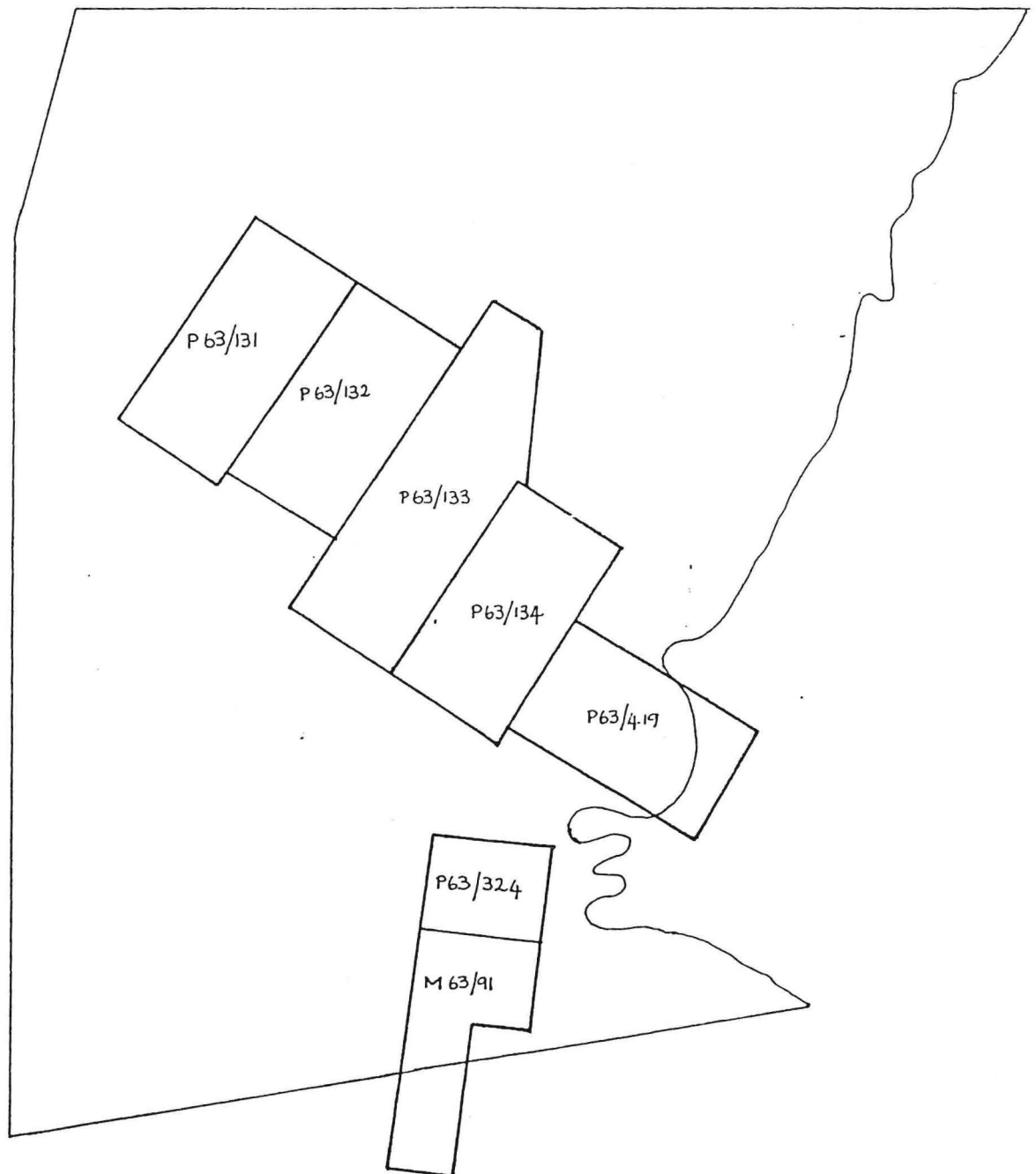
Allocasuarina sp. nov. (in press) had previously been collected only on Mt Day 120 km to the WNW of the reserve (E. Bennett pers. comm.). This species is the dominant shrub in E. griffithsii/E. oleosa var. oleosa Very Open Mallee found on Mt Deans.

An unusual form of Eucalyptus sp.aff. annulata was recorded in association 4 in the centre of the reserve. It differs from E. annulata in its pointed rather than blunt operculum. No fruits were obtained.

Evidence of extensive past timber cutting of M. sheathiana and M. pauperiflora was observed throughout the reserve. Despite extensive human disturbance through timber cutting, prospecting and mining very few exotic weeds were observed.

FIGURE 2: Australis Mining NL Leases – Brockway

Timber Reserve



4.1.2 Eucalyptus brockwayi

E. brockwayi is common throughout the reserve with the exception of the south west portion. Moderate to good stands are common in the central and northern areas of the reserve. Seedling, sapling, pole, mature and senescent specimens of E. brockwayi were observed. With the exception of some disturbed mining sites, the recruitment of E. brockwayi was low.

Several virgin stands of E. brockwayi were found (see Map 2). These contained mature to senescent individuals. Several exceptionally tall E. brockwayi (>30 m) occur in a few of the central valleys (Figure 3).

4.1.3 Mining

E. brockwayi was recorded in all but one of the active and disused mining sites within the reserve. Extensive soil and vegetation removal has occurred at these sites and little regeneration has occurred. The extensive scarring of the landscape and lack of regeneration associated with these mining sites conflicts with the purposes of the reserve, i.e. conservation of flora and fauna and landscape management.

Australis Mining NL leases within the reserve with the highest conservation values are P63/131, P63/133 and P63/132 respectively.

P 63/131 contains the most diverse vegetation of these leases, and of any comparable area within the reserve. One of only two known disjunct populations of Allocasuarina sp. nov. occurs in this lease. Moderate populations of E. brockwayi occur at the edges of this lease. The lease encompasses Mt Deans and contains some of the most scenic landscape within the reserve.

P63/133 contains extensive stands of E. brockwayi as the dominant or co-dominant species. Particular good stands are found in the northern portion of the lease. The only observed populations of E. sp. aff. annulata occur in this lease.

P63/132 contains good stands of E. brockwayi throughout the lease.

These three leases occur in areas of high conservation value (see 4.1.4) and on the hilliest areas of the reserve. Track and mining activity could lead to erosion.

Compared to the above leases, other Australis Mining NL^{leases} (P63/134, P63/139, P63/324, M63/91) were of low to moderate conservation value. P63/419 being of lowest value.

4.1.4 Conservation

Brockway Timber Reserve is of high conservation value due to the diversity of vegetation. Areas of very high value are outlined on Map 4. 3/4. These areas correspond to the areas containing the best stands of E. brockwayi, or those containing Allocasuarina sp. nov. These areas do not encompass all vegetation associations observed within the reserve.



FIGURE 3: Very tall Eucalyptus brockwayi, a central valley
Brockway Timber Reserve.



FIGURE 4: Eucalyptus brockwayi Woodland, with E. campaspe and E. ?celastroides, 5 km north of Mt Thirsty (Area 2a)



FIGURE 5: Euclayptus brockwayi Woodland - Theatre Rocks Road, (Area 2b, Map 3)

4.2 Distribution of Eucalyptus brockwayi

E. brockwayi occurs in a 40 km band from the Hyden Norseman Road south to the southern end of the Dundas Hills (Map 3). The western limit of E. brockwayi is a few kilometres west of the northern range containing Mt. Thirsty. Only scattered individuals are found east of the Lake Dundas drainage line (Stan Jones, pers. comm.).

E. brockwayi is found scattered throughout this range with two major concentrations occurring in the north west and south east (Area 1 and 2, Map 3).

In the south west, good stands are found throughout the Dundas Hills from Woollyenyer Hill south through Brockway Timber Reserve to hills 3km south of the Brockway Timber Reserve (Area 1 Map 3). In this area E. brockwayi is generally found on clay loam soils on gentle to moderate slopes. It occurs as a co-dominant with E. dundasii, E. flocktoniae, E. lesouefii. Good though small stands of E. brockwayi occur in the vicinity of Mt Kirk - 7 km west of Woollyenyer Hill. E. brockwayi is well reserved in this area in Brockway Timber Reserve.

In the north west, good to exceptional pure and mixed stands are found along and around a range of hills stretching roughly from the Hyden-Norseman Rd in the north to a few kilometres south of Theatre Rocks Road (Area 2 Map 3). Unlike the populations to the south west, E. brockwayi is common here on flat ground as well as on gentle to moderate slopes.

In the vicinity of Mt Thirsty and north to Hyden Norseman Rd (Area 2a Map 3) there are extensive pure stands of E. brockwayi as well as mixed stands similar to those found in Area 1. E. brockwayi occurs at its northern limit in this area, and is also found in an uncommon woodland association with E. campaspe and mallee E. ?celastroides on the flat ground 5 km north of Mt Thirsty (Figure 4).

Exceptionally dense and extensive pure stands of pole and mature E. brockwayi occur in the vicinity of Theatre Rocks Rd (Area 2b Map 3 and Figure 5) This area is the traditional seed collecting area for E. brockwayi (Stan Jones, pers. comm.).

The best stands of E. brockwayi observed were those in areas 2a and 2b, at the northern and western limits of E. brockwayi distribution, followed by those in the Dundas Hills. The status of E. brockwayi between areas 2a and 2b was not determined. In all of area 2b and parts of 2a, E. brockwayi occurs on flat ground where the likely conflict with mining interest appears to be less than that where E. brockwayi grows on hills.

No commercial cutting has occurred for around 20 years (Stan Jones, pers. comm.). This selective logging in the area may account for the large size of many E. brockwayi trees observed in relation to others species.

5 RECOMMENDATIONS

1. Mining activities should involve regeneration programs.
2. CALM preferences for "land swap" proposals with Australis Mining NL should be, in order : P62/419, P63/324, P63/134, P63/132, P63/133, P63/131.
3. Reservation of land in the vicinity of Theatre Rocks Rd (Area 2b) and or vicinity of Mt Thirsty (Area 2a) is recommended.

ACKNOWLEDGEMENTS

I am grateful for the assistance of Eleanor Bennett, Kings Park Board for identification of Allocasuarina sp nov., Anna Napier (Wildlife Research, CALM) for identification of some Eucalyptus species, and of Stan Jones, Norseman, for information regarding E. brockwayi.

REFERENCE

Muir, B.G. (1977) Biological Survey of the Western Australian Wheatbelt Part 2. Vegetation and Habitat of Bendering Reserve.
Rec. W.A. Mus. Supp. No 3.

APPENDIX 1: BROCKWAY TIMBER RESERVE PLANT LIST

Numbers refer to plant associations.
 x plants growing with Allocasuarina sp nov.
 i incidental

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	x	i
AMARANTHACEAE																		
Ptilotus obovatus	+			+														
APOCYNACEAE																		
Alyxia buxifolia	+							+	+	+	+							
ASTERACEAE																		
Cratystylis conocephala		+					+								+			
Olearia axillaris									+									
Olearia muelleri		+						+	+									
BORAGINACEAE																		
Halgania rigida			+		+				+						+			
BRASSICACEAE																		
Lepidium platypetalum										+							+	
CASUARINACEAE																		
Allocasuarina acutivalis											+							
A. huegelliana															+	+		
A. sp nov																		+
"globosa"																		
CHENOPODIACEAE																		
Atriplex vesicaria	+		+	+	+		+					+		+				
Maireana pentatropis				+														
M. radiata				+														
M. tomentosa		+																
Rhagodia crassifolia		+																
CYPERACEAE																		
Lepidosperma viscidum								+			+				+	+		
Lomandra effusa																		+
EUPHORBIACEAE																		
Beyeria ?leschenaultii			+	+						+								
FRANKENIACEAE																		
Frankenia cinerea		+					+											
GOODIENACEAE																		
Scaevola spinescens								+	+	+							+	
LAMINACEAE																		
Prostanthera aspalathoides											+					+	+	
Westringia rigida	+							+	+									
LEGUMINACEAE																		
Sub familiy																		
CAESALPINIOIDEAE																		
Cassia nemophila									+									
var. nemophila																		

APPENDIX 1 cont.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	x	i
Sub family																		
MIMOSOIDEAE																		
Acacia acamptoclada								+										
A. merrallii									+				+					
A. neurophylla																+	+	+
A. pachypoda					+							+	+	+				
A. sp			+		+													
Sub family																		
LEGUMINACEAE																		
Daviesia benthamii	+							+										
Swainsona canescens	+																	
var. canscens																		
Templetonia sulcata				+														
LILIACEAE																		
Dianella revoluta																+		
MYOPORACEAE																		
E. decipiens								+										
E. dempsteri		+			+										+			
E. glabra								+		+								
E. ionantha								+	+				+					
E. pachyphylla		+						+	+									
E. saligna								+		+						+		
E. scoparia		+							+						+			
MYRTACEAE																		
Calothamus gilesii																+		
Eucalyptus aff. annulata				+														
E. brockwayi	+	+	+	+	+			+										
E. calcygona					+													
E. celastroides																		
E. dundasii		+	+	+	+							+	+	+				
E. flocktoniae				+	+	+			+			+	+	+				
E. griffithsii																	+	+
E. lesouefii				+	+			+	+			+	+					
E. longicornis									+				+	+				
E. melanoxylon													+					
E. oleosa v. oleosa																	+	+
E. aff. pileata				+	+	+							+					
E. salmonophloia								+										
E. salubris		+	+	+	+		+											
E. stricklandii								+		+	+							
E. torquata									+									
E. transcontinentalis									+				+					
Melaleuca coccinea																+	+	
M. pauperiflora				+					+			+	+	+				
M. sheathiana	+	+		+	+	+						+		+				
M. uncinata											+							
PROTEACEAE																		
Grevillea huegellii								+										
Proteaceae sp								+		+								

APPENDIX 1 cont.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	x	i
RHAMNACEAE																		
Cryptandra milliaris														+				+
Spyridium complicatum	+		+							+	+					+		
RUTACEAE																		
Eristemon apiculatus				+									+					
SANTALACEAE																		
Exocarpus aphyllus	+				+													
Santalum acuminatum	+	+	+	+				+	+								+	
SAPINDACEAE																		
Dodonea microzyga										+	+					+	+	
D. stenozyga				+		+		+										
SOLANACEAE																		
Solanum nummularium		+																
ZYGOPHYLLIACEAE																		
Zygophyllum apiculatum		+		+										+				

APPENDIX 3; Australis Mining NL Leases, Brockway Timber Reserve

P63/131

Landscape: Encompasses Mt Deans, gentle to steep slopes.

Vegetation: Diverse, including Mixed Woodland (Ass 5), E. brockwayi/E. salubris Woodland (2), E. flocktoniae Woodland (6), E. torquata Low Woodland (10) Allocasuarina huegelliana Shrubland (15) and E. griffithsii/E. oleosa Very open Mallee.

Comments; Contains one of only two known populations of Allocasuarina sp. nov. (see 4.1.1). Diverse vegetation with moderate stands of E. brockwayi at the peripheries of the lease. Area susceptible to erosion. Old excavation pit present.

Conservation Status: Very high

P63/132

Landscape: Undulating gentle to moderate slopes east of Mt Dean.

Vegetation: Predominately E. brockwayi/E. salubris Woodland (3) and Mixed Woodland (5), with E. torquata Low Woodland (10).

Comments: Moderate to good stands E. brockwayi. An old mining site present, area susceptible to erosion.

Conservation Status: High

P63/133

Landscape: Undulating gentle to moderate slopes and wide creek flats.

Vegetation: Predominately E. brockwayi/E. salubris Woodland (3) and Mixed Woodlands (4 and 5).

Comments; Moderate to good stands of E. brockwayi present including some pure stands. Contains some E. brockwayi trees of exceptional height.

Contains E. sp. aff. annulata. Two old mining sites - extensive clearing.

Conservation Status: High

P63/134

Landscape: Gentle slopes and broad flats

Vegetation: Predominately Mixed Woodland (4, 4l and 4x). Also E. dundasii/E. flocktoniae/E. lesouefii Low Woodland (12).

Comments: E. brockwayi restricted to the western boundary. Overall presence low.

Conservation Status: (a) Moderate

P63/419

Landscape: Gentle slopes and broad flats.

Vegetation: Predominately E. dundasii Woodland (2) with small areas E. dundasii/E. flocktoniae/E. lesouefii Low Woodland, E. salubris Woodland. E. brockwayi ; scattered to absent.

Comments: Contains the most extensive stands of mature E. salubris in the reserve. Little disturbance.

Conservation status: Low

APPENDIX 3 cont.

P63/324

Landscape: Gentle slopes and valley flats.

Vegetation: Predominately E. dundasii Woodland (2) and Mixed Woodland (4)

E. brockwayi: Low - moderate.

Comments: Little disturbance.

Conservation Status: Low

M63/91

Landscape: Gentle - moderate slopes and valley flats.

Vegetation: Predominately mixed Woodland (4) with E. torquata Low Woodland,
E. stricklandii Low Woodland and E. flocktoniae Woodland. E. brockwayi:
moderate

Comments: Diverse vegetation, near the southern distribution limit of E. brockwayi. Extensive clearing associated with mining. Regeneration low to moderate in patches.

Conservation Status: Moderate

Tiedemann, Klaus

From: Tiedemann, Klaus
Sent: Friday, 14 June 2002 10:36 AM
To: Caporn, Norm
Cc: Young, Geoff
Subject: RE: Brockway Timber Reserve

Norm,

The only literature we have in our district office regarding vegetation in the Brockway Timber Reserve comes from two documents, they being:

(i)

'Preliminary Environmental Issues Assessment (with particular emphasis on flora and fauna) by Muir Environmental Consultants (1999) for: KINROSS GOLD PROSPECTS, NORSEMAN

(ii)

'Distyribution and Conservation Status of Eucalyptus Brockwayi, with particular reference to Brockway Timber Reserve'
by Libby Sandiford B.Sc (Hon.) for
CALM South Coast Region 1989.

I am sending you a copy of the latter document via the mail.

Also from my observation of the grid lines recently put in during the exploration phase, and my on-site discussions with the field supervisor, it appears that Mt. Dean itself will be affected, as the higher grade deposits occur in this area.

Finally, I wish to make you aware that I will be going on LSL during July to September.

In my absence Mike Fitzgerald, this District's new Nature Conservation Coordinator, will be acting D/M for the first six weeks and Geoff Young (new Esperance District PVS Coodinator) for the next six weeks. Mike however will be handling all mining issues.

Regards,
Klaus

-----Original Message-----

From: Caporn, Norm
Sent: Friday, 14 June 2002 9:43 AM
To: Blyth, John
Cc: Tiedemann, Klaus; Kealley, Ian; Valentine, Hayley; Gibson, Neil
Subject: Brockway Timber Reserve

John

Brockway Timber Reserve is located south of Norseman over the Dundas Hills and includes Mt Deans. It was reserved primarily to protect *E. brockwayi*.

There is real potential for a proposal to come forward to mine tantalum throughout the hills within the Brockway Timber Reserve on a fairly large scale.

The area is the primary occurrence for *E. brockwayi* and some other significant flora are dispersed through the area.

It is possible that a proposal may not greatly impact the conservation status of specific significant taxa and would get approval, however the area could end up highly impacted and fragmented which would be a shame.

Has there been any work done here on vegetation and if not is there any value in considering it before this proposal comes forward? or would we just be wasting our time?

Norm Caporn
Ph 93340388
Fax 93679913