NEC 1.1: Bloodwood open woodlands of the northern inland plains

Description

Key flora and fauna and abiotic elements

Woodlands dominated by *Corymbia terminalis* or *C. opaca* are grouped together in this NEC because they form communities with broadly similar biotic and abiotic features. There are eight communities in the NVIS data for the arid / semi-arid zone that contribute to its definition (Table 1).

These woodlands occur in inland Queensland and Northern Territory. They are generally low open woodlands with a mixed shrub and grass understorey. The dominant bloodwoods are either *C. terminalis* or *C. opaca*. The geographic ranges of each of these species are broadly distinct (Figure 1), with *C. terminalis* to the north and east, and *C. opaca* more central and south (Hill and Johnson, 1995). Note that there are wide zones of intergradation between the various bloodwood species (Figure 1).



Figure 1: **Distribution of the bloodwood species**: C. opaca (open circles), C. terminalis (plus), C. tumescens (solid circles), C. tumescens - C. terminalis (square), C. opaca - C. terminalis (open diamond) (from Hill and Johnson 1995, Fig 58). Species outside the semi-arid boundary have not been detailed here

These woodlands grow on sandy to loamy red earths on flat or undulating sand plains (subcommunities 2, 4, 6, and 7), calcareous clays on plains or low-lying areas (sub-community 3 and 5) and alluvial soils on terraces and floodplains (sub-community 1) (Table 1, Attachment 1-1).

The eucalypts in the bloodwood woodlands range from approximately three to 14 metres tall (Attachment 1-1). Some of the Queensland units (eg components of sub-community 2) contain variants that are *Acacia* dominated, often with emergent *C. terminalis*. Density of the upper canopy generally varies from 1 to <10%, but may be as high as 20% in variants that are *Acacia* dominated

(Attachment 1-1). Other components of the upper storey vary with location, and include ghost gums (*C. aparrerinja*) in NT and the Mount Isa Inlier of Queensland, *Eucalyptus pruinosa* in NT, and *Acacia aneura* (mulga) and *Lysiphyllum gilvum* (Bauhinia) in Queensland. Neldner (1991) notes, in relation to sub-community 1 (RE 1.3.6) that "*Corymbia aparrerinja* dominates on deeper soils, while *C. terminalis* dominates more extensive areas distant from streamline."

The mid-stratum is generally sparse and includes shrubs such as *Atalaya hemiglauca*, *Grevillea striata* and various *Acacia* species in both states, and species of *Senna*, *Hakea*, *Eremophila* and *Ventilago*. The ground layer often includes spinifexes (*Triodia pungens* or *T. bitextura*) and other perennial and annual grasses such as *Aristida pruinosa*, *Aristida latifolia*, *Eulalia aurea*, *Bothriochloa ewartiana*, *Cenchrus pennisetiformis*, and *Themeda triandra*.

More details about the floristics and structure of each sub-community are provided in the database accompanying this report and in Attachment 1-1. The above data and those in the tables were compiled from: Wilson *et al* (1990), Brocklehurst and Gibbons (2003), Sattler and Williams (1999), Environmental Protection Agency, Qld (2003b) and Neldner (1991).

There are few data on faunal associations. Sub-community 2 is reported to provide significant provincial fauna habitat due to the number and size of trees with hollows (Sattler and Williams 1999). Further information may be available in the reports listed by Sattler and Williams (1999) for the MII (their Table 1.5, pg 1/25) and the MGD (pg 4/7).

Links with other subcommunities or NECs

- In NT, to the north, grades into *Corymbia terminalis / E. chlorophylla* woodlands and *Eucalyptus pruinosa, Lysiphyllium* low open-woodlands (Wilson et al. 1990) and to the south, grades into arid zone shrublands or grasslands. Because of the broad mapping scale, other map units will occur within the mapped bloodwood woodlands: for example, *E. microtheca* (perhaps *E. victrix*) woodlands in depressions in map unit 41, and *Triodia spictata* hummock grassland on gravely rises within map unit 42 (Wilson et al 1990). Sub-community #7 also occurs as minor component within the Tanami desert hummock grasslands (NT map unit 79; Wilson *et al* 1990).
- In Qld, the tropical savannas mapping incorporates most if not all the Qld subcommunities of this NEC into map unit D46. There are a broad range of other communities included in this group (see Appendix 3.4 in Fox *et al* (2001) community Q108 is the woodland matching most Qld subcommunities presented here, but numbers 100, 101, 103, 105 -112, 115, 117, 203, 204, 207, 211, 221, 305A, 503 and 506 are also in that group. Most of the latter are primarily tropical.
- In Qld, there appear to be floristic and abiotic affinities with:
 - Archidendropsis basaltica and/or Acacia aneura ± Corymbia terminalis low open woodland on old alluvial sand plains (RE 4.5.4, MGD)
 - *Archidendropsis basaltica* and/or *Acacia aneura* ± *Corymbia terminalis* low open woodland on sand plains (RE 5.5.6, CHC)
 - two of the REs (4.5.5 and 1.5.7) grade into RE 4.5.8, a *Triodia pungens* hummock grassland wooded with *Acacia* spp. ± *Eucalyptus* spp. on Quaternary sand sheets (interpreted from Neldner 1991)
 - *C. terminalis* also occurs in NEC1.2, in woodlands dominated by *E. leucophloia* and in NEC1.3, with *E. pruinosa* and *E. leucophylla*

Bloodwoods (*C. tumescens*) occur in southern Qld, NW NSW and NE SA, but appear not to form woodlands in most situations. However, the data are sparse and the areas are not well surveyed. The pertinent information for the communities in these states is summarised in Attachment 1-2

Sub #	Name, with source or Regional Ecosystem number for name	Other refs for sub	State	IBRA region (subregion)	Comments
1	Ghost gum (<i>Corymbia aparrerinja</i>), bloodwood (<i>Corymbia terminalis</i>) open woodland on sandy terraces (RE 1.3.6)	Christian et al. (1954), Mount Isa, Wonorah, Gregory; Perry et al. (1964), Quamby, Kuridala; Neldner (1991), 3	Qld	MII (NWH3)	Significant provincial fauna habitat due to the number and size of trees with hollows. (Interpreted as floristic association 67 in Neldner 1991)
2	Bloodwood (<i>Corymbia terminalis</i>) and/or mulga (<i>Acacia aneura</i>) low open woodland on sandy red earth plains (RE 1.5.7)	Christian et al. (1954), Bundella, Wonorah; Neldner (1991), 21, 24	Qld	MII (NWH1)	(Interpreted as floristic associations 5 & 10 in Neldner 1991)
3	Corymbia terminalis ± Lysiphyllum gilvum and Acacia victoriae low open woodland on alluvium (RE 4.3.10)	Neldner (1991), 19d	Qld	MGD (MGD3)	(Interpreted as floristic association 44 in Neldner 1991)
4	Corymbia terminalis, Triodia pungens \pm Acacia spp., Senna spp., Eucalyptus spp. low open woodland on sand plains (RE 4.5.5)	Neldner (1991), 19a	Qld	MGD (MGD 2)	(Interpreted as floristic association 42 in Neldner 1991)
5	Corymbia terminalis low open woodland with Astrebla pectinata \pm Eulalia aurea on plains and low lying areas (RE 4.9.12)	Neldner (1991), 19b	Qld	MGD (MGD2)	(Interpreted as floristic association 44 in Neldner 1991)
6	<i>C. opaca</i> (Bloodwood) low open-woodland with <i>Triodia bitextura</i> (Curly Spinifex) hummock grassland understorey (Wilson <i>et al</i> 1990, map unit 41, Brocklehurst and Gibbons 2003 DVT 98)		NT	DMR, MGD, TAN	
7	<i>C. opaca</i> (Bloodwood) low open-woodland with <i>Triodia pungens</i> (Soft Spinifex) hummock grassland understorey (Wilson <i>et al</i> 1990, map unit 42, and Brocklehurst and Gibbons 2003, DVT 116)		NT	DMR, MGD, TAN	
8	Corymbia opaca (bloodwood) low open woodland with a Chrysopogon fallax tussock grassland understorey (Brocklehurst and Gibbons 2003, DVT 126)		NT	CHC1 (at Lucy Creek Station)	

Table 1: Sub-communities in NEC #1: Bloodwood open woodlands of the inland plains

National distribution

Known natural distribution (including bioregions, conservation reserves)

In Qld, two sub-communities (#1, 2) occurs in the Mt Isa Inlier IBRA region, the other three (#3 to 5) occur in the Mitchell Grass Downs IBRA region (Sattler and Williams, 1999, Figure 2). There is no representation of these communities in protected areas in Qld (Sattler and Williams, 1999). Only one sub-community (#4) is mapped; it covers 830ha in the MGD region. However, the tropical savannas mapping (Fox *et al* 2001) map the Queensland communities as part of their unit "D46", this is mapped here (Fig 2)

The communities in NT (# 6 and 7, see Figure 2) occur in the Davenport Murchison Ranges, Mitchell Grass Downs and Tanami IBRA regions. None are in conservation reserves or National Parks, according to the CAPAD mapping (Environment Australia 2002). Sub-community#6 (*C. opaca* low open-woodland with *Triodia bitextura* hummock grassland understorey) has a naturally restricted distribution and is confined to a distinct area south of the Barkly Tablelands (~ 330 000ha). Sub-community#7 (*C. opaca* low open-woodland with *Triodia pungens* hummock grassland understorey) occupies more extensive areas (~2 800 000ha) south of the Barkly Tablelands, and as unmapped small occurrences within hummock grasslands of the Tanami bioregion (Wilson et al. 1990). The remaining NT community (#8) is not in the NVIS data and the original report should be accessed for further details.



Figure 2: Indication of location of subcommunities: In the NT, the subcommunity 6 is indicated in blue, and #7 in yellow. The Qld sub-regions in which the sub-communities occur are shaded (MII horiz lines, MGD pale grey). Within these, the black patches indicate mapping of the tropical savannas unit D46 in these sub-regions. The CHC1 subregion in NT is indicated because sub-community 8 resides in it. The red line indicates the boundary of the semi-arid areas; grey outlines arid/semi-arid subregions.

Sub #	Name, with source or Regional Ecosystem number for name	area (km²)	% remain ing	Protected areas	Threat status ¹	Threats
1	Ghost gum (<i>Corymbia aparrerinja</i>), bloodwood (<i>Corymbia terminalis</i>) open woodland on sandy terraces (RE 1.3.6)	na	>30%	no representation	Of concern	Subject to buffel grass <i>Cenchrus ciliaris</i> invasion. High total grazing pressure and changed fire regime have led to major changes in floristics
2	Bloodwood (<i>Corymbia terminalis</i>) and/or mulga (<i>Acacia aneura</i>) low open woodland on sandy red earth plains (RE 1.5.7)	na	>30%	no representation	No concern at present	
3	<i>Corymbia terminalis</i> ± <i>Lysiphyllum gilvum</i> and <i>Acacia victoriae</i> low open woodland on alluvium (RE 4.3.10)	na	>30%	no representation	No concern at present	
4	<i>Corymbia terminalis, Triodia pungens</i> ± <i>Acacia</i> spp., <i>Senna</i> spp., <i>Eucalyptus</i> spp. low open woodland on sand plains (RE 4.5.5)	830 ha	>30%	no representation	No concern at present	
5	<i>Corymbia terminalis</i> low open woodland with <i>Astrebla pectinata</i> ± <i>Eulalia aurea</i> on plains and low lying areas (RE 4.9.12)	na	>30%	no representation	Of concern	Little regeneration or coppicing of <i>Corymbia terminalis</i> is occurring, possibly due to high total grazing pressure. Extensively invaded by buffel grass <i>Cenchrus ciliaris</i>
6	<i>C. opaca</i> (Bloodwood) low open-woodland with <i>Triodia bitextura</i> (Curly Spinifex) hummock grassland understorey (DVT 98)	3500*	100%**	no representation?		
7	<i>C. opaca</i> (Bloodwood) low open-woodland with <i>Triodia pungens</i> (Soft Spinifex) hummock grassland understorey (DVT 116)	28000*	100%**	no representation?		
8	<i>Corymbia opaca</i> (bloodwood) low open woodland with a <i>Chrysopogon fallax</i> tussock grassland understorey	?	?	?		

¹ For Queensland, = status recognised by the Environmental Protection Agency * Rounded to the closest 500km² because data (from Wilson et al 1990) are not precise. Ranges would be preferable (to indicate true uncertainty) but are not available ** Based on the NT pre-European mapping, which shows no change in extent

Information contributing to assessment of conservation status under EPBC Act

Components listed under State or Territory legislation

No sub-communities of this NEC are listed under state or territory legislation. No information has been found about species within this NEC that are listed. The Queensland EPA consider that two of the sub-communities (#1, in MII, and #5, in MGD) are of concern because of threatening processes in addition to clearing (Sattler and Williams 1999, Table 2).

Decline in geographic distribution

Table 2 details estimates of changes in distribution. It should be noted that the underlying data on areas are not precise. These figures should be expressed as a range, but no information on their accuracy is available. Given the scales of mapping and survey, the NT data are more likely to overestimate extant area. Nevertheless, the table indicates that all sub-communities have >30% remaining.

Threats to the national ecological community; loss or decline of functionally important species

Some components of the NEC have recognised threats (Tables 2 and 3):

- Sub-community 1: Subject to Buffel grass *Cenchrus ciliaris* invasion. High total grazing pressure and changed fire regime have led to major changes in floristics.
- Sub-community 5: Little regeneration or coppicing of *Corymbia terminalis* is occurring, possibly due to high total grazing pressure. Extensively invaded by buffel grass *Cenchrus ciliaris*.

The Queensland data are the most thorough; the lack of data for the other states does not imply lack of threat.

The data collected for the Terrestrial Biodiversity Assessment (Sattler and Creighton 2002) indicate threats that have been recorded for any ecosystem on a sub-regional basis (Table 3). These can be used to get a broad picture of the processes within the sub-regions, but will not all be applicable to these woodlands and are biased by survey effort (see introduction). Nevertheless, they add information to an otherwise data-poor environment. They show that grazing pressure, exotic weeds and changed fire regimes are the prevalent threats for the subregions inhabited by this NEC.

Reduction in ecological community integrity

Few data are available, apart from that supplied in Tables 2 and 3 ("threats").

Rate of detrimental change

No data were identified.

Table 3: Summary of threats to any ecosystems within the subregions (from data developed for Sattler and Creighton 2002). " y" indicates that the threat has been recorded as present.



Summary and recommendation regarding category of threat under the EPBC Act

Two of the eight sub-communities in this NEC are "of concern" (according to the Qld EPA) in respect to their conservation status, but none are listed under the EPBC act. For these two sub-communities, there is evidence (relevant to Criteria 3 and 4 of the nomination guidelines) of loss or decline of functionally important species and reduction in community integrity. However, given the lack of evidence of similar issues for the remaining components of the NEC, there is insufficient evidence to suggest it is eligible for nomination as a threatened NEC. Therefore, it appears that the NEC as currently defined is "not under threat".

Outstanding issues

- As with the other NECs defined, it is possible that experts may recommend the separation of sub-communities into their own distinct NEC, on the basis of the threatening processes impinging on the community and its response to those threats.
- This NEC may be viewed by experts as inseparable from the tropical bloodwood woodlands. In that case, the data presented here could be incorporated into a broader NEC.

Attachment 1-1: Details of biotic and abiotic features of the sub-communities. Extracted from Sattler and Williams (1999), Wilson (1990), and Neldner (1991). In many cases the descriptions are exact copies of text in those sources Sub-

comm'y	Code	Structure and floristics	Landform and soils
1	RE 1.3.6	Woodland and low woodland of <i>Corymbia aparrerinja</i> and <i>C. terminalis.</i> <i>Acacia victoriae</i> may dominate heavier soils. <i>Corymbia terminalis</i> , frequently with <i>C. aparrerinja</i> , <i>Atalaya hemiglauca</i> and	Terraces and floodplains on Quaternary alluvium; alluvial soils, some earths and deep yellow pedzolics;
1	Floristic association 67 (Neldner 1991): <i>Corymbia terminalis</i> ± <i>C.</i> <i>aparrerinja</i> + <i>Grevillea striata</i> open- woodland.	Grevillea striata, forms an open canopy (8-14 m high; PFC 5-10%; Density 75-175 trees/ha) <i>C. aparrerinja</i> is the dominant species on the deeper sands close to the streamlines. Shrubs are usually sparse, although <i>Eremophila</i> <i>duttonii</i> and <i>E. goodwinii</i> may form a shrubland in scalded areas. The ground layer is open and dominated by grasses, including <i>Aristida holathera</i> var. <i>holathera</i> , <i>A. jerichoensis</i> var. <i>subspinulifera</i> , <i>Bothriochloa ewartiana</i> , <i>Cenchrus pennisetiformis</i> , <i>Eulalia aurea</i> and <i>Themeda triandra</i> .	Limited to levees and sandplains along major streams draining Mount Isa highlands. <i>Corymbia aparrerinja</i> dominates on deeper soils, while <i>C. terminalis</i> dominates more extensive areas distant from streamline. Soils deep, uniform, alluvial loamy coarse sands to fine sandy clay loams
2	RE 1.5.7	Low open woodland of <i>Corymbia terminalis</i> and <i>Acacia aneura</i> . Associated species include <i>Grevillea striata</i> , <i>Acacia excelsa</i> , <i>Corymbia aparrerinja</i> , <i>Owenia</i> sp. and <i>Hakea suberosa</i> . Shrubby understorey. Sparse ground cover dominated by <i>Triodia</i> sp. ± other perennial and annual grasses.	Tertiary and Quaternary outwash sand plains, in places reworked by wind; deep loamy red earths;
2	Floristic association 5 (Neldner 1991): <i>Acacia aneura, A. tetragonophylla</i> tall open-shrubland.	Tall open shrubland. <i>Acacia aneura</i> and <i>A. tetragonophylla</i> occur with <i>A. aneura</i> predominating, and together form a distinct but discontinuous layer (Ht. 2.5-4 m; PFC 1-6%; Density 25-250 shrubs/ha.) Scattered trees – eg, of <i>C. terminalis</i>) may emerge above the canopy. Other isolated tall shrubs may also be present. Low shrubs occur but do not form a well defined layer. The ground layer is variable and composed of grasses and forbs. <i>C. terminalis</i> occurs sometimes. Tall shrubland to shrubby hummock grassland. <i>Acacia aneura</i> dominates in distinct groves, and forms a diffuse canopy (Ht. 8-15 m; PFC <5-20%; Density 100-500 tall shrubs/ha.). The groves of <i>A. aneura</i> occur in moister	Association limited in extent mainly in the south, on flat to undulating plains exhibiting slopes of 0-2%. Soils either shallow loamy, red earths with silcrete stone cover or shallow texture contrast soils overlying a hardpan. Surface soils in both situations neutral to slightly acid with the clay sub-soil in texture contrast soil situations ranging from neutral to alkaline.
2	Floristic association 10 (Neldner 1991): Acacia aneura, Triodia pungens ± Aristida holathera var. holathera groved tall open- shrubland.	depressions, and alternate with <i>Triodia pungens</i> shrubby hummock grassland (map unit 40) on deeper sands, and <i>A. georginae</i> tall open- shrubland (map unit 28a) where the sandy surface layer is shallow. Shrubs are infrequent in the <i>A. aneura</i> groves, but common in the areas around them. The ground layer is dominated by the hummock grass <i>Triodia</i> <i>pungens</i> and the tussock grass <i>Aristida holathera</i> var. <i>holathera</i> . Forbs are scarce. Frequent species: <i>Acacia excelsa</i> ssp. <i>angusta</i> , <i>A. georginae</i> , <i>Atalaya hemiglauca, Grevillea striata</i> .	Limited in extent in study area and restricted to aeolian sandplains in north-west. Soils deep, sandy red earths. Mapped as unit 24b
3	RE 4.3.10	Corymbia terminalis \pm Lysiphyllum gilvum and Acacia victoriae low open woodland	On alluvium. Shallow calcareous clay soils.

Sub- comm'y	Code	Structure and floristics Low open-woodland. <i>Corymbia terminalis</i> predominates and forms a sparse	Landform and soils
3 & 5	Floristic association 44 (Neldner 1991): Corymbia terminalis ± Lysiphyllum gilvum low open- woodland.	hemiglauca is usually codominant, with Lysiphyllum gilvum conspicuous in alluvial areas. Scattered shrubs including Acacia victoriae (2-3 m tall) are often present, but rarely form a distinct layer. Much of the ground is bare or stony with scattered Enneapogon spp. and Aristida contorta. Astrebla spp., Eulalia aurea and Chrysopogon fallax dominate gilgais in the area.	Very limited in extent. Occurs sporadically on clay plains and alluvia where calcareous rocks on or near the surface. Soils generally shallow calcareous clays, with deeper clay soils in gilgais. Mapped as unit 19b, or unit 19d in alluvial situations where <i>Lysiphyllum gilvum</i> and <i>Acacia victoriae</i> conspicuous.
4	RE 4.5.5	<i>Corymbia terminalis, Triodia pungens</i> ± Acacia spp., <i>Senna</i> spp., <i>E</i> . spp. Low open woodland	On sand plains over shales. Sandy red earth soils.
4	Floristic association 42 (Neldner 1991): <i>Corymbia terminalis, Triodia</i> <i>pungens</i> ± <i>Acacia</i> spp., <i>Senna</i> spp., <i>Eucalyptus</i> spp. low open-woodland.	Low open-woodland, grading into wooded hummock grassland <i>Corymbia terminalis</i> predominates and together with other low trees forms a distinct but discontinuous canopy (Ht. 7-10 m; PFC <10%; Density 25-125 trees/ha). A sparse to open shrub layer is usually present, and consists of a variety of species. The ground layer is dominated by <i>Triodia pungens</i> (PFC 10-35%), but tussock grasses and forbs are frequent between the <i>T. pungens</i> hummocks.	Moderately widespread in central-north and north-west. Occurs most extensively on sandplains overlying clay plains on edge of Barkly Tableland, and on tops of dissected tablelands and plateaus in central-north. Smaller areas occur on alluvial sandplains along northern streams. Soils deep sandy red earths on sandplains, and shallower, loamy red earths to lithosols on tops of tablelands.
5	RE 4.9.12	Corymbia terminalis low open woodland with Astrebla pectinata \pm Eulalia aurea	On plains and low lying areas. Shallow calcareous clays.
6	DVT 98	Low open woodland. Upper stratum dominated by <i>C. opaca</i> with occasional <i>E. papuana</i> (? <i>C. aparrerinja</i>). Shrub layer is sparse. <i>Acacia coriacea, Grevillea striata</i> and <i>Ventilago viminalis</i> are prominent in the shrub layer. Ground layer dominated by <i>Plectrachne pungens</i> (? <i>Triodia bitextura</i>) and tussock grasses are also common eg. <i>Aristida pruinosa, Aristida latifolia</i> and <i>Eulalia aurea.</i> Average heights: trees = 5m, shrubs = 1.6m, grasses = 0.4m. Average Cover: trees = 9%, shrubs = 3% and grasses = 45%.	On undulating plains with some limestone rises. Soils are mostly sandy red earths.
7	DVT 116	Low open woodland. Upper storey dominated by <i>C. opaca, E. pruinosa</i> and <i>E. papuana</i> (? <i>C. aparrerinja</i>). Shrub layer is sparse. Common shrubs include <i>Carissa lanceolata, Atalaya hemiglauca</i> and <i>A. lysiphloia</i> . Ground layer dominated by hummock grasses: <i>Triodia pungens</i> and <i>Plectrachne pungens</i> although tussock grasses are also common. Average heights: trees = 6m, shrubs = 1.4m and grasses = 0.4m. Average Cover: trees = 6%, shrubs = 11% and grasses = 39%	Occupies extensive areas on slightly elevated, gently undulating peneplain. Soils are lateritic red earths.
8	DVT 126	refer to Brocklehurst and Gibbons (2003) for reference to the source data	

Attachment 1-2: Information relating to the *Corymbia tumescens* communities of the central inlands

- In SA there is one record of low open woodlands in the Coopers Ck area (in the northeast of the state) comprising *C. tumescens* ("*E. terminalis*"), *E. coolabah* ssp *arida* ("*E. microtheca*") and *Acacia cyperophylla*, with or without *Eremophila bignoniiflora* + *Grevillea striata* (Mollemans *et al* 1984). However, no other reports mention this community and it is not mapped. It is not clear whether the occurrences of *C. tumescens* form a true community. If it does, it is of very limited extent, and it is unassessed at the present time.
- In NSW there are 3 communities that have been mapped in NVIS or DLWC mapping (Table 4). The most extensive of these (#2) appears to map a broad association which is not largely a bloodwood woodland. Millthorpe (1991) provides more detailed definitions, and describes this as a "Mulga western bloodwood community" in which the mulga (*Acacia aneura*) is the dominant tree.

#	Name, with source or Regional Ecosystem number for name	New interpretation of species, if different	State	IBRA region
1	<i>Eucalyptus</i> aff. <i>terminalis - Atalaya hemiglauca</i> low woodland [NVIS; \Pickard, 1994 #35, map unit 19]	C. tumescens	NSW	СНС
2	<i>Eucalyptus</i> aff. <i>terminalis</i> - <i>Eucalyptus populnea</i> ssp. <i>bimbil</i> open woodland (NVIS; Pickard and Norris 1994 map unit 13)	C. tumescens	NSW	ML
3	Bloodwood / Mulga community (DLWC 2002)	C. tumescens	NSW	СР

Table 4: Mapped bloodwood communities of NSW

- The related communities in Qld are defined as shrublands eg:
 - *Acacia aneura* ± *Eucalyptus populnea* ± *E. terminalis* tall <u>shrubland</u> on residuals (RE 6.7.10, ML)
 - *Acacia aneura* ± *Acacia* spp. ± *Corymbia terminalis* tall open <u>shrubland</u> on low dunes over alluvium (RE 6.6.1, ML)
 - Acacia aneura groved with Corymbia terminalis or Corymbia blakei tall open shrubland on Quaternary sediments (RE 6.5.16, ML)
 - *Atalaya hemiglauca* ± *Acacia aneura* ± *Acacia* spp. ± *Corymbia terminalis* tall open shrubland on sand dunes (RE 5.6.4, CHC)

Regardless of their status, these communities are as a whole different enough from the woodlands defined in this NEC to be excluded. They have not been formed into an NEC of their own because the evidence that is available suggests that they should be included within an Acacia – dominated shrubland.

NEC 1.2: *Eucalyptus leucophloia* woodlands of the Mt Isa Inlier IBRA region of Queensland

Description

Introduction, key flora, fauna and abiotic elements

Eucalyptus leucophloia is found across the drier monsoon tropics of NT and Qld, from Top Springs east to Cloncurry and from Daly Waters south to Wauchope (Hill and Johnson, 2000; Figure 1). Widespread on open savanna woodlands on shallow sandy soils on sandstone. It may intergrade with *E. brevifolia* to the west of Top Springs in NT. The MT Isa Inlier region is the south-western limit of the geographic range of *E. leucophloia*. This NEC only includes the occurrences that are predominantly arid and semi-arid in distribution; those that occur in the Mt Isa Inlier IBRA region. The list of sub-communities is derived from the Regional Ecosystem Description Database (Environmental Protection Agency Qld, 2003b; Table 1). The sub-communities that are predominantly tropical are excluded (eg. Units: D50, H28 in NT and Qld; Figure 2). The typical understorey of these communities is floristically and / or structurally different.

Eucalyptus leucophloia also occurs as scattered trees in the Pilbara region of WA. However, this species was earlier confused with *E. brevifolia* (Beard, 1990) and it would appear from the NVIS mapping that these communities have been mapped as hummock grasslands with low tree steppe or scattered trees of *E. brevifolia* (vegetation association no. 82, 198, 587 and 607). The *E. leucophloia* ssp. *leucophloia* in WA is an endemic sub-species to the Pilbara region; (Hill and Johnson, 2000) that has been excluded from this NEC because it does not form woodlands in WA.



Figure 1: Distribution of E. leucophloia subspecies in northern Australia (from Hill and Johnson, 2000).

Eucalyptus leucophloia may co-occur with *E. leucophylla* and *C. terminalis*, but is considered separate in this NEC because these woodlands are exposed to different threatening processes. For example, none of the sub-communities of *E. leucophloia* woodlands in the Mt Isa Inlier region are regarded as threatened (Sattler and Williams, 1999), whilst some of the *E. leucophylla* woodlands are regarded as **of concern** because of severe grazing pressure (see NEC#1.3). In addition, these species are generally found on different landforms. *Eucalyptus leucophloia* generally occurs on hills and ranges, whilst *E. leucophylla* is found on low hills and in valley bottoms and *C. terminalis* is mainly found on plains (See NEC #1.1).

The *E. leucophloia* woodlands in this NEC are low open woodlands (tree height 4-7m). *Eucalyptus leucophloia* dominates the upper storey forming a distinct but discontinuous canopy (Neldner, 1991) and frequently has a mallee habit in the Mt Isa region. Other eucalypt and hakea species are occasionally present, particularly on the lower slopes of ridges (Neldner, 1991). These may include *E. pruinosa*, *E. leucophylla*, *C. capricornia*, *C. terminalis*, *C. aparrerinja*, *C. aspera*, *E. normantonensis*, *C. grandifolia* ssp. *grandifolia* (Sattler and Williams, 1999), *Hakea chordophylla* and *Hakea suberea* (Neldner, 1991).

The ground layer is open (height < 0.5m; PFC 5-15%) and commonly dominated by *Triodia molesta* and *Triodia pungens* with occasional forbs and tussock grasses. Frequent forbs include *Cassytha capillaris*, *Cheilanthes sieberi*, *Euphorbia tannensis* var. *eremophila*, *Evolvulus alsinoides*, *Goodenia grandiflora*, *Heliotropium fasciculatum*, *Hybanthus aurantiacus*, *Ptilotus* spp., *Sclerolaena* spp., and *Tephrosia* spp (Neldner, 1991). Frequent graminoids include Aristida spp., *Cymbopogon bombycinus*, *Enneapogon lindleyanus*, *Eriachne mucronata*, *Themeda triandra* and *Triodia longiceps* (lower slopes only).

Acacias may form a prominent shrubby understorey, particularly in the west where these woodlands grade into *Acacia* shrublands. The shrub layer is generally 1-2m high with a PFC of 5-15% (Neldner, 1991). Frequent shrubs include *Abutilon leucopetalum*, *Acacia acradenia*, *A. adsurgens*, *A. chisholmii*, *A. galioides*, *A. hilliana*, *A. montolica*, *A retrivenia*, *Capparis lasiantha*, *C. umbonata*, *Cassia oligophylla*, *Dodonaea lanceolata*, *D. ternophylla*, *Eremophila latrobei*, *E. longifolia*, *Gossypium australe* and *Indigofera leucotricha*.

Some of the regional ecosystems in Qld include both areas of woodlands and areas of *Triodia* spp. hummock grassland sparsely wooded with *E. leucophloia* (Neldner, 1991). It is the woodland component of these sub-communities that is included in this NEC.

Soils are generally skeletal soils but may also be lateritic red earths, shallow sandy loams, or calcareous red-brown earths. This NEC typically occurs on steeply folded ranges and strike ridges of acidic igneous, sedimentary and metamorphic rocks (Neldner, 1991; Sattler and Williams, 1999). In the Mt Isa Inlier IBRA region, rainfall is erratic and strongly seasonal (Neldner, 1991). Plants must be well adapted to long periods of water stress.

Typical understorey vegetation is different in the tropical woodlands than those in the Mt Isa Inlier region. In the tropical areas, shrublands of *Acacia chisholmii* or hummock grassland of *Triodia bitextura* are common, whilst in the more arid regions the understorey is generally hummock grassland dominated by *Triodia molesta* (Fox et al. 2001; Figure 2).

More details regarding the floristics and structure of each sub-community are provided in the database accompanying this report.

National distribution

Known natural distribution (including bioregions & conservation areas)

This NEC includes 7 sub-communities in Qld, all of which occur in the Mt Isa Inlier IBRA region (Table 1).

The total extant area of this NEC is unavailable until the mapping of the Mt Isa Inlier region in Queensland is complete. However, a broad map of the distribution of *E. leucophloia* woodlands in Mt Is Inlier is provided from the Tropical Savanna mapping data (Fox et al. 2001; Figures 2 & 3). There is one vegetation type in the Tropical Savanna mapping relevant to this NEC (Figures 2 and 3) - *Eucalyptus leucophloia* low open woodland with hummock grass understorey of *Triodia molesta* & / or *Triodia spp.* OR *Triodia molesta* &/or *Triodia* spp. hummock grassland sparsely wooded with low trees of *Eucalyptus leucophloia* +/- *Corymbia capricornia* (Unit J16). This map unit includes areas of

woodland dominated by *E. leucophloia* and areas of *Triodia* grassland wooded with *E. leucophloia* trees. Therefore, it is an overestimation of the distribution of *E. leucophloia* woodlands in the Mt Isa Inlier region (Figure 3).

The *E. leucophloia* woodlands are well reserved according to Neldner (1991). Protected areas include Lawn Hill National Park, Lawn Hill (Widdallion) Research Reserve and Camooweal Caves National Park (Table 2). The degree of representation in reserves varies between sub-communities (Table 2). Some of the sub-communities have a high representation in reserves (>10%; RE 1.9.6) whilst others have medium (4-10%; RE 1.10.7) or low (<4%; RE 1.11.2 and 1.5.3) representation. Two of the communities have no representation in reserves at all (RE 1.10.4 and 1.12.1).

Information contributing to the conservation status under the EPBC Act

Components listed under State or Territory legislation

None of the *E. leucophloia* woodlands are listed as threatened under the EPBC Act to date. Conservation status according to the Biodiversity Status (Status recognised by the Environmental Protection Agency) or VMA Status (Status under the Vegetation Management Act 1999) is of **no concern at present** for all sub-communities in this NEC.

No rare and / or threatened flora or fauna are listed in Sattler and Williams (1999) for these communities. However, further investigation is required to verify the absence of rare species.

Decline in geographic distribution

In all sub-communities, > 30% of the original extent remains (Table 1; Sattler and Williams, 1999). In general, there has been relatively little clearing in the Mt Isa Inlier IBRA region compared with other IBRA regions of Queensland. An estimated 80-90% of the pre-European vegetation remains in this region (Wilson et al. 2002). Figures for the extant areas of each sub-community are not available until the mapping of this region is complete.

Threats to the national ecological community

The *E. leucophloia* woodlands are generally regarded as in good condition. Threatening processes are only listed for 1 sub-community in Sattler and Williams (1999). Changes in fire regime are leading to floristic changes of the sub-community Snappy gum (*Eucalyptus leucophloia*) low open woodland on red earths on plateaus (RE 1.5.3). In general, grazing pressure is the most threatening process in the Mt Isa Inlier IBRA region (National Land and Water Audit, 2002). Mining is important in the Mt Isa Inlier but impacts are localised (see NEC 1.3; Minerals Division, 1998; Northern Australia Forum, 2003).

Loss or decline of functionally important species

No data available

Reduction in ecological integrity

No data available

Rate of detrimental change

No data available

Summary & recommendations re category of threat under the EPBC Act

At present, this NEC does not appear to warrant listing as a threatened community under the EPBC act. There is no evidence of a significant decline in distribution (criterion 1) or significant reduction in ecological integrity (criterion 4) of the *E. leucophloia woodlands* in Queensland. In addition, these woodlands do not have small distribution (criterion 2) and are not significantly fragmented. However, the current extent of the sub-communities within this NEC will not be available until the 1:100 000 mapping is complete for the Mt Isa Inlier region. Until then, a proper assessment of this NEC is not possible.

Outstanding issues

- Should the tropical occurrences of *E. leucophloia* be amalgamated with this NEC? This will largely depend on whether they are ecologically distinct. As discussed in this report, understorey vegetation may be different.
- The *E. leucophloia* woodlands intergrade with hummock grassland wooded with *E. leucophloia* trees. Whilst, the grassland component has been excluded from this NEC, it may be better incorporated.

Table 1: Sub-communities in the NEC: E. leucophloia woodlands of the semi-arid region of Queensland.

The data are from the latest version of the Regional Ecosystem Description Database (EPA, 2003b).

Sub #	Sub-community name (RE name)	RE no.	IBRA region	EPA status	Extant area (ha)	% pre-European remaining	Extent reserved
1	Snappy gum (Eucalyptus leucophloia) low open woodland on red earths on plateaus.	1.5.3	MII	No concern at present	na	> 30% remains	<4%
2	Snappy gum (<i>Eucalyptus leucophloia</i>) low open woodland on skeletal soils on lateritic scarps and plateaus.	1.7.1	MII	No concern at present	na	>30% remains	<4%
3	Snappy gum (<i>Eucalyptus leucophloia</i>) low open woodland on siliceous rocky hills on folded sediments.	1.11.2	MII	No concern at present	na	> 30% remains	<4%
4	Snappy gum (<i>Eucalyptus leucophloia</i>) and bloodwood (<i>Corymbia terminalis</i>) low open woodland on rocky hills on acid igneous rocks.	1.12.1	MII	No concern at present	na	> 30% remains	No representation
5	Snappy gum (<i>Eucalyptus leucophloia</i>) and bloodwood (<i>Corymbia terminalis</i>) low open woodland on limestone hills.	1.9.6	MII	No concern at present	na	> 30% remains	>10%
6	Snappy gum (<i>Eucalyptus leucophloia</i>) and <i>Corymbia grandifolia</i> low open woodland on stony low hills and colluvium.	1.10.7	MII	No concern at present	na	> 30% remains	4-10%
7	Snappy gum (<i>Eucalyptus leucophloia</i>) and/ or <i>Acacia</i> spp. low open woodland on stony sandstone plateaus.	1.10.4	MII	No concern at present	na	> 30% remains	No representation

Table 2: List of reserves in which each of the sub-communities is represente	d.
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There 2. List of reserves in which each of the sub communities is represented.							
Sub-community name (RE name)	RE no.	Reserve name					
Snappy gum (<i>Eucalyptus leucophloia</i>) and <i>Corymbia grandifolia</i> low open woodland on stony low hills and colluvium.	1.10.7	Lawn Hill NP, Lawn Hill (Widdallion) RR					
Snappy gum (<i>Eucalyptus leucophloia</i>) low open woodland on siliceous rocky hills on folded sediments.	1.11.2	Lawn Hill (Widdallion) RR					
Snappy gum (<i>Eucalyptus leucophloia</i>) low open woodland on red earths on plateaus.	1.5.3	Camooweal Caves NP					
Snappy gum (<i>Eucalyptus leucophloia</i>) low open woodland on skeletal soils on lateritic scarps and plateaus.	1.7.1	Lawn Hill NP					
Snappy gum (<i>Eucalyptus leucophloia</i>) and bloodwood (<i>Corymbia terminalis</i>) low open woodland on limestone hills.	1.9.6	Lawn Hill NP					



Figure 2: Map showing the distribution of E. leucophloia *woodlands in both arid and tropical areas of Australia. This map was derived from the Tropical Savanna Mapping (Fox et al. 2001).*



Figure 3: Map of distribution of Eucalyptus leucophloia *woodlands within the semi-arid and / or arid region of Queensland. This map was derived from the tropical savanna mapping (Fox et al. 2001).*

NEC 1.3: *Eucalyptus pruinosa* (Silver Box) and / or *Eucalyptus leucophylla* (Cloncurry Box) woodlands of the semi-arid and arid areas of Northern Territory and Queensland

Description

Introduction, key flora, fauna and abiotic elements

Eucalyptus pruinosa is a widespread and locally dominant tree across a major part of the monsoon tropics (Johnson and Hill, 2000; Figure 1). However, its distribution does extend into the semi-arid and arid areas of NT and Qld (Figure 1). There are two geographically separate sub-species of *E. pruinosa*: *E. pruinosa* ssp. *tenuata* and *E. pruinosa* ssp. *pruinosa* (Johnson and Hill, 2000). The latter sub-species is found further south in both tropical and semi-arid areas of NT and Queensland.

This NEC includes the sub-communities listed in the Regional Ecosystem Description Database that are predominantly semi-arid or arid in distribution (Table 1; Environmental Protection Agency Qld, 2003b). A number of these communities are regarded as threatened by the EPA in Qld, whilst none of woodlands dominated by *E. leucophylla* or *E. pruinosa* further north are listed as threatened (Sattler and Williams, 1999). Therefore, it is appropriate to group the semi arid and tropical occurrences separately. The communities that are tropical in distribution are excluded here.

Within the arid zone, *E. leucophylla* occupies a similar region to *E. pruinosa* and these species may occur together in the Mt Isa Inlier IBRA region in Queensland. Both species also occupy similar landforms, mainly found on lower slopes or low hills and valley bottoms. Therefore, grouping of these two species in this NEC appeared appropriate.¹



Figure 1: Distribution of the two subspecies of E. pruinosa in northern Australia (from Hill and Johnson, 2000).

There are 10 sub-communities in this NEC, 9 of which occur in Qld and 1 sub-community in NT (Table 1). Most of these sub-communities are low open woodlands with the exception of RE 1.10.8, which is open woodland. The height of the tree layer is <10m high, typically ranging from 5-8m (Christian et al. 1954; Neldner, 1991). Some of the sub-communities merge into *Triodia* spp. hummock grasslands wooded with *E. leucophylla* or *E. pruinosa* (Neldner, 1991).

¹ *E. leucophylla* was previously described as *E. argillacea* in Queensland (Australian National Botanic Gardens, 2002).

Eucalyptus pruinosa occurs in small stands and typically in patches rarely exceeding a few sq. km in area (Beadle, 1981). It is a small gnarled tree and may be mallee-like (Beadle, 1981). It occurs mostly on flat or undulating country such as low slopes or hills (Beadle, 1981; Sattler and Williams, 1999) and may form mosaics with *Melaleuca* scrub. The *E. leucophylla* woodlands dominate the low slopes of ranges and erosional plains in the Mt Isa Inlier region, but also occur on deep clay soils of alluvial flats or valley bottoms, sometimes co-dominating with *C. terminalis* (Neldner, 1991). In NT, *E. pruinosa* occurs on gentle undulating plains (Wilson *et al.* 1990).

The Mt Isa Inlier in which most of this NEC occurs is a geographically ancient area that has been folded and faulted to produce a complex of landforms and geological substrates (Neldner, 1991). This NEC is found on soils derived from acidic igneous, sedimentary and metamorphic ranges and ridges (Neldner, 1991). In Qld, soil types on which this NEC occurs include red and yellow earths, shallow yellow podzolics, shallow loams, red-brown earths (may be calcareous), non-calcic brown soils or skeletal soils (Sattler and Williams, 1999). In NT, *E. pruinosa* woodlands included in this NEC are found on deep sandy yellow earths, lateritic red earths or deep sands (Wilson *et al.* 1990).

Woody understorey species are few and rare in the *E. pruinosa* woodlands, and may include *Bauhinia cunninghamii*, *Exoecaria parvifolia* and *Hakea arborescens*; shrubs 1-2m high include *Carissa lanceolata*, *Acacia* spp., *Capparis* spp., *Celastrus* spp. and *Phyllanthus* spp. On deeper soils, tussock grasses, such as *Aristida pruinosa*, *Chrysopogon pallidus* and *Cymbopogon bombycinus* dominate the herbaceous layer. *Triodia pungens* is common on shallow soils (Beadle, 1981). In NT, *E. pruinosa*, *Lysiphyllum cunninghamii*, and *Corymbia opaca* dominate the tree layer. Shrub species include *Carissa lanceolata*, *Acacia lysiphloia* and *Atalaya hemiglauca*. *Triodia pungens*, *Chrysopogon fallax* and *Enneapogon polyphyllus* dominate the ground layer (Wilson *et al.* 1990).

In the *E. leucophylla* woodlands, *Triodia* spp. and annual grasses dominate the understorey. Other tree species may include *E. normantonensis*, *C. capricornia*, *E. leucophloia* on steepest slopes, *E. pruinosa* and *E. tectifica*. A sparse shrub layer may be present and may include *Acacia hilliana* and *Senna* spp.

Some of the *E. leucophylla* woodlands areas are potential habitat for rare and threatened fauna including the night parrot *Pezoporus occidentalis* (RE 1.5.4) (Sattler and Williams, 1999).

The sources of information used to describe the sub-communities and this NEC are provided in Table 3.

National distribution

Known natural distribution (including bioregions, conservation areas)

In Qld, this NEC is restricted to the Mt Isa Inlier IBRA region, whilst in NT this NEC is scattered across several IBRA regions: Mitchell Grass Downs, Davenport Murchison, Sturt Plateau, and the Gulf Falls and Uplands.

The total area of this NEC cannot be estimated as extant areas for the Queensland sub-communities are not available until the mapping for the Mt Isa Inlier region is complete. Furthermore, a map of the Regional Ecosystems included in this NEC cannot be provided from the current NVIS data. However, these communities are mapped in the Tropical Savanna data (Fox et al. 2001) as broader vegetation communities (Figure 2). This mapping provides an approximate estimate of the distribution of this NEC until more accurate mapping is available. There are three vegetation types in the Tropical Savanna Mapping relevant to this NEC (Fox et al. 2001):

• *Eucalyptus leucophylla* +/- *Corymbia terminalis* low open woodland with understorey of bare soil and sparse tussock grasses or *Triodia* spp. (UNIT D51)

- Eucalyptus leucophylla +/- E. pruinosa +/- Corymbia terminalis low woodland to low open woodland +/- shrub layer of Acacia spp., Cassia spp. with understorey of Triodia spp. +/- tussock grasses (UNIT G3)
- Eucalyptus pruinosa +/- Lysiphyllum cunninghamii +/- Corymbia spp. low woodland +/- shrub layer of Acacia chisholmii, Melaleuca spp. with tussock grass understorey of Sehima nervosum, Chrysopogon fallax, Aristida spp. +/- Triodia spp. (UNIT D34)

The map units that are grasslands with scattered trees of *E. leucophylla* and / or *E. pruinosa* have been excluded. Figure 2 also includes the NVIS mapping data for MU 39 in NT (mapped at a scale of 1:1,000,000). In NT, the *E. pruinosa* woodlands included in this NEC are estimated to cover ~ 1 million ha (Map Unit 39; Wilson et al. 1990).

In Queensland, protected areas include Lawn Hill National Park, Lawn Hill (Arthur Creek) Resource Reserve and Camooweal Caves National Park (Table 2). However, there is no representation in the reserve system for REs 1.7.2 and 1.11.3. Where communities are reserved, the representation is usually low (<4% of original extent) except in the case of RE 1.9.7 and 1.9.3, which have a high representation (>10% of original extent) (Sattler and Williams, 1999). Within the NT, there is no reservation of this NEC.

Information contributing to the conservation status under the EPBC Act

Components listed under State or Territory legislation

Conservation status according to the VMA Status (Status under the Vegetation Management Act 1999) is of **no concern at present** for all sub-communities in Qld except for RE 1.9.3 which is regarded as **of concern**. This is because it is regarded as a naturally restricted ecosystem (defined as having an original extent of < 10,000ha; Sattler and Williams, 1999).

However, the Biodiversity Status (Status recognised by the Environmental Protection Agency) is **of concern because of threatening processes in addition to clearing** for half of the REs in this NEC (Table 1; RE 1.11.4, 1.5.5, 1.5.4, 1.7.2 and 1.9.3). The Qld EPA have listed these communities as of concern due to their condition, generally due to moderate degradation and / or the soil surface is moderately degraded. In these cases, floristic diversity is greatly reduced, but may recover with the removal of threatening processes (Sattler and Williams, 1999). This category may also include communities of high biodiversity that have significantly contracted in extent and are now highly fragmented (Sattler and Williams, 1999). There is no formal legislation for threatened communities in NT.

Some of the *E. leucophylla* woodland areas are potential habitat for rare and threatened fauna including the night parrot *Pezoporus occidentalis* (RE 1.5.4) (Sattler and Williams, 1999).

Decline in geographic distribution

For all sub-communities in Qld, > 30% of the pre-European extent remains (Environmental Protection Agency Qld, 2003). However, RE 1.9.3 is regarded as a naturally restricted type; defined as having an original extent of less than 10,000ha (Sattler and Williams, 1999; Table 1). This community is regarded as of concern by the EPA in Qld due to the relatively small area it covers and because it is also subject to threatening processes (mainly grazing).

Threats to the national ecological community

The main types of threatening processes in the Mt Isa inlier IBRA region are grazing pressure (mainly cattle but also sheep), changed fire regime and weed invasion (National Land and Water Resources Audit, 2001). These threats are listed as severe in many of the sub-communities included in this NEC. For example, a combination of Buffel grass *Cenchrus ciliaris* invasion, changed fire regime and high

total grazing pressure (mainly cattle) is leading to changes in floristic composition and structure of some of the *E. pruinosa* woodlands in Queensland (RE 1.11.4, 1.5.5 and 1.7.2) (Sattler and Williams, 1999). In some areas, scalding occurs due to high total grazing pressure (RE 1.10.8) (Sattler and Williams, 1999). On the whole this region is considered fairly poor grazing country and stocking rates therefore should be maintained at a low level (<u>Tropical</u> Savannas CRC, 1998).

Mining is important in the Mt Isa Inlier but impacts are localised (Minerals Division, 1998; Northern Australia Forum, 2003). The commencement of large-scale mining and smelting of the silver-leadzinc deposits began in 1930 and is ongoing (Minerals Division, 1998). About a quarter of the Mt Isa Inlier province is covered by granted Exploration Permits (EPM) and a further quarter is subject to EPM applications (Minerals Division, 1998).

Clearing is not a significant issue in the Mt Isa Inlier IBRA region, given that between 80-90% of remnant vegetation is remaining and annual clearing rates are low for woodlands in this region (Wilson et al. 2002).

Within NT, feral animals, weed invasion and changed fire regime are the main types of threatening processes, but these occur at a much lower degree than in Queensland (Parks and Wildlife Commission, 2003).

Loss or decline of functionally important species

No data available.

Reduction in ecological integrity

The threats listed above have lead to a reduction in ecological integrity of many of these woodlands (Sattler and Williams, 1999). However, the current condition of the vegetation in many of these woodlands is poorly known and further biological surveys are recommended (eg. RE 1.10.8; Sattler and Williams, 1999).

Rate of detrimental change

No data available.

Summary & recommendations re: category of threat under the EPBC Act

None of the *Eucalyptus pruinosa* or *E. leucophylla* woodlands are listed as threatened under the EPBC Act to date. This NEC is not eligible for listing as threatened under the EPBC act according to criterion 1 (decline in geographic distribution), as > 30% of the pre-European extent remains for all REs. However, the current extent of sub-communities is not available until the 1:100 000 mapping for the Mt Isa Inlier region is complete.

Despite the reported degradation of these communities due to grazing and weed invasion, this NEC does not appear eligible for listing under the EPBC Act according to criterion 4 (Reduction in community integrity). In order to list a community under the Act, the change in integrity must be such that regeneration is unlikely within the immediate future, even with positive intervention (EPBC Act, 1999). The Qld EPA acknowledges that diversity of native species may recover with the removal of threatening processes (Sattler and Williams, 1999). Further assessment of the condition of vegetation in the sub-communities listed as threatened at a state level is needed before a proper assessment of this NEC is possible.

Outstanding issues

- Should the tropical occurrences of *E. pruinosa* be included in this NEC? This will depend on further investigation into tropical eucalypt woodlands and on whether the occurrences in the Mt Isa Inlier are regarded as threatened.
- The assessment of an appropriate conservation status of this NEC is dependent on further information on the condition of the woodlands included in this group.

Sub-community name ²	RE no.	State	IBRA region	Extant area (ha)	% pre-European remaining	% reserved	EPA status
Cloncurry box (<i>Eucalyptus leucophylla</i>) low open woodland on basic rocky hills on folded sediments.	1.11.3	QLD	MĬ	na	> 30% remains	No representation	No concern at present
Cloncurry box (<i>Eucalyptus leucophylla</i>) low open woodland on red earths in valleys.	1.5.4	QLD	MI	na	> 30% remains	<4%	Of concern because of threatening processes in addition to clearing.
Cloncurry box (<i>Eucalyptus leucophylla</i>) low open woodland on hillocks on Mesozoic claystones.	1.9.3	QLD	MI	na	> 30% remains of a naturally restricted type.	>10%	Of concern
Cloncurry box (<i>Eucalyptus leucophylla</i>) low open woodland on low hills on limestones and calcareous shales.	1.9.5	QLD	MI	na	> 30% remains	<4%	No concern at present
Silver-leaved box (<i>Eucalyptus pruinosa</i>) open woodland on slopes adjoining sandstone plateaus.	1.10.8	QLD	MI	na	> 30% remains	<4%	No concern at present
Silver-leaved box (<i>Eucalyptus pruinosa</i>) low open woodland on shallow soils in valleys below folded sediments.	1.11.4	QLD	MI	na	> 30% remains	<4%	Of concern because of threatening processes in addition to clearing.
Silver-leaved box (<i>Eucalyptus pruinosa</i>) low open woodland on red earth plains.	1.5.5	QLD	MI	na	> 30% remains	<4	Of concern because of threatening processes in addition to clearing.
Silver-leaved box (<i>Eucalyptus pruinosa</i>) low open woodland on calcareous red/brown earths on small alluvial fans.	1.7.2	QLD	MI	na	> 30% remains	No representation	Of concern because of threatening processes in addition to clearing.
Silver-leaved box (Eucalyptus pruinosa) low open woodland on shale hills.	1.9.7	QLD	MI	na	> 30% remains	>10%	No concern at present
<i>E. pruinosa</i> (Silver Leaf Box), <i>Lysiphyllum cunninghamii</i> (Bauhinia) low open-woodland with hummock / tussock grassland understorey	MU39	NT	DMR, GUP, MGD, MI & TAN	1,000,000	Unknown but >30% remains	Unknown	Not listed as threatened in NT

Table 1: Sub-communities in the NEC: Eucalyptus pruinosa and E. leucophylla woodlands of the semi-arid and / or arid areas of Northern Territory ar	nd Queensland.
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² Sub-community names for NT are according to Wilson et al. (1990) and sub-community names and Regional Ecosystem (RE) numbers for Qld are according to Sattler and Williams (1999). The data for Qld are from the latest version of the Regional Ecosystem Description Database (Environmental Protection Agency Qld, 2003b).



Figure 2: Distribution of E. leucophylla and E. pruinosa woodlands in the arid zone of northern Australia. Map is derived from the Tropical Savanna mapping (Fox et al. 2001).

RE No.	Sub-community name	Reserve name
1.10.8	Silver-leaved box (<i>Eucalyptus pruinosa</i>) open woodland on slopes adjoining sandstone plateaus.	Lawn Hill NP, Lawn Hill (Arthur Creek) RR
1.11.4	Silver-leaved box (<i>Eucalyptus pruinosa</i>) low open woodland on shallow soils in valleys below folded sediments.	Lawn Hill (Arthur Creek) RR
1.5.5	Silver-leaved box (<i>Eucalyptus pruinosa</i>) low open woodland on red earth plains.	Camooweal Caves NP
1.7.2	Silver-leaved box (<i>Eucalyptus pruinosa</i>) low open woodland on calcareous red/brown earths on small alluvial fans.	No representation
1.9.7	Silver-leaved box (<i>Eucalyptus pruinosa</i>) low open woodland on shale hills.	Lawn Hill NP, Lawn Hill (Arthurs Creek) RR
MU39	<i>E. pruinosa</i> (Silver Leaf Box), <i>Lysiphyllum cunninghamii</i> (Bauhinia) low open-woodland with hummock / tussock grassland understorey	No representation
1.11.3	Cloncurry box (<i>Eucalyptus leucophylla</i>) low open woodland on basic rocky hills on folded sediments.	No representation
1.5.4	Cloncurry box (<i>Eucalyptus leucophylla</i>) low open woodland on red earths in valleys.	Lawn Hill (Arthur Creek) RR
1.9.3	Cloncurry box (<i>Eucalyptus leucophylla</i>) low open woodland on hillocks on Mesozoic claystones.	Lawn Hill NP
1.9.5	Cloncurry box (<i>Eucalyptus leucophylla</i>) low open woodland on low hills on limestones and calcareous shales.	Lawn Hill NP

Table 2: List of reserves and national parks in which each of the sub-communities occurs.

Table 3: Sources of ecological information used to describe the sub-communities and the NEC.

RE no.	Reference / Source	Map unit no. / land	Floristic Association
		system	
1.11.3	Neldner (1991)	38	48 49
	Christian et al. (1954)	Mount Isa	
	Perry et al. (1964)	Argylla, Kuridala,	
		Quamby	
1.5.4	Neldner (1991)	15, 19	40 39 42 43 44
	Christian et al. (1954)	Waverley	
	Perry et al. (1964)	Quamby, Kuridala	
1.9.3	-	-	-
1.9.5	Christian et al. (1954)	Thorntonia, Redbank	-

Note: Floristic associations in bold are the most extensive in distribution.

NEC 1.4: Eucalyptus gongylocarpa woodlands

This NEC description is not fully developed because priority was given to completing NECs where there were definite indications of threat. Explanation of the membership of this community, some relevant information, and references to further data are provided; the information indicates that these woodlands are not threatened, although there are processes impacting on them in some areas.

Description, including natural distribution

Beadle (1981) comments: *Eucalyptus gongylocarpa* (Marble gum) is remarkable in the desert because of its size, being a tree reaching a height of 8-13m (rarely 20m). It occurs either as isolated trees or in pure stands as savannah woodlands on red sandplain, or on the slopes and the crests of dunes.... The understorey is always dominated by hummock grasses, *Triodia pungens* in the north and *Triodia basedowii* in the south. Scattered tall shrubs sometimes occur..."

The *E. gongylocarpa* communities are either open woodlands or grasslands. They occur in South Australia, the Northern Territory and Western Australia. Relevant records for each state are detailed below.

South Australia:

In SA, *E. gongylocarpa* communities occur in the far north-west, on the sandplains of the Victoria Desert. In the SA NVIS data it is mapped broadly across the "Unnamed Conservation Park". A biological survey has just been completed in a relevant area (NW region of SA) (Lang et al 2003). This will have details of the *E. gongylocarpa* woodlands in that area. It was not available for this report.

The NVIS data (Figure 1) maps *E. gongylocarpa* woodland in the Unnamed Conservation Park (Fig 1); this is south of the Anangu Pitjantjatjara lands. The Level 6 description indicates these species: Trees: *Eucalyptus gongylocarpa, Eucalyptus youngiana, Eucalyptus glomerosa* Tall Shrubs: *Acacia ligulata, Acacia ramulosa, Grevillea juncifolia* Low shrubs: *Eremophila gilesii, Thryptomene elliottii, Thryptomene maisonneuvei* Ground: *Triodia basedowii*

Relevant references for this region are Lang et al. (2003), and Department for Environment and Heritage SA (1996).

Northern Territory: (from Wilson *et al* 1990) and Brocklehurst and Gibbons (2003): <u>Name</u>: *E. gongylocarpa* (Marble Gum) open-woodland with open-hummock grassland understorey <u>Units</u>: map unit 30; DVT 112 <u>Main species</u>:

- upper: Eucalyptus gongylocarpa, Corymbia opaca
- mid: Acacia ligulata, Dodonaea viscosa, Grevillea stenobotrya
- ground: Triodia pungens, Triodia basedowii, Paractaenum refractum

<u>Description:</u> Tree canopy dominated by *E. gongylocarpa* with *E. opaca* dominant in localised areas. Shrub layer is tall and open dominated by *Acacia ligulata* and *Dodonaea viscosa*. Ground layer is a hummock grassland dominated by *Triodia pungens* and *Triodia basedowii*. Tussock grasses may be seasonally present. Found on expanses of sand dunes, adjacent to Lake Amadeua, with isolated patches to the north-west of Kings Canyon. The vegetation is variable, often with isolated *E. gongylocarpa* trees scattered throughout *Allocasuarina* woodland (MU 92). Minor areas of *Acacia* spp. *E. gamophylla* sparse-shrubland (MU 83) occur and a small patch of *Xanthorrhoea thorntonii* is found in association with *E. gongylocarpa* in the Glen Edith area. Average height of trees = 12m, average height of shrubs = 3m and average height of grasses = 0.3m. Average PFC of trees = 5%, average PFC of shrubs = 5% and average PFC of grasses = 17%.

<u>IBRA regions</u>: GSD, FIN. Note that data on threats in the FIN bioregion can be obtained from Woinarski (2002)

Western Australia:

In WA the *E. gongylocarpa* communities are not classified as woodlands within NVIS – Beard maps them as hummock grassland / open tree or mallee steppe. However, other WA references that report cover give values in the range 1-5% (e.g. Milewski and Dell 1992), which could be classified in NVIS as woodland. The woodlands often have mallee species within them, and *E. gongylocarpa* occurs in both mallee and tree form (Specht 1972). Beard's relevant vegetation associations most frequently mention *E. youngiana*, and sometimes *E. kingsmillii*, as co-occurring mallee eucalypts.

Beard veg	NVIS level 5 description
	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee (E. youngiana) over hard
84	spinifex (<i>T. basedowii</i>) between sandhills
85	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee (<i>E. youngiana</i>) over hard spinifex on sandplain
236	Hummock grasslands, shrub steppe; mulga (A. aneura) and mallee (marble gum) over hard spinifex
239	Hummock grasslands, open medium tree & mallee steppe; marble gum (<i>E. gongylocarpa</i> & mallee (<i>E. youngiana</i>) over hard spinifex (<i>T. basedowii</i>) between sandhills
532	Hummock grassland, mixed sandplain - sparse low trees over sparse dwarf shrubs with spinifex; marble gum (<i>E. gongylocarpa</i>) & red mallee (<i>E. oleosa</i> group) mixed dwarf shrubs with <i>T. scariosa</i> & <i>T.</i> sp
542	Shrublands; mallee scrub marble gum (<i>Eucalyptus gongylocarpa</i>)
862	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee (<i>E. kingsmillii</i>) over hard spinifex (<i>T. basedowii</i>)
1239	Hummock grasslands, open medium tree & mallee steppe; marble gum & mallee (<i>E. youngiana</i>) over hard spinifex (<i>T. basedowii</i>) on sandplain

Table 1: Details of communities including E. gongylocarpa in WA

Information for the above associations on current and pre-European extent, % remaining, % reserved can be retrieved from Appendix 1 of Shepherd et al (2002). A map showing the locations of these associations, based on NVIS, is presented in Figure 1. A distribution map of *E. gongylocarpa* in Western Australia, based on herbarium specimen records, can be accessed from the Florabase database (Western Australian Herbarium, 2003).

Detailed information on *E. gongylocarpa* woodlands in WA is provided in Milewski and Dell (1992) (see reference #9 in their list). They describe low woodlands with tree cover of 4-6% and height of 6-10m. Details of the flora in each stratum are provided, as are records of fauna. Other relevant data sources include: Chapman *et al* (1994), World Wildlife Fund (2001), Department of Conservation and Land Management (1996), McKenzie (2003) and the WA synopsis reports listed in Attachment 4-1.



Figure 1: NVIS communities with E. gongylocarpa *in the description.* According to the NVIS data, some of these are grasslands with emergent trees rather than woodlands. Other occurrences are unmapped (eg. in the NW corner of SA). See text. The grey lines indicate IBRA regional boundaries; the red line encloses the arid/ semi-arid region.

Information on fauna

- Department for Environment and Heritage SA (1996) noted: "There are unique insects in the area, including a recently discovered bug (Hemiptera) which inhabits the bark of marble gums near the Serpentine Lakes. This bug may prove to represent a previously unknown family.
- Baxter and Henderson (2000): "We recently sighted the Princess Parrot (*Polytelis alexandrae*) in the Unnamed Conservation Park of the Great Victoria Desert, South Australia during October 1998. This significant observation involves what was possibly a breeding pair attending a hollow in a marble gum *Eucalyptus gongylocarpa*". They postulate a link between the parrot and the marble gum.
- Thompson & Pianka (1999) record the use of *E. gongylocarpa* hollows by the black-headed goanna *Varanus tristis* in the western Great Victoria Desert (Red Sands, 28° 12' S, 123° 35' E). The goannas appeared to use holes in the stump of dead trees for breeding and for egg laying.
- the WA synopsis reports (Attachment 4-1) note a very diverse mammalian and reptilian fauna in these communities.

• Dell *et al* (1992) record faunal observations at their *E. gongylocarpa* woodland sites in central WA.

Summary & recommendation regarding category of threat under the EPBC Act

The communities that make up this NEC have some interesting relationships with fauna. In some cases there are indications that there are threatening processes impacting on the sub-communities – see the synopsis reports for the communities in the Great Victoria Desert and WA. Here, mining and feral animals are affecting components of the NEC. However, at a national scale these woodlands are not threatened.

Outstanding issues

This NEC description is incomplete. Also, some of the component communities are described as hummock grassland in WA, and perhaps are so sparse that they should be excluded from the group. Further investigation of these communities are required to resolve this.

Attachment 4-1: Information from WA synopsis reports on E. gongylocarpa communities

- 1. WA Synopsis report for Great Victoria Desert 2 (Barton and Cowan 2003b):
 - a. Vegetation is primarily a Tree steppe of *Eucalyptus gongylocarpa*, Mulga and *E. youngiana* over hummock grassland dominated by *Triodia basedowii* on the aeolian sands;
 - b. <u>Ecosystem at Risk</u>: Yellow sandplain communities of the Great Victoria Desert (these include Beard 84, an *E. gongylocarpa* community). Very diverse mammalian and reptile fauna, distinctive plant communities Threats from mining (also camels and rabbits);
 - c. <u>Vertebrates at Risk</u> (the relationship with vegetation is not specified): Princess Parrot *Polytelis alexandrae*, Slender-billed Thornbills *Acanthiza iredalei iredalei*, Mulgara *Dasycercus cristicauda*, Black-footed Rock Wallaby *Petrogale lateralis* MacDonnell Ranges race, and Great Desert Skink *Egernia kintorei*;
 - d. <u>Flora at Risk</u> includes: *Conospermum toddii, Calytrix warburtonensis, Dampiera ramosa, Dicrastylis nicholasii, Eremophila aureivisca* ms, *Eremophila undulata, Labichea deserticola, Micromyrtus helmsii, Olearia arida,* and *Ptilotus stipitatus* (the relationship with vegetation is not specified).
- 2. WA: Similar information in synopsis report for Great Victoria Desert 1 (Barton and Cowan 2003a), where "Spinifex (*Triodia* spp.) and mallee (*Eucalyptus* spp., *Eucalyptus kingsmilli, E. youngiana*) over hummock grassland dominated by *Triodia basedowii* occur on the aeolian sand plain. Scattered marble gum (*E gongylocarpa*) and native pine (*Callitris* spp.) occur on the deeper sands of the sand plains". In this case, also, yellow sandplain communities are described as an ecosystem at risk, with similar biodiversity values and similar threats.
- 3. WA: Synopsis report for Great Victoria Desert 1 (Barton and Cowan 2003a): "Vegetation is primarily a Tree steppe of *Eucalyptus gongylocarpa*, Mulga and *E. youngiana* over hummock grassland dominated by *Triodia basedowii* on the aeolian sands. Not designated as ecosystem at risk, cf the above.
- 4. WA: Synopsis report for NULLARBOR 1 (Barton and Cowan 2003d): "Vegetation in the Northern sections of the subregion are primarily a Tree steppe of *Eucalyptus gongylocarpa*, Mulga and *E. youngiana* over hummock grassland dominated by *Triodia basedowii* on the aeolian sands".
- 5. WA: Synopsis report for COOLGARDIE 3 (Cowan 2003a): Beard vegetation association 542 (Shrublands; mallee scrub marble gum (*Eucalyptus gongylocarpa*)) is recorded as present; no record of threat.

NEC 1.5: *Eucalyptus thozetiana* (Mountain Yapunyah) and *Acacia* woodlands of the Mulga Lands in Queensland

Description

Introduction, key flora, fauna and abiotic elements

Eucalyptus thozetiana is regarded as a disjunct species as a result of fragmentation of the semi-arid woodlands by a reduction in the mean annual rainfall from c. 300mm to 250-200mm (Beadle, 1981). It may form tall shrublands sometimes with *E. normantonensis*. This NEC includes 4 sub-communities of woodlands dominated by *E. thozetiana* in the semi-arid and / or arid regions of Australia (Table 1). The list of sub-communities is derived from the Regional Ecosystem Description Database (EPA, 2003b). Temperate occurrences of these woodlands and any communities mapped as tall shrublands are not included in this NEC (eg. 2 tall shrubland communities in the CHC Bioregion).

In the arid zone, *E. thozetiana* is intermixed with *Acacia* species such as *Acacia aneura*, *Acacia microsperma*, *Acacia harpophylla*, *Acacia catenulata* and *Acacia petraea*. These woodlands may be better grouped with *Acacia* woodlands given that they intergrade with *Acacia* woodlands.

In most sub-communities in this NEC, *E. thozetiana* dominates the upperstorey forming a distinct but open canopy (generally 10-12m high) (Neldner, 1984). The exception to this is RE 6.7.7, in which *Acacia catenulata* (5-7m high) dominates and *E. thozetiana* occurs as emergent trees. Occasionally *E. cambageana* may co-dominate the upperstorey. Dominant shrubs include *Eremophila mitchellii* (2-4m), *Dodonaea* sp. aff. *adenophora*, *Acacia microsperma* (on lower slopes of dissected valleys), *Ptilotus obovatus* var. *parviflorus* or *Phebalium glandulosum* (may be locally abundant on the scarps). Other shrubs may include *Acacia anuera*, *Acacia catenulata*, *Acacia cambegi*, *Capparis loranthifloia*, *Geijera parviflora* and *Heterodendrum oleifolium*. The height of the tall shrub layer ranges from 1.5-13m and projective foliage cover is typically 10-30% (Neldner, 1984).

The low shrub layer is generally <2m and projected foliage cover ranges from <1%-13%. Low shrubs include Acacia anuera, Apophyllum anomalum, Canthium latifolia, Capparis lasiantha, Carissa ovata, Senna spp., Dodonaea petiolaris, Enchylaena tomentosa, Eremophila spp., Myoporum deserti, Scaevola spinescens and Ptilotus obovatus (Neldner, 1984). Ground layer is usually extremely sparse (PFC ranges from <1%-20%) and dominated by grasses, typically <1m high. Frequent forbs include Dysphania myriocephala, Einadia hastata, Hibiscus sturtii, Salsola kali, Sclerolaena spp., Solanum spp., Zygophyllum apiculatum and graminoids include Digitaria ammophila, Enteropogon acicularis, Eragrostis lacunaria, Paspalidium caespitosum, Sporobolus spp., and Tripogon loliiformis.

This NEC occurs on scarps and slopes often where weathered Cretaceous sediments are exposed by eroding Tertiary sandstones, and sometimes on plateaus. Soil types are generally shallow stony lithosols.

National distribution

Known natural distribution (including bioregions, conservation areas)

This NEC is restricted to the Mulga Lands IBRA region of Qld. The mapping of extant vegetation in the Mulga Lands is incomplete; only the east has been mapped in the NVIS database to date. Therefore, we are unable to provide a map of this NEC. Extant and pre-European areas are provided in Table 1; these are from Accad *et al.* (2000). The total area of this NEC is approximately 99,100ha (Table 1). The sub-communities covering the largest areas are REs 6.7.5 and 6.7.6, which cover 51,900ha and 33,000ha respectively. The other two REs have a restricted distribution covering <10,000ha.

The *E. thozetiana* and *Acacia* woodlands are represented in the Mariala National Park, Hell Hole Gorge National Park, Welford National Park and Idalia National Park. The extent reserved is generally very low ($\leq 1\%$; Table 1), except for RE 6.7.7 which has 7% of the extant area reserved (Sattler and Williams, 1999).

Summary and recommendations re: category of threat under the EPBC Act

Components listed under State or Territory legislation

Conservation status according to VMA Status (Status under the Vegetation Management Act 1999) is of **no concern at present** for all sub-communities in Qld. However, since September 2003 RE 6.7.5 was regarded as **of concern** according to the Biodiversity Status (Status recognised by the Environmental Protection Agency), due to erosion and scalding associated with displacement of the native ground layer (Environmental Protection Agency Qld, 2003d).

A number of rare and / or threatened flora and fauna occur within this NEC. For example, rare and / or threatened fauna include the yellow footed rock wallaby *Petrogale xanthope celeris* (RE 6.7.7) and redthroat *Sericornis brunneus* (RE 6.7.3). Rare and / or threatened flora include *Melaleuca kunzeoides*, *Xerothamnella parviflora* (RE 6.7.7) and *Cadellia pentastylis* (RE 6.7.5).

Decline in geographic distribution

For all communities in this NEC > 30% of the pre-European extent remains. However, the lower slopes of RE 6.7.5, which act as natural saline discharge areas, have been extensively cleared. Many of the remaining areas are on steeper slopes and scarps. This is the western extent of an ecosystem that extends into the Brigalow Belt bioregion (11.7.1).

Threats to the national ecological community

The main threats in the Mulga Lands IBRA region are grazing pressure and vegetation clearing (National Land and Water Resources Audit, 2001). Opal mining occurs in some of the areas supporting RE 6.7.7 (Sattler and Williams, 1999). Gully erosion is common in RE 6.7.5 (Turner, 1978).

Loss or decline of functionally important species

No data available.

Reduction in ecological integrity

None of these sub-communities are regarded as threatened at present due to degradation or reduction in ecological integrity (Environmental Protection Agency Qld, 2003b).

Rate of detrimental change

No data available.

Summary and recommendations re: conservation status under the EPBC Act

In summary, from the data collated in this report this NEC is not eligible for listing as threatened at present. It should be acknowledged that one sub-community is regarded as of concern at a state level. However, there is insufficient data to warrant listing the NEC as a whole.

Outstanding issues

• This NEC requires re-assessment as the communities within it may be more appropriately grouped with *Acacia* woodlands.

Sub #	Sub-community name (Re description)	IBRA region	RE no.	EPA status	Extant area (ha) ¹	% pre- European remaining	% reserved	Reserves
1	Acacia microsperma \pm Eucalyptus thozetiana \pm Acacia aneura open woodland/shrubland on scarps and slopes.	ML	6.7.3	No concern at present	4600	> 30% remains	<1%	Mariala NP
2	Acacia catenulata \pm Eucalyptus thozetiana and/or Acacia ensifolia low open woodland with Triodia sp. and/or Acacia petraea $\pm A$. aneura on scarps and plateaus.	ML	6.7.7	No concern at present	9600	> 30% remains	7%	Hell Hole Gorge NP, Idalia NP, Mariala NP, Welford NP
3	<i>Eucalyptus thozetiana</i> \pm <i>Acacia aneura</i> open woodland on scarps and slopes.	ML	6.7.6	No concern at present	33000	> 30% remains	<1%	Hell Hole Gorge NP, Idalia NP
4	<i>Eucalyptus thozetiana</i> or <i>E. cambageana</i> , <i>Acacia harpophylla</i> woodland on scarps.	ML	6.7.5	Of concern	51900	> 30% remains	1%	Mariala NP
	Totals and	d percentage	99100	Not provided	Not provided	na		

Table 1: Sub-communities in the NEC: E. thozetiana and Acacia woodlands of the Mulga Lands in Queensland.

NEC 1.5: E. thozetiana and Acacia woodlands of the Mulga Lands in Queensland

¹ Areas are from Accad et al. (2000)

NEC 1.6: Poplar box woodlands of the arid / semi-arid zone

This NEC is not complete, because key information was not available by the end of this consultancy. We have summarised here the important issues, plus sources of information that we have identified. The communities may properly form more than one NEC, particularly if some face more threatening processes than others. Poplar box as a species occurs in arid, semi-arid and temperate areas.

General issues

E. populnea (poplar box) occurs across a large geographic area of eastern Australia and in a wide range of communities (Beeston *et al* 1980). Johnson and Hill (1990) distinguish two subspecies:

- ssp. *populnea* to the north and east, extending from the Tropic of Capricorn south to the western Darling Downs (ie primarily to the east of the semi-arid boundary)
- ssp. *bimbil*

There is extensive intergradation between the subspecies where their ranges meet.

A good basis for distinguishing an arid component appears to lie in the work of Beeston *et al* (1980). The authors detail 17 woodland communities in which poplar box is dominant, with information on common flora in the strata, and maps of distribution. There are also associated abiotic data. The original site data (from 1400 sites) and mapping is now being retrieved and converted to databases and digital mapping . The advantage of the Beeston work is that it has spanned NSW and Qld, and thus provides a consistent basis for assessing the communities. Information about the state of this data, and suggestions for further references are in Attachment 6-1.

In addition to the above, John Benson (Royal Botanic Gardens, Sydney) is classifying the NSW poplar box communities. This work is nearing completion but is not yet available. He has developed a slightly different grouping to that of Beeston et al (1980). His data will be valuable once available. The focus is not on mapping, but details are provided about the existing mapped communities and how they relate to his classification.

The western NSW communities are mapped and described only broadly in NVIS (following Pickard and Norris 1994) and there are inconsistencies with the work of Beeston et al. (1980).I In particular, the Beeston communities E3 and E5, *E. populnea* with *Casuarina* species, are remapped by Pickard and Norris (1994) as Belah-Rosewood communities with no mention of *E. populnea*. This requires clarification.

These communities described by Beeston et al (1980) are likely to form one or more arid / semi-arid NEC(s):

- C3: E. populnea E. intertexta
- D: E. populnea with Acacia aneura communities 4 of these, all relevant
- E3 and E5: *E. populnea* with Casuarina species (see above)
- possibly G2: *E. populnea* with *E. melanophloia* but this may be more prevalent to the east of the semi-arid boundary
- C7: E. populnea "E. terminalis" (now renamed Corymbia tumescens)

In addition, this is in the arid / semi-arid area but is probably included in other NECs:

• C11: *E. populnea* with a variety of species occuring along watercourses - in the NEC(s) relevant to watercourses

Note that the above interpretations are rough because they are based on the mapping of broader categories as presented in Beeston et al (1980), and the text in the same article. The mapping that is now being finalised maps each community separately.

The works with relevant information include:

- Beeston, G. R., P. J. Walker, R. Purdie, and J. Pickard. 1980. Plant communities of the poplar box (*Eucalypus populnea*) lands of Eastern Australia. Australian Rangelands Journal 2:1-16.
- Iwaszkiewicz, A., and W. S. Semple. 1988. A review of information relevant to the Bimble Box - pine and associated rangelands of Western New South Wales. Soil Conservation Service of NSW Technical Report No. 6., Chatswood, NSW.
- John Benson's database (Royal Botanic Gardens, Sydney), which is still in progress
- Keith, D. A. 2002. A Compilation Map of Native Vegetation for New South Wales, Version 1.1. NSW NPWS, NSW.
- Sattler, P. S., and R. D. Williams, editors. 1999. The conservation status of Queensland's bioregional ecosystems. Environmental Protection Agency, Brisbane.
- Division of Land Utilization. 1974. Western Arid Region Land Use Study Part I. Technical Bulletin No. 12. Page 131. Queensland Department of Primary Industries, Brisbane.
- Division of Land Utilization. 1980. Western Arid Region Land Use Study Part II. Technical Bulletin No. 22. Page 142. Queensland Department of Primary Industries, Brisbane.
- Mills, J. R., C. R. Ahern, R. W. Purdie, and W. J. F. McDonald. 1990. Western Arid Region Land Use Study Part III. Technical Bulletin No. 29. Page 249. Division of Land Utilization, Queensland Department of Primary Industries, Brisbane.
- Division of Land Utilization. 1977. Western Arid Region Land Use Study Part IV. Technical Bulletin No. 23. Queensland Department of Primary Industries, Brisbane.
- Turner, E. J., W. J. F. McDonald, C. R. Ahern, and M. B. Thomas. 1993. Western Arid Region Land Use Study Part V. Technical Bulletin No. 30. Department of Primary Industries, Brisbane.
- Wilson, P. R., R. W. Purdie, and C. R. Ahern. 1990. Western Arid Region Land Use Study -Part VI. Technical Bulletin No. 28. Department of Primary Industries, Brisbane.

Queensland regional ecosystems within the arid – semi-arid zone that are relevant are summarized in Table 1. Note that there are several others that are mulga-dominated that are not included in the table, and that these may also occur further to the east.

Issues relevant to conservation status.

The communities further to the west are likely to face less severe threats compared with those in the semi-arid areas. Beeston et al (1980) note that there is poor reservation across the range of these communities. Since their work, many of the communities to the east of the semi-arid boundary have been substantially cleared. It is important that these arid / semi-arid communities are assessed because poplar box as a species has been targeted for clearing. Of the 21 Queensland regional ecosystems listed in Table 1, only 8 have an EPA status of "no concern at present". Of the remaining, 7 are "Of concern" and 8 are "Endangered".

Table 1: Information on Queensland REs within the arid/semi-arid boundary that may be relevant to the poplar box NEC(s). Those with numbers beginning with "6" are in the Mulga Lands bioregion, and those with "11" are in the arid / semi-arid section of the Darling Riverine Plains. All of them may also occur further to the east. These data are taken directly from the web version of Sattler and Williams 1999 (http://www.epa.qld.gov.au/environment/science/herbarium/regional_ecosystems/)

Regional Ecosystem	VMA status	EPA status	Comments	% of pre- clearing extent remaining (Sept 2000)	Extant % reserved	Description
6.3.18	Not of concern	Of concern	Many remaining areas have been fragmented or disturbed by ring barking which has	> 30%	Low.	Eremophila mitchellii +/- Acacia aneura +/- A. cambagei low tree layer. The ground layer is open to dense and often dominated by grasses. Occurs on flat to gently undulating alluvial plains. Soils are usually moderately deep to deep earths or sometimes texture contrast with a sandy surface.
6.4.3	Of concern	Endangered	removed many larger habitat trees.	10-30%	Low (<1%).	Eucalyptus populnea, Casuarina cristata or Acacia harpophylla +/- Geijera parviflora woodland on undulating clay plains. Texture contrast soils.
6.5.2	Not of concern	No concern at present	Many remaining areas have been fragmented or disturbed by ring	> 30%	Low (<1%).	<i>Eucalyptus populnea</i> and/or <i>E. melanophloia</i> woodland - open woodland with an <i>Acacia aneura</i> low woodland - open woodland layer. Occurs on flat to gently undulating plains formed by Quaternary sediments over the Tertiary surface. Soils are often shallow to moderately deep red earths with hard setting surfaces.
6.5.3	Not of concern	Of concern	barking which has removed many larger habitat trees.	> 30%	Low (<1%).	Eucalyptus populnea woodland +/- Acacia aneura, Eremophila mitchellii low tree layer. Deep massive earth or texture contrast soils.
6.5.4	Of concern	Of concern		10-30%	Low (<1%).	Eucalyptus populnea +/- Callitris glaucophylla woodland +/- Acacia aneura, Eremophila mitchellii low tree layer. Loamy red earth soils.
6.5.5	Of concern	Endangered		10-30%	Low (2.5%).	<i>Eucalyptus intertexta</i> +/- <i>E. populnea</i> +/- <i>Callitris glaucophylla</i> woodland +/- <i>Acacia aneura</i> low tree layer. Occurs on flat to gently undulating plains of Quaternary sediments. Soils are often deep earths.

Regional Ecosystem	VMA status	EPA status	Comments	% of pre- clearing extent remaining (Sept 2000)	Extant % reserved	Description
6.5.8	Not of concern	No concern at present		> 30%	Low (<1%).	Acacia aneura, Eucalyptus populnea low woodland +/- Eremophila gilesii low shrub layer. Occurs on gently undulating plains formed on Quaternary deposits over the Tertiary surface. Soils are shallow to very shallow red earths with hard setting surfaces and gravel and ironstone on the surface.
6.5.9	Not of concern	Of concern	Threatening processes in addition to clearing.	> 30%	No representation.	Acacia aneura, Eucalyptus populnea +/- E. melanophloia shrubby low woodland. There is a low tree layer dominated by mixed species such as Archidendropsis basaltica, Ventilago viminalis and Eremophila mitchellii. Occurs on flat to gently undulating plains of Quaternary sediments over the Tertiary surface. Moderately deep to deep red earthy sand soils.
6.5.10	Not of concern	No concern at present		> 30%	No representation.	Open woodland of <i>Eucalyptus populnea</i> with a low woodland/open forest dominated by <i>Acacia aneura</i> +/- <i>Grevillea striata, Acacia excelsa, Hakea ivoryi</i> . Occurs on flat to gently undulating plains formed by Quaternary deposits over the Tertiary surface. Red earth soils.
6.5.13	Not of concern	No concern at present		> 30%	No representation.	<i>Eucalyptus populnea</i> +/- <i>Brachychiton populneus</i> low woodland with <i>Acacia aneura</i> low tree layer. <i>E. melanophloia</i> often occurs on upper slopes and ridges. Occurs on gently undulating plains formed from Quaternary deposits over the Tertiary surface. Soils are often shallow to moderately deep red earths with a hard setting surface and sometimes a gravel or ironstone covering.
6 5 17	Not of	No concern		> 20%	No	<i>Eucalyptus populnea, E. melanophloia</i> +/- <i>Callitris glaucophylla</i> woodland +/- <i>Acacia aneura</i> low tree layer. <i>Eucalyptus melanophloia</i> usually codominates but may be dominant or absent from localised areas. <i>Callitris glaucophylla</i> is also often codominant on sandier areas. A low tree layer dominated by <i>Acacia aneura, Eremophila mitchellii, Geijera parviflora</i> or <i>Callitris glaucophylla</i> is usually present. The ground layer is sparse to open and dominated by <i>Aristida</i> spp. and perennial grasses. Occurs on gently undulating plains formed from Cainozoic silts and mixed sediments. Soils are usually deep sandy red earths or deep duplex with thick sandy surfaces.
6.5.17	Not of concern	No concern at present		> 30%	No representation.	+/- Acacia aneura low tree layer. Eucalyptus melanophiola usually codominates but may be dominant or absent from localised areas. glaucophylla is also often codominant on sandier areas. A low tree dominated by Acacia aneura, Eremophila mitchellii, Geijera parviflo Callitris glaucophylla is usually present. The ground layer is sparse open and dominated by Aristida spp. and perennial grasses. Occur gently undulating plains formed from Cainozoic silts and mixed sec Soils are usually deep sandy red earths or deep duplex with thick s surfaces.

Regional Ecosystem	VMA status	EPA status		Comments % of pre- clearing extent remaining (Sept 2000)	Extant % reserved	Description
11.3.2	Of concern	Of concern		10-30%	Low.	<i>Eucalyptus populnea</i> woodland to open woodland. <i>E. melanophloia</i> may be present and locally dominant. There is often a grassy ground layer sometimes with a distinct low tree layer dominated by species such as <i>Geijera parviflora, Eremophila mitchellii, Acacia salicina, Lysiphyllum</i> spp., <i>Cassia brewsteri, Callitris glaucophylla</i> and <i>Acacia excelsa</i> . Occurs on Cainozoic alluvial plains with variable soil types including texture contrast, deep uniform clays, massive earths and sometimes cracking clays.
11.3.17	Of concern	Endangered	Most of the remaining area are highly fragmented.	10-30%	No representation.	<i>Eucalyptus populnea</i> woodland with <i>Casuarina cristata</i> and/or <i>Acacia harpophylla</i> clumps or scattered trees and a low tree layer dominated by <i>Geijera parviflora</i> . Occurs on Cainozoic alluvial plains.
11.3.18	Not of concern	No concern at present		> 30%	Low.	<i>Eucalyptus populnea</i> and/or <i>E. melanophloia</i> dominate the woodland canopy. Other canopy tree species that may be present include <i>Callitris glaucophylla, E. crebra, E. chloroclada</i> and <i>Angophora leiocarpa</i> . A low tree layer dominated by <i>Allocasuarina luehmannii, Callitris glaucophylla</i> and/or <i>Eremophila mitchellii</i> is often present. The ground cover is usually sparse and dominated by perennial grasses. Occurs on Cainozoic alluvial plains with deep texture-contrast soils with sandy surface horizons.
						Woodland dominated by <i>Eucalyptus populnea</i> and <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> in a lower tree layer. Poplar box trees have been recorded from 14–18 m high, and the lower tree layer 6–14 m high. A tall shrub layer is frequently present and dominated by <i>Eremophila mitchellii</i> and <i>Geijera parviflora</i> . Other tall shrub shrubs, such as <i>Ventilago viminalis</i> and <i>Archidendropsis basaltica</i> , and lower shrubs such as <i>Carissa ovata</i> and <i>Alectryon oleifolius</i> , may be locally present. The ground stratum is often sparse. Usually associated with flat or lower, middle and upper slopes of gently undulating Cainozoic clay plains. Soils are usually texture
11.4.7	Endangered	Endangered		< 10%	Low.	contrast, but gilagaied cracking clays and earths may also be present.

Regional Ecosystem	VMA status	EPA status	Comments	% of pre- clearing extent remaining (Sept 2000)	Extant % reserved	Description
11.5.3	Not of concern	No concern at present		> 30%	Low.	<i>Eucalyptus populnea</i> and/or <i>E. melanophloia</i> +/- <i>Corymbia clarksoniana</i> +/- <i>C. dallachiana</i> and occasionally <i>E. cambageana</i> shrubby woodland. Localised areas may be dominated by <i>E. crebra</i> . A low tree layer dominated by species such as <i>Eremophila mitchellii, Geijera parviflora, Ventilago viminalis</i> and occasionally <i>Allocasuarina luehmannii</i> is often present. Occurs on flat to gently undulating Cainozoic sand plains with deep red earth soils.
11.5.13	Of concern	Of concern		10-30%	No representation.	<i>Eucalyptus populnea</i> woodland +/- <i>Acacia aneura</i> low tree layer. <i>E. melanophloia</i> and <i>Callitris glaucophylla</i> are common components of the canopy layer, the former dominating over localised areas. Occurs on Cainozoic sand plains with deep red earth soils.
11.9.7	Of concern	Of concern		10-30%	Low.	<i>Eucalyptus populnea</i> +/- <i>E. melanophloia</i> woodland to open woodland often with a shrubby understorey dominated by species such as <i>Eremophila mitchellii, Geijera parviflora, Heterodendrum oleifolium</i> and (in the west) <i>Archidendropsis basaltica</i> . Occurs on Cainozoic to Proterozoic consolidated, fine-grained sediments. Often occurs on undulating plains and rises with texture contrast soils.
11.9.10	Of concern	Endangered	Threatening processes in addition to clearing.	10-30%	Low.	Acacia harpophylla, Eucalyptus populnea shrubby open forest on Cainozoic to Proterozoic consolidated, fine-grained sediments. Occurs on lower parts of undulating plains often with deep texture-contrast soils.
11.10.11	Not of concern	No concern at present		> 30%	Low.	<i>Eucalyptus melanophloia</i> and/or <i>E. populnea</i> +/- <i>Callitris glaucophylla</i> shrubby woodland. Other tree species that may be present in the canopy or sub-canopy include <i>Acacia</i> spp., <i>A. excelsa, Angophora leiocarpa, E. moluccana, Allocasuarina luehmannii, Eucalyptus chloroclada, Corymbia trachyphloia</i> and <i>E. crebra</i> . Occurs on Cainozoic to Proterozoic consolidated, medium to coarse-grained sediments on undulating to rolling hills usually with texture contrast soils.
11.12.17	Endangered	Endangered		< 10%	No representation.	<i>Eucalyptus populnea</i> woodland with <i>Eremophila mitchellii</i> dominated mid layer. Occurs on colluvial lower slopes formed on Mesozoic to Proterozoic igneous rocks.

Attachment 6-1: Information from Greg Beeston relating to his data and additional references

The data that has been discovered is listed below and a few short notes are made about each as to its state of digital preparedness. Please note that all data sets will be using the taxonomy of the 1970s when they were collected and will need some time to bring them up to current naming conventions.

- 1. Data sets from Beeston *et al* as reported in the paper and additional background data not published.
- 2. All site data in digital form including site/landscape, species and soils data.
- 3. A matrix for each state containing a species list against the community numbers reporting the number of sites where the species was found in each community.
- 4. Copies of the coloured map produced . These are located in the archive of CSIRO Land and Water at the Black Mountain laboratories. Contact:

CSIRO Land and Water, Canberra ACT Ph: (02) 6246 5722 Fax: (02) 6246 5800

- 5. In addition an acetate containing the line work of the map has been found and scanned and is in the process of being made into a digital map.
- 6. Paper copies of all the original references from which the paper was written are also available.

Other information

- In the Mulga Bioregion, the two western-most reserves (now Idalia National Park in the northern part of the Gowan range east of Yaraka; and Welford NP west of the Barcoo, north-east of Windorah) contain some *Eucalyptus populnea* along creek lines.
- **BALONNE MARANOA DATA:** Digital data files relating to all sites in this survey area regardless of whether Poplar Box was present. They contain soil, landscape and tree density data for the major tree species. These relate to a paper printed in Tropical Grasslands about Mulga (full reference details not available).
- NOGOA BELYANDO DATA: The data sheets relating to the sites not coded during the Poplar Box work. Not all of these may be locatable as some were not found when we coded all the sites in the 1970's. (Maybe 5-10% not found)

These will all need coding into digital files.

• *WESTERN ARID SURVEYS:* Greg Beeston has digital files of the flora site data from some of the early study areas and Rosemary Purdie has some other data. This will have to be investigated to see how complete it is.

Relevant references (some may be out of print):

SOIL CONSERVATION SERVICE (pre-1991)

- A Review of Information Relevant to the Mulga Rangelands of Western NSW. N.M. Irons and E.E. Quinlan (1988). ISSN 1031-8321.
- A Review of Information Relevant to the Bimble Box Pine and Associated Rangelands of Western NSW. A. Iwaszkiewicz and W.S. Semple (1988).
- A Review of Information Relevant to the Saltbush Plains Rangelands of Western NSW. K.L. Dalton (1988). ISSN 1031-8321.
- A Review of Information Relevant to the Belah and Bluebush Rangelands of Western NSW. R.N. Scriven (1988). ISSN 1031-8321.
- A Review of Information Relevant to the Downs Country of Far Western NSW. K.L. Dalton (1988). ISSN 1031-8321.

Lands of the North-West Corner of NSW. P.L. Milthorpe et al. (1991). ISSN 1031-8321.

The Physical and Vegetation Resources of the Aeolian Landscapes of Far South-Western NSW. W.S. Semple and D.J. Eldridge (1991). ISSN 1031-8321.

- A Review of Information Relevant to the Riverine Woodland and Forest Rangelands of South-Western NSW. K.L. Dalton (1989). ISSN 1031-8321.
- A Review of Information Relevant to the Mitchell Grass Plain Rangelands of Western NSW. M.C. Campbell (1989). ISSN 1031-8321.
- A Review of Information Relevant to the Northern Floodplain Rangelands of Western NSW. A.F. O'Halloran, W.S. Semple, N.M. Irons and N.I. Sargent (in press). ISSN 1031-8321.
- A Computerised Listing of References Pertaining to the Rangelands and Rangelands Plants of Western NSW. W.S. Semple and N.M. Irons (1989) . ISSN 1031-8321.

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT (1991-1995)

- A Review of Information Relevant to the Southern Grasslands of Western NSW. A.F. O'Halloran and W.S. Semple (in press).
- A Review of Information Relevant to the Gidgee/Brigalow Rangelands of Western NSW. V.E. Newbury (In press)

DEPARTMENT OF LAND AND WATER CONSERVATION (post-1995)

Grassy white box woodlands. Bill Semple (1998)

NEC 1.7: The *Eucalyptus intertexta* woodlands on rocky hills of arid and semi-arid SA and NSW

Description

Broad information used to define this group:

Eucalyptus intertexta (usually "gum-barked coolibah" but "red box" in the NVIS NSW data, arising from Pickard and Norris 1994) occurs in WA, NT, SA and NSW and Qld (Beadle 1981, Sattler and Williams 1999, and see Figure 1). The WA and NT occurrences are grasslands with emergent trees, as are the northern occurrences in SA (Brandle, 1998; Specht, 1972; Wilson *et al* 1990). These have therefore been excluded from this woodland NEC.

Eucalyptus intertexta also occurs in woodlands dominated by *Eucalyptus populnea* ssp. *bimbil*; these tend to be in higher rainfall areas. These are not included in this NEC, and fit either within temperate poplar box NECs or the arid zone poplar box NEC(s) (currently NEC 1.6). These are not resolved because the data are not yet available. The Queensland occurrences of *E. intertexta* (in RE 6.5.5 and 6.5.7) appear to fit into this category, and have therefore been excluded.



Figure 1 (after Beadle 1981): Distribution of E. intertexta in Australia

Key flora and fauna and abiotic elements, and their interactions

There are two groups within this NEC:

• *E. intertexta* with *Callitris glaucophylla* (sub-communities 1 to 3, Table 1)

• *E. intertexta* with *Acacia* spp (sub-community 4 and parts of subcommunity 1, Table 1)

The main difference between them is the present of *C. glaucophylla* (white cypress pine) in the former; the pine when dense can suppress other shrub species in the understorey. It appears that the pine occurs higher up the slopes (Brandle, 2001; Pickard and Norris, 1994).

The SA sub-community is a composite of steep slope woodlands with dense shrub or *Triodia* spinifex understorey and a raised valley open understorey association. On the slopes *Callitris glaucophylla* tends to be the dominant tree species. On the raised valleys *E. intertexta* is more prevalent and *Acacia rivalis* is present in the shrub layers. Towards the north of the Flinders Ranges related communities have a grassland structure. Descriptions of the three floristic groups within this sub-community are presented in Table 2.

The NSW sub-communities are on level to undulating country, low gravely rises and ridge crests and rocky hills. The mapping probably does not reflect the distribution of these woodlands well (the scale is too broad), and so sub-communities 2 and 3 (by name dominated by *Callitris glaucophylla*) have

been included to indicate some areas in which the *E. intertexta* – dominated woodlands are likely to occur. The mapped communities stop abruptly at the Western Division Boundary and are not continued in mapping to the east; this demonstrates the broad scale and likely inaccuracy of the mapping. Iwaszkiewicz and Semple (1988) present a description without mapping; their description appears to be more precise than that of Pickard and Norris (1994).



Figure 2: Distribution of the sub-communities. The red line indicates the border of the arid / semi-arid zone, and grey lines within that indicate IBRA subregional boundaries. The NSW NVIS sub-communities are shown in deep green (#2), light green (#3), and yellow (#4.)

Iwaszkiewicz and Semple (1988) describe the NSW communities as an *E. intertexta* – *C. glaucophylla* association, allowing for a trend for *Acacia* to replace the *Callitris* towards the west (this is consistent with the mapping presented here). The major structural type is open woodland (density of 45 trees/ha), though woodland and open forest also occur. The *E. intertexta* is replaced by *E. populnea* in higher rainfall areas (probably to the north and east of subcommunity #2). The woodlands with *Acacia aneura* (sub-community #4) also include *Acacia excelsa* (Iwaszkiewicz and Semple 1988) and occur on red earths that are sometimes very shallow to skeletal (Pickard and Norris, 1994).

More broadly, other trees occurring in the association include *Grevillea striata* and *Brachychiton* populneus. A shrub layer is almost always present and includes *Eremophila mitchellii*, *Geijera* parviflora, Cassia eremophila, Eremophila sturtii and Heterodendrum oleifolium. The ground layer includes Aristida jerichoensis var subspinulifera, Eragrostis lacunaria, Austrostipa spp., Sclerolaena diacantha and Chenopodium spp. (Iwaszkiewicz and Semple 1988). Soils tend to be sandy and poorly developed.

Keith (2002) includes these woodlands in his group 89: Mid-west rocky hills woodlands. This includes communities to the east of the Western Division boundary in which other trees (*E. viridis, E. dwyeri, E. vicina, E. sideroxylon* and *Brachychiton populneus* ssp. *trilobus*) are dominant.

Other features

Two plant species that can be associated with the SA sub-community are rare: *Acacia confluens* (Arkaroola wattle), which occurs in floristic group 56 (but also occurs in other groups) and *Daviesia stricta* (Flinders Ranges bitter pea) which occurs in floristic group 57. Further information is in Brandle (2001).

Sub#	Description	State	IBRA	Comments
1**	<i>Eucalyptus intertexta</i> Gum-barked Coolibah Open woodland over <i>Dodonaea</i> spp., <i>Cassinia laevis</i> Curry Bush or <i>Senna</i> spp. Shrubland.	SA	FLB	This is the mapped vegetation group #19, which includes two floristic groups dominated by <i>Callitris glaucophylla</i> and one (Group 58) dominated by <i>E.</i> <i>intertexta</i>
2	<i>Callitris glaucophylla - E. intertexta</i> open forest	NSW	CP MDD, ML	included because has floristic affinities with sub-communities 1 and 4, and because the mapping is broad and probably includes regions of <i>E. intertexta</i> – dominated woodlands
3	Callitris glaucophylla low open forest	NSW	MDD CP	included because has floristic affinities with sub-communities 1 and 3, and because the mapping is broad and probably includes regions of <i>E. intertexta</i> – dominated woodlands
4	E. intertexta - Acacia aneura woodland	NSW	CP MDD	
	<i>E. intertexta</i> open woodland	NSW		In the NVIS data there are a few tiny fragments of vegetation with this description. It is not clear what the source is
5	<i>E. intertexta – C. glaucophylla</i> association	NSW		This was described by Iwaszkiewicz and Semple (1988) and appears to be the most complete data on these woodlands, but they are not mapped

Table 1: Sub-communities of NEC1.7

**Note that sub- community #1 is an aggregate of 3 floristic groups 56, 57 and 58) (Brandle, 2001) in which *C. glaucophylla* is variously dominant (group 56 and 57) or not. *E. intertexta* is present in all groups and dominant in #58. There is one more floristic group (#12) which includes *C. glaucophylla* and *E. intertexta* but is structurally closer to a grassland. Pending further clarification, the latter group has been excluded

Table 2: Description of floristic groups in sub-community#1, from Brandle (2001)

Floristic	Description
group	
56	Callitris glaucophylla White Cypress-pine/ Eucalyptus intertexta Gum-barked Cooliban Open
	woodland over Cassinia laevis Curry Bush/ Dodonaea viscosa Sticky Hop-bush with Triodia spp.
	Spinifex/ Ptilotus obovatus Silver Mulla Mulla/ Sida petrophila Rock Sida/ Chrysocephalum
	semicalvum Scented Button-bush and Cheilanthes lasiophylla Woolly Cloak-fern.
	This woodland association was found on slopes and crests of the steeply dissected hills and
	mountains of the northern Flinders. This association was particularly common in the Arkaroola area
	where in many places the association is dominated by Spinifex hummock grassland with emergent
	Gumbarked Coolibahs.
57	Callitris glaucophylla White Cypress-pine/ Eucalyptus intertexta Gum-barked Coolibah +/- Eucalyptus
	flindersii Flinders Grey Mallee Open woodland over Cassinia laevis Curry Bush/ Dodonaea viscosa
	Sticky Hop-bush with Triodia spp. Spinifex/ Lomandra multiflora Hard Mat-rush/ Xanthorrhoea
	quadrangulata Rock Grass-tree/ Cheilanthes sieberi Narrow Rock-fern.
	This open woodland to shrubland group was typical of the highest ridges, escarpments and plateaus
	of the mountains along the central spine of the northern Flinders.
58	Eucalyptus intertexta Gum-barked Coolibah / Callitris glaucophylla White Cypress-pine Open
	woodland over Acacia rivalis Silver Wattle/ Senna artemisioides Desert Senna with Dodonaea lobulata
	Lobed-leaf Hop-bush and Sclerolaena patenticuspis Spear-fruit Bindyi/ Austrodanthonia caespitosa
	Common Wallaby-grass in the understorey. This woodland association appears to be restricted to a
	small, elevated area of low hills in the Angepena area of the northern Flinders with smaller patches
	adjacent to Wilpena Pound.

National distribution

Known natural distribution (including bioregions, conservation reserves)

See Table 1 and Figure 2 for distribution.

The SA sub-community (#1) is composed of 3 floristic groups (Table 2), two of which are reserved in the Gammon Ranges National Park and the Flinders Ranges National Park; one of these two is further reserved in Mt Remarkable NP. Brandle (2001) notes the lack of reservation of the third group.

The NSW sub-communities #2 and 3 may be reserved in the Yathong Nature Reserve, which overlaps their distribution, but the mapping of the communities is very broad and details of the vegetation within the reserve are needed to ascertain the true situation.

Information contributing to assessment of conservation status under EPBC Act

Components under State or Territory legislation

None of the component sub-communities are listed under the EPBC Act, or under State legislation.

Decline in geographic distribution

No mapped data are available because neither state have provided detailed pre-European mapping. In NSW, approximately 90% remains uncleared, but there are much higher clearing rates in the poplar-box dominated communities into which it merges.

Loss or decline of functionally important species

Threats to the national ecological community

The data collected for the Terrestrial Biodiversity Assessment (Sattler, 2002) indicate threats that have been recorded for any ecosystem on a sub-regional basis (Table 3). These can be used to get a broad picture of the processes within the sub-regions, but will not all be applicable to these woodlands and are biased by survey effort (see introduction). Nevertheless, they add information to an otherwise data-poor environment. They show that a range of threatening processes occur in the inhabited subregions, including broad-scale vegetation clearing, grazing pressure, changed hydrology, exotic weeds and feral animals. The first two are most likely to be the most serious for this NEC.

Table 3: Summary of threats to any ecosystems within the subregions (from data developed for Sattle
2002). "y" indicates that the threat has been recorded as present.

, .			•				
Threat	CP2	CP3	CP4	FLB4	FLB5	MDD6	MUL3
Broad scale vegetation clearing	У	У	У	У		У	У
Changed fire regimes			У				
Changed hydrology - other	У	У	У	У		У	У
Changed hydrology - salinity		У	У	У			
Exotic weeds				У	У		
Feral animals	У	У	У	У	У	У	
Firewood collection			У				
Grazing pressure	У	У	У	У	У	У	У
Increasing fragmentation		У	У	У		У	У
Other				У			
Pathogens							
Pollution			У	у			

Reduction in ecological community integrity

Rate of detrimental change

Summary and recommendation regarding category of threat under the EPBC Act

The information about the status of this woodland community derives from brief discussions with state experts. SA do not include it in their list of rangeland communities that are of concern (Neagle 2003). In NSW, this community is not threatened because it is not extensively cleared. Therefore, it appears that its current status should be "not under threat".

Outstanding issues

Faunal data have not been identified. These need to be added.

The membership of this NEC has not been discussed with state experts. This needs to be done. Once the data of Benson (in prep) are available, these could be used to further inform this NEC.