5. Considerations for Future Comprehensive Assessment

5.1 Overview

Any future comprehensive assessment of the World Heritage values of the subtropical biogeographic region of Australia, including northeast NSW and southeast QLD, should be directed towards identifying the 'best of the best' of eucalypt vegetation to represent the outstanding eucalypt biodiversity of this region. This would involve detailed analysis to determine which suite of areas, across all tenures (including existing World Heritage Areas), would best capture the eucalypt World Heritage values of the region. Any such suite of areas would need to adequately represent the species diversity and ecological diversity present in the region. Once these areas were identified, for the purposes of a nomination, the assessment would then need to evaluate the conservation status of the chosen areas, to determine whether the areas that qualify as 'best of the best' are protected and under appropriate management to satisfy the requirements for World Heritage nomination.

5.2 Areas Outside Existing Reserves

As noted in section 4.2.1 above, there are substantial areas of eucalypt forest that occur outside the reserve system in the northeast NSW region, and more than 50% of ecosystem types including the majority of nationally rare, endangered and vulnerable ecosystems have not met identified reserve targets. Given the threats detailed earlier in the report, these ecosystems remain vulnerable to destruction and degradation from unsustainable management practices and other threatening processes. These realities make it imperative that any comprehensive assessment of the World Heritage values of the Study Area is undertaken across all tenures. In addition, any areas that are identified as supporting outstanding eucalypt values should be added to the reserve system so as to protect these values. This would also allow these areas to meet the criteria for protection within the World Heritage Operational Guidelines and thereby make them suitable for inclusion in any eucalypt nomination.

Dangar's Falls, Oxley Wild Rivers NP: Parts of the extensive gorge system of this reserve are included in the Gondwana Rainforests WHA as it protects significant patches of dry rainforest which is often found juxtaposed with Northern Gorge Dry Sclerophyll Forest. **Photo:** B. Cerese

5.3 Options for World Heritage Listing

It is the opinion of the author and project reference group that any assessment and nomination aimed at identifying and assessing the full range of eucalypt values of the subtropical biogeographical region of Australia must include the Gondwana Rainforests WHA (existing and proposed). There are a number of reasons for this. Firstly, the Project analysis reveals that a very substantial area of eucalypt forests are present in the existing and proposed WHA. In fact, more than half of the eucalypt forests that are within conservation reserves are currently World Heritage listed or proposed for listing. Any assessment of eucalypt values that did not include these forests would therefore be excluding a very significant portion of the eucalypt biota of the region. Secondly, any World Heritage contribution from this region would need to demonstrate that it incorporates the full ecological diversity of the eucalypts. This includes the diversity of the wet sclerophyll eucalypt class that is integral to the values of the region and the interface with all three main rainforest types - cool temperate, warm temperate and sub-tropical (P. Hitchcock 2012, pers. comm. 24 April). Given that the majority of the wet sclerophyll class, and indeed many of the best examples of this class, fall within the existing and proposed WHA boundaries, these areas would be crucial to adequately represent the full range of World Heritage values of the region in any potential eucalypt nomination (Hunter 2006; Hitchcock 2012).

Hunter (2004) flagged the possibility of future Gondwana nominations including consideration of the eucalypt values of these areas and identified the potential to broaden any re-nominations to include the catena of eucalypt communities identified by the Expert Panel. Hitchcock (2012, pers. comm. 24 April) also maintains that any case being made for a World Heritage Eucalypt forest nomination in northeast NSW and southeast QLD must embrace the existing World Heritage listed areas and that integration with those sites is strongly recommended, especially given the substantial overlap of values. It is the opinion of the author, project reference group and the community workshop convened as part of this Project, that the best way to represent and protect the World Heritage eucalypt values of the forests of northeast NSW would be to include them within the proposed Gondwana Rainforests WHA additions nomination.

As Hunter (2004) suggests, there exists the possibility for expansion of the Gondwana Rainforests WH

Wet Sclerophyll Forest, Butterleaf NP: The distinction between the shrubby escarpment wet sclerophyll forests and the more open tablelands forests is blurred in many areas due to increased fire regimes associated with cattle grazing, which favour grassy understorey at the expense of woody species. **Photo:** B. Cerese

property to include the range of attributes related to the eucalypt-dominated vegetation theme within southeast QLD and northeast NSW. What this would in effect mean is that the Statement of Significance for the existing WHA would need to be reviewed and rewritten to more specifically recognise the global significance of the eucalypt species and eucalypt ecosystems within the WHA. Alternatively, a renomination of the Gondwana WHA could be undertaken with inclusion of the eucalypt theme as part of the justification. There are precedents for this as other WHA's have been renominated to embrace previously omitted values, for example, renomination to embrace cultural heritage criteria has occurred in several Australian World Heritage Areas (P. Hitchcock 2012, pers. comm., 24 April).

In terms of World Heritage criteria, the inclusion of eucalypt values in a revised Statement of Significance or renomination process for the Gondwana Rainforests WHA would be readily achievable by inserting eucalypt species and ecosystems into the existing listing under Criterion (x), to give the eucalypt values of the area a greater specific focus. As a follow on from this, the eucalypt values would also then need to be included in the assessment of the areas currently proposed as additions to the WHA. Finally, once the 'best of the best' of the eucalypt areas in the northeast NSW region had been identified, those areas not in the existing or proposed WHA could be added so as to represent the full range of eucalypt species diversity and ecological diversity within the new and expanded WHA.

As mentioned earlier and elaborated in Feature Box Three, the latest fossil evidence from South America suggests that eucalypts are every bit as Gondwanan as the much publicised rainforests. In all likelihood, the ancestral eucalypts not only coexisted with but cohabited with rainforest in Gondwana, and the competitive interaction between these two communities may well be a phenomenon of great antiquity (Hitchcock 2012). In the light of this evidence, the northeast NSW region seems the perfect place to tell the whole story of the Gondwanan biota- from the ancient rainforest floristic elements; to the ongoing competitive interaction between rainforest and eucalypt forests that is evident in the extensive mingling of wet sclerophyll and rainforest vegetation in the region; and finally, to the representation of a whole catena of eucalypt species and communities that display the adaptive radiation of Gondwanan biota across a range of environmental conditions. A further name change to the Gondwana Forests WHA, or simply Gondwana WHA, would encapsulate this expansion of the Gondwana theme to recognise the outstanding values of the full range of eucalypt biota of the region.

5.4 Connectivity Conservation

A key consideration of any assessment of the conservation significance of an area of land, including heritage assessment, is the geographical and ecological context. Some of the factors that are important in relation to this include the long term viability of a particular species, population or vegetation community, the representativeness of a parcel of land and the species it supports, the proximity of an area to existing protected areas, and connectivity to other lands of known conservation value (Blakers 1987; Hitchcock 2012). It is also important to consider whether the attributes identified at a given site are locally, regionally or nationally rare, common or are replicated elsewhere.

There is a growing scientific consensus on the importance of landscape connectivity for ensuring successful conservation outcomes over time, particularly in relation to maintaining biodiversity and ecosystem resilience in the face of synergistic climate change impacts (Hitchcock 2012; Mackey 2010). Connectivity conservation focuses on the need for systematic conservation planning to be undertaken on a landscape scale and is based around the following landscape elements:

- core areas: typically the largest, most intact blocks of habitat which are reservoirs for the conservation of plant and animal populations and maintenance of ecological processes in which conservation is the principal aim;
- landscape corridors: which facilitate the movement of fauna, exchange of plant genetic material and flow of ecosystem processes across the landscape; and
- buffers: areas of land surrounding core areas where conservation is an important component of a wider multiple-use regime, thereby protecting conservation areas from threatening processes originating off-reserve, and enhancing protection of biodiversity assets found on other land tenures (adapted from Scott 2003 & Mackey 2010).

The Operational Guidelines for Implementation of the World Heritage Convention (UNESCO 2008, Paragraphs 103-107) acknowledge the need for a whole of landscape approach to biological conservation through promotion of the use of buffer zones for the effective protection of nominated World Heritage Properties. In light of this, and the abovementioned considerations, it is recommended that any comprehensive assessment process give consideration to the need for buffering and maintenance of connectivity of core areas of eucalypt vegetation to conserve the outstanding values of the forests of northeast NSW. This is particularly relevant given the degree of habitat loss and fragmentation in the northeast NSW region (as noted by the Expert Panel (World Heritage Report 1999), in addition to the small size and isolation of some areas of key eucalypt habitat in the region. The identification of the temperate eucalypt forests as one of the ten Australian ecosystems most vulnerable to climate change tipping points, in particular the wet forests where one of the most important future threats is changes to fire regimes arising from climate change (Laurance *et al.* 2011), also obviates the need for any conservation assessment of the eucalypt forests of northeast NSW to include landscape connectivity as a key consideration.

Koala *Phascolarctos cinereus* resting in *Eucalyptus tereticornis:* The Koala is under threat in northeast NSW from habitat fragmentation, land clearing, urban expansion, logging operations, road kills, dog attacks and disease and is heavily dependent on maintenance and re-establishment of habitat connectivity in the landscape for its continuing survival. **Photo:** B.Cerese.

Recommendations

In light of the assessment and documentation presented in this report identifying the outstanding universal values of the eucalypt forests of northeast New South Wales, and the commitments made in Regional Forest Agreements, this report recommends that State and Commonwealth Governments:

1. Urgently decide on a strategy for ensuring that the outstanding universal values of the eucalypt biota of Australia are incorporated into a program of World Heritage nominations;

2. Undertake a comprehensive assessment of the World Heritage eucalypt theme in the northeast NSW and southeast QLD region, across all tenures, so as to identify that suite of areas that best represents the full range of outstanding eucalypt values of the subtropical biogeographic region of Australia as represented in criteria (x) of the Operational Guidelines of the World Heritage Convention;

3. Include evaluation of the tall eucalypt forests of the region according to criteria (vi) and (vii) of the Operational Guidelines of the World Heritage Convention in any comprehensive assessment that is undertaken;

4. Prioritise the protection of any areas of eucalypt forests identified in the comprehensive assessment as containing outstanding eucalypt values that fall outside the current reserve system, so as to protect those values and render such areas eligible for any nomination;

5. Review and rewrite the Statement of Significance for the Gondwana Rainforests WHA to more specifically recognise the global significance of the eucalypt species and ecological communities within the WHA or undertake a renomination of the entire Gondwana Rainforests WHA including assessment and documentation of the full range of outstanding eucalypt values of the WHA;

6. Modify the current process for nomination of proposed extensions to the Gondwana Rainforests WHA so as to include an assessment of the eucalypt values of the areas identified in the nomination and include in the amended process all areas identified in the comprehensive assessment that are not part of the current proposal;

7. Undertake a comprehensive analysis of the Aboriginal cultural values and biological diversity attributes of the eucalypt forests of northeast New South Wales, as represented in criteria (v) and (x) of the Operational Guidelines of the World Heritage Convention, with a view to these values being part of any future World Heritage nomination in this area, as either core or associative values.

Eucalyptus sp. Photo: H. Nicholson.

Conclusion

The results of the assessment undertaken in the Northeast NSW Eucalypt Assessment Project confirm and expand the findings of the World Heritage Expert Panel in relation to the outstanding universal values of the eucalypt forests of northeast NSW. The eucalypt attributes detailed in this report suggest that the northeast NSW region is likely to make a highly significant contribution to the recognition of the outstanding universal value of the eucalypts in Australia. However, whilst some of the eucalypt biodiversity of the region is currently protected within the Gondwana Rainforests WHA, the eucalypt values of these forests have not been documented and a significant proportion of the overall eucalypt diversity is not represented in these areas. It is therefore critical that a comprehensive assessment of the World Heritage values of these forests be undertaken and followed up with a program of nomination so as to fully recognise and adequately protect these areas.

It is to be hoped that the findings of this report will encourage urgent action on the part of State and Commonwealth Governments to take up their commitment to further investigate the World Heritage values of the eucalypt forests of Australia. The universal values of Australia's iconic eucalypts have been endorsed by UNESCO through the listing of the Greater Blue Mountains World Heritage Area. The task remains, however, to have this unique feature of the Australian biota fully recognised on the international stage through the nomination and listing of other areas so as to fully represent the extraordinary diversity and exceptional flexibility of this remarkable biota. The assessment and nomination of the eucalypt forests of the subtropical biogeographic region would be a commendable next step on the path to full recognition of the eucalypts Australia wide.

Acronyms

ACT - Australian Capital Territory
CBD - Convention on Biological Diversity
CERRA - Central Eastern Rainforest Reserves of Australia
CMA - Catchment Management Authority
CoA - Commonwealth of Australia
CRA - Comprehensive Regional Assessment
DECCW - Department of Environment, Climate Change and Water
EA - Environment Australia
ENGO - Environmental Non-Government Organisation
EPBC Act - Environment Protection and Biodiversity Conservation Act
GIS- Geographic Information System
IBRA - Interim Biogeographic Regionalisation for Australia
IUCN - the International Union for the Conservation of Nature and Natural Resources (n.b. use of the name 'IUCN - the World Conservation Union' was discontinued in 2008)
ICOMOS - International Council on Monuments and Sites
JANIS - Joint ANZECC / MCFFA National Forest Policy Statement Implementation Sub-committee
NPA - National Parks Association
NPWS - National Parks and Wildlife Service
NSW - New South Wales
QLD - Queensland
RBGDT - Royal Botanic Gardens and Domain Trust
RFA - Regional Forest Agreement
ROTAP - Rare or Threatened Australian Plants
TSC Act - Threatened Species Conservation Act
UNESCO - United Nations Educational, Scientific and Cultural Organisation
UN - United Nations
WHA - World Heritage Area
WHC - World Heritage Commission

the Project- the northeast New South Wales Eucalypt Assessment Project

the Study Area- the northeast NSW study area (as defined in section 3.3.1)

Appendices

Appendix 1: Forested places identified by the World Heritage Expert Panel in relation to the sub-theme of eucalypt-dominated vegetation (World Heritage Report 1997)

Forested places identified by the Expert Panel in relation to the sub-theme of eucalypt-dominated vegetation	State or Territory
Specified south-west National Parks and associated areas	Western Australia (south-west)
The Moonee-Binderay area, including Guy Fawkes Wilderness Area	New South Wales (north-east)
Specified National Parks in the sandstone area centred on the Blue Mountains	New South Wales (central)
Natural forest areas of south-eastern Australia extending from the sea to the alps and the inland slopes	New South Wales (south-east) Victoria (east) Australian Capital Territory
The Carnarvon Ranges, including Carnarvon National Park	Queensland
Natural eucalypt forest areas on the inland slopes, and eucalypt and Melaleuca-dominated areas on the coastal plains, adjacent to the Wet Tropics World Heritage Area	Queensland
Cooloola National Park, adjacent to the Fraser Island World Heritage Area	Queensland
Eucalypt-dominated areas adjacent to the Central Eastern Rainforest Reserves World Heritage Area, including Bunya Mountains National Park	Queensland
Kakadu National Park World Heritage Area	Northern Territory
The Tasmanian Wilderness World Heritage Area	Tasmania

Appendix 2: Summary of the outstanding universal values and significant attributes of eucalypt-dominated vegetation in Australia

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Table 7 Summary of outstanding universal values and significant attributes of eucalypt-dominated vegetation in Australia

Outstanding universal value of eucalypt-dominated vegetation	Explanatory sentence	Significant attributes identified in relation to eucalypt-dominated vegetation	Advice concerning data issues
Ancient origins in Gondwana and evolution in Australia	Eucalypt-dominated vegetation is globally-outstanding as an example of the taxonomic radiation of a single phylogenetic group in response to environmental change following the breakup of Gondwana.	- basal taxa in eucalypt clades - taxa associated with radiation - sub-genera	- need to consider Isla Gorge, Queensland, and Walpole region, Western Australia in addition to areas identified by the World Heritage Expert Panel
	Ongoing evolutionary processes amongst the eucalypts, including introgression, hybridisation and divergence, contribute to the globally-outstanding value of eucalypt-dominated vegetation in terms of its evolution in Australia.	- peaks of richness within subgenera [surrogate] - peaks of total eucalypt species richness - relicts - spatially-restricted species (ie less than 100 x 100 km) - rare taxa	- use Leigh & Briggs (1988) - data of A.M Gill *et al.* 1985 - data of A.M. Gill *et al.* (in progress)
	The high taxonomic diversity of the eucalypts contributes to the globally-outstanding value of eucalypt-dominated vegetation in terms of its evolution in Australia.	- peaks of richness within subgenera [surrogate] - peaks of total eucalypt species richness - relicts - spatially-restricted species - rare taxa	- use Leigh & Briggs (1988) - data of A.M Gill *et al.* 1985 - data of A.M. Gill *et al.* (in progress)
Domination of an entire continent	Eucalypt-dominated vegetation is a globally-outstanding and unique example of the domination of an entire continent by a single phylogenetic lineage.	- norms of environmental classes - extremes of environmental classes	- total number of classes flexible, (but within 10-25) - 8-12 climatic zones (Belbin & Margules - Bioclim) - 3 nutrient classes (based on lithology) - need to capture catenas in broad classes (e.g. sea to alps, laterite cap to sandy plain)
Diverse range of growth forms	Eucalypt-dominated vegetation is globally-outstanding for the unusual diversity of growth forms amongst the eucalypts which range from the world's tallest hardwood trees to low or even prostrate shrubs.	- structural classes [surrogate] - representation of extreme types (e.g. marlocks, mallets)	- use Carnahan structural mapping for treeless areas, - use NFI maps for tree areas - ensure representation of unmappable types (e.g. mallets, marlocks, creepers etc)
Wide diversity of eucalypt-dominated communities	Eucalypt-dominated vegetation is globally-outstanding for its wide diversity of communities, reflecting its exceptional range of structural, physiognomic and floristic diversity	- vegetation types - floristic regions	as for "diverse range of growth forms" (see above) - ensure specified vegetation types included (Tables 3 & 4)
Unique ecology of eucalypt dominated communities	Eucalypt-dominated vegetation is globally-outstanding for its unique ecology which includes: - a globally-outstanding range of fire regimes.	- environmental classes - vegetation maps including structural classes vegetation types floristic regions	- as for "domination of an entire continent" (see above) - as for "wide diversity of eucalypt-dominated communities" (see above) - ensure specified vegetation types included (Tables 3 & 4)
	- a wide range of characteristics that facilitate survival and reproduction under different fire regimes.	as above	as above
	-exceptional lignotuber and epicormic shoot responses to defoliation.	as above	as above

Table 7 (cont)

Outstanding universal value of eucalypt-dominated vegetation	Explanatory sentence	Significant attributes identified in relation to eucalypt-dominated vegetation	Advice concerning data issues
Unique ecology of eucalypt dominated communities(cont)	Eucalypt-dominated vegetation is globally-outstanding for its unique ecology which includes: - unusual types of fuels with a high woody component.	- environmental classes - vegetation maps including structural classes vegetation types floristic regions	- as for "domination of an entire continent" (see above) - as for "wide diversity of eucalypt-dominated communities" (see above) - ensure specified vegetation types included (Tables 3 & 4)
	- characteristics that facilitate long-distance propagation of fire.	as above	as above
	- the capacity to maintain high growth rates under a wide range of soil nutrient conditions.	as above	as above
	- adaptations to a-wide range of soils and moisture regimes.	as above	as above
	- the capacity to produce hollows utilised by fauna, including a large proportion of vertebrate fauna.	- structural vegetation - floristic survey data	as above
	-an exceptional diversity of groups of invertebrate fauna, including the mallee moths and the psyllids.	environmental classes - vegetation maps including structural classes vegetation types floristic regions	- as for "domination of an entire continent" (see above) - as for "wide diversity of eucalypt-dominated communities" (see above) - ensure specified vegetation types included (Tables 3 & 4) - ensure unusual groups included
Cultural significance of eucalypt-dominated vegetation	Eucalypt-dominated vegetation requires further investigation for possible global significance for cultural values, including as a cultural landscape.	*[expert opinion required]*	
Aesthetic significance of eucalypt-dominated vegetation	Eucalypt-dominated vegetation requires further investigation for possible global significance for aesthetic values associated with landscapes, tall trees, understoreys and contribution to the visual arts.	*[expert opinion required]*	
Economic significance of eucalypt-dominated vegetation	Eucalypt-dominated vegetation requires further investigation for possible global significance for economic values associated with wood production, fuel and other commodities and uses in many countries of the world.	*[expert opinion required]*	
Genetic significance of eucalypt-dominated vegetation	Eucalypt-dominated vegetation requires further investigation for possible global significance as a genetic repository in relation to the natural values of eucalypt ecosystems in Australia and also for the utility values of eucalypts which are exceptionally-widely planted throughout the world.	*[expert opinion required]*	

Appendix 3: Eucalypts of the Northeast NSW Study Area

Scientific Name	Common Name	Endemic (Yes/No)	Legal Status	ROTAP Code
Angophora bakeri	Narrow-leaved Apple		U	
Angophora costata	Sydney Red Gum		U	
Angophora exul			E1	2R-
Angophora floribunda	Rough-barked Apple		U	
Angophora inopina			V	2RC-
Angophora leiocarpa			U	
Angophora paludosa		Y	U	
Angophora robur	Sandstone Rough-barked Apple	Y	V	2RC-
Angophora subvelutina	Broad-leaved Apple		U	
Angophora woodsiana			U	
Corymbia dolichocarpa	Long-fruited Bloodwood		U	
Corymbia gummifera	Red Bloodwood		U	
Corymbia henryi	Large-leaved Spotted Gum		U	
Corymbia intermedia	Pink Bloodwood		U	
Corymbia maculata	Spotted Gum		U	
Corymbia trachyphloia subsp. trachyphloia	White Bloodwood		U	
Corymbia variegata	Spotted Gum		U	
Eucalyptus acaciiformis	Wattle-leaved Peppermint	Y	U	
Eucalyptus acmenoides	White Mahogany		U	
Eucalyptus agglomerata	Blue-leaved Stringybark		U	
Eucalyptus albens	White Box		U	
Eucalyptus amplifolia subsp. amplifolia & subsp. sessiliflora	Cabbage Gum		U	
Eucalyptus ancophila		Y	U	2K
Eucalyptus andrewsii	Gum-topped Peppermint		U	
Eucalyptus approximans	Barren Mountain Mallee	Y	V	2K
Eucalyptus baileyana	Bailey's Stringybark		U	
Eucalyptus bancroftii	Orange Gum		U	
Eucalyptus banksii	Tenterfield Woollybutt	Y	U	
Eucalyptus bicostata	Eurabbie		U	
Eucalyptus biturbinata	Grey Gum		U	
Eucalyptus blakelyi	Blakely's Red Gum		U	
Eucalyptus boliviana	Bolivia Stringybark	Y	V	2V
Eucalyptus bridgesiana	Apple Box		U	
Eucalyptus brunnea	Brown Gum	Y	U	
Eucalyptus caleyi (subsp caleyi & subsp ovendenii)	Ovenden's Ironbark		caleyi-U / ovendenii-V	2VC-
Eucalyptus caliginosa	Broad-leaved Stringybark	Y	U	
Eucalyptus camaldulensis	River Red Gum		E2	
Eucalyptus cameronii	Diehard Stringybark	Y	U	
Eucalyptus campanulata	New England Blackbutt		U	
Eucalyptus camphora subsp. relicta	Warra Broad-leaved Sally	Y	E1	3VC-
Eucalyptus canaliculata	Grey Gum		U	
Eucalyptus capitellata	Brown Stringybark		U	
Eucalyptus carnea	Thick-leaved Mahogany		U	
Eucalyptus codonocarpa		Y	U	3RCa
Eucalyptus conica	Fuzzy Box		U	
Eucalyptus conjuncta			U	2K
Eucalyptus crebra	Narrow-leaved Ironbark		U	
Eucalyptus cypellocarpa	Monkey Gum		U	
Eucalyptus dalrympleana subsp. dalrympleana & subsp. heptantha	Mountain Gum		U	
Eucalyptus dawsonii	Slaty Gum		U	
Eucalyptus dealbata	Tumbledown Red Gum		U	
Eucalyptus deanei	Mountain Blue Gum		U	
Eucalyptus dissita	Gibraltar Mallee	Y	V	2RC-

Scientific Name	Common Name	Endemic (Yes/No)	Legal Status	ROTAP Code
Eucalyptus dives	Broad-leaved Peppermint		U	
Eucalyptus dorrigoensis	Dorrigo White Gum	Y	U	3RCa
Eucalyptus dunnii	Dunn's White Gum	Y	U	3RCa
Eucalyptus dwyeri	Dwyer's Red Gum		U	
Eucalyptus elliptica	Bendemeer White Gum	Y	U	3KC-
Eucalyptus eugenioides	Thin-leaved Stringybark		U	
Eucalyptus exserta	Peppermint		U	
Eucalyptus fastigata	Brown Barrel		U	
Eucalyptus fergusonii subsp. fergusonii & subsp. dorsiventralis			U	3KC- / 2RC-
Eucalyptus fibrosa	Red Ironbark		U	
Eucalyptus fusiformis	Grey Ironbark	Y	U	3RC-
Eucalyptus glaucina	Slaty Red Gum		V	3VCa
Eucalyptus globoidea	White Stringybark		U	
Eucalyptus goniocalyx	Long-leaved Box		U	
Eucalyptus grandis	Flooded Gum		U	
Eucalyptus interstans			U	
Eucalyptus laevopinea	Silver-top Stringybark		U	
Eucalyptus largeana	Craven Grey Box	Y	U	3R
Eucalyptus ligustrina	Privet-leaved Stringybark		U	
Eucalyptus longifolia	Woollybutt		U	
Eucalyptus macrorhyncha	Red Stringybark		U	
Eucalyptus magnificata		Y	E1	3K
Eucalyptus major	Grey Gum		U	
Eucalyptus malacoxylon	Apple Box		U	3R
Eucalyptus mckieana	McKie's Stringybark	Y	V	2VC-
Eucalyptus melanophloia	Silver-leaved Ironbark		U	
Eucalyptus melliodora	Yellow Box		U	
Eucalyptus michaeliana	Brittle Gum		U	3RCa
Eucalyptus microcodon	Border Mallee		E1	2RC-
Eucalyptus microcorys	Tallowwood		U	
Eucalyptus moluccana	Grey Box		U	
Eucalyptus nicholii	Narrow-leaved Black Peppermint	Y	V	3V
Eucalyptus nitens	Shining Gum		U	
Eucalyptus nobilis	Forest Ribbon Gum		U	
Eucalyptus nortonii	Large-flowered Bundy		U	
Eucalyptus notabilis	Mountain Mahogany		U	
Eucalyptus nova-anglica	New England Peppermint	Y	U	
Eucalyptus obliqua	Messmate		U	
Eucalyptus olida	Strawberry Gum	Y	U	2RCa
Eucalyptus ophitica		Y	U	2K
Eucalyptus oreades	Blue Mountains Ash		U	
Eucalyptus oresbia			V	2E
Eucalyptus pachycalyx subsp. banyabba	Banyabba Shiny-barked Gum	Y	E1	2VCi
Eucalyptus paniculata subsp. paniculata & subsp. matutina	Grey Ironbark		U	- / 2K
Eucalyptus parramattensis subsp. decadens			V	2V
Eucalyptus pauciflora	White Sally		U	
Eucalyptus pilularis	Blackbutt		U	
Eucalyptus piperita	Sydney Peppermint		U	
Eucalyptus placita	Grey Ironbark		U	
Eucalyptus planchoniana	Bastard Tallowwood	Y	U	
Eucalyptus praecox	Brittle Gum		U	
Eucalyptus prava	Orange Gum		U	
Eucalyptus propinqua	Small-fruited Grey Gum		U	
Eucalyptus psammitica	Bastard White Mahogany	Y	U	3K

Scientific Name	Common Name	Endemic (Yes/No)	Legal Status	ROTAP Code
Eucalyptus punctata	Grey Gum		U	
Eucalyptus pyrocarpa	Large-fruited Blackbutt	Y	U	
Eucalyptus quadrangulata	White-topped Box		U	
Eucalyptus quinniorum	Monkey Gum	Y	U	2RCa
Eucalyptus racemosa	Narrow-leaved Scribbly Gum		U	
Eucalyptus radiata subsp. sejuncta	Narrow-leaved Peppermint		U	
Eucalyptus resinifera subsp. resinifera & subsp. hemilampra	Red Mahogany		U	
Eucalyptus retinens		Y	U	3RC-
Eucalyptus robusta	Swamp Mahogany		U	
Eucalyptus rossii	Inland Scribbly Gum		U	
Eucalyptus rubida subsp. barbigerorum	Blackbutt Candlebark	Y	V	3V
Eucalyptus rudderi	Rudder's Box	Y	U	3RC-
Eucalyptus rummeryi	Steel Box	Y	U	3RC-
Eucalyptus saligna	Sydney Blue Gum		U	
Eucalyptus scias subsp. apoda	Large-fruited Red Mahogany	Y	U	3K
Eucalyptus scoparia	Wallangarra White Gum	Y	E1	2VCi
Eucalyptus scopulorum		Y	U	2RC
Eucalyptus seeana	Narrow-leaved Red Gum	Y	E2	
Eucalyptus serpentinicola		Y	U	2R
Eucalyptus siderophloia	Grey Ironbark		U	
Eucalyptus sideroxylon	Mugga Ironbark		U	
Eucalyptus sieberi	Silvertop Ash		U	
Eucalyptus signata	Scribbly Gum		U	
Eucalyptus sparsifolia	Narrow-leaved Stringybark		U	
Eucalyptus stellulata	Black Sally		U	
Eucalyptus subcaerulea		Y	U	2RCat
Eucalyptus subtilior		Y	U	
Eucalyptus tereticornis	Forest Red Gum		U	
Eucalyptus tetrapleura	Square-fruited Ironbark	Y	V	2VCa
Eucalyptus tindaliae	Stringybark		U	
Eucalyptus umbra	Broad-leaved White Mahogany		U	
Eucalyptus viminalis	Ribbon Gum		U	
Eucalyptus viridis	Green Mallee		U	
Eucalyptus williamsiana		Y	U	
Eucalyptus youmanii	Youman's Stringybark	Y	U	2R

ROTAP Coding System for Plants at Risk

Category	Coding	Definition
Plant Distribution	1	Known only from the type* collection
	2	Restricted distribution - range extending over less than 100km
	3	Range more than 100km but in small populations
Conservation Status	X	Presumed extinct - not collected for 50 years or the only known populations destroyed
	E	Endangered - at serious risk in the short term (one or two decades) **
	V	Vulnerable - at risk over a longer period (20-50 years) **
	R	Rare but with no current identifiable threat
	K	Poorly known species suspected of being at risk
Reservation Status	C	Species is known to occur within a proclaimed reserve
	a	Species is considered to be adequately reserved. 1000 or more plants occur within a proclaimed reserve
	i	Species is considered to be inadequately reserved. Less than 1000 plants occur within a proclaimed reserve
	-	Species is recordered from a reserve but the population size is unknown
	t	Total known species population is within a reserve
	Px	Western Australian Department of Conservation and Land Management (CALM) Priority Flora Code. Range from P1 (highest priority) to P4 (lowest priority).
	+	Species also occurs outside of Australia

Appendix 4: Eucalypt Communities/ forest Ecosystems of the Northeast NSW

Forest Ecosystem	Vegetation Class (Keith 2006)
Rough-barked Apples	Dry Sclerophyll Shrub Forests
Silverleaved Ironbark-Cypress	Dry Sclerophyll Shrub Forests
Smoothbarked Apple	Dry Sclerophyll Shrub Forests
Smoothbarked Apple-Sydney Peppermint-Stringybark	Dry Sclerophyll Shrub Forests
Stringybark-Mallee	Dry Sclerophyll Shrub Forests
Dry Heathy Sandstone Blackbutt	Dry Sclerophyll Shrub Forests
Orange Gum-Black Cypress	Dry Sclerophyll Shrub Forests
Round-leaved Gum wet heath	Dry Sclerophyll Shrub Forests
Sandstone Spotted Gum-Blackbutt	Dry Sclerophyll Shrub Forests
Sherwood Needlebark Stringybark	Dry Sclerophyll Shrub Forests
Western New England Blackbutt	Dry Sclerophyll Shrub Forests
Baileys Stringybark	Dry Sclerophyll Shrub Forests
Blackbutt-Sydney Peppermint-Smoothbarked Apple	Dry Sclerophyll Shrub Forests
Blue Mountain Ash	Dry Sclerophyll Shrub Forests
Blue-leaved Stringybark	Dry Sclerophyll Shrub Forests
Clarence Lowland Needlebark Stringybark	Dry Sclerophyll Shrub Forests
Coast Range Bloodwood-Mahogany	Dry Sclerophyll Shrub Forests
Coastal Sands Blackbutt	Dry Sclerophyll Shrub Forests
Dry Heathy Blackbutt-Bloodwood	Dry Sclerophyll Shrub Forests
Dry Heathy New England Blackbutt	Dry Sclerophyll Shrub Forests
Dry Heathy New England Stringybarks	Dry Sclerophyll Shrub Forests
Heathy Scribbly Gum	Dry Sclerophyll Shrub Forests
Highland Granite Stringybarks	Dry Sclerophyll Shrub Forests
Ironbark	Dry Sclerophyll Shrub Forests
Lowlands Scribbly Gum	Dry Sclerophyll Shrub Forests
Mallee-Peppermint mosaic	Dry Sclerophyll Shrub Forests
Needlebark Stringybark-Large Fruited Blackbutt	Dry Sclerophyll Shrub Forests
Open Tumbledown Gum-Black Cypress-Orange Gum	Dry Sclerophyll Shrub Forests
Orange Gum-Ironbark	Dry Sclerophyll Shrub Forests
Orange Gum-New England Blackbutt-Tumbledown Gum	Dry Sclerophyll Shrub Forests
Orange Gum-Tumbledown Gum-Apple	Dry Sclerophyll Shrub Forests
Outcrop Black Cypress-Tumbledown Gum	Dry Sclerophyll Shrub Forests
Outcrop Orange Gum-New England Blackbutt	Dry Sclerophyll Shrub Forests
Peppermint	Dry Sclerophyll Shrub Forests
Red Bloodwood	Dry Sclerophyll Shrub Forests
Sydney Peppermint-Stringybark	Dry Sclerophyll Shrub Forests
Tumbledown Gum-Ironbark	Dry Sclerophyll Shrub Forests
Stringybark-Apple	Dry Sclerophyll Shrub/Grass Forests
Clarence Lowlands Spotted Gum	Dry Sclerophyll Shrub/Grass Forests
Foothill Grey Gum-Ironbark-Spotted Gum	Dry Sclerophyll Shrub/Grass Forests
Gorge Ironbark-Grey Gum	Dry Sclerophyll Shrub/Grass Forests
Grey Box-Ironbark	Dry Sclerophyll Shrub/Grass Forests
Grey Box-Northern Grey Gum	Dry Sclerophyll Shrub/Grass Forests
Richmond Range Spotted Gum-Box	Dry Sclerophyll Shrub/Grass Forests
Silverleaved Ironbark	Dry Sclerophyll Shrub/Grass Forests
Apple-Black Cypress	Dry Sclerophyll Shrub/Grass Forests
Coast Range Spotted Gum-Blackbutt	Dry Sclerophyll Shrub/Grass Forests
Dry Grassy Stringybark	Dry Sclerophyll Shrub/Grass Forests
Dry open Redgum-Broad Leaved Apple	Dry Sclerophyll Shrub/Grass Forests
Dry Redgum-Bloodwood-Apple	Dry Sclerophyll Shrub/Grass Forests
Dry Silvertop Stringybark-Apple	Dry Sclerophyll Shrub/Grass Forests
Eastern Red Gums	Dry Sclerophyll Shrub/Grass Forests

Forest Ecosystem	Vegetation Class (Keith 2006)
Escarpment Scribbly Gum-Apple	Dry Sclerophyll Shrub/Grass Forests
Foothills Grey Gum-Spotted Gum	Dry Sclerophyll Shrub/Grass Forests
Gorge Grey Box	Dry Sclerophyll Shrub/Grass Forests
Gorge Grey Gum	Dry Sclerophyll Shrub/Grass Forests
Grey Gum-Stringybark	Dry Sclerophyll Shrub/Grass Forests
High Elevation Open Spotted Gum	Dry Sclerophyll Shrub/Grass Forests
Montane Stringybark-Gum	Dry Sclerophyll Shrub/Grass Forests
New England Stringybark-Blakelys Red Gum	Dry Sclerophyll Shrub/Grass Forests
Tallowwood	Dry Sclerophyll Shrub/Grass Forests
Silvertop Stringybark	Sclerophyll Grassy Woodlands
Snow Gum	Sclerophyll Grassy Woodlands
Snow Gum -Mountain/Manna Gum	Sclerophyll Grassy Woodlands
Snow Gum-Black Sallee	Sclerophyll Grassy Woodlands
Lowlands Spotted Gum-Box	Sclerophyll Grassy Woodlands
Stringybark-Gum	Sclerophyll Grassy Woodlands
Alpine Gum	Sclerophyll Grassy Woodlands
Apple-Manna Gum woodland	Sclerophyll Grassy Woodlands
Black Sallee	Sclerophyll Grassy Woodlands
Broad-leaved Stringybark	Sclerophyll Grassy Woodlands
Broad-leaved Stringybark-Apple Box	Sclerophyll Grassy Woodlands
Broad-leaved Stringybark-Ribbon Gum	Sclerophyll Grassy Woodlands
Candlebark	Sclerophyll Grassy Woodlands
Dry Foothills Spotted Gum	Sclerophyll Grassy Woodlands
Grey Box-Red Gum-Grey Ironbark	Sclerophyll Grassy Woodlands
Lowland Red Gum	Sclerophyll Grassy Woodlands
Lowlands Grey Box	Sclerophyll Grassy Woodlands
Manna Gum	Sclerophyll Grassy Woodlands
Manna Gum-Stringybark	Sclerophyll Grassy Woodlands
Peppermint-Mountain/Manna Gum	Sclerophyll Grassy Woodlands
Red Gum-Apple	Sclerophyll Grassy Woodlands
Red Gum-Stringybark	Sclerophyll Grassy Woodlands
White Box-Ironbark-Red Gum	Sclerophyll Grassy Woodlands
Yellow Box-Blakely's Red Gum	Sclerophyll Grassy Woodlands
Yellow Box-Broad-leaved Stringybark	Sclerophyll Grassy Woodlands
Yellow Box-Grey Box-Red Gum	Sclerophyll Grassy Woodlands
Roundleaved Gum	Semi-mesic Forests
South Coast Shrubby Grey Gum	Semi-mesic Forests
Mixed New England Stringybarks	Semi-mesic Forests
Northern Grassy Sydney Blue Gum	Semi-mesic Forests
Northern Open Grassy Blackbutt	Semi-mesic Forests
Northern Ranges Dry Tallowwood	Semi-mesic Forests
Barrington Dry Shrubby New England Blackbutt-Blue Gum	Semi-mesic Forests
Central Mid Elevation Sydney Blue Gum	Semi-mesic Forests
Diehard Stringybark-New England Blackbutt	Semi-mesic Forests
Dorrigo White Gum	Semi-mesic Forests
Dry Foothills Blackbutt-Turpentine	Semi-mesic Forests
Dry Grassy Blackbutt-Tallowwood	Semi-mesic Forests
Dry Grassy Tallowwood-Grey Gum	Semi-mesic Forests
Dry Open New England Blackbutt	Semi-mesic Forests
Escarpment Redgum	Semi-mesic Forests
Escarpment Tallowwood-Bloodwood	Semi-mesic Forests
Eurabbie	Semi-mesic Forests
Grassy New England Blackbutt-Tallowwood-Blue Gum	Semi-mesic Forests
Messmate-Mountain Gum Forest	Semi-mesic Forests

Forest Ecosystem	Vegetation Class (Keith 2006)
Mixed Tableland Stringybark-Gum OpenForest	Semi-mesic Forests
Moist Messmate-Gum	Semi-mesic Forests
New England Peppermint	Semi-mesic Forests
Open Messmate-New England Blackbutt	Semi-mesic Forests
Open Ribbon Gum	Semi-mesic Forests
Open Silvertop Stringybark-Blue Gum	Semi-mesic Forests
Open Silvertop Stringybark-Tallowwood	Semi-mesic Forests
Red Mahogany	Semi-mesic Forests
Swamp Mahogany	Swamp Sclerophyll Forests
Roundleaved Gum-Turpentine	Wet Sclerophyll Forests
South Coast Tallowwood-Blue Gum	Wet Sclerophyll Forests
Southern Wet Sydney Blue Gum	Wet Sclerophyll Forests
Steel Box/Craven Grey Box	Wet Sclerophyll Forests
Dunns White Gum	Wet Sclerophyll Forests
Mann River Wet New England Blackbutt	Wet Sclerophyll Forests
Northern Moist Blackbutt	Wet Sclerophyll Forests
Northern Wet Brushbox	Wet Sclerophyll Forests
Northern Wet Tallowwood-Blue Gum	Wet Sclerophyll Forests
Richmond Range Spotted Gum	Wet Sclerophyll Forests
Washpool Brushbox-Tallowwood	Wet Sclerophyll Forests
Wet Bloodwood-Tallowwood	Wet Sclerophyll Forests
Wet Spotted Gum-Tallowwood	Wet Sclerophyll Forests
Barrington Moist Blue Gum-White Mahogany	Wet Sclerophyll Forests
Barrington Wet New England Blackbutt-Blue Gum	Wet Sclerophyll Forests
Brown Barrell	Wet Sclerophyll Forests
Brown Barrell-Gum	Wet Sclerophyll Forests
Coastal Flooded Gum	Wet Sclerophyll Forests
Cool Moist Messmate	Wet Sclerophyll Forests
Corkwood-Crabapple and Mixed Stringybarks	Wet Sclerophyll Forests
High Elevation Ferny Blackbutt	Wet Sclerophyll Forests
High Elevation Messmate-Brown Barrell	Wet Sclerophyll Forests
High Elevation Moist Open Tallowwood-Blue Gum	Wet Sclerophyll Forests
Low Relief Coastal Blackbutt	Wet Sclerophyll Forests
Messmate	Wet Sclerophyll Forests
Mid Elevation Wet Blackbutt	Wet Sclerophyll Forests
Mid North Coast Wet Brushbox-Tallowwood-Blue Gum	Wet Sclerophyll Forests
Mixed Moist Hardwood	Wet Sclerophyll Forests
Moist Escarpment New England Blackbutt	Wet Sclerophyll Forests
Moist Foothills Spotted Gum	Wet Sclerophyll Forests
Moist Open Escarpment White Mahogany	Wet Sclerophyll Forests
Moist Shrubby Stringybark-Gum	Wet Sclerophyll Forests
Mountain Gum-Brown Barrell	Wet Sclerophyll Forests
Nymboida Tallowwood-Turpentine	Wet Sclerophyll Forests
Open Coastal Brushbox	Wet Sclerophyll Forests
Open Shrubby Brushbox-Tallowwood	Wet Sclerophyll Forests
Turpentine	Wet Sclerophyll Forests
Very Wet New England Blackbutt-Tallowwood	Wet Sclerophyll Forests
Wet Coastal Tallowwood-Brushbox	Wet Sclerophyll Forests
Wet Flooded Gum-Tallowwood	Wet Sclerophyll Forests
Wet Foothills Blackbutt-Turpentine	Wet Sclerophyll Forests
Wet New England Blackbutt-Silvertop Stringybark	Wet Sclerophyll Forests
Wet Shrubby Brushbox-Tallowwood	Wet Sclerophyll Forests
Whitetopped Box	Wet Sclerophyll Forests

Appendix 5: Endangered Ecological Communities of the Northeast NSW Study Area

Endangered Ecological Community (with a Eucalypt component)
Central Hunter Grey Box—Ironbark Woodland
Central Hunter Ironbark—Spotted Gum—Grey Box Forest
Coastal Cypress Pine Forest
Grey Box—Grey Gum Wet Sclerophyll Forest
Hunter Floodplain Red Gum Woodland
Hunter Lowland Redgum Forest
McKies Stringybark/Blackbutt Open Forest
Montane Peatlands and Swamps
New England Peppermint (Eucalyptus nova-anglica) Woodland
Ribbon Gum—Mountain Gum—Snow Gum Grassy Forest/Woodland
River-Flat Eucalypt Forest on Coastal Floodplains
Subtropical Coastal Floodplain Forest
Swamp Sclerophyll Forest on Coastal Floodplains
White Box Yellow Box Blakely's Red Gum Woodland
White Gum Moist Forest

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