

# A review of koala tree use across New South Wales





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## Summary

Koalas depend on trees for feeding, shelter and as sites for social activities. However, as for any arboreal folivore (leaf-eater), tree use at any location is determined through a seemingly complex mix of factors. Different trees, and tree species, are used in accordance with the values, both positive and negative, they offer individual koalas. These values may be compromised or concentrated by natural or human-induced disturbance.

This review concerns evidence of koala tree use, for whatever purpose, across New South Wales. It is intended as a platform to inform the predictive modelling of koala tree species and to contribute to a koala habitat suitability information base. The inclusion of local scale information relating to koala tree use allows for a bottom-up consideration of a fundamental driver of koala habitat selection – local tree use patterns and tree associations.

Seven Koala Management Areas (KMAs) (after Phillips 2000 & DECC 2008) were used to regionalise the state and as the basis for collation of koala tree use evidence. KMAs were originally derived and mapped by Phillips (2000) to broadly reflect the regional distributions of tree species deemed to be preferred by koalas as food trees, with minor realignments to conform with local government area (LGA) boundaries and facilitate koala conservation planning and assessment at that level of government (Phillips 2000). KMAs have been formalised within the NSW Koala Recovery Plan (DECC 2008) and koala food tree lists, developed for each KMA, are routinely applied for the purposes of development planning, assessment and regulation through State Environmental Planning Policy No 44 – Koala Habitat Protection (SEPP 44).

Evidence of koala tree use was sourced from written reports and published research articles concerning koala habitat, as well as from personal communications with koala experts and local koala carers. Tree use levels were designated based upon informed interpretation and qualitative standardisation of available evidence from these sources.

Koala tree use varied substantially between KMAs, largely in accordance with patterns of tree species distributions and abundance at the regional scale, and within KMAs, presumably reflecting the responses of different tree species to local environmental variation, and the resultant variation in leaf chemistry and moisture, and the responses of koalas to locally available tree resources.

Sampling biases, taxonomic and field identification issues and interpretations are acknowledged as inherent limitations; however, the trends and patterns revealed in this review offer a consolidated basis for further consideration of koala tree and habitat requirements at regional and statewide scales.

The review identified evidence of koala use for 137 tree species across New South Wales, including three groups not designated to species level ('*Acacia* sp.', '*Banksia* sp.' and 'rainforest species'). One hundred and three (103) of the tree species (75%) were from the genus *Eucalyptus*. Of these, 103 eucalypt species 64 (62%) were from the sub-genus *Symphyomyrtus*, 39 (38%) were from the sub-genus *Eucalyptus* and one was from the sub-genus *Alveolata*. Evidence for the use of tree species from the *Angophora*, *Corymbia*, *Syncarpia*, *Lophostemon*, *Melaleuca*, *Allocasuarina*, *Casuarina*, *Callitris*, *Banksia* and *Acacia* genera was also sourced; some at high to moderate levels locally but most at moderate to low use levels overall.

Three species, forest red gum (*Eucalyptus tereticornis*), river red gum (*E. camaldulensis*) and ribbon gum (*E. viminalis*) were identified as statewide high use species, based upon the sourced tree use evidence, in as much as they were high use species in more than three of the seven KMAs. An additional 48 species (47 eucalypts and yellow bloodwood *Corymbia eximia*) were high use species in one or two KMAs.



Sourced evidence indicated yellow box (*E. melliodora*) as the species with most widespread koala use (used at some level in six of seven KMAs) followed by ribbon gum (*E. viminalis*), rough-barked apple (*Angophora floribunda*) and black she-oak (*Allocasuarina littoralis*) (five of seven KMAs) and grey gum (*E. punctata*), white stringybark (*E. globoidea*), and white cypress-pine (*Callitris glaucophylla*) (all used, at some level, within four of seven KMAs). These are all relatively common and widespread species (e.g. *E. melliodora* has the highest number of records within the NSW BioNet Vegetation Information System (BioNet VIS) database for any eucalypt), meaning that their widespread use may not reflect any active preference by koalas but may relate simply to their prevalence within koala habitats across New South Wales. The relative abundance of tree species across the State and the seven KMAs is presented in consideration of the relationship between tree species use and prevalence.

Summary koala tree use results for the seven KMAs (highest tree species use to lowest) were as follows:

- **Central Coast KMA** – Documented koala use of 74 tree species including 55 eucalypts (or 47% of the 115 eucalypt species with >9 records in this KMA in the BioNet VIS database) and 19 non-eucalypts. High use species from Symphyomyrtus (12) and Eucalyptus (5) sub-genera.
- **North Coast KMA** – 61 tree species used, including 39 eucalypts (46% of 84 with >9 BioNet VIS records) and 22 non-eucalypts. High use species from Symphyomyrtus (9) and Alveolata (1) sub-genera.
- **Northern Tablelands KMA** – 40 tree species used, including 34 eucalypts (33% of 103 with >9 BioNet VIS records) and six non-eucalypts. High use species from Symphyomyrtus (13) and Eucalyptus (6) sub-genera.
- **Central & Southern Tablelands KMA** – 28 tree species used, including 24 eucalypts (23% of 103 with >9 BioNet VIS records) and four non-eucalypts. High use from Symphyomyrtus (2) and Eucalyptus (3) sub-genera.
- **South Coast KMA** – 22 tree species used, including 16 eucalypts (21% of 77 with >9 BioNet VIS records) and six non-eucalypts. High use species from Symphyomyrtus (5) and Eucalyptus (2) sub-genera.
- **Western Slopes and Plains KMA** – 19 tree species used, including 13 eucalypts (24% of 54 with >9 BioNet VIS records) and six non-eucalypts. All eucalypts used were from Symphyomyrtus sub-genus.
- **Far West and South West KMA** – There was a near complete lack of documented koala tree use in this KMA. River red gum (*E. camaldulensis*) is a known high use species and targeted survey may reveal use of other species (e.g. several box species).

The patterns of koala tree use across New South Wales and at regional (KMA) levels reflect the complex interplay between the requirements of individual koalas (for food, shelter and social needs) and access to trees of a necessary quality and diversity to satisfy those needs. Literature and expert-based explanations for varying tree use patterns at local and regional scales are discussed, including the need for koalas to balance and trade nutrient, moisture and toxins levels within available tree species and individual trees.

Products of direct relevance to NSW/regional koala habitat suitability modelling are the designated tree use lists and ranks interpreted from the sourced koala tree use evidence. It is anticipated that these will be relevant to the development of koala tree species distribution models and spatial indices reflecting tree occurrence, association and diversity applicable as surrogates for vegetation in the modelling of suitable koala habitats at regional and state scales.



## Acknowledgements

David Scotts lead the research, evidence evaluation and the writing for this review.

A review of this type obviously leans heavily upon the results of endeavours undertaken by others. Every effort has been made to provide correct and appropriate reference to written reports, published papers and personal communications sourced for this review.

Dr Steve Phillips, and his Biolink colleagues, are acknowledged specifically as their koala habitat mapping work across the NSW North and Central Coast particularly has featured heavily in this review. Phillips (2000) has been a pivotal reference in the consideration of koala feed tree use across NSW Koala Management Areas for planning and regulatory purposes and was a basis for this review.

The long-term work of current and previous Australian Koala Foundation (AKF) ecologists (John Callaghan, Dave Mitchell, Steve Phillips and colleagues) in mapping NSW koala habitats and investigating koala use of canopy tree species is also acknowledged. While AKF's more recent NSW koala habitat mapping was not available for this review other reports were sourced.

Other koala researchers, surveyors, carers and individuals whose work and knowledge has contributed information to this review are acknowledged and thanked.

Patricia Edwards (Clarence Environment Centre) is acknowledged for her passionate voluntary work for koala conservation and investigations of patterns of koala tree use locally across the Clarence Valley and broader afield. Pat's spreadsheet summaries of eucalypt taxonomy and leaf structure in relation to koala tree species use inspired the initial spreadsheet method for this review.

Mike Day (OEH Science) produced Figures 1 and 7–13 and Allen McIlwee (OEH Science) provided and summarised tree species records for Koala Management Areas from the OEH BioNet VIS database.

Comments on an earlier draft of this report were provided by Chris Allen, Martin Predavec, Kylie Madden, Adam Roff, John Turbill and Lachlan Wilmott (all from OEH).

This review was commissioned under the Science Division's Koala Habitat Suitability Map project and was reviewed by its Peer Review Panel (PRP). Jill Thonell assisted with incorporating the results of the last review by this PRP.

## Abbreviations/terms commonly used in the text

KMA	Koala Management Area (NSW) after Phillips (2000) and as recognised in the NSW Koala Recovery Plan (DECC 2008)
LGA	Local government area
NPWS	National Parks and Wildlife Service (part of OEH)
NSW	New South Wales
OEH	Office of Environment and Heritage (NSW)
SEPP 44	State Environmental Planning Policy No 44 – Koala Habitat Protection
SOS	<u>NSW Saving our Species program</u>
SOS Iconic Koala	<u>NSW Saving our Species Iconic Koala Project</u>
BioNet VIS	OEH's BioNet <u>Vegetation Information System database</u> , the standard repository for plot-based vegetation species data (downloaded September 2017)

# 1. Background

The NSW Government has embarked upon a program of statewide koala habitat suitability mapping in response to recommendations put forward by the NSW Chief Scientist & Engineer (Chief Scientist & Engineer 2016) in addressing the decline of koala populations in key areas of New South Wales. Specifically, that report recommended (Rec. 3):

That Government publish a statewide predictive koala habitat map within three years of the receipt of this report [December 2016], with immediate priority given to improving coverage of the north coast.

The Office of Environment and Heritage (OEH) has been charged with the development of a statewide habitat suitability map, extending across public and private land tenures, which is intended to facilitate strategic, regionally based decision-making concerning all aspects of koala conservation management and planning at the landscape scale. It will complement koala habitat information at local scales (e.g. for local government areas) as well as information at the state and regional scale about likely koala occurrence or occupancy (see Predavec et al. 2015).

## 1.1 Koala habitat mapping and koala tree use as a focus

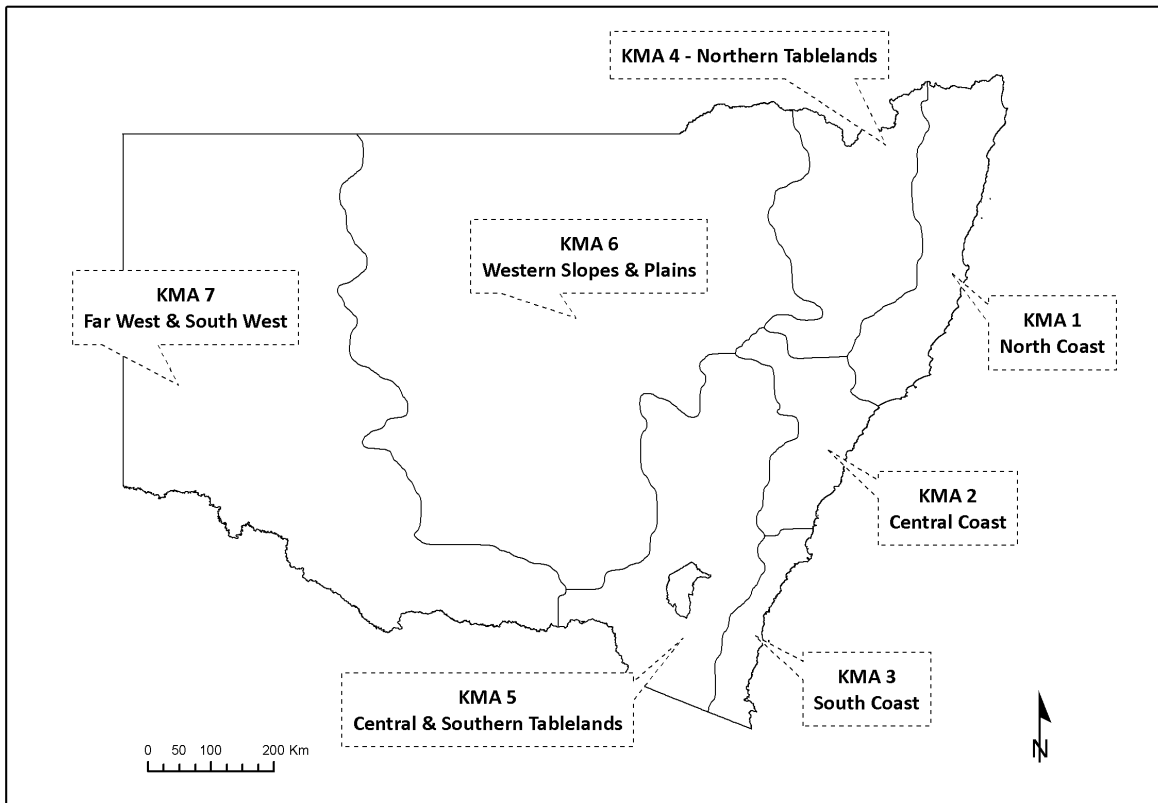
Koalas have long been the subject of habitat use and mapping studies and the key distributional drivers have been discussed at length. These include the abundance and diversity of preferred tree species (e.g. Hindell and Lee 1987, Lunney et al. 1998, Phillips and Callaghan 2000, Smith 2004, Callaghan et al. 2011), tree foliar chemistry (e.g. Cork and Sanson 1990, Moore et al. 2004b), soil type and soil moisture (e.g. Clifton et al. 2007, Ellis et al. 2010), forest structure and tree size (e.g. Smith 2004, Phillips et al. 2000), disturbance history (e.g. Smith 2004, Rhodes et al. 2006, Lunney et al. 2007), landscape configuration (e.g. McAlpine et al. 2006) and the evolving impacts of climate change and temperature extremes (e.g. Adams-Hosking 2011, Crowther et al. 2014, Briscoe et al. 2016, Lunney et al. 2012a & b, Lunney et al. 2017). Combinations and interactions of these drivers impact the extent and quality of koala habitat and their spatial characterisation offers a basis for mapping of suitable koala habitat across New South Wales through a predictive modelling program.

Actual koala occurrence is mediated within potentially suitable habitat by many factors including habitat quality and the presence and severity of threats such as predators, disease, and roads (e.g. Dique et al. 2003, McAlpine et al. 2006, DECC 2008, AMBS 2012); these threats generally require consideration, mapping and accounting for at more localised scales.

Like all animals and plants, koalas require habitat of a quantity and quality sufficient to support their ecological needs. These include demographic or social needs (scope to breed, move and disperse) and, perhaps most fundamentally, the needs of individuals for adequate forage and shelter.

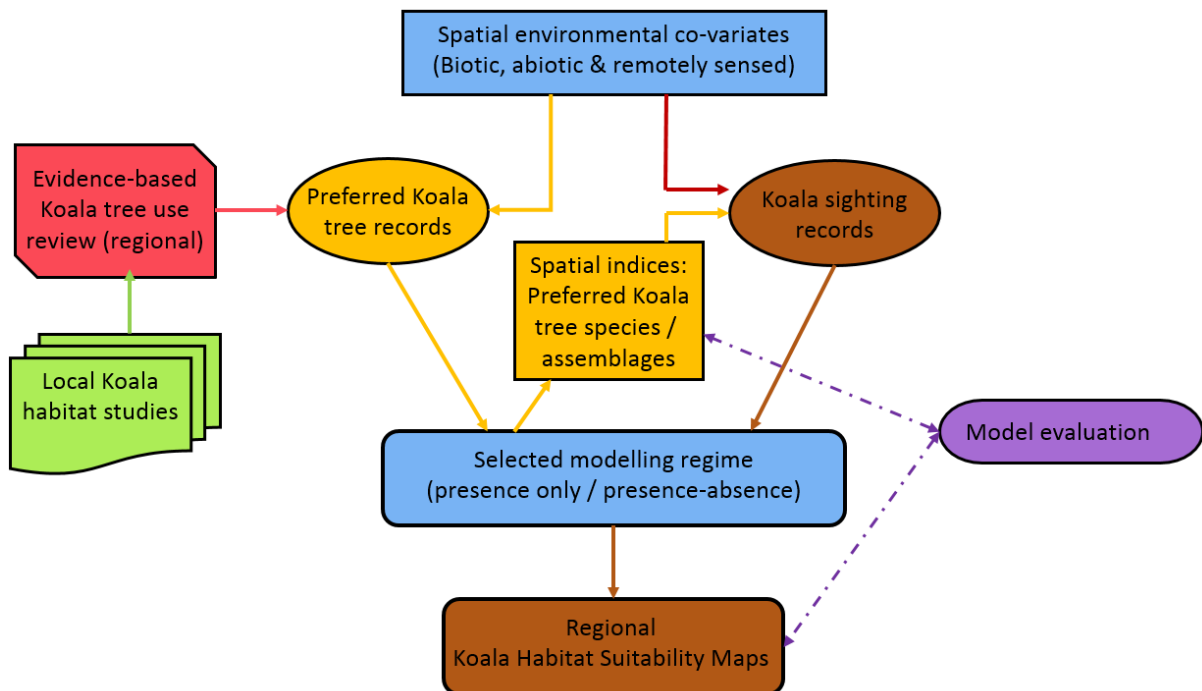
This review of koala tree use aims to inform Office of Environment and Heritage's (OEH) regional and statewide koala habitat suitability mapping program by providing qualitative evidence-based information regarding koala tree use across Koala Management Areas (KMAs) of New South Wales (after Phillips 2000 and DECC 2008). KMAs were used to regionalise New South Wales for this review (Figure 1) but won't necessarily be used as regions for future koala habitat suitability modelling. They were adopted as they have been formalised within the NSW Koala Recovery Plan (DECC 2008) and koala food tree lists, developed for each KMA, are routinely applied for the purposes of development planning, assessment and regulation relevant to koala conservation through State Environmental Planning Policy No 44 – Koala Habitat Protection (SEPP 44). They represent an accepted and current basis for regionalising the State for consideration of koala tree use.





**Figure 1 NSW Koala Management Areas (after Phillips 2000; DECC 2008) formed the spatial basis for the koala tree use review**

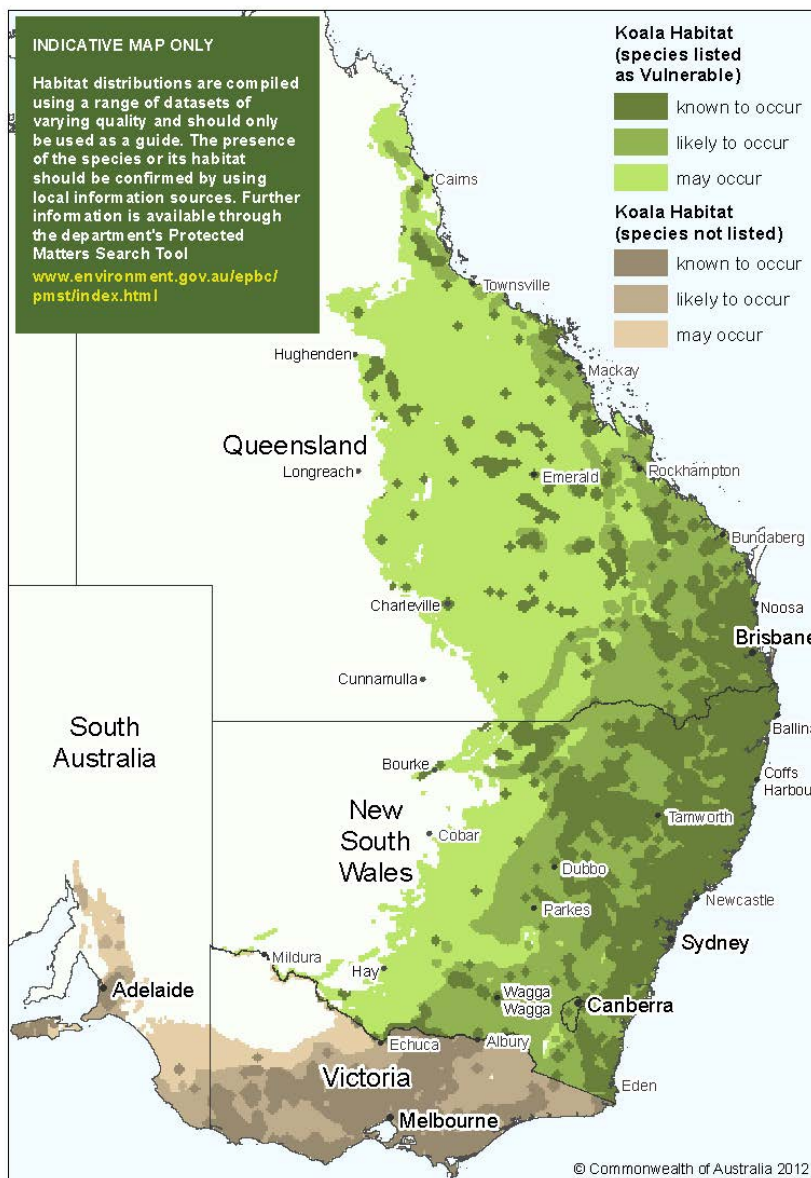
Figure 2 illustrates how this tree use review fits within a broader project framework. The results from this qualitative evidence-based review of koala trees allows for the inclusion of a ‘bottom-up’ approach in the modelling and mapping of koala habitat suitability.



**Figure 2 Overall OEH NSW Koala Habitat Suitability Mapping Project framework including a ‘bottom-up’ approach to koala habitat mapping based on local evidence of koala tree use (red symbol) to aid and refine koala habitat distribution modelling**

## 1.2 The koala's conservation status

The combined koala populations of Queensland, New South Wales and the Australian Capital Territory are listed as vulnerable at the national level under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Figure 3). The koala is formally listed as a vulnerable species in New South Wales under the *Biodiversity Conservation Act 2016*. It is a protected species in Queensland, Victoria and South Australia, and various provisions are made for its consideration in conservation, planning and assessment programs in those states. See NRMCC (2009) for discussion of the koala's official conservation status in Queensland, Victoria and South Australia. Irrespective of formal conservation status the koala's future remains clouded in uncertainty across its entire range (e.g. McAlpine et al. 2015).



**Figure 3** Indicative map of the koala's national distribution and conservation status (as of 2012)

Extract from: [www.environment.gov.au/system/files/pages/187f297d-db69-4aab-b994-cec0bf27c716/files/phascolarctos-cinereus-distribution-map.pdf](http://www.environment.gov.au/system/files/pages/187f297d-db69-4aab-b994-cec0bf27c716/files/phascolarctos-cinereus-distribution-map.pdf)

## 2. Introduction

Koala populations across New South Wales and Queensland are in decline (Chief Scientist & Engineer 2016) and today persist within habitats that are either remnants of a bygone era or manifestations of human-induced changes to potential habitat distributional patterns (see Black et al. 2014; McAlpine et al. 2015 and Adams-Hosking et al. 2016 for reviews of regional koala population trends across Australia).

Koalas have persisted within wooded eastern Australian landscapes for millennia but their association and co-existence with humans has been of a mixed character. In many locations and for many thousands of years koalas were an important part of Aboriginal culture and featured in stories and legends, some current. In many areas, they were hunted as a source of food by Aboriginal people (and by dingoes) but are assumed to have remained widespread (Black et al. 2014; Wedrowicz et al. 2017) (see the [Australian Koala Foundation's website](#) for more regarding this association).

It may be that koala populations often occurred, and continue to occur, at naturally low densities (e.g. Close et al. 2017) but it is apparent that the advent of European colonisation saw fluctuations in many koala populations that may have included an initial increase as hunting by Aboriginal people declined, and predatory dingoes were poisoned, in many areas (Black et al. 2014). However, with the gradual intensification and spread of more modern anthropogenic impacts and threats (e.g. vegetation loss, fragmentation and degradation, direct hunting for a fur trade, stress-induced disease and death from vehicle-strike) koala populations and occurrence patterns have changed (Lunney and Leary 1988, Black et al. 2014).

Prime koala habitats, associated with more fertile plains and valleys of the coast and tablelands, were impacted first and most severely (Lee and Martin 1988, Lunney and Leary 1988, Reed and Lunney 1990) but disturbance effects rippled across the koala's range (e.g. Menkhorst 2008, Wedrowicz et al. 2017).

Koala populations and occurrence patterns are still changing today in the face of ongoing land-use shifts including habitat re-establishment but often involving habitat degradation, loss and fragmentation. Looming threats include climate change and the often-drastic impacts of extreme weather conditions (e.g. Ellis et al. 2010, Adams-Hosking et al. 2011, Lunney et al. 2012b, Seabrook et al. 2014, McAlpine et al. 2015, Briscoe et al. 2016).

Koalas still inhabit a broad range of forests and woodlands across eastern and south eastern mainland Australia (Figure 3). They also endure within agricultural and even urban landscapes where there are sufficient useable habitat trees and the impacts of prevailing threats are not overwhelming (see DECC 2008 and Chief Scientist & Engineer 2016 for threat summaries).

Koala habitat use and selection is influenced by factors operating at multiple scales from the individual tree to patches to regional landscapes (McAlpine et al. 2015). To generate meaningful models and predictions of suitable koala habitat there is a need to address and characterise variation in as many of these factors as possible.

### 2.1 Tree use – a primary determinant of habitat for a specialist folivore

As an obligate arboreal folivore (leaf-eater) a critical common denominator for the presence of koalas within an area is the occurrence of canopy trees providing browse and shelter of a quality sufficient to support individuals locally and a population more broadly. Trees provide food and shelter and sites for social interactions (Moore et al. 2010; Melzer et al. 2014); they are the fundamental resource unit for koala occurrence and management.



It has been recognised for some time that koalas utilise a broad spectrum of tree species, genera and families for their feeding, shelter, resting, and socialising needs.

### 2.1.1 Recognised broad tree use patterns – genus and sub-genus levels

Koalas generally feed within trees of the *Eucalyptus* genus (Hawkes 1978; Lee and Martin 1988; Phillips 2000) but local habitat studies across their extensive range have revealed they also feed within tree species from many other genera including *Corymbia*, *Angophora*, *Lophostemon*, *Melaleuca*, *Acacia*, *Allocasuarina* and *Callitris* (e.g. U Nyo Tun 1993, Hasegawar 1995, Smith 2004, Melzer et al. 2014).

Within the *Eucalyptus* genus, and assuming *Angophora* and *Corymbia* to be separate genera (see taxonomic methods below), three sub-genera are widely recognised to include favoured koala use trees: Alveolata (containing just tallowwood *Eucalyptus microcorys*, a favoured koala food tree species on the NSW mid and north coast), and Symphyomyrtus and Eucalyptus (the latter are referred to under alternative taxonomic regimes as the Monocalyptus sub-genus, and hereafter referred to in this report as the ‘monocalypts’ to avoid confusion with the *Eucalyptus* genus).

The Symphyomyrtus sub-genus is generally recognised as containing most of the koala’s favoured tree species (e.g. Wallis et al. 2012, Moore et al. 2004a, Melzer et al. 2014, Youngentob 2014). Recent work has also revealed, however that monocalypt species are also widely used by koalas as food trees in some, typically low-nutrient, landscapes (e.g. Sluiter et al. 2002, Allen 2010, Allen et al. 2010, Stalenberg et al. 2014, Leigh/Science for Wildlife 2017).

Patterns of koala tree use (for feeding) at this sub-generic level are thought to reflect, at least partly, tree leaf chemistry (see Sections 2.1.2 and 2.1.3 below) and locally determined trade-offs between the procurement of leaf nutrients and the accumulation of toxins (e.g. Cork and Foley 1997; Moore et al. 2004a & b, 2010).

Leaves of the symphyomyrt eucalypts have relatively higher levels of available nitrogen, an important indicator of nutrient levels (Wallis et al. 2012; Moore 2004a; Youngentob 2014) but also relatively high levels of certain plant secondary metabolites (PSMs), the tree’s toxic defence against browsing animals (Wallis et al. 2012).

By way of contrast leaves of the monocalypt eucalypts have relatively lower levels of available nitrogen and varying levels of a different suite of PSMs (Youngentob 2014).

### 2.1.2 Recognised broad tree use patterns – species and tree levels

Callaghan et al. (2011) recognised the role played by supplementary food tree species but stressed koala occurrence to be primarily determined by patterns of differential tree use that include a subset of preferentially selected eucalypt species.

Within any location, they typically display a dietary preference for a subset of tree species that may be considered of primary importance, with others used for secondary browsing as well as sometimes critical resting and shelter sites (e.g. Eberhard 1978, Hindell and Lee 1987, Phillips 1990, Phillips and Callaghan 2000, Callaghan et al. 2011, Melzer et al. 2014). The subset of preferred food trees varies across New South Wales (Phillips 2000; DECC 2008).

Recent koala habitat studies within lower nutrient landscapes of the NSW southern tablelands, southern highlands and south coast have shown that in many locations koala tree use patterns may be more complex, reflecting the need for animals to make use of a broader range of tree species over large home ranges (e.g. Stalenberg et al. 2014, Youngentob 2014).

In these environments, the concepts of preferred and non-preferred tree species may be less relevant and the presence of high tree species diversity may be a better reflection of koala habitat quality (Stalenberg et al. 2014).

The importance of some level of tree species diversity in determination of koala habitat quality has also been reported from some higher fertility locations such as Pine Creek State Forest and Bongil Bongil National Park on the NSW north coast (Smith and Andrews 1997; Smith 2004).

As proposed by Stalenberg et al. (2014), the degree to which habitats will limit koala populations may be determined by the overall quality and diversity of the trees available. In very low-quality habitats koalas may be unable to obtain necessary nutrients for population expansion and maintenance. Similarly, low-diversity habitat may limit koalas' abilities to select tree species and individual trees with different chemical profiles to achieve a varied diet.

These concepts of habitat and tree quality and diversity may be directly relevant to the extension of koala tree use patterns, derived at local scales, to habitat mapping at regional and state scales; the conceptual 'bottom-up' approach to koala habitat mapping (Figure 2).

### 2.1.3 Factors driving koala tree use patterns

Patterns of koala tree use vary spatially (e.g. with habitat type, relative site productivity, disturbance history, koala density and elevation) across the koala's broad distributional range (Phillips 2000; Ellis et al. 2002; Callaghan et al. 2011; Au et al. 2017) and also temporally, such as daily and seasonally depending on factors such as prevailing temperature and rainfall and associated impacts on soil moisture and leaf growth within a particular location (e.g. Krockenberger 1993, Matthews et al. 2007, Crowther et al. 2014, Smith et al. 2013, Melzer et al. 2014). Critical factors include:

1. **Tree foliar (leaf) chemistry** – It is well established that foliar chemistry is a significant driver in the selection of suitable trees for feeding by all arboreal folivores (Cork et al. 1983; Foley and Hume 1987; Cork 1992; Cork and Foley 1997; Moore et al. 2004a & b; Moore and Foley 2005; Moore et al. 2010). The fact that foliar chemistry varies both among and within tree species and impacts koala tree choice provides a mechanism to influence koala distribution, at least at the local scale (e.g. Moore et al. 2004a, b; Moore and Foley 2005; Moore et al. 2010) and potentially at broader spatial scales (e.g. Youngentob 2014).
2. **Site quality and soil nutrients** – It has long been considered that the best koala habitats occur within higher-quality soil landscapes and locations (e.g. Lunney and Leary 1988, Reed and Lunney 1990) and many local koala habitat studies support that view to the extent that even broadly accepted koala food tree species are preferred on one soil landscape but avoided on another (e.g. Phillips et al. 2000, Phillips and Callaghan 2000). The interplay between foliar chemistry, koala tree use and site quality (or soil nutrients) remains clouded however (e.g. Moore et al. 2004a) with many koala populations occurring in areas of low or very low soil quality (e.g. Allen 2010, Allen et al. 2010, Stalenberg et al. 2014, Leigh/Science for Wildlife 2017).
3. **Tree genetic lineage** – Tree genetic lineage may also be involved in determining local koala tree use patterns with indications that certain parameters relating to leaf chemistry (nutrients and toxins) are highly heritable (Moore et al. 2004b). Differences within a tree species (of nutrients and toxicity) due to genetic variability can give rise to the situation where important local populations of trees may not be suitable in terms of forage quality elsewhere. The opposite may also be true of a primary food species where some areas across its range do not make up a substantial portion of a koala's diet because of inferior nutritional chemotype (K Youngentob 2017–18, pers. comm.).
4. **Tree foliar moisture and free water** – Koalas meet their water requirements through a combination of the moisture within browsed leaves and drinking from free water

sources. Eucalypt leaves typically contain more than 50% water content by weight and herbivores should not have too much difficulty meeting their water balance in that situation (Lunney et al. 2012b). However, koalas may move to moister microclimates (gullies and drainage lines, lower topographic positions) during times of high temperature and drought (e.g. Gordon et al. 1988, Munks et al. 1996). Free water may be a significant habitat limitation for koalas in some locations (e.g. western semi-arid NSW), and in many environments, it may be the case that forests cannot support permanent koala populations without adequate water availability; in these locations leaf moisture levels can be just as important as leaf chemistry (Ellis et al. 2002; 2010; Melzer et al. 2014; Crowther et al. 2014).

5. **Shelter needs** – Use of shelter trees for thermoregulatory purposes is another driver of koala tree use, particularly in hotter and more arid locations and during periods of extreme temperatures (Ellis et al. 2002; Briscoe et al. 2014). The morphological features of some non-food tree species, such as the provision of relatively greater canopy shade, may be as significant as leaf moisture and nutrient content in koala tree use in response to changes in environmental conditions (Ellis et al. 2002 & 2010; Kavanagh et al. 2007; Sullivan et al. 2003; Crowther et al. 2014; Briscoe et al. 2014).
6. **Tree neighbourhoods** – Tree neighbourhoods (or the collection of trees within an area) appear to be important to koalas. Trees are more likely to be visited if they are growing in either a particularly poor neighbourhood or a particularly good neighbourhood; the quality of the neighbourhood being defined by the size of the neighbouring trees and their foliar chemistry (Moore et al. 2010). Stalenberg et al. 2014 argue that in habitats of low nutritional quality taxonomic and phenotypic diversity is likely to be important. In some locations, the use of species that may be considered of lower importance to koalas overall appears to be elevated due to their local co-occurrence and association with preferred tree species (e.g. Phillips et al. 2000, Philips and Callaghan 2000, Smith 2004, OEH 2014 & 2015).
7. **Overall preference for larger trees** – Within tree species, koalas also appear to use individual trees at least partly based on physical characteristics such as size and structure (e.g. Smith 2004, Moore and Foley 2005, Matthews et al. 2007, Callaghan et al. 2011). There is evidence that koalas prefer to rest in large trees; however, koalas will feed from very small trees if they can access the leaves (B Moore 2017–18, pers. comm.)
8. **Overall preference for habitats supporting structural diversity** – This includes trees within multiple size classes (e.g. Smith and Andrews 1997, Smith 2004, J Turbill 2017–18, pers. comm.).
9. **Landscape configuration** – Localised impacts of disturbance (habitat loss, fragmentation and degradation) can result in koalas being absent from otherwise useable habitat (McAlpine et al. 2015), leading to misleading tree use patterns. Similarly, tree planting and habitat restoration programs can lead to aberrant tree use by koalas (e.g. Gunnedah district – Phil Spark, John Lemon personal communications).
10. **Breeding status and other social influences** – Koalas may display different tree use patterns at different life-cycle phases, e.g. breeding and non-breeding (Krockenberger 1993), or use of transitory habitats during dispersal phases (Dique et al. 2003).
11. **The presence of threats** – Locally significant threats (e.g. dogs, disease, road kill) can lead to altered occupancy resulting in many areas of unoccupied, but otherwise good, habitat (e.g. Ellis et al. 2002, 2010).



## **2.2 Applying local habitat studies to regional koala habitat mapping**

The innate variability found within koala tree use means that localised studies are more effective at defining koala habitat than regional or state (or national) studies, but localised information can then be extended and used to protect and enhance koala habitat more effectively at broader scales.

It should be noted that intraspecies differences in nutrients and toxins can give rise to a situation where a locally important species may not be as suitable in terms of forage quality where they occur elsewhere. These situations are however likely to be rare.

By reviewing local koala habitat studies from across New South Wales this study aims to inform koala habitat suitability mapping at regional scales (Figure 2).

## 3. Methods

Evidence of koala tree use was sourced from written reports and published research articles concerning koala habitat, as well as from personal communications with koala experts and koala carers.

### 3.1 Tree taxonomy

Evidence-based interpretation of the sourced koala tree use literature means that taxonomic variations and field tree species identification issues inherent within these studies are largely reflected in the derived koala tree use patterns. Where taxonomic changes could be incorporated with confidence, and in accordance with the adopted taxonomic bases, they have been.

For the purposes of this report, the taxonomy of tree species within the *Eucalyptus* genus follows Brooker (2000) generally, but modified to adopt the separation of *Angophora* and *Corymbia* (per Ladiges and Udovicic 2000 and Harden 2002). Other variations from Brooker (2000), are in accordance with NSW PlantNET (The Plant Information Network System of The Royal Botanic Gardens and Domain Trust Version 2.0); e.g. the separation of *E. brunnea* from *E. deanei* (Johnson and Hill 1990).

Consideration was given to the incorporation of *E. signata* into *E. racemosa* (after Pfeil and Henwood 2004); however, the NSW BioNet VIS includes five scribbly gum species and this was followed to minimise confusion. This issue is most relevant to the Central Coast KMA where all five scribbly gum species occur and *E. sclerophylla* is considered a koala high use species based on recent survey results (L Wilmott 2017–18, pers. comm.)

Koala tree use is considered at the level of tree species, with added consideration of sub-genus (within the *Eucalyptus* genus) and section (within Symphyomyrtus (the symphyomyrts), *Eucalyptus* (the monocalypts) and *Alveolata* (tallowwood) sub-genera) in tabulating and describing tree use patterns. Variation in koala tree use at the level of tree sub-species has not been incorporated.

#### 3.1.1 Tree species field identification caveat

This qualitative review has revolved around informed interpretation of reported and published koala habitat studies and the reported tree use patterns are a direct reflection of that interpretation. It is recognised that many tree species are difficult to identify in the field, a fact that applies especially to some *Eucalyptus* species with very similar morphology. In addition, variation in the identification skills of field workers cannot be accounted for.

Two sourced reports acknowledged field tree species identification difficulties, pending collection of suitable reference material and final species identification. These instances are recorded in the relevant table (Table 10 in Appendix 1); koala use has been reported for each of the tree species concerned from elsewhere within the relevant KMA (KMA 2), meaning that koala tree use patterns, at the regional scale, have not been impacted.

### 3.2 Koala Management Areas as the basis for regionalising New South Wales

Seven Koala Management Areas (KMAs) (after Phillips 2000 & DECC 2008) were used to regionalise the State and as the basis for collation of koala tree use evidence. KMAs were originally derived and mapped by Phillips (2000) to broadly reflect the regional distributions of tree species deemed to be preferred by koalas as food trees, with minor realignments to

conform with local government area (LGA) boundaries and so facilitate koala conservation planning and assessment at that level of government (Phillips 2000). KMAs have been formalised within the NSW Koala Recovery Plan (DECC 2008) and koala food tree lists, developed for each KMA, are routinely applied for the purposes of development planning, assessment and regulation relevant to koala conservation through SEPP 44.

### 3.3 Interpretation of local koala habitat and tree use studies

A variety of local koala habitat studies have been undertaken for varying purposes across New South Wales (see Rennison 2017 for a review). Relevant written reports and published papers sourced for this review are listed in Table 1.

Koala tree use has been investigated by local koala habitat studies incorporating a variety of field survey and data analysis methods, each with its own assumptions, limitations and advantages. This is not a review of the efficacy of these sampling methods but they are listed here to illustrate the breadth and variety of NSW-based data sources reviewed:

- **Faecal pellet surveys** – koala surveys and local koala habitat studies incorporating the collection and identification of koala faecal pellets, or scats, were pioneered by ecologists working within the Australian Koala Foundation (Phillips et al. 2000; Phillips and Callaghan 2000; Callaghan et al. 2002). Standardised collection methods (e.g. the Spot Assessment Technique, or SAT method, (Phillips and Callaghan 2011)), systematic sampling within regularised on-ground grids (e.g. RGB-bSAT) and variations on these methods, including the more recently developed Rapid-SAT method have been applied in many locations across eastern and south eastern Australia to investigate and characterise local koala tree use patterns (e.g. see numerous references to Phillips, Callaghan, Allen, Jurskis and others in Table1).
- **Diet analyses** based on analysis of plant remains within koala faecal pellet collections (e.g. Sluiter et al. 2002, AMBS 2012, Melzer et al. 2014).
- **Radio and GPS-tracking studies** (e.g. Krockenberger 1993, Jurskis et al. 1995, Jurskis and Potter 1997, Kavanagh et al. 2007, Matthews et al. 2007, AMBS 2012, Leigh/Science for Wildlife 2017, Cullen et al. in prep).
- **Dog tracking**, i.e. the use of sniffer dogs, trained to focus on koalas and/or koala scats (e.g. Cristescu and Frere 2017).
- **Daytime observation** (e.g. Madani 2014, Leigh/Science for Wildlife 2017).
- **Systematic nocturnal spotlighting** (e.g. Smith 2004, Leigh / Science for Wildlife 2017, Cullen et al. in prep.).
- **In-care and captive koala feeding preferences** (e.g. Pahl and Hume 1990, Smith 2004).

#### 3.3.1 Koala tree use levels

The determination of koala tree use levels from this variety of local koala habitat studies necessitated a qualitative but objective approach to the designation of tree use levels. Where available, quantitative measures of koala tree use (e.g. scat strike rates typically developed to summarise tree use levels in systematic scat surveys) were used to inform designated use levels.

This review, and the ranking of koala use trees flowing from it, avoided the terms ‘primary’, ‘secondary’, ‘tertiary’ and ‘supplementary’ in referring to koala use trees. These terms are common parlance in many local koala habitat studies (e.g. see review by Rennison 2017) and are subject to wide interpretative variation.



Tree use levels designated in this review reflect the author's informed interpretation and standardisation of the sourced evidence, moderated or influenced by the opinions of local koala experts. In standardising koala tree use within KMAs four qualitative use levels were designated: high, significant, irregular and low.

In ranking koala use trees within KMAs high use was subdivided into regional high use (tree species used at a high level in at least three surveys within a KMA) and local high use (tree species used at a high level in one or two locations).

In considering tree use at the state level (across KMAs) an additional level was designated, state high use, for tree species used at a high level within at least three KMAs. While purely descriptive and arbitrary, these thresholds and ranks are considered adequate for the designation of relative koala tree use levels for the purposes of feeding, shelter and social needs.

Use levels of many tree species varied within KMAs, typically in response to different soil landscapes (e.g. Phillips and Hopkins 2008, Phillips et al. 2011, Phillips 2013) and likely nutrient availability (e.g. *E. pilularis* (and other species) use in the Central Coast KMA (L Wilmott 2017–18, pers. comm.)). In deriving use levels for tree species within each KMA the highest designated use level was adopted as the regional level.

### 3.4 Koala tree use – base lists

Appendix 2 provides a list of trees known, or at least expected, to be used by koalas across New South Wales. Those species with a 'Y' (Yes) for any of the three columns in this list appear on base lists of compiled koala food trees developed for:

- DECC (2008) (NSW)
- NSW Planning & Environment (2016) *Explanation of Intended Effect: State Environmental Planning Policy No 44 – Koala Habitat Protection* (NSW)
- Youngentob (2014) (Eastern Australia, but only NSW species listed).

This list formed a base reference for this review to build upon. Those species with an 'N' (No) only in Appendix 2 have been recorded as koala use trees in this evidence-based review and added to the list (see results below for further information).

**Table 1** References and personal communications for koala tree use evidence accessed for this review, listed by NSW Koala Management Area (KMA) (after Phillips 2000; DECC 2008)

KMA	Location	Reference
1. <b>North Coast</b>	Tweed	Phillips et al. 2011
	Byron	Hopkins & Phillips 2012
	Ballina	Phillips & Chang 2013
	Lismore	Phillips 2011; Millard 2012
	Richmond Valley	Mitchell 2008; Phillips 2014; EPA 2016; Phillips & Weatherstone 2015
	Clarence Valley	Clarence Valley Council 2015
	Coffs Harbour	Lunney et al. 1999; Smith 2004; AMBS 2012
	Bellingen	OEH 2014
	Nambucca	OEH 2015
	Kempsey	Phillips & Hopkins 2008
	Port Macquarie	Phillips 2013
Taree	Callaghan et al. 2002	
Port Stephens	Phillips et al. 2000; Matthews et al 2007; ELA 2013	
2. <b>Central Coast</b>	Campbelltown	Phillips & Callaghan 2000; Sluiter et al. 2002, Ward & Close 2004
	Lower Hunter Valley	ELA 2013 (expert review)
	Hawkesbury / Wollemi	Leigh (Science for Wildlife) 2017
	Shoalhaven Gorge area	Allen 2010
	Wingecarribee	L Wilmott, D Cullen & K Madden (OEH unpublished data); Madani 2014; Cullen et al. (in prep.)
Wollondilly	L Wilmott, B Slogget & K Madden (OEH unpublished data)	
Yengo NP/Parr SRA	Curtin et al. 2002	
3. <b>South Coast</b>	Bermagui – Mumbulla	Allen 2010; Allen et al. 2010, 2014; Gow-Carey 2012
	Eden	Jurskis et al. 1994; Jurskis & Potter 1997; Lunney et al. 1997; Allen 2010
4. <b>Northern Tablelands</b>	Nth Tablelands review	Ede et al. 2016
	Armidale (Newholme)	Pahl & Hume 1990; Carney 1995; Heinz 1999
	Nowendoc	Krockenberger 1993, Carr et al. 2017
	Armidale/Uralla, Walcha	Carr et al. 2017
	Ashford/Inverell/Delungra	Cristescu & Frere 2017
5. <b>Central &amp; Southern Tablelands</b>	Bathurst area	Price 1993
	Cooma–Monaro	Allen 2014; Gruber et al. 2014
6. <b>Western Slopes &amp; Plains</b>	Moree	Parsons Brinkerhoff 2008
	Pilliga	Date & Paull 2000; Kavanagh & Barrott 2001; Kavanagh et al. 2007; Niche Environment & Heritage 2013
	Gunnedah/Liverpool Plains	Smith 1992; Lunney et al. 2012b; Crowther et al. 2014; Greenloaning & Phillips 2013; North West Ecological 2016
7. <b>Far West &amp; South West</b>	West & south-west NSW	OEH Threatened Species website (accessed July 2017)
	South-west Queensland	Sullivan et al. 2003; Wu et al. 2012; Smith et al. 2013
<b>Broader NSW</b>	NSW	Hawkes 1978; Reed et al. 1990; Phillips 2000; Mitchell 2015*

\* Australian Koala Foundation recommendations for NSW LGAs based on known koala tree use and distributions.

+ Personal communications: **North Coast**: Patricia Edwards (Clarence Environment Centre), Mark Fisher & John Turbill (OEH Coffs Harbour), Keith Kendall (Kendall & Kendall), Brad Law (NSW I-L Parramatta), David Milledge (Landmark Ecological Services), Steve Phillips (Biolink Ecological), John Pyle, Martin Smith (NPWS Coffs Harbour), Lorraine Vass (Friends of the Koala, Lismore); **Central Coast**: Vicki Lett (WIRES); Kylie Madden and Lachlan Wilmott (OEH Wollongong); **Northern Tablelands**: Brad Law; David Carr (Stringybark Ecological); Peter Croft (NPWS Glen Innes); Carina Johnson (LLS Armidale); John Lemon (JML Environmental); Richard Morsley (Armidale Council); **Central Tablelands**: Steven Cox (OEH Dubbo); **Western Slopes and Plains**: Angela Baker (LLS Gunnedah); Sue Brookhouse (Koala carer); Phil Cameron (AREA Environmental Consultants & Communication); John Lemon; Dan Lunney, David Milledge, David Paull (Ethical Ecology); Martin Predavec (OEH Hurstville); Darren Shelly (OEH Dubbo); Phil Spark, David Walker (OEH Dubbo); **Far West and South West**: Amanda Lavender (NPWS Moama); **Broader NSW**: Steve Phillips, Kara Youngentob.

## 4. Results

The results of this evidence-based review are presented for seven (7) Koala Management Areas (KMAs) and for New South Wales combined (all KMAs).

Summary koala use evidence for New South Wales (across all KMAs) is provided in Table 2 and Figures 4 and 5.

For presentation purposes, the combined tabulated koala use evidence for New South Wales (across all seven KMAs) is provided within the body of the report (Tables 3–6). Tabulated koala use evidence for individual KMAs is provided in Appendix 1 (Tables 7–27).

Summary koala use evidence (for each of the seven KMAs) is provided in Figure 6.

### 4.1 General patterns of koala tree use

This review has collated evidence of koala use for 137 tree species across New South Wales, including three groups not designated to species level ('*Acacia* sp.', '*Banksia* sp.' and 'rainforest species') (Table 2).

#### 4.1.1 Caveat on koala tree use patterns

It is worth emphasising up-front that koala use of individual trees or tree taxa (species, sub-genera and genera), for whatever purpose (e.g. feeding, shelter, social needs), might reflect any, or a combination, of the following:

- Targeted selection of the tree or tree taxon, as a food, shelter or other resource.
- Incidental use as a result of the tree's, or tree taxon's, association or co-occurrence with favoured trees, or tree taxa. This relates to the concept of 'palatability mapping' and 'palatable neighbourhoods' for koalas, whereby some trees and tree species may be utilised coincidentally, due to the presence of a subset of preferred feed trees (e.g. Moore and Foley 2010).
- Coincidental prevalence or abundance of a tree taxon within locally or regionally suitable koala habitats. This aspect might reflect koalas' familiarity with certain species leading to an elevated propensity to use those species simply in line with their frequency of encounter.

These factors can be, and typically are, addressed in local koala habitat studies through systematic sampling and analysis regimes comparing use and availability of tree species within sampling plots and study areas.

This review has striven to provide a direct reflection of reported local patterns and has incorporated the consideration of regional tree species availability, and its potential impact on regional koala tree use patterns, through interrogation of regional (KMA) and state tree species occurrence records held within the NSW BioNet Vegetation Information System (BioNet VIS) database, the standard repository for plot-based vegetation species data.

#### 4.1.2 Koala tree use patterns within tree genera

One hundred and three (75%) of the tree species used by koalas were from the genus *Eucalyptus* but many additional tree genera are used across the State (Tables 2–6, Figures 4–6).

Highest koala tree use diversity was evident for the Central Coast KMA (73 species) followed by North Coast (61 species) and Northern Tablelands (40 species). Lowest koala

tree use diversity was evident for Far West and South West KMA (10 species deemed likely to be used) and Western Slopes and Plains KMA (19 species) (Tables 2 and 3).

Koala tree use at the level of tree genus can be looked at in terms of up-front evidence (Tables 2 and 3, Figure 4) and in relation to the relative availability of species within each genus (e.g. Tables 4 and 5). As far as the latter is concerned, koalas appear to make use of tree species within genera according to general patterns of availability. Across the koala's NSW distribution, most common and widespread species appear to be used at some level (Tables 4 and 5). The following is a summary of koala tree use (from Tables 2–5 and Figure 4) across tree genera for which evidence of use was sourced:

- *Eucalyptus* – Koalas clearly used eucalypts more than any other genus (Tables 2–4, Figure 4) with documented use of 103 species across New South Wales (all KMAs) (or 43% of the 239 eucalypt species with >9 BioNet VIS records, to September 2017) (Table 4). Evidence for eucalypt species use was highest for the Central Coast KMA (55 species), followed by North Coast KMA (39 species) and Northern Tablelands KMA (34 species), and lowest for Far West and South West KMA (9 species) and Western Slopes and Plains KMA (13 species) (Table 2, Figure 4A).
- *Corymbia* – There was evidence of use for five species across NSW KMAs (Tables 2, 3 and 5; Figure 4) (46% of the 11 *Corymbia* species with >9 BioNet VIS). This included evidence of use for four species in North Coast KMA, three in Central Coast KMA, two in South Coast KMA and none for the remaining KMAs.
- *Lophostemon* – Two species occur in New South Wales (Table 5): brush box *L. confertus* occurs in the North Coast and Central Coast KMAs and swamp box *L. suaveolens* in North Coast KMA only. Evidence was collated for use of both species in the North Coast KMA (Table 3).
- *Syncarpia* – One species occurs in New South Wales: turpentine *S. glomulifera* occurs in each of the three coastal KMAs. Evidence of high to moderate use for *S. glomulifera* was collated for the Central Coast and North Coast KMAs (Table 3).
- *Angophora* – There was evidence of use for four species across all NSW KMAs (Tables 2, 3 and 5; Figure 4) (28% of the 14 *Angophora* species with >9 BioNet VIS records).
- *Allocasuarina/Casuarina* – There was evidence of use for four species across NSW KMAs (Tables 2, 3 and 5; Figure 4) (of the five *Allocasuarina/Casuarina* species with >9 BioNet VIS records); highest use level was moderate for forest oak *Allocasuarina torulosa* in the North Coast KMA with other evidence indicating overall low use levels.
- *Acacia* sp. and *Banksia* sp. – These species were clumped to reflect treatment in many local koala habitat studies; low to moderate use in most KMAs where they occur.
- *Melaleuca* – Seven species are listed for New South Wales in BioNet VIS and they occur mainly in the coastal KMAs; evidence of use for four species was collated for the North Coast and Central Coast KMAs (Tables 2, 3 and 5; Figure 4).
- 'Rainforest species' and 'other species' groupings in Table 2 and Figure 4 reflect the inconsistent treatment of non-hardwood tree species in local koala habitat use studies. It is acknowledged that koalas are known to make use of tree species within many additional genera (e.g. *Callicoma*, *Glochidion*, *Synoum*, *Trochocarpa*, *Cryptocarya*, *Alphitonia*, *Rhodamnia*, *Caldcluvia*, etc. (e.g. AMBS 2012)) but these occurrences are not well documented overall. The introduced camphor laurel *Cinnamomum camphora* occurs in the North Coast and Central Coast KMAs and is occasionally used by koalas in the North Coast KMA (Figure 4A) – presumably exclusively for shelter.

It is worth noting that evidence of use (for feeding, shelter or social needs) in this context relates to the factors outlined in Section 4.1.1 (above) and it is highly unlikely that forests, woodlands or remnants dominated by non-eucalypts, or eucalypts that are less favoured by koalas for feeding, will support koalas for anything other than movement purposes.



**Table 2 Summary figures for the number of tree species and relative koala tree ‘use levels’ (for feeding, shelter or social purposes) within tree genera across the KMAs of New South Wales**

Genus	Number of tree species, within listed genera, with designated koala ‘use levels’ (see legend above)																																															
	1. North Coast					2. Central Coast					3. South Coast					4. Northern Tablelands					5. Central & Southern Tablelands					6. Western Slopes & Plains					7. Far West & South West					NSW combined												
	Regional high use (>2 KMAs)	High use	Significant use	Irregular use	Low use	Total sp.	Regional high use (>2 KMAs)	High use	Significant use	Irregular use	Low use	Total sp.	Regional high use (>2 KMAs)	High use	Significant use	Irregular use	Low use	Total sp.	Regional high use (>2 KMAs)	High use	Significant use	Irregular use	Low use	Total sp.	Regional high use (>2 KMAs)	High use	Significant use	Irregular use	Low use	Total sp.	Regional high use (>2 KMAs)	High use	Significant use	Irregular use	Low use	Total sp.												
Eucalyptus	4	5	10	15	5	39	2	15	15	14	9	55	4	3	3	4	2	16	1	18	4	5	6	34	2	3	3	15	1	24	1	7	2	2	1	13	1	2	4	1	1	9	3	47	25	16	12	103
Corymbia	0	0	0	4	0	4	0	1	1	1	0	3	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	0	5
Lophostemon	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2						
Syncarpia	0	0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1						
Angophora	0	0	1	1	0	2	0	0	0	1	2	3	0	0	1	0	0	1	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	1	1	0	0	3	0	1	4						
Allocauarina/casuarina	0	0	1	2	0	3	0	0	0	0	3	3	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	1	0	1	0	0	1	3	0	4						
Acacia*	0	0	0	*	0	1*	0	0	*	0	0	1*	0	0	0	0	*	1*	0	0	0	0	*	1*	0	0	0	0	*	1*	0	0	0	0	0	0	0	0	0	*	0	1*						
Banksia*	0	0	0	*	0	1*	0	0	0	0	*	1*	0	0	0	0	0	0	0	0	0	0	*	1*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	0	1*						
Callitris	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	0	2	0	1	0	0	0	1	0	0	0	1	0	1	0	1	0	2	0	3
Melaleuca	0	0	1	1	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	4
Cinnamomum (camphor laurel)	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Rainforest species*	0	0	0	*	0	1*	0	0	0	0	*	1*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	0	1*						
Other species	0	0	0	3	0	3	0	0	0	0	3	3	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	2	5	7
<b>TOTALS</b>	<b>4</b>	<b>5</b>	<b>14</b>	<b>33</b>	<b>5</b>	<b>61*</b>	<b>2</b>	<b>17</b>	<b>17</b>	<b>16</b>	<b>21</b>	<b>73*</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>6</b>	<b>5</b>	<b>22*</b>	<b>1</b>	<b>18</b>	<b>6</b>	<b>5</b>	<b>10</b>	<b>40*</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>18</b>	<b>2</b>	<b>28*</b>	<b>1</b>	<b>8</b>	<b>2</b>	<b>3</b>	<b>5</b>	<b>19*</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>10</b>	<b>3</b>	<b>50</b>	<b>31</b>	<b>33</b>	<b>20</b>	<b>137*</b>

\* Individual species were not collated for acacias, banksias and ‘rainforest species’ as sourced data was inconsistent for these and was often **clumped** to the level of genus; these groupings are counted as one ‘species’ in this table.

See Tables 3–27 for species listings and rankings relevant across New South Wales and within each KMA.

**Table 3 Canopy tree species with qualitative evidence of koala use across New South Wales (all KMAs) (after Phillips 2000; DECC 2008)**

	Documented high use	Documented significant use	Documented irregular use	Documented low use			
Species	KMA 1. North Coast	KMA 2. Central Coast	KMA 3. South Coast	KMA 4. Northern Tablelands	KMA 5. Central & Southern Tablelands	KMA 6. North West Slopes	KMA 7. Far West & South West
<b>Sub-Genus Alveolata – tallowwood is regionally important on the North Coast; less so on the Central Coast</b>							
Tallowwood ( <i>E. microcorys</i> )	█	█					
<b>Sub-Genus Symphyomyrtus</b>							
<b>Section Racemus – evidence of patchy use of a single species</b>							
Brittle or Hillgrove gum ( <i>E. michaeliana</i> )		█		█			
<b>Section Latoangulatae (blue gums, red mahoganies, grey gums) – important group on the North and Central Coasts</b>							
Mountain blue gum ( <i>E. deanei</i> )		█					
Mountain blue gum ( <i>E. brunnea</i> )				█			
Flooded gum ( <i>E. grandis</i> )	█						
Sydney blue gum ( <i>E. saligna</i> )	█	█					
Large-fruited red mahogany ( <i>E. scias</i> )		█					
Red mahogany ( <i>E. resinifera</i> )	█	█					
Swamp mahogany ( <i>E. robusta</i> )	█	█					
Bangalay ( <i>E. botryoides</i> )		█					
Small-fruited grey gum ( <i>E. propinqua</i> )	█	█					
Grey gum ( <i>E. biturbinata</i> )	█			█			
Large-fruited grey gum ( <i>E. canaliculata</i> )	█						
Grey gum ( <i>E. punctata</i> )	█	█	█			█	
<b>Section Similares – a high use species on the South Coast and Central Coast</b>							
Woollybutt ( <i>E. longifolia</i> )		█	█				
<b>Section Bisectaria – irregular use recorded for one species</b>							
Scaly bark ( <i>E. squamosa</i> )			█				
<b>Section Liberivalvae (red gums) – includes 2 species with evidence of local to regional high use</b>							
Narrow-leaved red gum ( <i>E. seeana</i> )	█						
Orange gum ( <i>E. prava</i> )				█			
Orange gum ( <i>E. bancroftii</i> )	█						
Parramatta red gum ( <i>E. parramattensis</i> )	█	█					
<b>Section Exsertaria (red gums) – includes important species with evidence of regional and local high use across NSW</b>							
Tumbledown red gum ( <i>E. dealbata</i> )				█		█	
Dirty gum ( <i>E. chloroclada</i> )						█	
Blakely's red gum ( <i>E. blakelyi</i> )				█	█	█	
Slaty red gum ( <i>E. glaucina</i> )	█						
Cabbage gum ( <i>E. amplifolia</i> )	█	█		█			
Forest red gum ( <i>E. tereticornis</i> )	█	█		█			
River red gum ( <i>E. camaldulensis</i> )						█	█
<b>Section Maidenaria (white, manna &amp; ribbon gums, apple boxes) – important group, especially at colder, higher elevations</b>							
Wattle-leaved peppermint ( <i>E. acaciiformis</i> )				█			
Narrow-leaved black peppermint ( <i>E. nicholii</i> )				█			
Brittle gum ( <i>E. mannifera</i> )		█				█	
Argyle apple ( <i>E. cinera</i> )		█					
New England black peppermint ( <i>E. nova-anglica</i> )				█			
Apple box ( <i>E. bridgesiana</i> )		█		█	█		
Maiden's gum ( <i>E. maidenii</i> )			█				

Species	KMA 1. North Coast	KMA 2. Central Coast	KMA 3. South Coast	KMA 4. Northern Tablelands	KMA 5. Central & Southern Tablelands	KMA 6. North West Slopes	KMA 7. Far West & South West
Gully gum ( <i>E. smithii</i> )		Yellow					
White-topped box ( <i>E. quadrangulata</i> )	Blue	Green					
Mountain grey gum ( <i>E. cypellocarpa</i> )		Green	Green		Blue		
Large-flowered bundy ( <i>E. nortonii</i> )					Blue		
Bundy ( <i>E. goniocalyx</i> )					Blue		
Ribbon gum ( <i>E. viminalis</i> )	Blue	Green	Blue	Green	Green		
Ribbon gum ( <i>E. nobilis</i> )				Green			
Mountain gum ( <i>E. dalrympleana</i> )				Green	Blue		
Candlebark ( <i>E. rubida</i> )					Blue		
<b>Section Adnataria (boxes, ironbarks) – mixed evidence of use – all regions, some regional high use species</b>							
Coolibah ( <i>E. coolabah</i> )						Green	
Steel box ( <i>E. rummeryi</i> )	Blue						
Gum coolibah ( <i>E. intertexta</i> )							Yellow
Black box ( <i>E. largiflorens</i> )							Green
Bimble or poplar box ( <i>E. populnea</i> )						Green	Orange
Narrow-leaved grey box ( <i>E. pilligaensis</i> )						Green	
Western grey box ( <i>E. microcarpa</i> )						Blue	Orange
Grey box ( <i>E. moluccana</i> )	Orange	Orange		Blue			
White box ( <i>E. albens</i> )				Blue		Green	Blue
Coastal grey box ( <i>E. bosistoana</i> )		Green	Green				
Red ironbark ( <i>E. fibrosa</i> )	Yellow	Orange					
Ovenden's ironbark ( <i>E. caleyi</i> )				Yellow			
Grey ironbark ( <i>E. siderophloia</i> )	Orange	Yellow					
Beyer's ironbark ( <i>E. beyeriana</i> )		Green					
Narrow-leaved ironbark ( <i>E. crebra</i> )	Blue	Orange				Yellow	
Silver-leaved ironbark ( <i>E. melanophloia</i> )				Yellow		Orange	Orange
Blue box ( <i>E. baueriana</i> )		Blue	Blue				
Red box ( <i>E. polyanthemus</i> )					Blue		
Grey ironbark ( <i>E. paniculata</i> )		Green	Green				
Grey ironbark ( <i>E. placita</i> )	Yellow						
Mugga ironbark ( <i>E. sideroxylon</i> )		Orange		Yellow	Yellow	Blue	
Red ironbark ( <i>E. tricarpa</i> )			Green				
Yellow box ( <i>E. melliodora</i> )	Blue	Blue		Green	Blue	Orange	Orange
<b>Sub-Genus Eucalyptus</b>							
<b>Section Amentum (white mahoganies) – species with associate to significant use on the North and Central Coasts</b>							
White mahogany ( <i>E. acmenoides</i> )	Orange	Blue					
Bastard white mahogany ( <i>E. psammitica</i> )	Yellow						
Bastard white mahogany ( <i>E. umbra</i> )	Yellow	Blue					
Broad-leaved white mahogany ( <i>E. carnea</i> )	Blue	Blue					
<b>Section Pseudophloius (pseudo-stringybarks) – blackbutt is widely used on the North Coast</b>							
Blackbutt ( <i>E. pilularis</i> )	Orange	Green					
<b>Section Aromatica (peppermints) – evidence of notable high use at colder, higher elevations</b>							
River peppermint ( <i>E. elata</i> )		Orange	Yellow				
Narrow-leaved peppermint ( <i>E. radiata</i> )		Orange		Green	Blue		
Broad-leaved peppermint ( <i>E. dives</i> )		Blue			Green		
<b>Section Capillulus (stringybarks) – used in all coastal regions, particularly Central Coast, and all tablelands regions</b>							
Yellow stringybark ( <i>E. muelleriana</i> )		Yellow	Green				
Silver-top stringybark ( <i>E. laevopinea</i> )	Blue			Green			
Red stringybark ( <i>E. macrorhyncha</i> )		Blue		Green	Green		
Large-leaved stringybark ( <i>E. williamsiana</i> )				Orange			
Youman's stringybark ( <i>E. youmanii</i> )				Green			

Species	KMA 1. North Coast	KMA 2. Central Coast	KMA 3. South Coast	KMA 4. Northern Tablelands	KMA 5. Central & Southern Tablelands	KMA 6. North West Slopes	KMA 7. Far West & South West
Brown stringybark ( <i>E. capitallata</i> )							
Diehard stringybark ( <i>E. cameronii</i> )							
White stringybark ( <i>E. globoidea</i> )							
Broad-leaved stringybark ( <i>E. caliginosa</i> )							
Thin-leaved stringybark ( <i>E. eugenoides</i> )							
Narrow-leaved stringybark ( <i>E. sparsifolia</i> )							
Tindale's stringybark ( <i>E. tindaliae</i> )							
Blue-leaved stringybark ( <i>E. agglomerata</i> )							
Illawarra stringybark ( <i>E. imitans</i> )							
(Sandstone) stringybark ( <i>E. oblonga</i> )							
<b>Section Eucalyptus (green-leaved ashes) – messmate is used extensively on the Southern Tablelands</b>							
Brown barrel ( <i>E. fastigata</i> )							
Messmate ( <i>E. obliqua</i> )							
<b>Section Longitinales (black sallies) – single species, black sally, used on the Northern Tablelands</b>							
Black sally ( <i>E. stellulata</i> )							
<b>Section Cineracea (snow gum &amp; blue-leaved ashes) – includes some significant to high use species</b>							
Snow gum or white sally ( <i>E. pauciflora</i> )							
Silvertop ash ( <i>E. sieberi</i> )							
Yertchuk ( <i>E. considaniana</i> )							
New England blackbutt ( <i>E. andrewsii</i> )							
New England blackbutt ( <i>E. campanulata</i> )							
Scribbly gum ( <i>E. signata</i> )							
Hard-leaved scribbly gum ( <i>E. sclerophylla</i> )							
Narrow-leaved scribbly gum ( <i>E. racemosa</i> )							
Broad-leaved scribbly gum ( <i>E. haemastoma</i> )							
Inland scribbly gum ( <i>E. rossii</i> )							
Sydney peppermint ( <i>E. piperita</i> )							
<b>Section Insolitae – single species, bastard tallowwood, used only locally on the North Coast</b>							
Bastard tallowwood ( <i>E. planchoniana</i> )							
<b>Non-Eucalypts</b>							
<b>Corymbia (Bloodwoods, Spotted Gums)</b>							
Yellow bloodwood ( <i>C. eximia</i> )							
Red bloodwood ( <i>C. gummifera</i> )							
Pink bloodwood ( <i>C. intermedia</i> )							
Spotted gum ( <i>C. henryi</i> )							
Spotted gum ( <i>C. maculata</i> )							
<b>Lophostemons</b>							
Brushbox ( <i>L. confertus</i> )							
Swamp turpentine ( <i>L. suaveolens</i> )							
<b>Syncarpias</b>							
Turpentine ( <i>S. glomulifera</i> )							
<b>Angophoras</b>							
Rough-barked apple ( <i>A. floribunda</i> )							
Smooth-barked apple ( <i>A. costata</i> )							
Broad-leaved apple ( <i>A. subvelutina</i> )							
Narrow-leaved apple ( <i>A. bakeri</i> )							

An evidence-based review of koala tree use across New South Wales

Species	KMA 1. North Coast	KMA 2. Central Coast	KMA 3. South Coast	KMA 4. Northern Tablelands	KMA 5. Central & Southern Tablelands	KMA 6. North West Slopes	KMA 7. Far West & South West
<b>Allocasuarinas and Casuarinas</b>							
Black she-oak ( <i>A. littoralis</i> )	Blue	Yellow	Yellow	Yellow	Yellow		
Forest oak ( <i>A. torulosa</i> )	Orange	Yellow					
Swamp oak ( <i>C. glauca</i> )	Blue	Yellow					
Belah ( <i>C. cristata</i> )						Blue	
<b>Acacias</b>							
Acacia species	Blue			Yellow	Blue	Yellow	
<b>Banksias</b>							
Banksia species	Blue	Yellow		Yellow			
<b>Callitris</b>							
White cypress-pine ( <i>C. glaucophylla</i> )				Yellow	Blue	Green	Blue
Black cypress-pine ( <i>C. endlicheri</i> )					Blue		
Coast cypress-pine ( <i>C. columellaris</i> )	Blue						
<b>Melaleucas</b>							
Willow bottlebrush ( <i>M. salignus</i> )	Blue						
Broad-leaved paperbark ( <i>M. quinervia</i> )	Orange						
Prickly-leaved paperbark ( <i>M. nodosa</i> )		Yellow					
Red-flowered paperbark ( <i>M. hypericifolia</i> )		Yellow					
<b>Others</b>							
Camphor laurel ( <i>Cinnamomum camphora</i> )	Yellow						
Red ash ( <i>Alphitonia excelsa</i> )	Blue						
Cheese tree ( <i>Glochidion ferdinandi</i> )	Blue						
'Rainforest species'	Blue						
Lilly pilly ( <i>Acmena smithii</i> )			Yellow				
Coachwood ( <i>Ceratopetalum apetalum</i> )		Yellow					
Silky oak ( <i>Grevillea robusta</i> )		Yellow					
Wilga ( <i>Geijera parviflora</i> )						Yellow	
Kurrajong ( <i>Brachychiton populneus</i> )						Yellow	



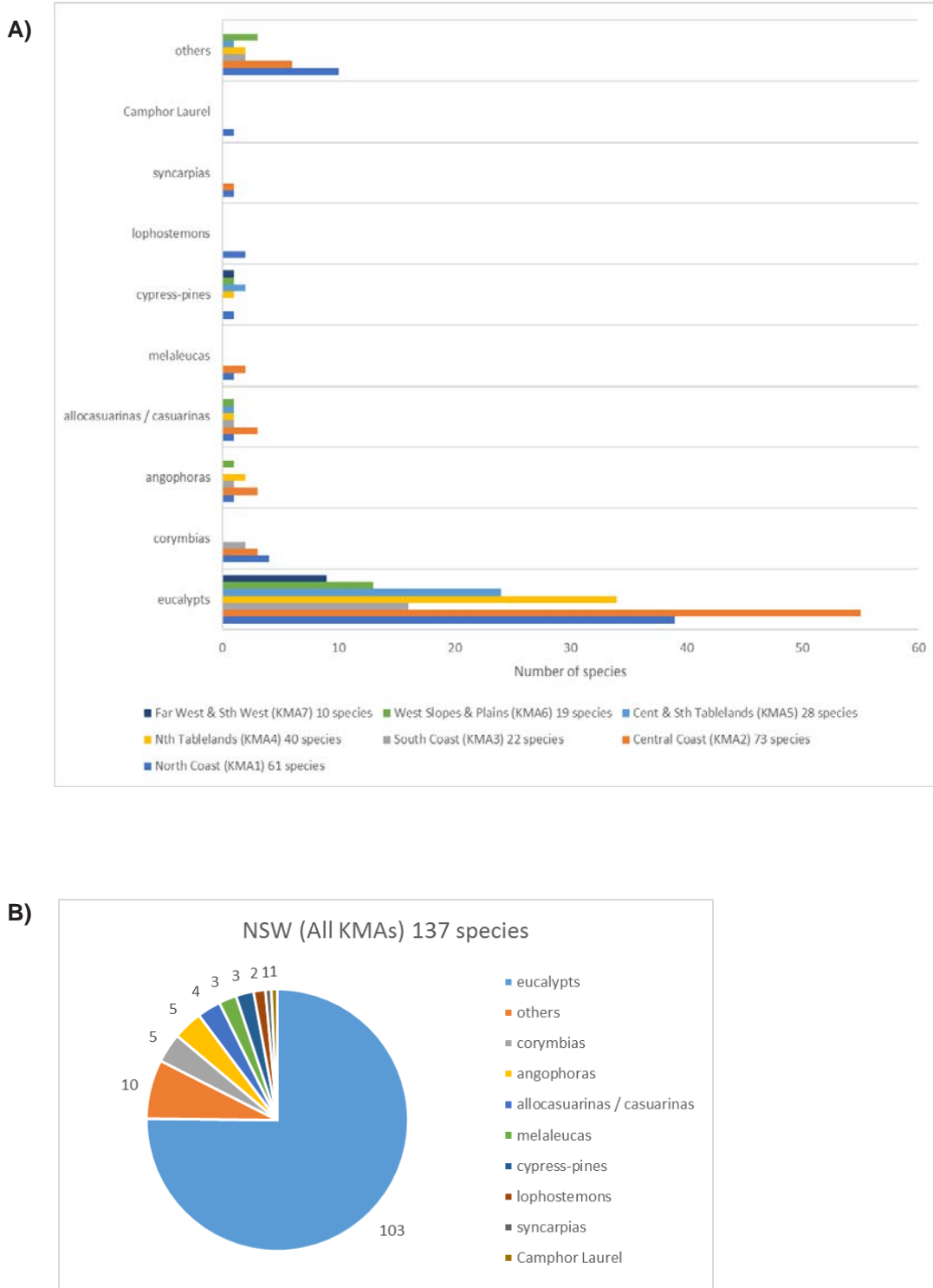
**Table 4 Koala use classes assigned to *Eucalyptus* tree species with BioNet VIS records for New South Wales (as of September 2017) – species are listed within four sub-genera and ranked in order of total records**

Regional high use		High use	Significant use	Irregular use	Low use	No sourced evidence of use
Species	VIS records	Species	VIS records			
<b>Sub-Genus Alveolata</b>		<b>Sub-Genus Symphyomyrtus (cont.)</b>				
1 <i>Eucalyptus microcorys</i>	6,068	41 <i>Eucalyptus bosistoana</i>	1,131			
		42 <i>Eucalyptus prava</i>	1,056			
<b>Sub-Genus Eudesmia</b>		43 <i>Eucalyptus smithii</i>	991			
1 <i>Eucalyptus baileyana</i>	221	44 <i>Eucalyptus caleyi</i>	978			
		45 <i>Eucalyptus biturbinata</i>	949			
<b>Sub-Genus Symphyomyrtus (Symphyomyrsts)</b>		46 <i>Eucalyptus chloroclada</i>	916			
1 <i>Eucalyptus melliodora</i>	8,739	47 <i>Eucalyptus nortonii</i>	891			
2 <i>Eucalyptus crebra</i>	8,183	48 <i>Eucalyptus macarthurii</i>	890			
3 <i>Eucalyptus tereticornis</i>	7,882	49 <i>Eucalyptus intertexta</i>	880			
4 <i>Eucalyptus camaldulensis</i>	7,350	50 <i>Eucalyptus deanei</i>	843			
5 <i>Eucalyptus punctata</i>	7,122	51 <i>Eucalyptus tetrapleura</i>	820			
6 <i>Eucalyptus blakelyi</i>	6,828	52 <i>Eucalyptus quadrangulata</i>	818			
7 <i>Eucalyptus albens</i>	6,821	53 <i>Eucalyptus glaucina</i>	738			
8 <i>Eucalyptus saligna</i>	4,949	54 <i>Eucalyptus maidenii</i>	692			
9 <i>Eucalyptus moluccana</i>	4,717	55 <i>Eucalyptus benthamii</i>	647			
10 <i>Eucalyptus fibrosa</i>	4,527	56 <i>Eucalyptus baueriana</i>	639			
11 <i>Eucalyptus viminalis</i>	4,416	57 <i>Eucalyptus viridis</i>	587			
12 <i>Eucalyptus populnea</i>	4,081	58 <i>Eucalyptus delegatensis</i>	582			
13 <i>Eucalyptus parramattensis</i>	4,068	59 <i>Eucalyptus angophoroides</i>	580			
14 <i>Eucalyptus cypellocarpa</i>	3,956	60 <i>Eucalyptus scias</i>	577			
15 <i>Eucalyptus dalrympleana</i>	3,914	61 <i>Eucalyptus brunnea</i>	574			
16 <i>Eucalyptus bridgesiana</i>	3,810	62 <i>Eucalyptus nubila</i>	573			
17 <i>Eucalyptus siderophloia</i>	3,607	63 <i>Eucalyptus cinerea</i>	552			
18 <i>Eucalyptus mannifera</i>	3,024	64 <i>Eucalyptus ovata</i>	538			
19 <i>Eucalyptus propinqua</i>	2,971	65 <i>Eucalyptus conica</i>	527			
20 <i>Eucalyptus largiflorens</i>	2,924	66 <i>Eucalyptus pilligaensis</i>	513			
21 <i>Eucalyptus dealbata</i>	2,837	67 <i>Eucalyptus dunnii</i>	511			
22 <i>Eucalyptus robusta</i>	2,799	68 <i>Eucalyptus leptophylla</i>	496			
23 <i>Eucalyptus microcarpa</i>	2,753	69 <i>Eucalyptus nova-anglica</i>	461			
24 <i>Eucalyptus resinifera</i>	2,519	70 <i>Eucalyptus dawsonii</i>	454			
25 <i>Eucalyptus paniculata</i>	2,380	71 <i>Eucalyptus costata</i>	449			
26 <i>Eucalyptus socialis</i>	2,315	72 <i>Eucalyptus beyeriana</i>	415			
27 <i>Eucalyptus coolabah</i>	2,296	73 <i>Eucalyptus notabilis</i>	405			
28 <i>Eucalyptus dwyeri</i>	2,289	74 <i>Eucalyptus oleosa</i>	387			
29 <i>Eucalyptus polyanthemos</i>	2,159	75 <i>Eucalyptus canaliculata</i>	383			
30 <i>Eucalyptus sideroxylon</i>	2,112	76 <i>Eucalyptus aggregata</i>	379			
31 <i>Eucalyptus rubida</i>	2,080	77 <i>Eucalyptus acaciiformis</i>	368			
32 <i>Eucalyptus botryoides</i>	1,954	78 <i>Eucalyptus seeana</i>	365			
33 <i>Eucalyptus dumosa</i>	1,867	79 <i>Eucalyptus fergusonii</i>	364			
34 <i>Eucalyptus melanophloia</i>	1,853	80 <i>Eucalyptus squamosa</i>	351			
35 <i>Eucalyptus goniocalyx</i>	1,759	81 <i>Eucalyptus tricarpa</i>	341			
36 <i>Eucalyptus longifolia</i>	1,717	82 <i>Eucalyptus aquatica</i>	318			
37 <i>Eucalyptus amplifolia</i>	1,668	83 <i>Eucalyptus banksii</i>	275			
38 <i>Eucalyptus grandis</i>	1,556	84 <i>Eucalyptus bancroftii</i>	262			
39 <i>Eucalyptus gracilis</i>	1,218	85 <i>Eucalyptus nitens</i>	262			
40 <i>Eucalyptus nobilis</i>	1,150	86 <i>Eucalyptus nicholii</i>	248			

Species	VIS records	Species	VIS records
<b>Sub-Genus Symphyomyrtus (cont.)</b>		<b>Sub-Genus Symphyomyrtus (cont.)</b>	
87 <i>Eucalyptus bicostata</i>	246	139 <i>Eucalyptus chapmaniana</i>	19
88 <i>Eucalyptus camphora</i>	222	140 <i>Eucalyptus ignorabilis</i>	18
89 <i>Eucalyptus sturgissiana</i>	221	141 <i>Eucalyptus exserta</i>	17
90 <i>Eucalyptus michaeliana</i>	213	142 <i>Eucalyptus leucoxydon</i> subsp. <i>pruinosa</i>	17
91 <i>Eucalyptus dorrigoensis</i>	207	143 <i>Eucalyptus ophitica</i>	16
92 <i>Eucalyptus elliptica</i>	191	144 <i>Eucalyptus saxatilis</i>	16
93 <i>Eucalyptus rummeryi</i>	173	145 <i>Eucalyptus castrensis</i>	14
94 <i>Eucalyptus retinens</i>	160	146 <i>Eucalyptus imlayensis</i>	14
95 <i>Eucalyptus malacoxylon</i>	150	147 <i>Eucalyptus alligatrix</i> subsp. <i>alligatrix</i>	10
96 <i>Eucalyptus vicina</i>	149	148 <i>Eucalyptus panda</i>	9
97 <i>Eucalyptus praecox</i>	139	149 <i>Eucalyptus major</i>	5
98 <i>Eucalyptus fusiformis</i>	127	150 <i>Eucalyptus scopulorum</i>	5
99 <i>Eucalyptus pulverulenta</i>	127	151 <i>Eucalyptus calycogona</i>	3
100 <i>Eucalyptus morrisii</i>	123	152 <i>Eucalyptus denticulata</i>	2
101 <i>Eucalyptus canobolensis</i>	112	153 <i>Eucalyptus obtusa</i>	2
102 <i>Eucalyptus placita</i>	108	154 <i>Eucalyptus</i> sp. aff. <i>cypellocarpa</i> sp. nov.	2
103 <i>Eucalyptus parvula</i>	104	155 <i>Eucalyptus triplex</i>	1
104 <i>Eucalyptus quinniorum</i>	101	153 <i>Eucalyptus obtusa</i>	2
105 <i>Eucalyptus volcanica</i>	101	154 <i>Eucalyptus</i> sp. aff. <i>cypellocarpa</i> sp. nov.	2
106 <i>Eucalyptus kartzoffiana</i>	94	155 <i>Eucalyptus triplex</i>	1
107 <i>Eucalyptus badjensis</i>	88		
108 <i>Eucalyptus hypostomatica</i>	77	<b>Sub-Genus Eucalyptus ('Monocalypts')</b>	
109 <i>Eucalyptus polybractea</i>	64	1 <i>Eucalyptus pilularis</i>	7,304
110 <i>Eucalyptus porosa</i>	64	2 <i>Eucalyptus sieberi</i>	6,695
111 <i>Eucalyptus baeuerlenii</i>	62	3 <i>Eucalyptus piperita</i>	6,417
112 <i>Eucalyptus largeana</i>	60	4 <i>Eucalyptus macrorhyncha</i>	6,154
113 <i>Eucalyptus ancophila</i>	59	5 <i>Eucalyptus globoidea</i>	6,022
114 <i>Eucalyptus globulus</i>	57	6 <i>Eucalyptus pauciflora</i>	4,654
115 <i>Eucalyptus pseudoglobulus</i>	54	7 <i>Eucalyptus radiata</i>	4,036
116 <i>Eucalyptus camphora</i> subsp. <i>camphora</i>	52	8 <i>Eucalyptus dives</i>	3,800
117 <i>Eucalyptus behriana</i>	51	9 <i>Eucalyptus campanulata</i>	3,308
118 <i>Eucalyptus wilcoxii</i>	50	10 <i>Eucalyptus acmenoides</i>	3,305
119 <i>Eucalyptus perriniana</i>	49	11 <i>Eucalyptus eugenoides</i>	3,146
120 <i>Eucalyptus glaucescens</i>	46	12 <i>Eucalyptus obliqua</i>	3,101
121 <i>Eucalyptus corticosa</i>	45	13 <i>Eucalyptus agglomerata</i>	3,059
122 <i>Eucalyptus interstans</i>	45	14 <i>Eucalyptus rossii</i>	2,954
123 <i>Eucalyptus ochrophloia</i>	44	15 <i>Eucalyptus fastigata</i>	2,649
124 <i>Eucalyptus rudderi</i>	44	16 <i>Eucalyptus laevopinea</i>	2,635
125 <i>Eucalyptus oresbia</i>	42	17 <i>Eucalyptus camfieldii</i>	2,530
126 <i>Eucalyptus gillii</i>	40	18 <i>Eucalyptus muelleriana</i>	2,307
127 <i>Eucalyptus rubida</i> subsp. <i>barbigerorum</i>	37	19 <i>Eucalyptus sparsifolia</i>	2,306
128 <i>Eucalyptus fracta</i>	34	20 <i>Eucalyptus haemastoma</i>	2,201
129 <i>Eucalyptus magnificata</i>	34	21 <i>Eucalyptus caliginosa</i>	2,062
130 <i>Eucalyptus aenea</i>	32	22 <i>Eucalyptus sclerophylla</i>	1,943
131 <i>Eucalyptus nandewarica</i>	30	23 <i>Eucalyptus elata</i>	1,873
132 <i>Eucalyptus pachyalyx</i> subsp. <i>banyabba</i>	30	24 <i>Eucalyptus umbra</i>	1,823
133 <i>Eucalyptus pumila</i>	30	25 <i>Eucalyptus carnea</i>	1,801
134 <i>Eucalyptus scoparia</i>	24	26 <i>Eucalyptus cameronii</i>	1,416
135 <i>Eucalyptus recurva</i>	21	27 <i>Eucalyptus stellulata</i>	1,176
136 <i>Eucalyptus conspicua</i>	20	28 <i>Eucalyptus robertsonii</i>	1,070
137 <i>Eucalyptus bakeri</i>	19	29 <i>Eucalyptus capitellata</i>	1,021
138 <i>Eucalyptus camphora</i> subsp. <i>relicta</i>	19	30 <i>Eucalyptus consideriana</i>	954

Species	VIS records	Species	VIS records
<b>Sub-Genus Eucalyptus ('Monocalypts') (cont.)</b>		<b>Sub-Genus Eucalyptus ('Monocalypts') (cont.)</b>	
31 <i>Eucalyptus racemosa</i>	931	63 <i>Eucalyptus cunninghamii</i>	91
32 <i>Eucalyptus oblonga</i>	918	64 <i>Eucalyptus tenella</i>	83
33 <i>Eucalyptus andrewsii</i>	858	65 <i>Eucalyptus triflora</i>	72
34 <i>Eucalyptus signata</i>	855	66 <i>Eucalyptus stenostoma</i>	69
35 <i>Eucalyptus blaxlandii</i>	681	67 <i>Eucalyptus paliformis</i>	68
36 <i>Eucalyptus planchoniana</i>	612	68 <i>Eucalyptus debeuzevillei</i>	67
37 <i>Eucalyptus luehmanniana</i>	501	69 <i>Eucalyptus kybeanensis</i>	67
38 <i>Eucalyptus stricta</i>	480	70 <i>Eucalyptus spectatrix</i>	65
39 <i>Eucalyptus fraxinoides</i>	467	71 <i>Eucalyptus imitans</i>	62
40 <i>Eucalyptus cannonii</i>	458	72 <i>Eucalyptus sp. aff. radiata</i>	50
41 <i>Eucalyptus tindaliae</i>	432	73 <i>Eucalyptus laophila</i>	47
42 <i>Eucalyptus oreades</i>	426	74 <i>Eucalyptus latiuscula</i>	45
43 <i>Eucalyptus youmanii</i>	422	75 <i>Eucalyptus ralla</i>	44
44 <i>Eucalyptus subtilior</i>	324	76 <i>Eucalyptus lacrimans</i>	42
45 <i>Eucalyptus niphophila</i>	321	77 <i>Eucalyptus serpentinicola</i>	39
46 <i>Eucalyptus pyrocarpa</i>	308	78 <i>Eucalyptus olsenii</i>	33
47 <i>Eucalyptus ligustrina</i>	262	79 <i>Eucalyptus conjuncta</i>	30
48 <i>Eucalyptus obstans</i>	202	80 <i>Eucalyptus bensonii</i>	28
49 <i>Eucalyptus apiculata</i>	197	81 <i>Eucalyptus copulans</i>	24
50 <i>Eucalyptus mckieana</i>	196	82 <i>Eucalyptus approximans</i>	21
51 <i>Eucalyptus williamsiana</i>	171	83 <i>Eucalyptus deuaensis</i>	21
52 <i>Eucalyptus multicaulis</i>	168	84 <i>Eucalyptus apothalassica</i>	17
53 <i>Eucalyptus dendromorpha</i>	159	85 <i>Eucalyptus dissita</i>	17
54 <i>Eucalyptus olida</i>	146	86 <i>Eucalyptus expressa</i>	16
55 <i>Eucalyptus baxteri</i>	140	87 <i>Eucalyptus boliviana</i>	14
56 <i>Eucalyptus psammitica</i>	132	88 <i>Eucalyptus mackintii</i>	12
57 <i>Eucalyptus prominula</i>	128	89 <i>Eucalyptus sp. aff. macrorhyncha</i>	12
58 <i>Eucalyptus codonocarpa</i>	127	90 <i>Eucalyptus subcaerulea</i>	10
59 <i>Eucalyptus langleyi</i>	114	91 <i>Eucalyptus microcodon</i>	6
60 <i>Eucalyptus burgessiana</i>	107	92 <i>Eucalyptus yangoura</i>	6
61 <i>Eucalyptus gregsoniana</i>	101	93 <i>Eucalyptus cephalocarpa</i>	3
62 <i>Eucalyptus moorei</i>	93	94 <i>Eucalyptus sp. aff. globoidea</i>	1





**Figure 4** Number of tree species from nine genera and one grouping of ‘others’ with sourced evidence of koala use (for feeding, shelter or other uses); **A)** across seven KMAs and **B)** for New South Wales (all KMAs)

‘Others’ comprises *Acacia* species, *Banksia* species, red ash *Alphitonia excelsa*, cheese tree *Glochidion ferdinandii*, lilly pilly *Acmena smithii*, coachwood *Ceratopetalum apetalum*, silky oak *Grevillea robusta*, wilga *Geijera parviflora*, kurrajong *Brachychiton populneus* and additional ‘rainforest species’.



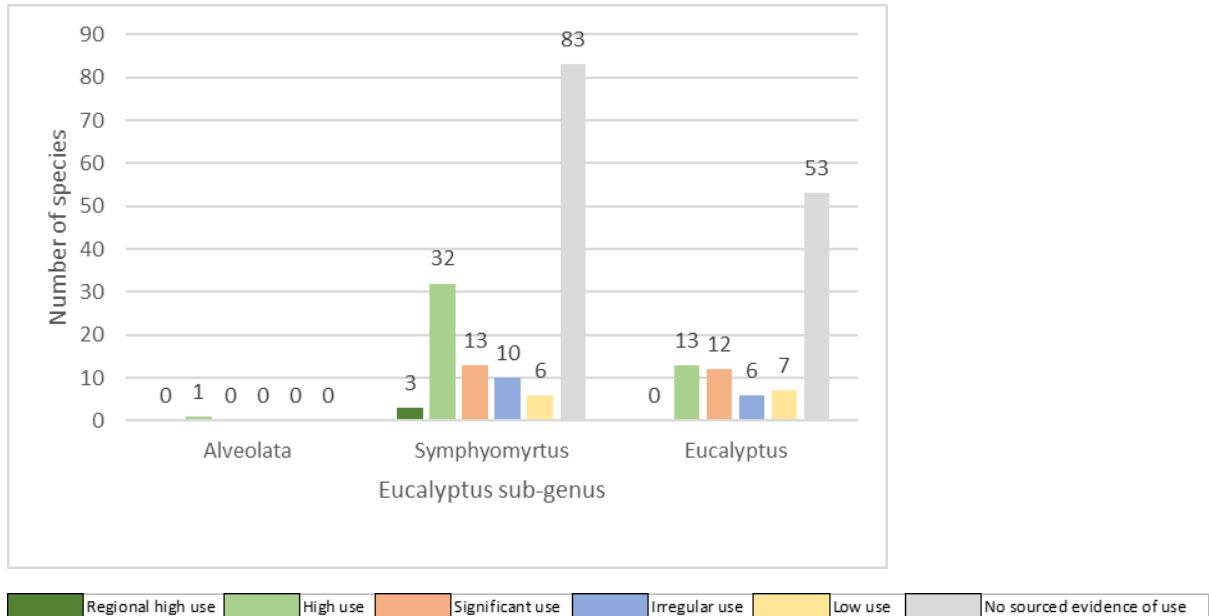
### 4.1.3 Koala tree use patterns within the *Eucalyptus* sub-genera

Evidence of koala use was found for species within three eucalypt sub-genera (Tables 3 and 4; Figures 5 and 6): Alveolata, Symphyomyrtus and Eucalyptus. A fourth eucalypt sub-genus, Eudesmia (with just one constituent species, Bailey's stringybark *E. baileyana*), also occurs in New South Wales (only in the North Coast KMA growing on infertile sandstone-derived soils north from Coffs Harbour) but no evidence of use by koalas was found (Table 4).

Evidence of koala tree use within the three relevant sub-genera can be summarised at the state level (across all KMAs) and for each KMA:

State-level evidence:

- Of the 103 eucalypt species for which evidence of use in New South Wales was found, 64 (63%) were from the sub-genus Symphyomyrtus, 39 (38%) were from the sub-genus Eucalyptus and one was from the sub-genus Alveolata (Tables 3 and 4, Figure 5).
- Alveolata – The sole member of sub-genus Alveolata, tallowwood (*E. microcorys*) is a known favoured koala feed tree.
- Symphyomyrtus – The 64 symphyomyrtle species with evidence of koala use comprise 44% of the 147 species with >9 BioNet VIS records across New South Wales (Table 4, Figure 5). All high to significant use symphyomyrtle species are relatively abundant at the state level (Table 5). No evidence of koala use was sourced for 83 (56%) of symphyomyrtle species with >9 BioNet VIS records including a number of relatively abundant and widespread species (Table 4, Figure 5) (see Section 4.1.4 for more on this).
- Eucalyptus (often referred to as monocalypts) – The 39 monocalypt species with evidence of koala use comprise 42% of the 90 species with >9 BioNet VIS records across New South Wales (Table 4, Figure 5). All high to significant use monocalypt species are relatively abundant at the state level (Table 4). No evidence of koala use was sourced for 51 (57%) monocalypt species with >9 BioNet VIS records including a number of relatively abundant and widespread species (Table 4, Figure 5) (see Section 4.1.4 for more on this).

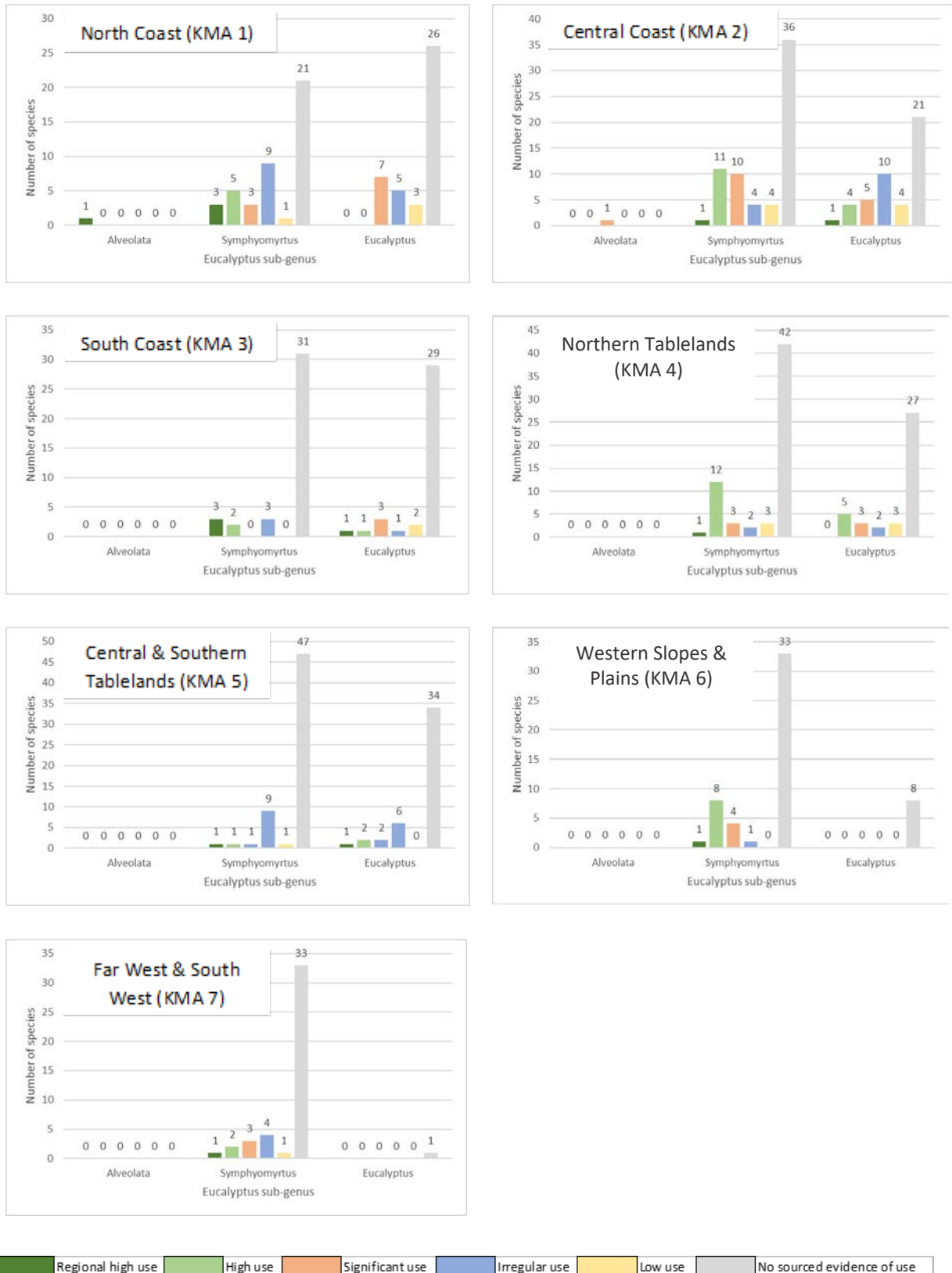


**Figure 5** Number of *Eucalyptus* species at assigned koala use levels within three sub-genera across all NSW KMAs combined

Species counted are those with >9 records within the BioNet VIS database for New South Wales, as of September 2017.

KMA-level evidence:

- Overall occurrence and koala use of tree species within three eucalypt sub-genera varies substantially between KMAs (Figure 6). Overall the collated evidence illustrates highest koala use levels for symphyomyrtle species across all seven KMAs. For obvious reasons, namely the low occurrence of monocalypt species (sub-genus *Eucalyptus*), koala use is restricted to symphyomyrtle species in more westerly NSW KMAs (Western Slopes and Plains KMA and Far West and South West KMA). Relatively high koala use of monocalypt species was evident for KMAs 2, 3, 4 and 5 particularly, and KMA 1 to a lesser degree (Figure 6).
- *Alveolata* – evidence of koala use of *E. microcorys* across most of its NSW range – high use in North Coast KMA and significant use in the northern part of Central Coast KMA (Figure 6; Tables 3, 7 and 10).
- *Symphyomyrtus* – evidence of use across all seven KMAs; species used at regional high to low levels across all KMAs but many species (well over 50% of those with >9 BioNet VIS records) lacking evidence of koala use in every KMA (Table 3, KMA-specific tables in Appendix 1; Figure 6).
- *Eucalyptus* – evidence of use across five of seven KMAs; species used at regional high to low levels across four KMAs (Central Coast, South Coast, Northern Tablelands, Central & Southern Tablelands) but only at moderate to low levels across the North Coast KMA (Table 3, KMA-specific tables in Appendix 1; Figure 6).



**Figure 6** Number of *Eucalyptus* species at assigned koala use levels within three sub-genera across NSW KMAs

Species counted are those with >9 records within the BioNet VIS database for the relevant KMA, as of September 2017.

#### 4.1.4 Koala tree species use patterns across New South Wales (all KMAs)

Tables 2, 3, 4, 5 and 6 provide a summary of the koala tree use evidence collated across seven KMAs. Brief annotation is included within Table 4 to help summarise the evidence.

Evidence of koala use was found for 137 tree 'species' across New South Wales (seven KMAs); these included 103 *Eucalyptus* species (of 237 with >9 records in the BioNet VIS database) and 34 non-eucalyptus 'species', the latter including three groupings of acacia species, banksia species and rainforest species.

Key summary points and patterns from the tree species evidence list for New South Wales (Tables 3–5) and the assigned statewide rankings (Table 6) are:

- Three species, forest red gum (*Eucalyptus tereticornis*), river red gum (*E. camaldulensis*) and ribbon gum (*E. viminalis*) were identified as statewide high use species, based upon the sourced tree use evidence, in as much as they were high use species in more than three of the seven KMAs. An additional 50 species (47 eucalypts and three non-eucalypts) were high use species in one or two KMAs (Table 6)).
- Sourced evidence indicated yellow box (*E. melliodora*) as the species with most widespread koala use (used at some level in six of seven KMAs) followed by ribbon gum (*E. viminalis*), rough-barked apple (*Angophora floribunda*) and black she-oak (*Allocasuarina littoralis*) (five of seven KMAs) and grey gum (*E. punctata*), white stringybark (*E. globoidea*), and white cypress-pine (*Callitris glaucophylla*) (all used, at some level, within four of seven KMAs). These are all relatively common and widespread species (Table 4) (e.g. *E. melliodora* has the highest number of records within the BioNet VIS database for any eucalypt), meaning their widespread use may not reflect any active preference by koalas but may relate simply to their prevalence within koala habitats across New South Wales.
- Regional high use and high use tree species occurred across most of the *Eucalyptus* Sections (Table 3) including those of the Alveolata, Symphyomyrtus and *Eucalyptus* sub-genera.
- Red gums, (Section Similares and Exsertaria), white, manna & ribbon gums and apple boxes (Section Maidenaria) and stringybarks (Section Capillulus) included high proportions of high use species (Table 3).
- Non-eucalypts were used extensively with high use evident for some, e.g. turpentine (*Syncarpia glomulifera*), white cypress-pine (*Callitris glaucophylla*) and (*Corymbia eximia*) (Table 5).
- Notable, relatively widespread or abundant *Eucalyptus* species for which evidence of koala use was not sourced included: Dwyer's red gum (*E. dwyeri*), alpine ash (*E. delegatensis*), apple-topped gum (*E. angophoroides*), swamp gum (*E. ovata*), fuzzy box (*E. conica*), Dunn's white gum (*E. dunnii*), mountain mahogany (*E. notabilis*), shining gum (*E. nitens*), broad-leaved sally (*E. camphora*), brittle gum (*E. praecox*), Moonbi apple box (*E. malacoxylon*) and Manara Hills red gum (*E. vicina*), all within the top 100 for Symphyomyrtle eucalypt species NSW BioNet VIS records (see Table 4); the same applies to monocalypts (Table 4). While non-use of some of these can be assumed to reflect avoidance or at least spatial habitat separation (e.g. *E. delegatensis*) others appear on endorsed lists of koala feed trees (e.g. Phillips 2000, DECC 2008) and occur within habitats and locations occupied by koalas. Further survey may reveal evidence of use for many of these or evidence may exist but was not sourced for this review.

**Table 6 A summarised ranking reflecting evidence of koala tree use across all KMAs in NSW (after Phillips 2000; DECC 2008)**

Use = feeding, shelter, social; legend represents the state use level for tree species.

High use in ≥3/7 KMAs		High use in 1 or 2 KMAs		Significant use in ≥1 KMA (no high use)		Irregular use in ≥1 KMA (no higher use)		Low use in ≥1 KMA (no higher use)	
Rank	Species	Rank	Species	Rank	Species	Rank	Species	Rank	Species
1	Forest red gum ( <i>E. tereticornis</i> )	2	Yellow box ( <i>E. melliodora</i> )						
1	River red gum ( <i>E. camaldulensis</i> )	2	Blackbutt ( <i>E. pilularis</i> )						
1	Ribbon gum ( <i>E. viminalis</i> )	2	Narrow-leaved peppermint ( <i>E. radiata</i> )						
2	Tallowwood ( <i>E. microcorys</i> )	2	Broad-leaved peppermint ( <i>E. dives</i> )						
2	Mountain blue gum ( <i>E. brunnea</i> )	2	Yellow stringybark ( <i>E. muelleriana</i> )						
2	Red mahogany ( <i>E. resinifera</i> )	2	Silver-top stringybark ( <i>E. laevopinea</i> )						
2	Swamp mahogany ( <i>E. robusta</i> )	2	Red stringybark ( <i>E. macrorhyncha</i> )						
2	Small-fruited grey gum ( <i>E. propinqua</i> )	2	Youman's stringybark ( <i>E. youmanii</i> )						
2	Grey gum ( <i>E. punctata</i> )	2	White stringybark ( <i>E. globoidea</i> )						
2	Woollybutt ( <i>E. longifolia</i> )	2	Broad-leaved stringybark ( <i>E. caliginosa</i> )						
2	Orange gum ( <i>E. prava</i> )	2	Blue-leaved stringybark ( <i>E. agglomerata</i> )						
2	Orange gum ( <i>E. bancroftii</i> )	2	Silvertop ash ( <i>E. sieberi</i> )						
2	Parramatta red gum ( <i>E. parramattensis</i> )	2	Hard-leaved scribbly gum ( <i>E. sclerophylla</i> )						
2	Tumbledown red gum ( <i>E. dealbata</i> )	2	Inland scribbly gum ( <i>E. rossii</i> )						
2	Dirty gum ( <i>E. chloroclada</i> )	2	Yellow bloodwood ( <i>C. eximia</i> )						
2	Blakely's red gum ( <i>E. blakelyi</i> )	2	Turpentine ( <i>S. glomulifera</i> )						
2	Slaty red gum ( <i>E. glaucina</i> )	2	White cypress-pine ( <i>C. glaucophylla</i> )						
2	Cabbage gum ( <i>E. amplifolia</i> )	3	Mountain blue gum ( <i>E. deanei</i> )						
2	Wattle-leaved peppermint ( <i>E. acaciiformis</i> )	3	Flooded gum ( <i>E. grandis</i> )						
2	Narrow-leaved black peppermint ( <i>E. nicholii</i> )	3	Sydney blue gum ( <i>E. saligna</i> )						
2	Brittle gum ( <i>E. mannifera</i> )	3	Large-fruited red mahogany ( <i>E. scias</i> )						
2	Apple box ( <i>E. bridgesiana</i> )	3	Bangalay ( <i>E. botryoides</i> )						
2	Maiden's gum ( <i>E. maidenii</i> )	3	New England black peppermint ( <i>E. nova-anglica</i> )						
2	White-topped box ( <i>E. quadrangulata</i> )	3	Western grey box ( <i>E. microcarpa</i> )						
2	Mountain grey gum ( <i>E. cypellocarpa</i> )	3	Narrow-leaved ironbark ( <i>E. crebra</i> )						
2	Ribbon gum ( <i>E. nobilis</i> )	3	Grey box ( <i>E. moluccana</i> )						
2	Mountain gum ( <i>E. dalrympleana</i> )	3	Red ironbark ( <i>E. fibrosa</i> )						
2	Coolibah ( <i>E. coolabah</i> )	3	Grey ironbark ( <i>E. siderophloia</i> )						
2	Black box ( <i>E. largiflorens</i> )	3	Silver-leaved ironbark ( <i>E. melanophloia</i> )						
2	Bimble or poplar box ( <i>E. populnea</i> )	3	Mugga ironbark ( <i>E. sideroxyton</i> )						
2	White box ( <i>E. albens</i> )	3	White mahogany ( <i>E. acmenoides</i> )						
2	Narrow-leaved grey box ( <i>E. pilligaensis</i> )	3	River peppermint ( <i>E. elata</i> )						
2	Coastal grey box ( <i>E. bosistoana</i> )	3	Large-leaved stringybark ( <i>E. williamsiana</i> )						
2	Beyer's ironbark ( <i>E. beyeriana</i> )	3	Thin-leaved stringybark ( <i>E. eugenoides</i> )						
2	Grey ironbark ( <i>E. paniculata</i> )	3	Tindale's stringybark ( <i>E. tindaliae</i> )						
2	Red ironbark ( <i>E. tricarpa</i> )	3	(Sandstone) stringybark ( <i>E. oblonga</i> )						



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Rank	Species	Rank	Species
3	Messmate ( <i>E. obliqua</i> )	4	Swamp turpentine ( <i>L. suaveolens</i> )
3	Black sally ( <i>E. stellulata</i> )	4	Black she-oak ( <i>A. littoralis</i> )
3	Snow gum or white sally ( <i>E. pauciflora</i> )	4	Swamp oak ( <i>C. glauca</i> )
3	Yertchuk ( <i>E. consideniensis</i> )	4	Belah ( <i>C. cristata</i> )
3	Scribbly gum ( <i>E. signata</i> )	4	Acacia species
3	Narrow-leaved scribbly gum ( <i>E. racemosa</i> )	4	Banksia species
3	Sydney peppermint ( <i>E. piperita</i> )	4	Coast cypress-pine ( <i>C. columellaris</i> )
3	Red bloodwood ( <i>C. gummifera</i> )	4	Black cypress-pine ( <i>C. endlicheri</i> )
3	Rough-barked apple ( <i>A. floribunda</i> )	4	Willow bottlebrush ( <i>M. salignus</i> )
3	Smooth-barked apple ( <i>A. costata</i> )	4	Red ash ( <i>Alphitonia excelsa</i> )
3	Broad-leaved apple ( <i>A. subvelutina</i> )	4	Cheese tree ( <i>Glochidion ferdinandi</i> )
3	Forest oak ( <i>A. torulosa</i> )	4	'Rainforest species'
3	Broad-leaved paperbark ( <i>M. quinquinervia</i> )	5	Brittle or Hillgrove gum ( <i>E. michaeliana</i> )
4	Grey gum ( <i>E. biturbinata</i> )	5	Argyle apple ( <i>E. cinerea</i> )
4	Large-fruited grey gum ( <i>E. canaliculata</i> )	5	Gully gum ( <i>E. smithii</i> )
4	Scaly bark ( <i>E. squamosa</i> )	5	Gum coolibah ( <i>E. intertexta</i> )
4	Narrow-leaved red gum ( <i>E. seeana</i> )	5	Ovenden's ironbark ( <i>E. caleyi</i> )
4	Large-flowered bundy ( <i>E. nortonii</i> )	5	Grey ironbark ( <i>E. placita</i> )
4	Bundy ( <i>E. goniocalyx</i> )	5	Bastard white mahogany ( <i>E. psammitica</i> )
4	Candlebark ( <i>E. rubida</i> )	5	Diehard stringybark ( <i>E. cameronii</i> )
4	Steel box ( <i>E. rummeryi</i> )	5	Illawarra stringybark ( <i>E. imitans</i> )
4	Red box ( <i>E. polyanthemus</i> )	5	Brown barrel ( <i>E. fastigata</i> )
4	Blue box ( <i>E. baueriana</i> )	5	New England blackbutt ( <i>E. campanulata</i> )
4	Bastard white mahogany ( <i>E. umbra</i> )	5	Broad-leaved scribbly gum ( <i>E. haemastoma</i> )
4	Broad-leaved white mahogany ( <i>E. carnea</i> )	5	Narrow-leaved apple ( <i>A. bakeri</i> )
4	Brown stringybark ( <i>E. capitallata</i> )	5	Prickly-leaved paperbark ( <i>M. nodosa</i> )
4	Narrow-leaved stringybark ( <i>E. sparsifolia</i> )	5	Red-flowered paperbark ( <i>M. hypericifolia</i> )
4	New England blackbutt ( <i>E. andrewsii</i> )	5	Camphor laurel ( <i>Cinnamomum camphora</i> )
4	Bastard tallowwood ( <i>E. planchoniana</i> )	5	Lilly pilly ( <i>Acmena smithii</i> )
4	Pink bloodwood ( <i>C. intermedia</i> )	5	Coachwood ( <i>Ceratopetalum apetalum</i> )
4	Spotted gum ( <i>C. henryi</i> )	5	Silky oak ( <i>Grevillea robusta</i> )
4	Spotted gum ( <i>C. maculata</i> )	5	Wilga ( <i>Geijera parviflora</i> )
4	Brushbox ( <i>L. confertus</i> )	5	Kurrajong ( <i>Brachychiton populneus</i> )

#### 4.1.5 Varying koala use of *Eucalyptus* species between KMAs

For some species, including some eucalypt species often considered to be favoured by koalas, use levels varied substantially between KMAs. Examples, with comparisons summarised for those KMAs where the species is known to occur (>9 BioNet VIS records) included:

##### **Sub-genus Alveolata**

*E. microcorys* (high use in KMA 1, significant use in KMA 2, no evidence in KMA 4)

##### **Symphomyrtae (sub-genus Symphyomyrtus)**

*E. robusta* (high use in KMAs 1 and 2; no evidence in KMA 3)

*E. botryoides* (significant use in KMA 2; no evidence in KMA 3)

*E. camaldulensis* (high use in KMAs 4, 6 and 7; no evidence in KMAs 2 and 5)

*E. glaucina* (high use in KMA 1; no evidence in KMA 2)

*E. albens* (high use in KMA 6; irregular use in KMA 4; no evidence in KMAs 2 and 5)

*E. tereticornis* (high use in KMAs 1 and 2; no evidence in KMAs 3 and 4)

*E. saligna* & *E. propinqua* (significant use in KMA 1; no evidence of use in KMAs 3 and 4)

##### **Monocalyptae (sub-genus Eucalyptus)**

*E. agglomerata* (high use KMA 2; irregular use in KMA 3; no use in KMA 1)

*E. macrorhyncha* (high use in KMAs 4 and 5; irregular use in KMA 2; no evidence in KMA 6)

*E. laevopinea* (high use in KMA 4; moderate use KMA 1; no evidence in KMAs 2 and 6)

*E. pilularis* (high use in KMA 2; significant use in KMA 1; no evidence in KMA 3)

*E. sclerophylla* (high use in KMA 2; no evidence in KMA 3)

It is noted that use levels of many tree species also varied within KMAs, typically in response to different soil landscapes (e.g. Phillips and Hopkins 2008, Phillips et al. 2011, Phillips 2013) and likely nutrient availability (e.g. *E. pilularis* (and other species) use in the Central Coast KMA (L Wilmott 2017–18, pers. comm.)). In deriving use levels for tree species within each KMA the highest designated use level was adopted as the regional level.

## 4.2 North Coast (KMA 1)

The North Coast KMA (Figure 7) has been the focus of significant amounts of targeted koala survey and koala tree use study (see references in Table 1). Much of this work has been facilitated through the development of LGA-based Comprehensive Koala Plans of Management under the provisions and requirements of SEPP 44.

Summarised results of collated koala tree use evidence for the North Coast KMA are tabulated in Appendix 1 (Tables 7–9) to indicate tree species use patterns and relative use levels (Table 7), tree use levels within eucalyptus sub-genera relative to total records held within the NSW BioNet VIS (Table 8) and an evidence-based ranking of tree species for the North Coast KMA (Table 9). Brief annotation is included within Table 7 to help summarise the sourced evidence.

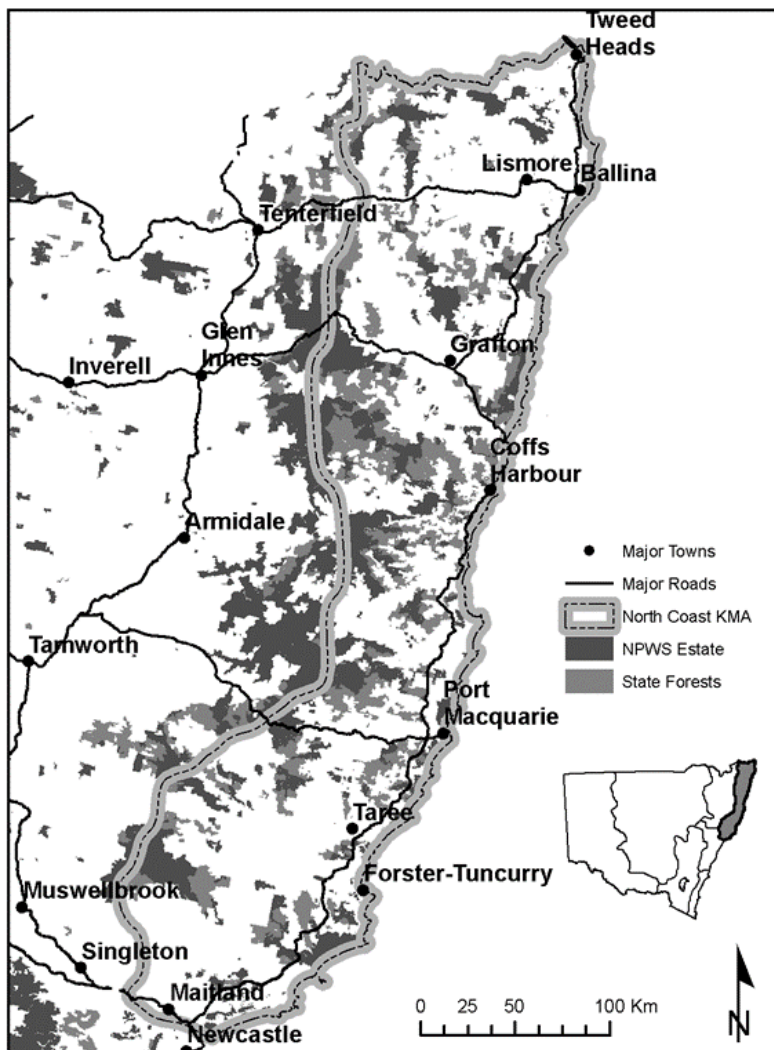


Figure 7 North Coast Koala Management Area (after Phillips 2000; DECC 2008)

Evidence of koala use was found for 61 tree species in the North Coast KMA (Tables 7–9); these included 39 *Eucalyptus* species (comprising 46% of 84 species with >9 records within the BioNet VIS database and 22 non-eucalyptus ‘species’, the latter including three groupings of ‘*Acacia* species’, ‘*Banksia* species’ and ‘rainforest species’ (also see Table 2 and Figure 6 for summary graphs and figures)).

Key summary points and patterns from the tree species evidence collation and review for KMA 1 are:

- Four species, tallowwood (*E. microcorys*), swamp mahogany (*E. robusta*), small-fruited grey gum (*E. propinqua*) and forest red gum (*E. tereticornis*) were identified as regional high use species, based upon the sourced tree use evidence, in as much as they were high use species in more than two reported studies from KMA 1. An additional six species (five eucalypts and smooth-barked apple *Angophora costata*) were high use species in one or two studies.
- All but one tree species for which evidence of regional high or high koala use was sourced were *Eucalyptus* species from the sub-genus Alveolata (tallowwood (*E. microcorys*)) or Symphyomyrtus (8 species) (Figure 6, Table 8a). The exception was *Angophora costata* for which evidence of high use in the Port Stephens area is documented (Matthews et al. 2007), presumably mostly for shelter.
- Species from three eucalypt sub-genera used – Alveolata (tallowwood (*E. microcorys*) was the sole representative), Symphyomyrtus (24 species used of 46 with >9 BioNet VIS records in the KMA), Eucalyptus (14 species used of 39 with >9 BioNet VIS records) (Figure 6, Tables 7 and 8a).
- The nine eucalypt species identified as regional high or high use species in the KMA were all from the sub-genus Symphyomyrtus (Figure 6, Tables 7 and 8a).
- A single species from the *Eucalyptus* sub-genus Eudesmia, Bailey's stringybark (*E. baileyana*) occurs in the North Coast KMA. The BioNet VIS database includes 221 records of this species (Table 8a) which occurs on poor, shallow sandy soils north from Coffs Harbour (Harden 2002) in habitats where nutrient availability can be assumed to be low and koalas unlikely to occur.
- High use Symphyomyrtle eucalypts were from the blue gums, red mahoganies and grey gums group (Section Latoangulatae) and the red gums groups (Sections Liberivalvae and Exsertaria).
- Evidence of widespread use across KMA 1, at varying use levels, was sourced for many species including *E. microcorys*, flooded gum (*E. grandis*), Sydney blue gum (*E. saligna*), red mahogany (*E. resinifera*), *E. robusta*, *E. propinqua*, *E. tereticornis*, blackbutt (*E. pilularis*), scribbly gum (*E. signata*), pink bloodwood (*Corymbia intermedia*), forest oak (*Allocasuarina torulosa*) and broad-leaved paperbark (*Melaleuca quinquinervia*). Some of these are known to be selectively favoured by koalas for feeding (e.g. the four regional high use species) but for others koala use may be more opportunistic and may be accentuated by the neighbouring presence of more favoured feed tree species.
- Evidence was lacking, or at least was not sourced, for koala use of many eucalypt species known to occur within KMA 1, some reasonably extensively (Table 8a). These included symphyomyrtle eucalypts (Figure 6) (e.g. several ironbark species – *E. tetrapleura*, *E. paniculata*, *E. fusiformis*, *E. fergusonii*, *E. ancophila*), species considered to be koala feed trees in the North Coast KMA by Phillips (2000) and DECC (2008) (e.g. mountain mahogany (*E. notabilis*), Rudder's box (*E. rudderi*) and Craven grey box (*E. largeana*)) and monocalypts (sub-genus Eucalyptus) (Figure 6) (e.g. white stringybark (*E. agglomerata*), a high use species in Central Coast KMA, and large-fruited blackbutt (*E. pyrocarpa*)). Reasons for this evident non-use are discussed below (Section 5.1).
- Non-eucalypts were used extensively but, apart from *A. costata* in a Port Stephens radiotracking study, at moderate to low use levels (Table 8b).
- Evidence was lacking, or at least was not sourced, for koala use of many non-eucalypt tree species within genera that include koala use species. BioNet VIS records (Table 8b) indicate some of these to be widespread and abundant within KMA 1 (e.g. the rough-barked apples, *Angophora robur* and *A. subvelutina*).

### 4.2.1 North Coast KMA summary

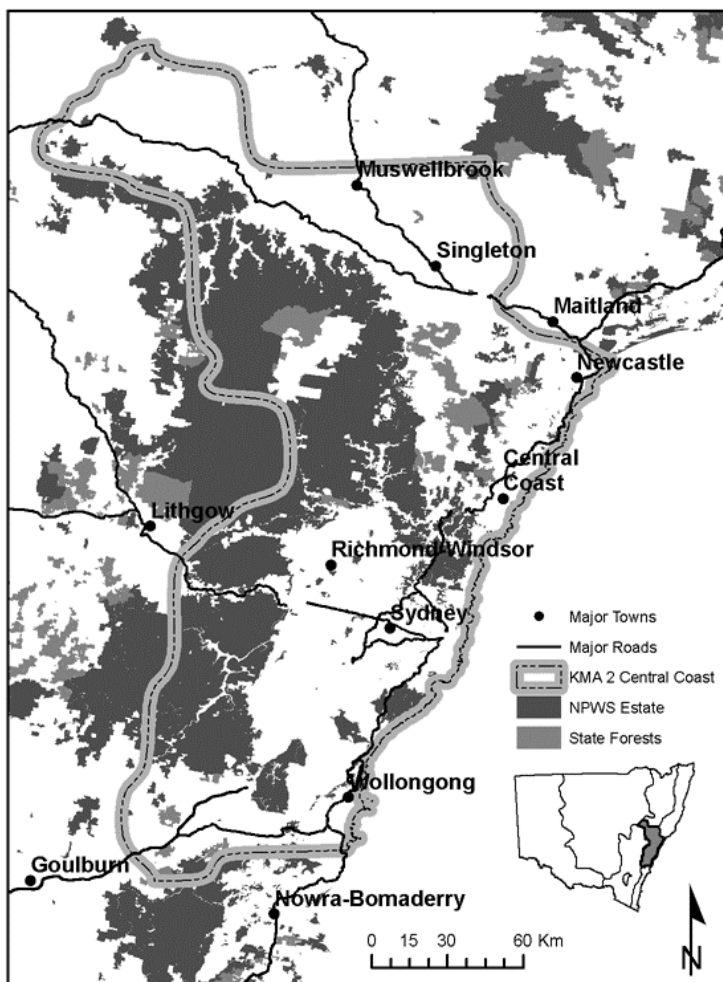
Extensive, but patchy, koala populations in the North Coast KMA range from high density to low-density, presumably reflecting local habitat quality and quantity and nutrient availability. Significant coastal populations are reasonably well known and a series of local koala habitat studies have revealed use of a high diversity of tree species but with four regional high use species (tallowwood *E. microcorys*, swamp mahogany *E. robusta*, small-fruited grey gum *E. propinqua* and forest red gum *E. tereticornis*) being regionally important determinants of koala occurrence (see Table 1 for many references), and the use of other species being potentially elevated when neighbouring these (e.g. Moore et al. 2010). Several other high use species, of more restricted distribution, appeared to have more localised use by koalas (e.g. several red gum species). Hinterland populations of the escarpment forests remain less well known in terms of koala tree use patterns.



### 4.3 Central Coast (KMA 2)

The Central Coast KMA (Figure 8) comprises a conglomerate of koala habitats and environments that don't really sit comfortably as a unit of management (K Madden, OEH Wollongong, pers. comm.). Revision of boundaries in this area would be likely to see parts of this KMA placed into other units (e.g. the Southern Highlands share affinities with the Central Tablelands) and vice versa (e.g. the greater Blue Mountains – Wollemi region could be consolidated into the Central Coast). Extensive koala survey and research has been carried out in this KMA centred on Campbelltown LGA, the Blue Mountains – Wollemi complex and the Wingecarribee and Wollondilly LGAs (see references in Table 1), yielding some remarkable information concerning koala tree use patterns in this diverse region.

Summarised results of collated koala tree use evidence for the Central Coast KMA are tabulated in Appendix 1 (Tables 10–12) to indicate tree species use patterns and relative use levels (Table 10), tree use levels within eucalyptus sub-genera relative to total records held within the NSW BioNet VIS (Table 11), and an evidence-based ranking of tree species for the Central Coast KMA (Table 12). Brief annotation is included within Table 10 to help summarise the sourced evidence.



**Figure 8 Central Coast Koala Management Area (after Phillips 2000; DECC 2008)**

Evidence of koala use was found for 74 tree species in the North Coast KMA (Tables 10–12); these included 55 *Eucalyptus* species (comprising 47% of 115 species with >9 records within the BioNet VIS database and 19 non-eucalyptus ‘species’, the latter including three groupings of ‘*Acacia* species’, ‘*Banksia* species’ and ‘rainforest species’ (also see Table 2 and Figure 6 for summary graphs and figures)).

Key summary points and patterns from the tree species evidence collation and review for KMA 2 are:

- The collated tree use evidence shows that koalas use a greater diversity of eucalypt species (55 documented) in KMA 2 than any other. This KMA also includes BioNet VIS records for 115 eucalypt species (above a threshold of 9 records) – the greatest number for any KMA (Figure 6). These high numbers reflect the presence of significant ecological variation and koala habitat diversity within KMA 2 from the coastal lowlands to the Blue Mountains hinterland and the Southern Highlands.
- Two species, grey gum (*E. punctata*) and white stringybark (*E. globoidea*) were identified as regional high use species, based upon the sourced tree use evidence, in as much as they were high use species in more than two reported studies from KMA 2. An additional 17 species (15 eucalypts, as well as yellow bloodwood (*Corymbia eximia*) and turpentine (*Syncarpia glomulifera*) were high use species in one or two studies.
- Species from three eucalypt sub-genera were used – Symphyomyrtus (30 of 66 with >9 BioNet VIS records in the KMA), Eucalyptus (24 of 45 with >9 BioNet VIS records), Alveolata (tallowwood *E. microcorys* was the sole representative) (Figure 6).
- Of 15 eucalypt species identified as regional high or high use species in the KMA, 11 were from sub-genus Symphyomyrtus and four from sub-genus Eucalyptus (Tables 10 and 11a).
- High use symphyomyrtle eucalypts were from the blue gums, red mahoganies and grey gums (Section Latoangulatae) and the red gums groups (Sections Liberivalvae and Exsertaria) (Table 10).
- A relatively high diversity of monocalypts (sub-genus Eucalyptus) were used including high use of species from the pseudo-stringybarks (Section Pseudophloius), stringybarks (Section Capillulus) and snow gums/blue-leaved ashes groups (Section Eucalyptus).
- A high diversity of white gums, manna gums, ribbon gums and apple boxes (Section Maidenaria within the Symphyomyrtus sub-genus) were used within the relatively colder Southern Highlands where they are more commonly found.
- Evidence of widespread use across KMA 2, at varying use levels, was sourced for many species including *E. punctata*, forest red gum (*E. tereticornis*), *E. globoidea*, blue-leaved stringybark (*E. agglomerata*), silvertop ash (*E. sieberi*), narrow-leaved scribbly gum (*E. racemosa*), red bloodwood (*Corymbia gummifera*) and *S. glomulifera*.
- Evidence was lacking, or at least was not sourced, for koala use of many eucalypt species known to occur within KMA 2, some reasonably extensively (Table 11a). These included symphyomyrtle eucalypts considered to be koala feed trees in the Central Coast KMA by Phillips (2000) and DECC (2008) – fuzzy box (*E. conica*), Dwyer's red gum (*E. dwyeri*), slaty red gum (*E. glaucina*), bundy (*E. goniocalyx*), maiden's gum (*E. maidenii*) and brittle gum (*E. praecox*) and monocalypts (sub-genus Eucalyptus) (Table 11a) (e.g. red stringybark (*E. cannonii*), Benson's stringybark (*E. bensonii*) and Blaxland's stringybark (*E. blaxlandii*). Reasons for this evident non-use are discussed below (Section 5.1)).
- Non-eucalypts were used extensively but, outside of *C. eximia*, *C. gummifera* and *S. glomulifera*, documented use was at moderate to low use levels.
- Evidence was lacking, or at least was not sourced, for koala use of many non-eucalypt tree species within genera that include koala use species. BioNet VIS records (Table 11b) indicate some of these to be widespread and abundant within KMA 2 (Table 11b) (e.g. species of *Angophora*, *Corymbia*, *Lophostemon*, *Callitris*).

### 4.3.1 Central Coast KMA summary

Extensive koala populations in the Central Coast KMA, including recently discovered populations (e.g. Blue Mountains – Leigh/Science for Wildlife 2017) and re-discovered (or recovered) populations (e.g. Wingecarribee – Madani 2014, Cullen et al. in prep.), utilise a very high diversity of trees species across a range of habitat types from the coastal plains to the Hawkesbury – Blue Mountains hinterland and the Southern Highlands.

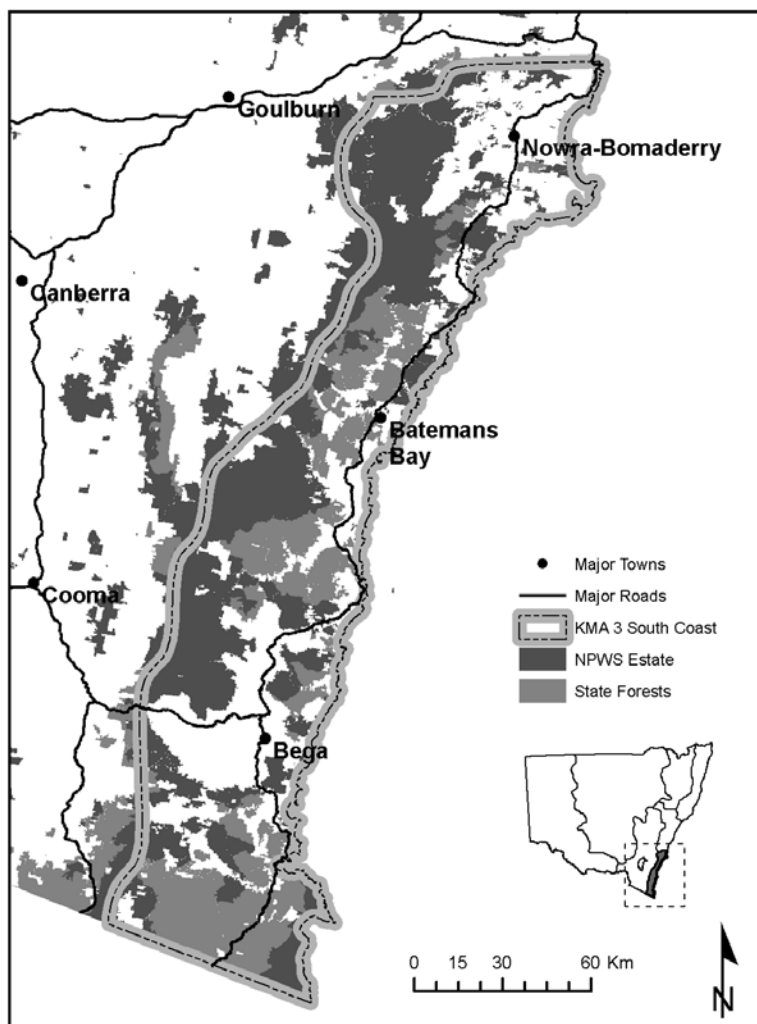
Two species from the eucalypt sub-genus *Symphyomyrtus*, grey gum *E. punctata* and forest red gum *E. tereticornis*, were designated as regional high use species but stringybarks and others from the *Eucalyptus* sub-genus, are also used extensively across the KMA (L Wilmott, D Cullen & K Madden (OEH unpublished data); Cullen et al. (in prep.); L Wilmott, B Sloggett & K Madden (OEH unpublished data)), and particularly in locations of lower site quality (e.g. Leigh / Science for Wildlife 2017).

In these locations, the concept of preferred tree species may be less well-defined. It may be the case that, above a minimum habitat quality threshold, koalas in these locations persist by occupying relatively large home ranges supporting a diverse range of tree species and topography and the opportunity to access a variety of leaf nutrient and moisture levels while off-setting leaf toxin loads to meet nutritional needs along with shelter and social needs (e.g. Stalenberg et al. 2014, Chris Allen (OEH Merimbula) and K Madden (OEH Wollongong) pers. comm.).

## 4.4 South Coast (KMA 3)

Koalas in the South Coast KMA (Figure 9) are distributed in patchy and sparse populations from the Shoalhaven Gorge region in the north to the Murrah flora reserves, between Bermagui and Tathra, and the Eden area in the south. Surveys and tree use studies have been ongoing in this KMA for some time (see references in Table 1) and have confirmed the persistence of small but important koala populations in reserves, state forests and private lands, and provide important information for habitat management across these tenures.

Summarised results of collated koala tree use evidence for the South Coast KMA (Figure 9) are tabulated in Appendix 1 (Tables 13–15) to indicate tree species use patterns and relative use levels (Table 13), tree use levels within eucalyptus sub-genera relative to total records held within the NSW BioNet VIS (Table 14) and an evidence-based ranking of tree species for the South Coast KMA (Table 15). Brief annotation is included within Table 13 to help summarise the sourced evidence.



**Figure 9 South Coast Koala Management Area (after Phillips 2000; DECC 2008)**

Evidence of koala use was found for 22 tree species in the South Coast KMA (Tables 13 and 14); these included 16 *Eucalyptus* species (comprising 21% of 76 species with >9 records within the BioNet VIS database and six non-eucalyptus ‘species’, the latter including two groupings of ‘*Acacia* species’ and ‘*Banksia* species’ (also see Table 2 and Figure 6 for summary figures and graph)). These figures are low in comparison with the other two coastal KMAs (KMAs 1 and 2), possibly in reflection of the overall low-density and patchy koala populations remaining on the South Coast.

Key summary points and patterns from the tree species evidence collation and review for KMA 3 are:

- The collated tree use evidence shows that koalas use a relatively lower diversity of tree species overall, and of eucalypt species particularly (16 documented) in KMA 3 than any other.
- Four species, woollybutt (*E. longifolia*), mountain grey gum (*E. cypellocarpa*), red ironbark (*E. tricarpa*) and white stringybark (*E. globoidea*) were identified as regional high use species, based upon the sourced tree use evidence, in as much as they were high use species in more than two reported studies from KMA 3. An additional seven species, six eucalypts and rough-barked apple (*Angophora floribunda*), were high use species in one or two studies (Table 13).
- Species from two eucalypt sub-genera were used, in overall low but similar proportions – Symphyomyrtus (9 species used of 39 with >9 BioNet VIS records in the KMA) and Eucalyptus (monocalypts) (8 species used of 37 with >9 BioNet VIS records) (Figure 6, Tables 2 and 14a).
- Of seven eucalypt species identified as regional high or high use species in the KMA, five were from sub-genus Symphyomyrtus and two from sub-genus Eucalyptus (Tables 13 and 14a).
- High use symphyomyrtle eucalypts were from three sections: Similares (woollybutt), Maidenaria (the white, manna and ribbon gums and apple boxes) and Adnataria (the boxes and ironbarks) (Table 13).
- High use monocalypts (sub-genus Eucalyptus) were both stringybarks (Section Capillulus) (Table 13).
- Evidence of widespread use across KMA 3, at varying use levels, was sourced for many species including *E. longifolia*, *E. cypellocarpa*, coastal grey box (*E. bosistoana*), *E. globoidea*, silvertop ash (*E. sieberi*) and rough-barked apple (*Angophora floribunda*).
- Evidence was lacking, or at least was not sourced, for koala use of many eucalypt species known to occur within KMA 3, some reasonably extensively (Table 14a). These included symphyomyrtle eucalypts considered to be koala feed trees in the South Coast KMA by Phillips (2000) and DECC (2008) – (e.g. cabbage gum (*E. amplifolia*), swamp gum (*E. ovata*), brittle gum (*E. mannifera*) and apple box (*E. bridgesiana*)). There was also a lack of collated evidence for koala use of several stringybark species including brown stringybark (*E. baxteri*), another brown stringybark (*E. capitallata*) and southern white stringybark (*E. yangoura*) (Table 15a). Reasons for this evident non-use are discussed below (Section 5.1).
- Evidence of use of non-eucalypts was restricted to four species (including ‘*Acacia* sp.’), with rough-barked apple (*Angophora floribunda*) used at significant to moderate levels in several studies across the KMA.
- Evidence was lacking, or at least was not sourced, for koala use of many non-eucalypt tree species within genera that include koala use species. BioNet VIS records (Table 14b) indicate some of these to be reasonably widespread and abundant within KMA 3 (e.g. species of *Angophora*, *Corymbia*, *Callitris*).

#### 4.4.1 South Coast KMA summary

The low numbers of tree species with evidence of koala use in this KMA reflects the overall low koala numbers and the relatively localised and sparse character of the known koala populations in this region.

Remnant koala populations of the South Coast KMA appear to make use of a relatively low number of tree species within low-density populations (e.g. Allen 2010; Allen et al. 2010, 2014; Gow-Carey 2012; Jurskis et al. 1994; Jurskis & Potter 1997; Lunney et al. 1997),



occupying habitats that have been impacted by human disturbance to varying degrees. Based on these studies, three species from the eucalypt sub-genus *Symphyomyrtus* were designated regional high use species (woollybutt *E. longifolia*, mountain grey gum *E. cypellocarpa*, red ironbark *E. tricarpa*) along with one from the sub-genus *Eucalyptus* (white stringybark *E. globoidea*).

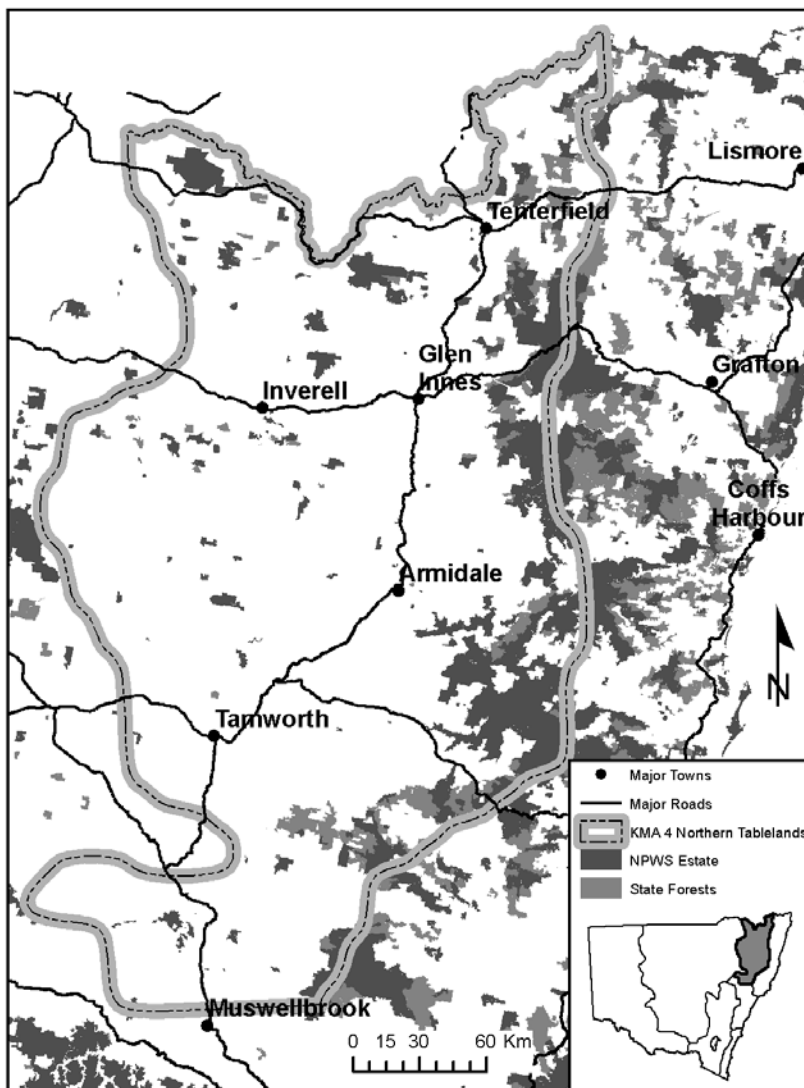
These species appear to be regionally important as potential indicators of koala habitat quality and their presence may elevate the use of associate species in their neighbourhood. However, recent work by Stalenberg et al. 2014 suggests that in some parts of this KMA, particularly locations of low site quality, the concepts of preferred koala tree species, and eucalypt sub-genera, may be less well-defined.

In such locations, and similarly to suggestions for koala tree use in parts of KMA 2, tree diversity and quality appear to become increasingly important and koalas may be trading and balancing between leaf nutrients and leaf toxins and spreading tree use across a diverse range of available species (e.g. Stalenberg et al. 2014, Chris Allen (OEH Merimbula) pers. comm.).

## 4.5 Northern Tablelands (KMA 4)

Until recently targeted koala survey and tree use studies had been quite limited in the Northern Tablelands KMA (Figure 10), but recent work, facilitated by OEH *Saving our Species* and Northern Tablelands Local Land Services, (see references in Table 1), has provided valuable tree use evidence for this area (C Johnson, LLS Armidale, pers. comm.).

Summarised results of collated koala tree use evidence for the Northern Tablelands KMA are tabulated in Appendix 1 (Tables 16–18) to indicate tree species use patterns and relative use levels (Table 16), tree use levels within eucalyptus sub-genera relative to total records held within the NSW BioNet VIS (Table 17), and an evidence-based ranking of tree species for the Northern Tablelands KMA (Table 18). Brief annotation is included within Table 16 to help summarise the sourced evidence.



**Figure 10 Northern Tablelands Koala Management Area (after Phillips 2000; DECC 2008)**

Evidence of koala use was found for 40 tree species in the Northern Tablelands KMA (Tables 16 and 17); these included 34 *Eucalyptus* species (comprising 33% of 104 species with >9 records within the BioNet VIS database and six non-eucalyptus ‘species’, the latter including two groupings of ‘*Acacia*’ species and ‘*Banksia*’ species (also see Table 2 and Figure 6 for summary figures and graph)).

Summary points and patterns from the tree species evidence collation and review for KMA 4 are:

- One species, manna gum (*E. viminalis*) was identified as a regional high use species, based upon the sourced tree use evidence, in as much as it was a high use species in more than two reported studies. An additional 18 species (all eucalypts) were high use species in one or two studies across the KMA. The total of 19 regional high or high use species was the highest for any of the seven KMAs with more than half of the eucalypts known to be used by koalas in KMA 4 being regional high or high use species.
- Species from two eucalypt sub-genera were used: Symphyomyrtus (21 species used of 68 with >9 BioNet VIS records in the KMA) and Eucalyptus (monocalypts) (13 species used of 45 with >9 BioNet VIS records) (Figure 6, Tables 2 and 17a).
- A single species from the *Eucalyptus* sub-genus Alveolata, tallowwood (*E. microcorys*) also occurs in the Northern Tablelands KMA but, although a high use species in the North Coast KMA, no evidence for its use in this KMA was found. The BioNet VIS database includes 522 records of this species in the KMA (Table 17) but it is likely to be of low palatability to koalas at higher elevations and colder temperatures (see Moore et al. 2004b).
- Of 19 eucalypt species identified as regional high or high use species, 13 were from sub-genus Symphyomyrtus and six from sub-genus Eucalyptus (Tables 16 and 17a).
- High use symphyomyrtle eucalypts were mostly from the red gum groups (Sections Liberivalvae & Exsertaria) and the white, manna and ribbon gums and apple boxes group (Section Maidenaria) (Table 16).
- High use monocalypts (sub-genus Eucalyptus) were mostly stringybarks (Section Capillulus) (Table 16).
- Most of the high use species were from the white gums, manna gums, ribbon gums and apple boxes (Section Maidenaria), with six species, the stringybarks (Section Capillulus), with five species, and the red gums (Sections Exsertaria and Liberivalvae) with four and one species respectively.
- Studies were limited in number but there was evidence for relatively widespread use, at varying use levels, for some species including *E. viminalis*, Blakely's red gum (*E. blakelyi*), wattle-leaved peppermint (*E. acaciaformis*), narrow-leaved peppermint (*E. nicholii*), apple box (*E. bridgesiana*), narrow-leaved peppermint (*E. radiata*), silver-top stringybark (*E. laevopinea*), red stringybark (*E. macrorhyncha*), broad-leaved stringybark (*E. caliginosa*), black sally (*E. stellulata*) and snow gum (*E. pauciflora*).
- Evidence was lacking, or at least was not sourced, for koala use of many eucalypt species known to occur within KMA 4, some reasonably extensively (Table 17a). These included symphyomyrtle eucalypts considered to be koala feed trees in the Northern Table lands KMA by Phillips (2000) and DECC (2008) – e.g. mountain mahogany (*E. notabilis*), Dwyer's red gum (*E. dwyeri*), brittle gum (*E. mannifera*), Moonbi apple box (*E. malacoxylon*), white-topped box (*E. quadrangulata*), large-flowered bundy (*E. nortonii*) and candlebark (*E. rubida*). There was also a lack of collated evidence for koala use of several stringybark species including yellow stringybark (*E. muelleriana*), privet-leaved stringybark (*E. ligustrina*), and species without common names: *E. subtilior*, *E. stannicola* and *E. conjuncta* (Table 17a). Reasons for this evident non-use are discussed below (Section 5.1).
- Evidence of use of non-eucalypts was restricted to four species (including *Acacia* sp. and *Banksia* sp.) with limited use of each at moderate to low levels.
- Evidence was lacking, or at least was not sourced, for koala use of many non-eucalypt tree species within genera that include koala use species. BioNet VIS records (Table 17b) indicate some of these to be reasonably widespread and abundant within KMA 4 (e.g. species of *Angophora*, *Corymbia*, *Callitris*).

#### 4.5.1 Northern Tablelands KMA summary

Relatively low-density koala populations vary in their use of tree species across this KMA, largely reflecting expected broad tree species (eucalypt) occurrence within landscapes that have been disturbed by human impacts to varying degrees.

The most productive landscapes of this KMA are largely cleared, or highly fragmented, meaning that extant vegetation available to koalas often exists as remnants within productive areas or larger forest and woodland habitats on less productive, more rugged landscapes; koala densities are therefore overall quite low, reflecting habitat carrying capacities.

Eucalypts are targeted as preferred tree species and more than half of the 34 species with documented use were regional high or high use species, possibly reflecting some limitation regarding potential preferred tree species compared with coastal KMAs.

One species was designated as a regional high use species, ribbon gum *E. viminalis*, but its use, and that of other eucalypts, varies across locations, potentially in response to site quality and available tree associations (e.g. Carr et al. 2017, David Carr 2017–18, pers. comm.).

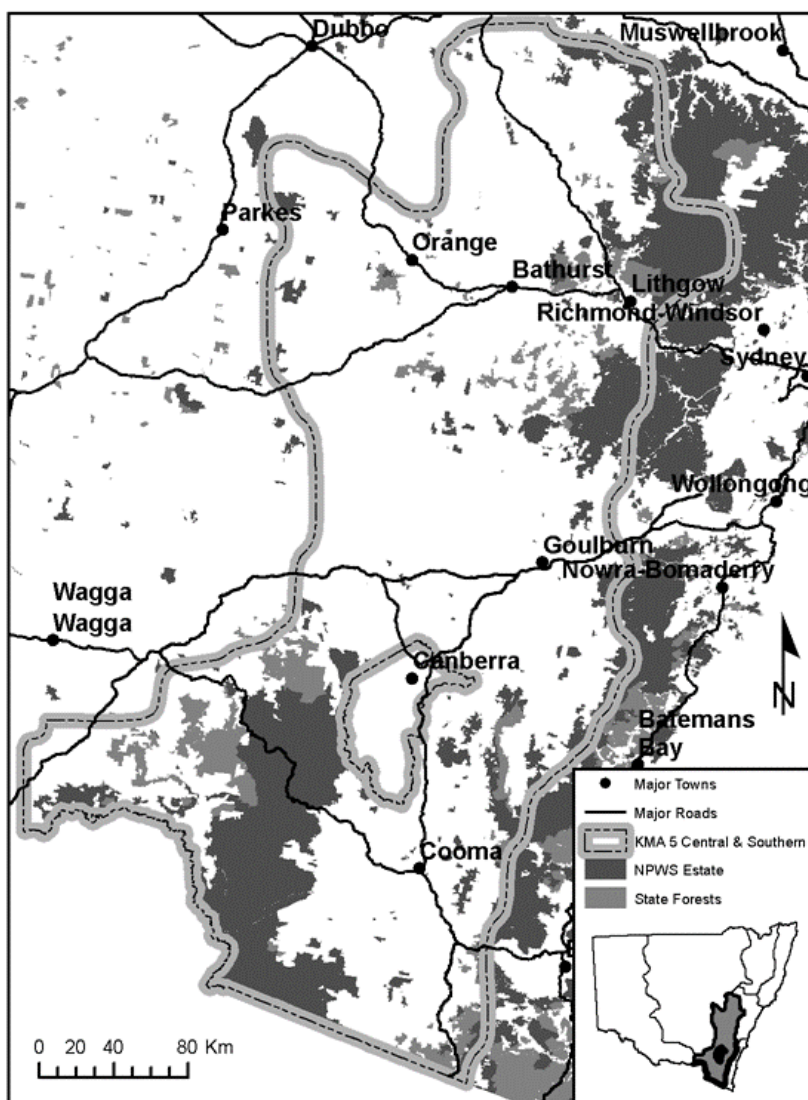
The use of combinations of eucalypt species from different sub-genera is likely to reflect, at least partly, the need for koalas to access food sources from a wide variety of tree species, and across relatively large home ranges, to meet their resource requirements.

This situation may be similar to that described by Stalenberg et al. 2014 for koalas occupying low-quality, low-fertility habitats within KMA 3, and suggested for similar koala habitats of KMA 2 (Kylie Madden 2017–18, pers. comm.).

## 4.6 Central and Southern Tablelands (KMA 5)

The Central and Southern Tablelands KMA (Figure 11) supports generally sparse and patchy but none-the-less important high elevation koala populations. The Central Tablelands koalas appear to be centred on the Bathurst – Cowra – Mudgee – Lithgow area. The Southern Tablelands koalas occupy rugged, relatively infertile landscapes in the Numeralla area, east of Cooma. Targeted koala research and surveys in these areas (see references in Table 1) have provided important koala tree use information.

Summarised results of collated koala tree use evidence for the Central and Southern Tablelands KMA (Figure 11) are tabulated in Appendix 1 (Tables 19–1) to indicate tree species use patterns and relative use levels (Table 19), tree use levels within eucalyptus subgenera relative to total records held within the NSW BioNet VIS (Table 20), and an evidence-based ranking of tree species for the Central and Southern Tablelands KMA (Table 21). Brief annotation is included within Table 19 to help summarise the sourced evidence.



**Figure 11 Central & Southern Tablelands Koala Management Area (after Phillips 2000; DECC 2008)**

Evidence of koala use was found for 28 tree species in the Central and Southern Tablelands KMA (Tables 19–21); these included 24 *Eucalyptus* species (comprising 24% of 105 species with >9 records within the BioNet VIS database, and four non-eucalyptus ‘species’, the latter



including 'Acacia' species as one (also see Table 2 and Figure 6 for summary figures and graph)).

Key summary points and patterns from the tree species evidence collation and review for KMA 5 are:

- Two species, brittle gum (*E. mannifera*) and scribbly gum (*E. rossii*) were identified as regional high use species, based upon the sourced tree use evidence, in as much as they were high use species in more than two reported studies from KMA 5. An additional three species (ribbon gum (*E. viminalis*), broad-leaved peppermint (*E. dives*) and red stringybark (*E. macrorhyncha*)) were high use species in one or two KMAs.
- Species from two eucalypt sub-genera were used, in roughly similar proportions: Symphyomyrtus (13 species used of 60 with >9 BioNet VIS records in the KMA) and Eucalyptus (monocalypts) (11 species used of 45 with >9 BioNet VIS records) (Figure 6, Tables 2 and 20a). There was a lack of sourced evidence for many species from both sub-genera.
- Of five eucalypt species identified as regional high or high use species in the KMA, two were from sub-genus Symphyomyrtus and three from sub-genus Eucalyptus (Tables 19 and 20a).
- High use symphyomyrtle eucalypts species were from the white gums, manna gums, ribbon gums and apple boxes group (Section Maidenaria) (Tables 19 and 20a).
- High use monocalypts (sub-genus Eucalyptus) were from the stringybarks (Section Capillulus), the snow gums and blue-leaved ashes (Section Cineracea) and the peppermints (Section Aromatica) (Tables 19 and 20a).
- Studies were limited in number but there was evidence for relatively widespread use, at varying levels of use, for some species including *E. mannifera*, *E. viminalis*, *E. dives*, *E. macrorhyncha*, *E. rossii* and snow gum (*E. pauciflora*).
- Evidence was lacking, or at least was not sourced, for koala use of many eucalypt species known to occur within KMA 5, some reasonably extensively (Table 20a). These included symphyomyrtle eucalypts considered to be koala feed trees in the Central and Southern Tablelands KMA by Phillips (2000) and DECC (2008) – e.g. tumbledown red gum (*E. dealbata*), river red gum (*E. camaldulensis*), swamp gum (*E. ovata*), maiden's gum (*E. maidenii*), white box (*E. albens*), fuzzy box (*E. conica*). There was also a lack of collated evidence for koala use of several monocalypt species that have been listed as potential koala feed trees in this or other KMAs including yellow stringybark (*E. muelleriana*), narrow-leaved stringybark (*E. sparsifolia*), Blaxland's stringybark (*E. blaxlandii*), Canon's stringybark (*E. cannonii*) and silver-top stringybark (*E. laevopinea*) (Table 20a). Reasons for this evident non-use are discussed below (Section 5.1).
- Evidence of use of non-eucalypts was restricted to four species (including *Acacia* sp. as one.) with limited use of each at moderate to low levels. This included irregular evidence for use of white cypress-pine (*Callitris glaucophylla*) and black cypress-pine (*C. endlicheri*).
- Evidence was lacking, or at least was not sourced, for koala use of many non-eucalypt tree species within genera that include koala use species. BioNet VIS records (Table 20b) indicate some of these to be reasonably widespread and abundant within KMA 5 (e.g. species of *Angophora* and *Corymbia*).

#### 4.6.1 Central and Southern Tablelands summary

Relatively low-density koala populations appear to be utilising a limited number of preferred tree species, particularly eucalypts, but they are also using *Callitris* species in some locations, presumably mostly for shelter but possibly as supplementary food sources. As for KMA 4, extant koala habitats within KMA 5 are an aberrant reflection of European human

land-use and the cumulative clearing, fragmentation and alienation of the most fertile and productive landscapes.

Koalas may be recovering to some extent from previous declines and currently persist within fragmented habitats in more productive landscapes and larger patches of forest and woodlands remaining in less productive, typically more rugged landscapes.

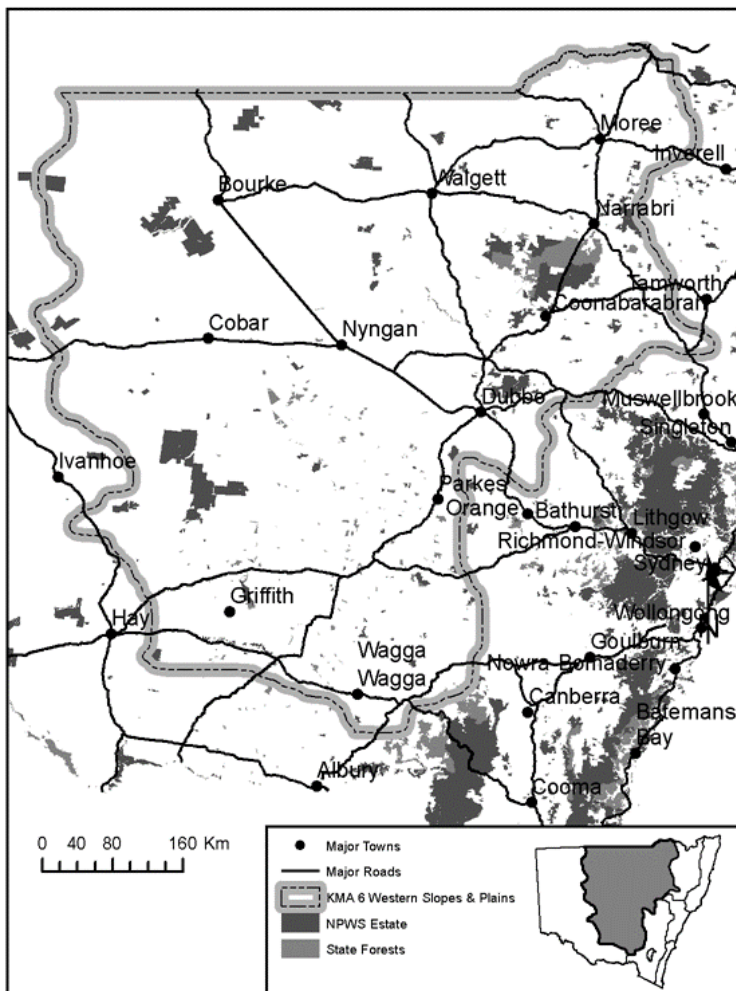
Two species were designated as a regional high use species, brittle gum *E. mannifera*, and scribbly gum *E. rossii*, but their use, and that of other eucalypts, varies across locations, potentially in response to site quality and available tree associations, much as appears the case in the Northern Tablelands KMA (see above).

## 4.7 Western Slopes and Plains (KMA 6)

This KMA occupies a large part of New South Wales (Figure 12) but targeted koala surveys have mostly been focused on the Liverpool Plains (particularly the Gunnedah area) and the Pilliga Forest (see references listed in Table 1). The Moree Plains and Walgett – Collarenebri areas have more recently been the subject of targeted koala surveys facilitated by OEH *Saving our Species* and North West Local Land Services (A Baker, LLS Gunnedah & P Spark 2017–18, pers. comm.).

These surveys were ongoing at the time of finalising this report; preliminary results have been incorporated as part of sourced evidence of koala tree use in this area. A seemingly isolated koala population also persists at Murrumbidgee National Park near Narrandera in the far south of this KMA.

Summarised results of collated koala tree use evidence for the Western Slopes and Plains KMA are tabulated in Appendix 1 (Tables 22–24) to indicate tree species use patterns and relative use levels (Table 22), tree use levels within eucalyptus sub-genera relative to total records held within the NSW BioNet VIS (Table 23), and an evidence-based ranking of tree species for the Western Slopes and Plains KMA (Table 24). Brief annotation is included within Table 22 to help summarise the sourced evidence.



**Figure 12 Western Slopes & Plains Koala Management Area (after Phillips 2000; DECC 2008)**

Evidence of koala use was found for 19 tree species in the Western Slopes and Plains KMA (Tables 22–24); these included 13 *Eucalyptus* species (comprising 24% of 54 species with >9

records within the BioNet VIS database and six non-eucalyptus ‘species’, the latter including ‘*Acacia*’ species as one (also see Table 2 and Figure 6 for summary figures and graph)).

Key summary points and patterns from the tree species evidence collation and review for KMA 6 are:

- One species, river red gum (*E. camaldulensis*) was identified as a regional high use species, based upon the sourced tree use evidence, in as much as it was a high use species in more than two reported studies from KMA 6. An additional eight species (seven eucalypts and one *Callitris* species (white cypress-pine *C. glaucophylla*)) were high use species in one or two studies across the KMA.
- Koala use species were all from the Symphyomyrtus sub-genus (13 species used of 46 with >9 BioNet VIS records in the KMA) (Figure 6, Tables 2 and 23a). Eight monocalypt eucalypts (sub-genus Eucalyptus) also occur within the KMA (>9 records within the BioNet VIS database) but no evidence of use was sourced (Figure 6, Tables 2 and 23a).
- All eight high use eucalypts were from sub-genus Symphyomyrtus (Tables 22 and 23a).
- Four of the high use symphyomyrtle eucalypts were from the red gum group (Section Exsertaria) and four were from the box – ironbark group (Section Adnataria) (Table 22).
- Studies were limited in number but there was evidence for relatively widespread use for some species including dirty (or Baradine) gum (*E. chloroclada*), Blakely’s red gum (*E. blakelyi*), *E. camaldulensis*, poplar or bimple box (*E. populnea*), white box (*E. albens*), and *Callitris glaucophylla*.
- Tumbledown red gum (*E. dealbata*) was used extensively on the Liverpool Plains (e.g. Gunnedah area).
- Pilliga box (*E. pilligaensis*) was used extensively in the Pilliga Forest.
- Relatively extensive use of coolibah (*E. coolabah*) was confirmed by Phil Spark (2017–18, pers. comm.) during recent surveys in the Narrabri – Collarenebri – Moree district.
- It is noted that the recorded high use of Mugga ironbark (*E. sideroxylon*) appears to be an artifact of plantings of this species throughout parts of Gunnedah, leading to artificially elevated use of this species beyond that recorded elsewhere, in that location (Phil Spark 2017–18, pers. comm.).
- Evidence was lacking, or at least was not sourced, for koala use of many eucalypt species known to occur within KMA 6, some reasonably extensively (Table 23a). These included symphyomyrtle eucalypts considered to be koala feed trees in this KMA by Phillips (2000) and DECC (2008) – e.g. mallee red gum (*E. nandewarica*), Dwyer’s red gum (*E. dwyeri*), Manara Hills red gum (*E. vicina*), black box (*E. largiflorens*) and fuzzy box (*E. conica*). Stringybarks are relatively uncommon across KMA 6 but evidence of use for two that do occur quite commonly, and which are listed for possible use within the KMA by Phillips (2000) and DECC (2008), was not found; these are red stringybark (*E. macrorhyncha*) and narrow-leaved stringybark (*E. sparsifolia*) (Table 23a). Reasons for this evident non-use are discussed below (Section 5.1).
- Evidence of use of non-eucalypts was restricted to five species (including *Acacia* sp.). *Callitris glaucophylla* is mentioned above as a high use species but evidence for the use of other non-eucalypts was generally at lower levels.
- Evidence was lacking, or at least was not sourced, for koala use of a number of non-eucalypt tree species within genera that include koala use species. BioNet VIS records (Table 23b) indicate some of these to be reasonably widespread and abundant within KMA 6 (e.g. black cypress-pine (*Callitris endlicheri*)).

#### 4.7.1 Western Slopes and Plains summary

A small number of preferred tree species (19) are used by an extensive koala population occupying habitats ranging from large contiguous blocks, generally in less productive remnant landscapes, (e.g. Pilliga – Kavanagh and Barrott 2001) to remnant trees along water courses and within urban and agricultural areas (e.g. Gunnedah – North West Ecological 2016).

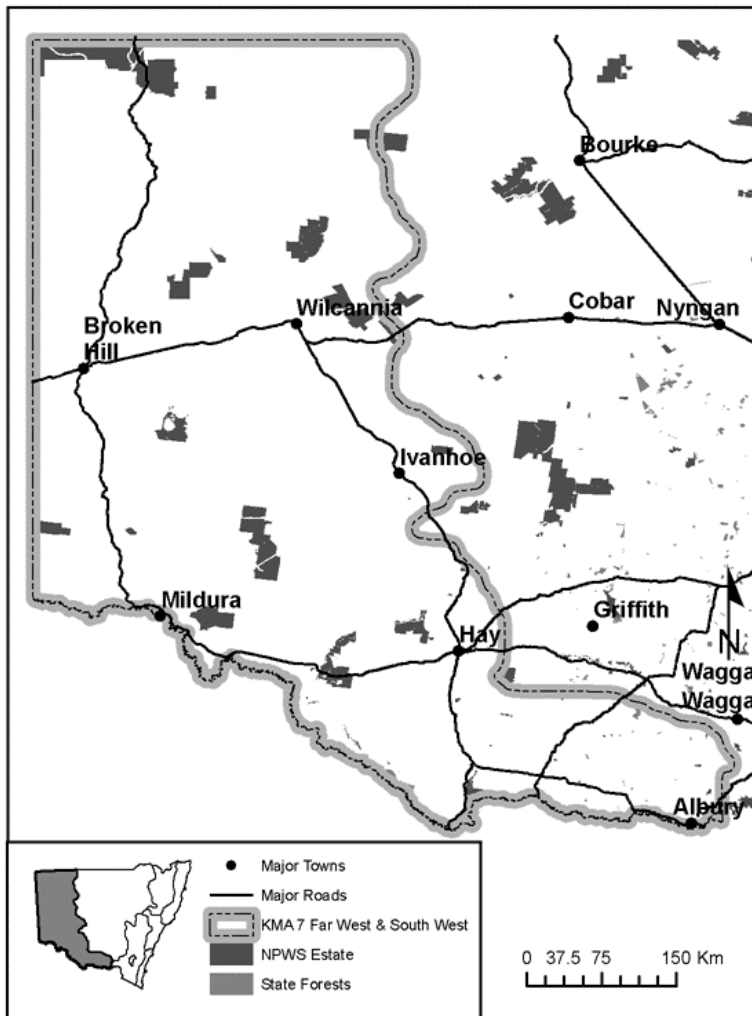
Travelling Stock Routes, road reserves and other Crown Reserves provide important habitat and connectivity within productive landscapes. One species was designated as a regional high use species, river red gum (*E. camaldulensis*) and seven other species (six eucalypts from the red gum and box sections and white cypress-pine (*Callitris glaucophylla*)) were designated high use species.

Combinations of these key species, in various associations with other tree species, appear to provide the basis for occupied koala habitats across this KMA. Thermoregulatory needs and behavioural responses to extreme temperature and drought may be as important as, if not more important than dietary needs in directing koala tree use, at least during hot and dry seasons. As elsewhere, the combination of dietary, shelter and social needs, individual koalas' responses to those needs and responses to local habitat disturbance regimes provide the mechanism for realised habitat niches and observed tree use patterns.



## 4.8 Far West and South West (KMA 7)

The Far West and South West KMA (Figure 13) includes large tracts that are unsuitable for koalas. There are historical koala records for the area between Ivanhoe and Wilcannia in the far west but tree use information could not be sourced and a well-informed Ivanhoe resident (ex-Mayor Mr Ray Longfellow) indicated that he had not heard of any koala sightings in that area over the last decade or more. An extant koala population persists in the Murray Valley National Park in the Riverina district. Targeted koala surveys and tree use studies are yet to be conducted for this koala population (A Lavender, NPWS Moama, pers. comm.).



**Figure 13 Far West and South West Koala Management Area (after Phillips 2000; DECC 2008)**

There was a near complete lack of documented koala tree use in this KMA but summarised results of sourced information, including predictions relating to tree species considered likely to be used by koalas in the KMA, are tabulated in Appendix 1 (Tables 25–27) to indicate tree species use (and likely use) patterns and relative use levels (Table 25), tree use levels (and likely levels) within eucalyptus sub-genera (and non-eucalypt genera), relative to total records held within the NSW BioNet VIS (Table 26), and a ranking of tree species likely to be used (Table 27). Brief annotation is included within Table 25 to help summarise the sourced evidence.

The only documented evidence of koala tree use within KMA 7 sourced for this review came from a local Ranger (Ms Amanda Lavender) for the Murray Valley National Park, which supports significant river red gum (*E. camaldulensis*) habitat (in association with similar

Victorian habitats), in the Riverina district south of Deniliquin. This species is a regional high use species for KMA 7.

Indicative likely use has been inferred for nine species (Tables 2, 25 and 26), based upon evidence of use from semi-arid koala populations in south-west Queensland and mapped distributions of vegetation communities containing likely koala use trees (see references in Table 1).

Evidence of use within other KMAs was found for all except black box (*E. largiflorens*). Despite the high likelihood that targeted survey will reveal koala use of this and other box species, in this KMA it was not included in the total tree species counts for New South Wales.

#### **4.8.1 Far West and South West KMA summary**

In the south-east of KMA 7 koalas are known to be extant in small, patchy and low-density populations along the Murray River (e.g. Murray Valley National Park – Amanda Lavender, NPWS Ranger, pers. comm.) where they are known to use river red gum (*E. camaldulensis*) as a regional high use species. It is likely, but not documented, that koalas make use of other species, e.g. box species of the adjacent floodplains.

The status of koalas in far western parts of the KMA is largely unknown but populations are presumed to be very small and restricted to riverine and floodplain habitats if present at all.

## 5. Discussion

This qualitative evidence-based review has allowed the compilation and interpretation of a broad suite of data relating to koala tree use across seven NSW KMAs. Tree taxonomy is a moving feast and changes to species designations over many years unavoidably cloud the outcomes of this review for some species. However, the collated evidence indicates that koalas make use of a broad range of tree species, as food, shelter or for social purposes, across the seven KMAs and that *Eucalyptus* species are clearly used preferentially. Local koala populations appear to make use of suitable *Eucalyptus* species according to broad patterns of availability and distribution and evidence for koala use was generally highest for the most abundant *Eucalyptus* species within a region or KMA. Within these abundant species groups, the collated and reviewed evidence suggests that, in most locations, subsets of eucalyptus species are favoured by koalas over others.

The review has also highlighted the use of tree species other than eucalypts by koalas. These included representatives from many genera particularly *Angophora*, *Corymbia*, *Lophostemon*, *Syncarpia*, *Allocasuarina* and *Callitris*. The use of non-eucalypt tree species varied between and within KMAs. Use may include feeding, shelter or other purposes but, as outlined above, it remains evident that these taxa do not determine koala occurrence and forests or woodlands dominated by them would never be high-quality koala habitats. Rather, use of these taxa, for whatever purpose, is likely to relate to the presence of eucalypts favoured by koalas for feeding in particular (e.g. Callaghan et al. 2011).

Some broad patterns and distinctions emerged from the review including varying use of eucalyptus species between and within KMAs and the lack of evidence for use of many species otherwise considered to be potential koala feed trees (e.g. Phillips (2000), DECC 2008)). Detailed studies of leaf chemistry and nutrient availability in response to varying soil character, terrain and topography remain to be done for most species. But the work of Moore et al. (2004b) on *E. microcorys* highlights that leaf palatability is likely to vary with environmental conditions and the relative availability of nutrients within available leaf forage.

These variations highlight the importance of characterising koala tree preferences at local scales. It is anticipated that extrapolation of tree use patterns to regional scales, undertaken considering local patterns, maintains sufficient integrity for derived tree species ranks and patterns to be informative for regional koala habitat modelling.

### 5.1 Evident koala non-use of tree species

A common factor across all seven KMAs, as outlined in the results above, was the lack of evidence for koala use of many eucalypt (and non-eucalypt) species known to occur, some with extensive occurrences, as revealed through collated records within the OEH BioNet VIS database. Some of these species are eucalypts listed as koala food trees by Phillips (2000) and DECC (2008) (Appendix 2).

This evident non-use may reflect:

- koala avoidance or non-preference, presumably relating to complex combinations and interactions of factors reviewed in Section 2.1.3: tree leaf chemistry, site quality and soil nutrients, tree genetic lineage, moisture and water availability, varying shelter and social needs, effects of varying tree neighbourhoods and associations, disturbance impacts and resultant forest or woodland structure, landscape configuration and impacts on koala movement abilities, and the local presence of different threats such as dogs and disease
- spatial habitat separation (e.g. species growing on poor soils with low-nutrient availability) meaning that koalas rarely if ever come across the tree species

- lack of targeted koala survey, or documentation of findings, in certain areas and environments
- incomplete sourcing of available tree use evidence.

It is not possible, nor necessary, to decipher these encrypted factors in this review, which aims to collate and summarise available koala tree use evidence. It is worth bearing these factors in mind, however, when considering the patterns and rankings reported herein.

## 5.2 Application of the review findings in regional and state level koala habitat mapping

This koala tree use review and ranking was prompted by the rationale that the koala's broad range across New South Wales means that environmental predictors for habitat modelling are likely to be most applicable when they are tailored to reflect regional, and even local, habitat use and occurrence patterns (McAlpine et al. 2008). This evidence-based review of koala tree use was planned and undertaken to inform canopy tree species modelling by ranking koala tree use across recognised NSW Koala Management Areas.

As referred to in the caveat on koala tree use patterns (Section 4.1.1 above), extension of the derived koala tree use ranks to koala habitat predictive mapping assumes that the ranks reflect real koala use and selection patterns rather than simply more passive use of trees according to their relative abundance and availability.

The vast majority of the sourced local koala habitat studies have investigated the use of tree species by koalas in comparison with the relative availability of tree species at sampling plots. Without exception, these comparisons revealed koala selection of a subset of tree species over others within any particular location, providing confidence in the local tree use patterns described.

This review has striven to provide a direct reflection of reported local patterns and has incorporated the consideration of regional tree species availability, and its potential impact on regional koala tree use patterns, through interrogation of regional (KMA) and state tree species occurrence records held within the BioNet VIS database, the standard repository for plot-based vegetation species data. Statistical analyses have not been incorporated in considering these broad patterns, but visual assessment of the tables generated to illustrate these data clearly show that:

- koalas do make use of tree species in broad accordance with the tree species' distribution and abundance
- tree use levels are patchy, within species, genera and sub-genera (particularly *Eucalyptus* sub-genera) indicating active selection rather than uniform use.

The innate variability found within koala tree use means that localised studies are more effective at defining koala habitat than regional or state (or national) studies, but localised information can then be extended and used to protect and enhance koala habitat more effectively at broader scales. The rankings of koala tree use for KMAs have been undertaken in that light.

### 5.2.1 Habitat palatability and non-palatability as inputs to koala habitat mapping

This review has confirmed the view that, in many locations, koalas prefer a subset of key tree species (e.g. Callaghan et al. 2011), but it has also highlighted that koalas generally make use of a variety of tree species, whether for food, shelter or other purposes. Variety may well prove to be the spice of life for koalas, with tree associations and tree species diversity as important determinants of habitat quality at any locality, providing koalas with the

variety of resources necessary to meet their needs. This point is implicit within the results of local koala habitat studies sourced for this review (Table 1 above), and has been stressed through the findings of Phillips (2000), Stalenberg et al. (2014), Youngentob (2014), Leigh/Science for Wildlife (2017) and Wilmott et al. (unpublished data), as well as the foundation work of many investigators of koala tree use and diet (see numerous references in list).

Tree species of the eucalypt sub-genus *Symphyomyrtus* are widely considered to constitute the mainstay of preferred koala trees (e.g. Moore et al. 2004a, Youngentob 2014) but evidence collated from local habitat studies suggests that species from the *Eucalyptus* sub-genus (often referred to as ‘monocalypts’) may be as important in some locations, and not all *Symphyomyrtle* species are used at high levels.

This review confirms the high importance of some *Symphyomyrtle* species across all NSW KMAs but also highlights the importance of species from the *Eucalyptus* sub-genus, particularly in the Central Coast, South Coast, Northern Tablelands and Central and Southern Tablelands KMAs. If variety in leaf chemical properties is as important as many local koala habitat studies suggest, then it may be that locations supporting combinations of the two (or three where tallowwood also occurs) eucalypt sub-genera are potential high-quality koala habitats.

Moore et al. (2010) refer to ‘palatability mapping’ as an important driver of local koala habitat selection whereby the composition of a forest or woodland neighbourhood, in terms of the availability of large and palatable tree species and individual trees, is an important contributor to habitat quality for koalas. The extent to which palatability, and the interplay between leaf nutrients and toxins, affects koala habitat and tree use at broader scales is likely to vary from region to region (Callaghan et al. 2011). For example, in more arid environments (e.g. the NSW western slopes and plains and south-west Queensland), thermoregulatory requirements may be just as important as leaf palatability in driving tree use patterns (Sullivan et al. 2003, Kavanagh et al. 2007, Ellis et al. 2010, Crowther et al. 2014, Briscoe et al. 2016).

Whatever the precise driver it appears that characterisation of koala tree use patterns, and derivation of spatial products reflecting those patterns, may be useful as inputs to koala habitat modelling and mapping at regional and state levels. Landscapes supporting predicted high or low probability habitats for high koala use tree species, associations of those species, or derived indices of abundance or diversity for those species, may be important koala habitats.

Stalenberg et al. (2014) promote taxonomic and phenotypic diversity (in available trees) as being of likely importance for koalas foraging in habitats of low nutritional quality; these measures of diversity may provide dietary choice to trade-off nutrients and toxins and minimise movement costs. It seems plausible that koalas make such trade-offs wherever they occur, even in habitats of higher nutritional quality, typically dominated by *Symphyomyrtle* eucalypts.

Extrapolation of this concept to broader spatial scales would suggest that landscapes supporting a diversity of potential food (or other use) trees may also be important koala habitats. This could include the need for alternative refuge habitat and trees during times of extreme hot weather and drought such as moister, cooler gullies and drainage lines which may even be unoccupied for extended periods but are none-the-less important parts of a koala’s home range.



### **5.2.2 Potential indices of koala tree use for regional and state level koala predictive habitat mapping**

It is anticipated that the regional koala tree use patterns and ranks discerned through this review offer a rationale and basis for the development of spatial indices (regionally tailored) of koala tree use, with application to koala predictive habitat suitability mapping at regional and state scales.

Examples of koala tree use indices following the findings of this review include:

- Indices reflecting the occurrence, and co-occurrence, of tree species with documented known high use. These indices could be derived to reflect the co-occurrence or association of tree species in particular environments relevant to koala distributions within designated regions (e.g. coastal sand-beds, floodplains and river valleys, forests and woodlands on different landforms).
- Indices reflecting the relative diversity of known koala use trees. Such indices would be built upon relative weightings applied to the ranked koala trees of a designated study region (e.g. a KMA); the hierarchy of weightings could be varied region to region to reflect the perceived relative importance of trees ranging from regional high use to low use and emphasising those high use tree species, most likely feed trees, that are fundamental to koala occupancy in different locations and environments.
- Indices of the relative proportion of known high use koala tree species (e.g. for any location across a KMA) as opposed to lower use tree species and non-use tree species.
- Indices of weighted summation of the probability of occurrence of koala use tree species for any location across a designated region (e.g. a KMA). The use of weightings of the ranked koala use trees in the development of such indices would again allow for the reflection of perceived regional tree use nuances.
- Indices dealing with remnants in areas largely cleared of native vegetation (e.g. trees and remnants within urban or agriculture-dominated landscapes).

It is anticipated that the derivation and application of koala tree use indices would incorporate recognition of the apparent importance of spatial context, or neighbourhood, in the determination of koala habitat quality.

The consideration of koala home range size, as it applies to each study region (e.g. KMA), would provide an ecologically relevant context.

### **5.2.3 Potential spatial masks of likely non-preferred tree species and associations for regional and state level koala habitat mapping**

The identification of likely koala non-habitat is an important part of koala conservation and regulation (e.g. McIlwee 2016, Law et al. 2017)).

The findings of this review offer scope for the identification and delineation of koala non-habitats that could be used to mask such areas from regional and state koala habitat mapping.

Such masks would need to be applied in recognition that these may be non-breeding habitats, but could still be used as movement habitat; this would draw a mapping distinction between potential breeding habitat and potential movement habitat. Examples of masks based on this review's findings could include:

- areas of non-habitat, e.g. pure rainforests, heathlands, wetlands, non-eucalypt swamp forests, grasslands, urban areas, and croplands without scattered eucalypts
- areas supporting only species of the eucalypt sub-genus *Eucalyptus*, i.e. areas devoid of species from the *Symphomyrtus* and *Alveolata* sub-genera

- areas supporting very low eucalypt diversity (e.g. forest stands dominated by one or two eucalypt species such as blackbutt (*E. pilularis*) or large-fruited blackbutt (*E. pyrocarpa*) on the north coast, silvertop ash (*E. sieberi*) on the south coast, alpine ash (*E. delegatensis*) in the alps, or white box (*E. albens*) on the western slopes).

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# Appendix 1. Tables of canopy tree species use for each individual Koala Management Area in New South Wales

**Table 7 Canopy tree species with evidence of koala use within the North Coast KMA (after Phillips 2000; DECC 2008)**

Results are summarised mostly from LGA-based koala habitat studies and studies undertaken for research and regulatory purposes (see Table 1 for references and koala experts consulted for personal opinions). For 3 LGAs results reflect tree use data for habitats of different soil landscapes (broad fertility): H = High, M = medium, L = Low.

	NC Upper (Reed et al. 1990)	Tweed (M-H)	Tweed (L-M)	Coastal Byron	Ballina	Lismore	Richmond Valley	Clarence Valley	Coffs Harbour	Bellingen	Nambucca	Kempsey (M-H)	Kempsey (L-M)	Port Macquarie (M-H)	Port Macquarie (L-M)	Mid Coast (Greater Taree)	Port Stephens	NC Lower (Reed et al. 1990)
<b>Documented high use</b>																		
<b>Documented significant use</b>																		
<b>Documented irregular use</b>																		
<b>Documented low use</b>																		
<b>Species</b>																		
<b>Sub-Genus Alveolata – tallowwood is a high use species across the North Coast KMA</b>																		
Tallowwood ( <i>E. microcorys</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
<b>Sub-Genus Symphyomyrtus</b>																		
<b>Section Latoangulatae (blue gums, red mahoganies, grey gums) – includes favoured koala trees of the North Coast KMA</b>																		
Flooded gum ( <i>E. grandis</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Sydney blue gum ( <i>E. saligna</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Large-fruited red mahogany ( <i>E. scias</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Red mahogany ( <i>E. resinifera</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Swamp mahogany ( <i>E. robusta</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Small-fruited grey gum ( <i>E. propinqua</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Grey gum ( <i>E. biturbinata</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Large-fruited grey gum ( <i>E. canaliculata</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Grey gum ( <i>E. punctata</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
<b>Section Liberivalvae (red gums) – includes 2 locally high use species</b>																		
Narrow-leaved red gum ( <i>E. seeana</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Orange gum ( <i>E. bancroftii</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Parramatta red gum ( <i>E. parramattensis</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
<b>Section Exsertaria (red gums) – includes regional and local high use species</b>																		
Slaty red gum ( <i>E. glaucina</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Cabbage gum ( <i>E. amplifolia</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Forest red gum ( <i>E. tereticornis</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
<b>Section Maidenaria (white gums, manna gums, ribbon gums, apple boxes) – generally higher elevation group – marginal on North Coast</b>																		
White-topped box ( <i>E. quadrangulata</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Ribbon gum ( <i>E. viminalis</i> )	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High

Species	NC Upper (Reed et al. 1990)	Tweed (M-H)	Tweed (L-M)	Coastal Byron	Ballina	Lismore	Richmond Valley	Clarence Valley	Coffs Harbour	Bellingen	Nambucca	Kempsey (M-H)	Kempsey (L-M)	Port Macquarie (M-H)	Port Macquarie (L-M)	Mid Coast (Greater Taree)	Port Stephens	NC Lower (Reed et al. 1990)
<b>Section Adnataria (boxes, ironbarks) – mixed use by koalas of the North Coast KMA</b>																		
Steel box ( <i>E. rummeryi</i> )							Yellow	Blue	Yellow									
Grey box ( <i>E. moluccana</i> )							Orange	Blue									Yellow	
Red ironbark ( <i>E. fibrosa</i> )							Yellow										Yellow	
Grey ironbark ( <i>E. siderophloia</i> )		Blue	Blue				Blue		Orange	Yellow			Yellow	Blue	Blue	Blue		
Narrow-leaved ironbark ( <i>E. crebra</i> )							Blue										Yellow	
Grey ironbark ( <i>E. placita</i> )																Yellow		
Yellow box ( <i>E. melliodora</i> )								Blue										
<b>Sub-Genus Eucalyptus</b>																		
<b>Section Amentum (white mahoganies) – notable evidence for two species when in association with more favoured tree species</b>																		
White mahogany ( <i>E. acmenoides</i> )					Yellow		Orange	Yellow	Orange	Yellow							Yellow	Blue
Bastard white mahogany ( <i>E. psammitica</i> )							Yellow											
Broad-leaved white mahogany ( <i>E. carnea</i> )			Yellow		Yellow							Yellow	Yellow	Blue			Yellow	
Bastard white mahogany ( <i>E. umbra</i> )																	Yellow	
<b>Section Pseudophloius (pseudo stringybarks) – notable use of blackbutt across the North Coast in association with more favoured species</b>																		
Blackbutt ( <i>E. pilularis</i> )	Orange	Blue	Blue	Orange	Blue		Blue		Orange			Blue	Yellow	Blue	Blue	Yellow	Yellow	Orange
<b>Section Capillulus (stringybarks) – overall patchy occurrence in the North Coast KMA and koala use evidence is similarly patchy</b>																		
Silver-top stringybark ( <i>E. laevopinea</i> )																		Blue
Brown stringybark ( <i>E. captallata</i> )																		Blue
White stringybark ( <i>E. globoidea</i> )													Orange	Blue	Blue		Yellow	
Thin-leaved stringybark ( <i>E. eugenoides</i> )							Orange	Blue								Blue	Yellow	
Tindale's stringybark ( <i>E. tindaliae</i> )							Orange	Blue										
<b>Section Cineraceae (snow gum and blue-leaved ashes) – overall low use on the north coast; some notable use of scribbly gum</b>																		
New England blackbutt ( <i>E. campanulata</i> )																		Blue
Scribbly gum ( <i>E. signata/E. racemosa</i> )	Blue	Blue		Blue			Yellow					Blue	Blue		Blue		Orange	
Sydney peppermint ( <i>E. piperita</i> )																		Blue
<b>Section Insolitae – single species, <i>E. planchoniana</i></b>																		
Bastard tallowwood ( <i>E. planchoniana</i> )							Blue											
<b>Non-Eucalypts – extensive documented use of non-eucalypts by koalas for feeding and for shelter across the North Coast</b>																		
<b>Corymbias</b>																		
Red bloodwood ( <i>C. gummifera</i> )							Blue						Blue		Blue	Yellow	Blue	
Pink bloodwood ( <i>C. intermedia</i> )				Blue	Yellow	Yellow	Blue	Yellow		Yellow			Yellow	Blue	Blue			
Spotted gum ( <i>C. henryi</i> )	Blue						Blue	Yellow						Blue	Blue			

An evidence-based review of koala tree use across New South Wales

Species	NC Upper (Reed et al. 1990)	Tweed (M-H)	Tweed (L-M)	Coastal Byron	Ballina	Lismore	Richmond Valley	Clarence Valley	Coffs Harbour	Bellingen	Nambucca	Kempsey (M-H)	Kempsey (L-M)	Port Macquarie (M-H)	Port Macquarie (L-M)	Mid Coast (Greater Taree)	Port Stephens	NC Lower (Reed et al. 1990)
Spotted gum ( <i>C. maculata</i> )							■	■						■	■		■	■
<b>Lophostemons</b>																		
Brushbox ( <i>L. confertus</i> )				■	■	■	■	■	■				■					■
Swamp turpentine ( <i>L. suaveolens</i> )		■	■	■			■											
<b>Syncarpias</b>																		
Turpentine ( <i>S. glomulifera</i> )					■		■		■	■		■	■				■	
<b>Angophoras</b>																		
Rough-barked apple ( <i>A. floribunda</i> )							■										■	
Smooth-barked apple ( <i>A. costata</i> )									■							■	■	
<b>Allocasuarinas/Casuarinas</b>																		
Black she-oak ( <i>A. littoralis</i> )												■	■	■	■			
Forest oak ( <i>A. torulosa</i> )		■		■	■	■	■		■	■		■	■	■	■		■	■
Swamp oak ( <i>C. glauca</i> )		■	■	■		■	■							■			■	
<b>Acacias</b>																		
Acacia species		■		■	■		■		■									■
<b>Banksias</b>																		
Banksia species					■		■											■
<b>Callitris</b>																		
Coastal cypress-pine ( <i>C. columellaris</i> )		■			■													
<b>Melaleucas</b>																		
Willow bottlebrush ( <i>M. salignus</i> )		■	■	■					■					■	■			
Broad-leaved paperbark ( <i>M. quinquinervia</i> )		■	■	■	■		■		■					■	■	■	■	
<b>Other</b>																		
Camphor laurel ( <i>Cinnamomum camphora</i> )		■	■	■	■					■								
Red ash ( <i>Alphitonia excelsa</i> )							■		■									
Hard corkwood ( <i>Endiandra sieberi</i> )							■		■									
Cheese tree ( <i>Glochidion ferdinandi</i> )					■		■											
Rainforest species							■		■									

**Table 8 Koala use classes assigned to tree species with BioNet VIS records for the North Coast KMA (as of September 2017) & ranked in order of total records**

Regional high use	High use	Significant use	Irregular use	Low use	No sourced evidence of use
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**a) Eucalypts – listed within sub-genera**

Species	VIS records	Species	VIS records
<b>Sub-Genus Alveolata</b>		<b>Sub-Genus Symphyomyrtus (cont.)</b>	
1 <i>Eucalyptus microcorys</i>	5,270	41 <i>Eucalyptus viminalis</i>	16
		42 <i>Eucalyptus scias</i>	15
<b>Sub-Genus Eudesma</b>		43 <i>Eucalyptus sideroxylon</i>	13
1 <i>Eucalyptus baileyana</i>	221	44 <i>Eucalyptus michaeliana</i>	11
		45 <i>Eucalyptus camaldulensis</i>	10
<b>Sub-Genus Symphyomyrtus (Symphyomyrts)</b>		46 <i>Eucalyptus nicholii</i>	9
1 <i>Eucalyptus siderophloia</i>	3,124	47 <i>Eucalyptus botryoides</i>	8
2 <i>Eucalyptus propinqua</i>	2,713	48 <i>Eucalyptus conica</i>	8
3 <i>Eucalyptus tereticornis</i>	2,384	49 <i>Eucalyptus deanei</i>	7
4 <i>Eucalyptus saligna</i>	2,003	50 <i>Eucalyptus longifolia</i>	5
5 <i>Eucalyptus parramattensis</i>	1,653	51 <i>Eucalyptus albens</i>	4
6 <i>Eucalyptus grandis</i>	1,480	52 <i>Eucalyptus cypellocarpa</i>	4
7 <i>Eucalyptus resinifera</i>	1,446	53 <i>Eucalyptus major</i>	4
8 <i>Eucalyptus robusta</i>	1,444	54 <i>Eucalyptus dealbata</i>	3
9 <i>Eucalyptus moluccana</i>	831	55 <i>Eucalyptus retinens</i>	3
10 <i>Eucalyptus tetrapleura</i>	820	56 <i>Eucalyptus globulus</i>	1
11 <i>Eucalyptus fibrosa</i>	718	57 <i>Eucalyptus leucoxylon</i>	1
12 <i>Eucalyptus crebra</i>	515	58 <i>Eucalyptus pseudoglobulus</i>	1
13 <i>Eucalyptus biturbinata</i>	464		
14 <i>Eucalyptus glaucina</i>	429	<b>Sub-Genus Eucalyptus ('Monocalypts')</b>	
15 <i>Eucalyptus dunnii</i>	428	1 <i>Eucalyptus pilularis</i>	3,858
16 <i>Eucalyptus punctata</i>	414	2 <i>Eucalyptus camfieldii</i>	2,270
17 <i>Eucalyptus amplifolia</i>	377	3 <i>Eucalyptus acmenoides</i>	2,207
18 <i>Eucalyptus seeana</i>	358	4 <i>Eucalyptus carnea</i>	1,659
19 <i>Eucalyptus paniculata</i>	264	5 <i>Eucalyptus campanulata</i>	804
20 <i>Eucalyptus bancroftii</i>	246	6 <i>Eucalyptus signata</i>	779
21 <i>Eucalyptus canaliculata</i>	191	7 <i>Eucalyptus globoidea</i>	723
22 <i>Eucalyptus rummeryi</i>	173	8 <i>Eucalyptus umbra</i>	620
23 <i>Eucalyptus fusiformis</i>	109	9 <i>Eucalyptus planchoniana</i>	580
24 <i>Eucalyptus fergusonii</i>	104	10 <i>Eucalyptus eugenioides</i>	564
25 <i>Eucalyptus quadrangulata</i>	102	11 <i>Eucalyptus cameranii</i>	281
26 <i>Eucalyptus notabilis</i>	95	12 <i>Eucalyptus laevopinea</i>	270
27 <i>Eucalyptus placita</i>	89	13 <i>Eucalyptus pyrocarpa</i>	256
28 <i>Eucalyptus nobilis</i>	80	14 <i>Eucalyptus piperita</i>	229
29 <i>Eucalyptus dorrigoensis</i>	76	15 <i>Eucalyptus obliqua</i>	174
30 <i>Eucalyptus melliodora</i>	67	16 <i>Eucalyptus psammitica</i>	131
31 <i>Eucalyptus ancophila</i>	59	17 <i>Eucalyptus agglomerata</i>	120
32 <i>Eucalyptus largeana</i>	54	18 <i>Eucalyptus capitellata</i>	86
33 <i>Eucalyptus brunnea</i>	40	19 <i>Eucalyptus caliginosa</i>	84
34 <i>Eucalyptus rudderi</i>	40	20 <i>Eucalyptus radiata</i>	58
35 <i>Eucalyptus melanophloia</i>	33	21 <i>Eucalyptus oreades</i>	54
36 <i>Eucalyptus blakelyi</i>	25	22 <i>Eucalyptus racemosa</i>	47
37 <i>Eucalyptus acaciiformis</i>	18	23 <i>Eucalyptus fastigata</i>	46
38 <i>Eucalyptus nova-anglica</i>	18	24 <i>Eucalyptus pauciflora</i>	38
39 <i>Eucalyptus bridgesiana</i>	16	25 <i>Eucalyptus ligustrina</i>	34
40 <i>Eucalyptus ophitica</i>	16	26 <i>Eucalyptus haemastoma</i>	32

Species	VIS records	Species	VIS records
<b>Sub-Genus Eucalyptus ('Monocalypts') (cont.)</b>		<b>Sub-Genus Eucalyptus ('Monocalypts') (cont.)</b>	
27 <i>Eucalyptus olida</i>	32	38 <i>Eucalyptus stellulata</i>	10
28 <i>Eucalyptus andrewsii</i>	31	39 <i>Eucalyptus dives</i>	6
29 <i>Eucalyptus serpentinicola</i>	31	40 <i>Eucalyptus microcodon</i>	6
30 <i>Eucalyptus beyeriana</i>	30	41 <i>Eucalyptus sieberi</i>	4
31 <i>Eucalyptus pachycalyx</i>	30	42 <i>Eucalyptus codonocarpa</i>	2
32 <i>Eucalyptus sparsifolia</i>	26	43 <i>Eucalyptus dissita</i>	2
33 <i>Eucalyptus approximans</i>	19	44 <i>Eucalyptus elata</i>	1
34 <i>Eucalyptus nitens</i>	19	45 <i>Eucalyptus oblonga</i>	1
35 <i>Eucalyptus interstans</i>	15	46 <i>Eucalyptus subcaerulea</i>	1
36 <i>Eucalyptus williamsiana</i>	12	47 <i>Eucalyptus youmanii</i>	1
37 <i>Eucalyptus macrorhyncha</i>	10		

### b) Non-eucalypts – listed within genera or ‘others’ with evidence of koala use

Species	VIS records	Species	VIS records
<b>Acacias (species not assigned)</b>		<b>Casuarinas</b>	
<i>Acacia melanoxylon</i>	2,001	<i>Casuarina cunninghamiana</i>	700
<i>Acacia irrorata</i>	1,672	<i>Casuarina glauca</i>	2,072
<i>Acacia floribunda</i>	728	<b>Corymbias</b>	
<i>Acacia falcata</i>	579	<i>Corymbia intermedia</i>	4,108
<i>Acacia aulacocarpa</i>	247	<i>Corymbia maculata</i>	1,861
<i>Acacia falciformis</i>	159	<i>Corymbia gummifera</i>	1,683
<i>Acacia parramattensis</i>	31	<i>Corymbia henryi</i>	548
<i>Acacia decurrens</i>	29	<i>Corymbia variegata</i>	523
<i>Acacia dealbata</i>	18	<i>Corymbia trachyphloia</i>	52
<i>Acacia mearnsii</i>	11	<i>Corymbia eximia</i>	4
<i>Acacia cognata</i>	1	<i>Corymbia tessellaris</i>	3
<b>Allocasuarinas</b>		<b>Lophostemons</b>	
<i>Allocasuarina torulosa</i>	5,686	<i>Lophostemon confertus</i>	4,494
<i>Allocasuarina littoralis</i>	2,148	<i>Lophostemon suaveolens</i>	1,376
<b>Angophoras</b>		<b>Melaleucas</b>	
<i>Angophora costata</i>	1,693	<i>Melaleuca quinquenervia</i>	3,024
<i>Angophora inopina</i>	1,308	<i>Melaleuca salignus</i>	1,816
<i>Angophora robur</i>	1,056	<i>Melaleuca nodosa</i>	1,347
<i>Angophora subvelutina</i>	766	<i>Melaleuca styphelioides</i>	1,113
<i>Angophora floribunda</i>	406	<i>Melaleuca linariifolia</i>	1,102
<i>Angophora woodsiana</i>	401	<i>Melaleuca sieberi</i>	940
<i>Angophora paludosa</i>	134	<i>Melaleuca hypericifolia</i>	6
<i>Angophora leiocarpa</i>	42	<b>Syncarpia</b>	
<i>Angophora bakeri</i>	8	<i>Syncarpia glomulifera</i>	3,725
<b>Banksias (species not assigned)</b>		<b>Others</b>	
<i>Banksia integrifolia</i>	1,375	<i>Alphitonia excelsa</i>	2,884
<i>Banksia serrata</i>	788	<i>Brachychiton populneus</i>	171
<b>Callitris</b>		<i>Ceratopetalum apetalum</i>	765
<i>Callitris columellaris</i>	167	<i>Glochidion ferdinandi</i>	2,730
<i>Callitris endlicheri</i>	6	<i>Grevillea robusta</i>	308
<i>Callitris glaucophylla</i>	2	<i>Cinnamomum camphora</i>	?



**Table 9 A ranking of canopy trees with sourced evidence of use in the North Coast KMA**

Regional high use (>2 areas in region)		Local high use		Significant use		Irregular use		Low use	
Rank	Species	Rank	Species	Rank	Species	Rank	Species	Rank	Species
1	Tallowwood ( <i>E. microcorys</i> )	4	Yellow box ( <i>E. melliodora</i> )						
1	Swamp mahogany ( <i>E. robusta</i> )	4	Broad-leaved white mahogany ( <i>E. carnea</i> )						
1	Small-fruited grey gum ( <i>E. propinqua</i> )	4	Silver-top stringybark ( <i>E. laevopinea</i> )						
1	Forest red gum ( <i>E. tereticornis</i> )	4	Brown stringybark ( <i>E. capitallata</i> )						
2	Red mahogany ( <i>E. resinifera</i> )	4	New England blackbutt ( <i>E. campanulata</i> )						
2	Orange gum ( <i>E. bancroftii</i> )	4	Sydney peppermint ( <i>E. piperita</i> )						
2	Parramatta red gum ( <i>E. parramattensis</i> )	4	Bastard tallowwood ( <i>E. planchoniana</i> )						
2	Slaty red gum ( <i>E. glaucina</i> )	4	Red bloodwood ( <i>C. gummifera</i> )						
2	Cabbage gum ( <i>E. amplifolia</i> )	4	Pink bloodwood ( <i>C. intermedia</i> )						
2	Smooth-barked apple ( <i>A. costata</i> )	4	Spotted gum ( <i>C. henryi</i> )						
3	Flooded gum ( <i>E. grandis</i> )	4	Spotted gum ( <i>C. maculata</i> )						
3	Sydney blue gum ( <i>E. saligna</i> )	4	Brushbox ( <i>L. confertus</i> )						
3	Grey box ( <i>E. moluccana</i> )	4	Swamp turpentine ( <i>L. suaveolens</i> )						
3	Grey ironbark ( <i>E. siderophloia</i> )	4	Rough-barked apple ( <i>A. floribunda</i> )						
3	White mahogany ( <i>E. acmenoides</i> )	4	Black she-oak ( <i>A. littoralis</i> )						
3	Blackbutt ( <i>E. pilularis</i> )	4	Swamp oak ( <i>C. glauca</i> )						
3	White stringybark ( <i>E. globoidea</i> )	4	Acacia species						
3	Thin-leaved stringybark ( <i>E. eugenoides</i> )	4	Banksia species						
3	Tindale's stringybark ( <i>E. tindaliae</i> )	4	Coastal cypress-pine ( <i>C. columellaris</i> )						
3	Scribbly gum ( <i>E. signata</i> / <i>E. racemosa</i> )	4	Willow bottlebrush ( <i>M. salignus</i> )						
3	Turpentine ( <i>S. glomulifera</i> )	4	Camphor laurel ( <i>Cinnamomum camphora</i> )						
3	Forest oak ( <i>A. torulosa</i> )	4	Red ash ( <i>Alphitonia excelsa</i> )						
3	Broad-leaved paperbark ( <i>M. quinquinervia</i> )	4	Hard corkwood ( <i>Endiandra sieberi</i> )						
4	Grey gum ( <i>E. biturbinata</i> )	4	Cheese tree ( <i>Glochidion ferdinandi</i> )						
4	Large-fruited grey gum ( <i>E. canaliculata</i> )	4	Rainforest species						
4	Grey gum ( <i>E. punctata</i> )	5	Large-fruited red mahogany ( <i>E. scias</i> )						
4	Narrow-leaved red gum ( <i>E. seeana</i> )	5	Red ironbark ( <i>E. fibrosa</i> )						
4	White-topped box ( <i>E. quadrangulata</i> )	5	Grey ironbark ( <i>E. placita</i> )						
4	Ribbon gum ( <i>E. viminalis</i> )	5	Bastard white mahogany ( <i>E. psammitica</i> )						
4	Steel box ( <i>E. rummeryi</i> )	5	Bastard white mahogany ( <i>E. umbra</i> )						
4	Narrow-leaved ironbark ( <i>E. crebra</i> )								

**Table 10 Canopy tree species with evidence of koala use within the Central Coast KMA (after Phillips 2000; DECC 2008)**

Results are summarised from studies undertaken for research, assessment and regulatory purposes (see Table 2 for references and koala experts consulted for personal opinions). For Campbelltown LGA summarised results reflect reported tree use data for habitats of different broad soil types (shale-based and sandstone-based).

id?: unresolved identification of stringybark species during fieldwork



Species	Campbelltown (Phillips & Callaghan 2000) – shale	Campbelltown (Phillips & Callaghan 2000) – sandstone	Campbelltown (Sluiter et al. 2002)	"Lower Hunter" (ELA 2013)	Yengo NP/Par SCA (Curtin et al. 2002)	Hawkesbury/Wollemi NP (Science for Wildlife 2017)	Shoalhaven Gorge & Plateaus (Allen 2010)	Wingecarribee- L. Wilmott, D. Cullen & K. Madden (OEH unpublished)	Wollondilly- L. Wilmott, B. Sloggett & K. Madden (OEH unpublished)
<b>Sub-Genus Alveolata – represented by a single species at its southern range limit</b>									
Tallowwood ( <i>E. microcorys</i> )									
<b>Sub-Genus Symphyomyrtus</b>									
<b>Section Racemus – single species, <i>E. michaeliana</i></b>									
Brittle or Hillgrove gum ( <i>E. michaeliana</i> )									
<b>Section Latoangulatae (blue gums, red mahoganies, grey gums) – includes important koala trees of the Central Coast KMA</b>									
Mountain blue gum ( <i>E. deanei</i> )									
Sydney blue gum ( <i>E. saligna</i> )									
Large-fruited red mahogany ( <i>E. scias</i> )									
Red mahogany ( <i>E. resinifera</i> )									
Swamp mahogany ( <i>E. robusta</i> )									
Bangalay ( <i>E. botryoides</i> )									
Small-fruited grey gum ( <i>E. propinqua</i> )									
Grey gum ( <i>E. punctata</i> )									
<b>Section Similares – represented by a single species in the Central Coast KMA</b>									
Woollybutt ( <i>E. longifolia</i> )									
<b>Section Bisectaria – varied group with limited (largely non-coastal) distributions</b>									
Scaly Bark ( <i>E. squamosa</i> )									
<b>Section Liberivalvae (red gums) – represented by a single species in the Central Coast KMA</b>									
Parramatta red gum ( <i>E. parramattensis</i> )									
<b>Section Exsertaria – includes two species with documented evidence of use in the Central Coast CMA</b>									
Cabbage gum ( <i>E. amplifolia</i> )									
Forest red gum ( <i>E. tereticornis</i> )									
<b>Section Maidenaria (white gums, manna gums, ribbon gums, apple boxes) – important at higher elevations, e.g. Southern Highlands</b>									
Brittle gum ( <i>E. mannifera</i> )									
Argyle apple ( <i>E. cinerea</i> )									
Apple box ( <i>E. bridgesiana</i> )									
Gully gum ( <i>E. smithii</i> )									
White-topped box ( <i>E. quadrangulata</i> )									
Mountain grey gum ( <i>E. cypellocarpa</i> )									
Ribbon gum ( <i>E. viminalis</i> )									

Species	Campbelltown (Philips & Callaghan 2000) – shale	Campbelltown (Philips & Callaghan 2000) – sandstone	Campbelltown (Sluiter et al. 2002)	'Lower Hunter' (ELA 2013)	Yengo NP/Parr SCA (Curtin et al. 2002)	Hawkesbury/Molleml NP (Science for Wildlife 2017)	Shoalhaven Gorge & Plateaus (Allen 2010)	Wingecarribee- L. Wilmott, D. Cullen & K. Madden (OEH unpublished)	Wollondilly- L. Wilmott, B. Sloggett & K. Madden (OEH unpublished)
<b>Section Adnataria (boxes, ironbarks) – mixed evidence of use across the Central Coast KMA</b>									
Grey box ( <i>E. moluccana</i> )									
Coastal grey box ( <i>E. bosistoana</i> )									
Red ironbark ( <i>E. fibrosa</i> )									
Grey ironbark ( <i>E. siderophloia</i> )									
Beyer's ironbark ( <i>E. beyeriana</i> )									
Narrow-leaved ironbark ( <i>E. crebra</i> )									
Grey ironbark ( <i>E. paniculata</i> )									
Red ironbark ( <i>E. sideroxylon</i> )									
Yellow box ( <i>E. melliodora</i> )									
<b>Sub-Genus Eucalyptus</b>									
<b>Section Amentum (white mahoganies) – includes three species with evidence of use in the Central Coast KMA</b>									
White mahogany ( <i>E. acmenoides</i> )									
Bastard white mahogany ( <i>E. umbra</i> )									
Broad-leaved white mahogany ( <i>E. carnea</i> )									
<b>Section Pseudophloius (pseudo-stringybarks) – patchy use of blackbutt on coastal Central Coast</b>									
Blackbutt ( <i>E. pilularis</i> )									
<b>Section Aromatica (peppermints) – evidence of notable to high use at higher elevations (Southern Highlands)</b>									
River peppermint ( <i>E. elata</i> )									
Narrow-leaved peppermint ( <i>E. radiata</i> )									
Broad-leaved peppermint ( <i>E. dives</i> )									
<b>Section Capillulus (stringybarks) – issues regarding species identification but broad use of this group across the Central Coast KMA</b>									
Yellow stringybark ( <i>E. muelleriana</i> )									
Red stringybark ( <i>E. macrorhyncha</i> )									
Brown stringybark ( <i>E. capitallata</i> )				id?					
White stringybark ( <i>E. globoidea</i> )				id?		id?			
Thin-leaved stringybark ( <i>E. eugenoides</i> )				id?		id?			
Narrow-leaved stringybark ( <i>E. sparsifolia</i> )						id?			
Blue-leaved stringybark ( <i>E. agglomerata</i> )						id?			
Heart-leaved stringybark ( <i>E. camfieldii</i> )									
Illawarra stringybark ( <i>E. imitans</i> )									
Sandstone stringybark ( <i>E. oblonga</i> )				id?					
<b>Section Eucalyptus (green-leaved ashes) – localised use of <i>E. obliqua</i> in the Southern Highlands</b>									
Messmate ( <i>E. obliqua</i> )									
<b>Section Cineracea (snow gum &amp; blue-leaved ashes) – evidence of variable koala use levels of species within this group</b>									
Silvertop ash ( <i>E. sieberi</i> )									
Yertchuk ( <i>E. consideriana</i> )									
Hard-leaved scribbly gum ( <i>E. sclerophylla</i> )									

Species	Campbelltown (Philips & Callaghan 2000) – shale	Campbelltown (Philips & Callaghan 2000) – sandstone	Campbelltown (Sluiter et al. 2002)	'Lower Hunter' (ELA 2013)	Yengo NP/Pair SCA (Curtin et al. 2002)	Hawkesbury/Molleml NP (Science for Wildlife 2017)	Shoalhaven Gorge & Plateaus (Allen 2010)	Wingecarribee- L. Wilmott, D. Cullen & K. Madden (OEH unpublished)	Wollondilly- L. Wilmott, B. Sloggett & K. Madden (OEH unpublished)
Broad-leaved scribbly gum ( <i>E. haemastoma</i> )									
Scribbly gum ( <i>E. rossii</i> )									
Sydney peppermint ( <i>E. piperita</i> )									
<b>Non-Eucalypts</b>									
<b>CORYMBIA (bloodwoods and spotted gums) – associate to significant use of Corymbias across the central coast</b>									
Yellow bloodwood ( <i>C. eximia</i> )									
Red bloodwood ( <i>C. gummifera</i> )									
Spotted gum ( <i>C. maculata</i> )									
<b>Syncarpias – significant use of turpentine in the Campbelltown area</b>									
Turpentine ( <i>S. glomulifera</i> )									
<b>Angophoras</b>									
Rough-barked apple ( <i>A. floribunda</i> )									
Smooth-barked apple ( <i>A. costata</i> )									
Narrow-leaved apple ( <i>A. bakeri</i> )									
<b>Allocasuarinas and Casuarinas</b>									
Black she-oak ( <i>A. littoralis</i> )									
Forest oak ( <i>A. torulosa</i> )									
Swamp oak ( <i>C. glauca</i> )									
<b>Acacias</b>									
Acacia species									
<b>Banksias</b>									
Banksia species									
<b>Melaleucas</b>									
Broad-leaved paperbark ( <i>M. quinquinervia</i> )									
Prickly-leaved paperbark ( <i>M. nodosa</i> )									
<b>Others</b>									
'Rainforest species'									
Lilly pilly ( <i>Acmena smithii</i> )									
Coachwood ( <i>Ceratopetalum apetalum</i> )									
Silky oak ( <i>Grevillea robusta</i> )									

**Table 11 Koala use classes assigned to tree species with BioNet VIS records for the Central Coast KMA (as of September 2017) and ranked in order of total records**

Regional high use	High use	Significant use	Irregular use	Low use	No sourced evidence of use
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**a) Eucalypts – listed within sub-genera**

Species	VIS records	Species	VIS records
<b>Sub-Genus Alveolata</b>		<b>Sub-Genus Symphyomyrtus (cont.)</b>	
1 <i>Eucalyptus microcorys</i>	276	44 <i>Eucalyptus hypostomatica</i>	76
		45 <i>Eucalyptus grandis</i>	72
<b>Sub-Genus Symphyomyrtus (Symphyomyrts)</b>		46 <i>Eucalyptus bridgesiana</i>	53
1 <i>Eucalyptus punctata</i>	4,929	47 <i>Eucalyptus dalrympleana</i>	53
2 <i>Eucalyptus tereticornis</i>	3,688	48 <i>Eucalyptus caleyi</i>	49
3 <i>Eucalyptus crebra</i>	3,625	49 <i>Eucalyptus rubida</i>	46
4 <i>Eucalyptus moluccana</i>	2,759	50 <i>Eucalyptus nicholii</i>	38
5 <i>Eucalyptus fibrosa</i>	2,507	51 <i>Eucalyptus nubila</i>	35
6 <i>Eucalyptus parramattensis</i>	2,395	52 <i>Eucalyptus fracta</i>	34
7 <i>Eucalyptus saligna</i>	1,716	53 <i>Eucalyptus pumila</i>	30
8 <i>Eucalyptus camaldulensis</i>	1,292	54 <i>Eucalyptus nobilis</i>	29
9 <i>Eucalyptus robusta</i>	1,192	55 <i>Eucalyptus aenea</i>	28
10 <i>Eucalyptus paniculata</i>	1,185	56 <i>Eucalyptus camphora</i>	27
11 <i>Eucalyptus resinifera</i>	1,020	57 <i>Eucalyptus conica</i>	22
12 <i>Eucalyptus amplifolia</i>	909	58 <i>Eucalyptus baeuerlenii</i>	20
13 <i>Eucalyptus macarthurii</i>	879	59 <i>Eucalyptus placita</i>	19
14 <i>Eucalyptus botryoides</i>	807	60 <i>Eucalyptus aggregata</i>	18
15 <i>Eucalyptus deanei</i>	802	61 <i>Eucalyptus praecox</i>	15
16 <i>Eucalyptus benthamii</i>	647	62 <i>Eucalyptus castrensis</i>	14
17 <i>Eucalyptus quadrangulata</i>	518	63 <i>Eucalyptus scoparia</i>	12
18 <i>Eucalyptus melliodora</i>	474	64 <i>Eucalyptus chloroclada</i>	11
19 <i>Eucalyptus cypellocarpa</i>	470	65 <i>Eucalyptus goniocalyx</i>	10
20 <i>Eucalyptus siderophloia</i>	397	66 <i>Eucalyptus maidenii</i>	10
21 <i>Eucalyptus squamosa</i>	351	67 <i>Eucalyptus bicostata</i>	9
22 <i>Eucalyptus longifolia</i>	338	68 <i>Eucalyptus dealbata</i>	8
23 <i>Eucalyptus aquatica</i>	318	69 <i>Eucalyptus microcarpa</i>	8
24 <i>Eucalyptus mannifera</i>	306	70 <i>Eucalyptus largeana</i>	5
25 <i>Eucalyptus albens</i>	298	71 <i>Eucalyptus polyanthemos</i>	4
26 <i>Eucalyptus glaucina</i>	294	72 <i>Eucalyptus rudderi</i>	4
27 <i>Eucalyptus dawsonii</i>	288	73 <i>Eucalyptus corticosa</i>	2
28 <i>Eucalyptus smithii</i>	279	74 <i>Eucalyptus biturbinata</i>	1
29 <i>Eucalyptus sideroxydon</i>	264	75 <i>Eucalyptus fusiformis</i>	1
30 <i>Eucalyptus fergusonii</i>	241	76 <i>Eucalyptus globulus</i>	1
31 <i>Eucalyptus beyeriana</i>	229	77 <i>Eucalyptus major</i>	1
32 <i>Eucalyptus notabilis</i>	223	78 <i>Eucalyptus melanophloia</i>	1
33 <i>Eucalyptus blakelyi</i>	217	79 <i>Eucalyptus populnea</i>	1
34 <i>Eucalyptus viminalis</i>	210	80 <i>Eucalyptus pulverulenta</i>	1
35 <i>Eucalyptus baueriana</i>	201	81 <i>Eucalyptus seeana</i>	1
36 <i>Eucalyptus scias</i>	197	<b>Sub-Genus Eucalyptus ('Monocalypts')</b>	
37 <i>Eucalyptus canaliculata</i>	151	1 <i>Eucalyptus piperita</i>	4,898
38 <i>Eucalyptus cinerea</i>	111	2 <i>Eucalyptus haemastoma</i>	2,168
39 <i>Eucalyptus dwyeri</i>	111	3 <i>Eucalyptus pilularis</i>	2,149
40 <i>Eucalyptus bosistoana</i>	104	4 <i>Eucalyptus sieberi</i>	2,094
41 <i>Eucalyptus ovata</i>	95	5 <i>Eucalyptus eugenioides</i>	1,640
42 <i>Eucalyptus propinqua</i>	94	6 <i>Eucalyptus globoidea</i>	1,535
43 <i>Eucalyptus michaeliana</i>	78	7 <i>Eucalyptus sparsifolia</i>	1,483



Species	VIS records	Species	VIS records
<b>Sub-Genus Eucalyptus ('Monocalypts') (cont.)</b>		<b>Sub-Genus Eucalyptus ('Monocalypts') (cont.)</b>	
8 <i>Eucalyptus sclerophylla</i>	1,291	32 <i>Eucalyptus muelleriana</i>	93
9 <i>Eucalyptus umbra</i>	1,200	33 <i>Eucalyptus rossii</i>	92
10 <i>Eucalyptus agglomerata</i>	1,030	34 <i>Eucalyptus pauciflora</i>	88
11 <i>Eucalyptus acmenoides</i>	951	35 <i>Eucalyptus cunninghamii</i>	86
12 <i>Eucalyptus capitellata</i>	923	36 <i>Eucalyptus ligustrina</i>	79
13 <i>Eucalyptus oblonga</i>	873	37 <i>Eucalyptus macrorhyncha</i>	75
14 <i>Eucalyptus racemosa</i>	870	38 <i>Eucalyptus dendromorpha</i>	74
15 <i>Eucalyptus radiata</i>	536	39 <i>Eucalyptus signata</i>	56
16 <i>Eucalyptus luehmanniana</i>	501	40 <i>Eucalyptus campanulata</i>	50
17 <i>Eucalyptus elata</i>	442	41 <i>Eucalyptus moorei</i>	43
18 <i>Eucalyptus camfieldii</i>	260	42 <i>Eucalyptus stellulata</i>	33
19 <i>Eucalyptus stricta</i>	231	43 <i>Eucalyptus carnea</i>	24
20 <i>Eucalyptus apiculata</i>	187	44 <i>Eucalyptus copulans</i>	24
21 <i>Eucalyptus fastigata</i>	186	45 <i>Eucalyptus bensonii</i>	17
22 <i>Eucalyptus oreades</i>	185	46 <i>Eucalyptus expressa</i>	16
23 <i>Eucalyptus consideriana</i>	176	47 <i>Eucalyptus imitans</i>	9
24 <i>Eucalyptus dives</i>	163	48 <i>Eucalyptus ralla</i>	9
25 <i>Eucalyptus laevopinea</i>	156	49 <i>Eucalyptus laophila</i>	8
26 <i>Eucalyptus obstans</i>	142	50 <i>Eucalyptus gregsoniana</i>	6
27 <i>Eucalyptus obliqua</i>	137	51 <i>Eucalyptus tenella</i>	4
28 <i>Eucalyptus blaxlandii</i>	136	52 <i>Eucalyptus cannonii</i>	3
29 <i>Eucalyptus prominula</i>	122	53 <i>Eucalyptus planchoniana</i>	1
30 <i>Eucalyptus multicaulis</i>	117	54 <i>Eucalyptus serpenticola</i>	1
31 <i>Eucalyptus burgessiana</i>	106		

## b) Non-eucalypts – listed within genera or 'others' with evidence of koala use

Species	VIS records	Species	VIS records
<b>Acacias (species not assigned)</b>		<b>Banksias (species not assigned)</b>	
<i>Acacia parramattensis</i>	2,799	<i>Banksia serrata</i>	3,829
<i>Acacia falcata</i>	1,773	<i>Banksia integrifolia</i>	1,238
<i>Acacia decurrens</i>	1,634	<b>Callitris</b>	
<i>Acacia floribunda</i>	1,378	<i>Callitris endlicheri</i>	462
<i>Acacia irrorata</i>	1,050	<i>Callitris glaucophylla</i>	47
<i>Acacia melanoxylon</i>	599	<b>Casuarinas</b>	
<i>Acacia mearnsii</i>	535	<i>Casuarina glauca</i>	2,201
<i>Acacia falciformis</i>	379	<i>Casuarina cunninghamiana</i>	702
<i>Acacia dealbata</i>	90	<i>Casuarina cristata</i>	9
<i>Acacia cognata</i>	2	<b>Corymbias</b>	
<i>Acacia aulacocarpa</i>	1	<i>Corymbia gummifera</i>	6,685
<b>Allocasuarinas</b>		<i>Corymbia maculata</i>	3,042
<i>Allocasuarina littoralis</i>	4,694	<i>Corymbia eximia</i>	1,466
<i>Allocasuarina torulosa</i>	4,033	<i>Corymbia trachyphloia</i>	123
<b>Angophoras</b>		<i>Corymbia intermedia</i>	3
<i>Angophora costata</i>	6,219	<i>Corymbia dolichocarpa</i>	1
<i>Angophora inopina</i>	3,895	<b>Lophostemons</b>	
<i>Angophora floribunda</i>	3,370	<i>Lophostemon confertus</i>	318
<i>Angophora bakeri</i>	1,645	<b>Melaleucas</b>	
<i>Angophora hispida</i>	1,099	<i>Melaleuca nodosa</i>	2,140
<i>Angophora subvelutina</i>	268	<i>Melaleuca linariifolia</i>	1,736
<i>Angophora crassifolia</i>	153	<i>Melaleuca styphelioides</i>	1,503
<i>Angophora euryphylla</i>	102	<i>Melaleuca quinquenervia</i>	862

Species	VIS records	Species	VIS records
<b>Melaleucas (cont.)</b>		<b>Syncarpia</b>	
<i>Melaleuca salignus</i>	756	<i>Syncarpia glomulifera</i>	4,723
<i>Melaleuca sieberi</i>	622	<b>Others</b>	
<i>Melaleuca hypericifolia</i>	212	<i>Ceratopetalum apetalum</i>	1,489
		<i>Grevillea robusta</i>	533

**Table 12 A ranking of canopy trees with sourced evidence of use in the Central Coast KMA**

Regional high use (>2 areas in region)		Local high use		Significant use		Irregular use		Low use	
Rank	Species	Rank	Species	Rank	Species	Rank	Species	Rank	Species
1	Grey gum ( <i>E. punctata</i> )	4	Sydney blue gum ( <i>E. saligna</i> )	1	White stringybark ( <i>E. globoidea</i> )	4	Scaly bark ( <i>E. squamosa</i> )	1	Swamp mahogany ( <i>E. robusta</i> )
2	Woollybutt ( <i>E. longifolia</i> )	4	Apple box ( <i>E. bridgesiana</i> )	2	Parramatta red gum ( <i>E. parramattensis</i> )	4	Yellow box ( <i>E. melliodora</i> )	2	Woollybutt ( <i>E. longifolia</i> )
2	Forest red gum ( <i>E. tereticornis</i> )	4	White mahogany ( <i>E. acmenoides</i> )	2	Forest red gum ( <i>E. tereticornis</i> )	4	Bastard white mahogany ( <i>E. umbra</i> )	2	Parramatta red gum ( <i>E. parramattensis</i> )
2	Brittle gum ( <i>E. mannifera</i> )	4	Broad-leaved white mahogany ( <i>E. carnea</i> )	2	Brittle gum ( <i>E. mannifera</i> )	4	Broad-leaved peppermint ( <i>E. dives</i> )	2	Forest red gum ( <i>E. tereticornis</i> )
2	White-topped box ( <i>E. quadrangulata</i> )	4	Broad-leaved peppermint ( <i>E. dives</i> )	2	White-topped box ( <i>E. quadrangulata</i> )	4	Red stringybark ( <i>E. macrorhyncha</i> )	2	Brittle gum ( <i>E. mannifera</i> )
2	Mountain grey gum ( <i>E. cypellocarpa</i> )	4	Red stringybark ( <i>E. macrorhyncha</i> )	2	Mountain grey gum ( <i>E. cypellocarpa</i> )	4	Brown stringybark ( <i>E. capitallata</i> )	2	White-topped box ( <i>E. quadrangulata</i> )
2	Ribbon gum ( <i>E. viminalis</i> )	4	Brown stringybark ( <i>E. capitallata</i> )	2	Ribbon gum ( <i>E. viminalis</i> )	4	Thin-leaved stringybark ( <i>E. eugenoides</i> )	2	Mountain grey gum ( <i>E. cypellocarpa</i> )
2	Coastal grey box ( <i>E. bosistoana</i> )	4	Thin-leaved stringybark ( <i>E. eugenoides</i> )	2	Coastal grey box ( <i>E. bosistoana</i> )	4	Narrow-leaved stringybark ( <i>E. sparsifolia</i> )	2	Ribbon gum ( <i>E. viminalis</i> )
2	Beyer's ironbark ( <i>E. beyeriana</i> )	4	Narrow-leaved stringybark ( <i>E. sparsifolia</i> )	2	Beyer's ironbark ( <i>E. beyeriana</i> )	4	Messmate ( <i>E. obliqua</i> )	2	Coastal grey box ( <i>E. bosistoana</i> )
2	Grey ironbark ( <i>E. paniculata</i> )	4	Messmate ( <i>E. obliqua</i> )	2	Grey ironbark ( <i>E. paniculata</i> )	4	Scribbly gum ( <i>E. rossii</i> )	2	Beyer's ironbark ( <i>E. beyeriana</i> )
2	Blackbutt ( <i>E. pilularis</i> )	4	Scribbly gum ( <i>E. rossii</i> )	2	Blackbutt ( <i>E. pilularis</i> )	4	Spotted gum ( <i>C. maculata</i> )	2	Grey ironbark ( <i>E. paniculata</i> )
2	Blue-leaved stringybark ( <i>E. agglomerata</i> )	4	Spotted gum ( <i>C. maculata</i> )	2	Blue-leaved stringybark ( <i>E. agglomerata</i> )	4	Rough-barked apple ( <i>A. floribunda</i> )	2	Blackbutt ( <i>E. pilularis</i> )
2	Silvertop ash ( <i>E. sieberi</i> )	5	Rough-barked apple ( <i>A. floribunda</i> )	2	Silvertop ash ( <i>E. sieberi</i> )	5	Brittle or Hillgrove gum ( <i>E. michaeliana</i> )	2	Blue-leaved stringybark ( <i>E. agglomerata</i> )
2	Hard-leaved scribbly gum ( <i>E. sclerophylla</i> )	5	Brittle or Hillgrove gum ( <i>E. michaeliana</i> )	2	Hard-leaved scribbly gum ( <i>E. sclerophylla</i> )	5	Argyle apple ( <i>E. cinerea</i> )	2	Silvertop ash ( <i>E. sieberi</i> )
2	Yellow bloodwood ( <i>C. eximia</i> )	5	Argyle apple ( <i>E. cinerea</i> )	2	Yellow bloodwood ( <i>C. eximia</i> )	5	Gully gum ( <i>E. smithii</i> )	2	Hard-leaved scribbly gum ( <i>E. sclerophylla</i> )
2	Turpentine ( <i>S. glomulifera</i> )	5	Gully gum ( <i>E. smithii</i> )	2	Turpentine ( <i>S. glomulifera</i> )	5	Grey ironbark ( <i>E. siderophloia</i> )	2	Yellow bloodwood ( <i>C. eximia</i> )
3	Tallowwood ( <i>E. microcorys</i> )	5	Grey ironbark ( <i>E. siderophloia</i> )	3	Tallowwood ( <i>E. microcorys</i> )	5	Yellow stringybark ( <i>E. muelleriana</i> )	3	Turpentine ( <i>S. glomulifera</i> )
3	Mountain blue gum ( <i>E. deanei</i> )	5	Yellow stringybark ( <i>E. muelleriana</i> )	3	Mountain blue gum ( <i>E. deanei</i> )	5	Heart-leaved stringybark ( <i>E. camfieldii</i> )	3	Tallowwood ( <i>E. microcorys</i> )
3	Large-fruited red mahogany ( <i>E. scias</i> )	5	Heart-leaved stringybark ( <i>E. camfieldii</i> )	3	Large-fruited red mahogany ( <i>E. scias</i> )	5	Illawarra stringybark ( <i>E. imitans</i> )	3	Mountain blue gum ( <i>E. deanei</i> )
3	Red mahogany ( <i>E. resinifera</i> )	5	Illawarra stringybark ( <i>E. imitans</i> )	3	Red mahogany ( <i>E. resinifera</i> )	5	Yertchuk ( <i>E. consideniiana</i> )	3	Large-fruited red mahogany ( <i>E. scias</i> )
3	Bangalay ( <i>E. botryoides</i> )	5	Yertchuk ( <i>E. consideniiana</i> )	3	Bangalay ( <i>E. botryoides</i> )	5	Broad-leaved scribbly gum ( <i>E. haemastoma</i> )	3	Red mahogany ( <i>E. resinifera</i> )
3	Small-fruited grey gum ( <i>E. propinqua</i> )	5	Broad-leaved scribbly gum ( <i>E. haemastoma</i> )	3	Small-fruited grey gum ( <i>E. propinqua</i> )	5	Smooth-barked apple ( <i>A. costata</i> )	3	Bangalay ( <i>E. botryoides</i> )
3	Cabbage gum ( <i>E. amplifolia</i> )	5	Smooth-barked apple ( <i>A. costata</i> )	3	Cabbage gum ( <i>E. amplifolia</i> )	5	Narrow-leaved apple ( <i>A. bakeri</i> )	3	Small-fruited grey gum ( <i>E. propinqua</i> )
3	Grey box ( <i>E. moluccana</i> )	5	Narrow-leaved apple ( <i>A. bakeri</i> )	3	Grey box ( <i>E. moluccana</i> )	5	Black she-oak ( <i>A. littoralis</i> )	3	Cabbage gum ( <i>E. amplifolia</i> )
3	Red ironbark ( <i>E. fibrosa</i> )	5	Black she-oak ( <i>A. littoralis</i> )	3	Red ironbark ( <i>E. fibrosa</i> )	5	Forest oak ( <i>A. torulosa</i> )	3	Grey box ( <i>E. moluccana</i> )
3	Narrow-leaved ironbark ( <i>E. crebra</i> )	5	Forest oak ( <i>A. torulosa</i> )	3	Narrow-leaved ironbark ( <i>E. crebra</i> )	5	Swamp oak ( <i>C. glauca</i> )	3	Red ironbark ( <i>E. fibrosa</i> )
3	Red ironbark ( <i>E. sideroxylon</i> )	5	Swamp oak ( <i>C. glauca</i> )	3	Red ironbark ( <i>E. sideroxylon</i> )	5	Banksia species	3	Narrow-leaved ironbark ( <i>E. crebra</i> )
3	River peppermint ( <i>E. elata</i> )	5	Banksia species	3	River peppermint ( <i>E. elata</i> )	5	Broad-leaved paperbark ( <i>M. quinquinervia</i> )	3	Red ironbark ( <i>E. sideroxylon</i> )
3	Narrow-leaved peppermint ( <i>E. radiata</i> )	5	Broad-leaved paperbark ( <i>M. quinquinervia</i> )	3	Narrow-leaved peppermint ( <i>E. radiata</i> )	5	Prickly-leaved paperbark ( <i>M. nodosa</i> )	3	River peppermint ( <i>E. elata</i> )
3	Sandstone stringybark ( <i>E. oblonga</i> )	5	Prickly-leaved paperbark ( <i>M. nodosa</i> )	3	Sandstone stringybark ( <i>E. oblonga</i> )	5	"Rainforest species"	3	Narrow-leaved peppermint ( <i>E. radiata</i> )
3	Sydney peppermint ( <i>E. piperita</i> )	5	"Rainforest species"	3	Sydney peppermint ( <i>E. piperita</i> )	5	Lilly pilly ( <i>Acmena smithii</i> )	3	Sandstone stringybark ( <i>E. oblonga</i> )
3	Red bloodwood ( <i>C. gummiifera</i> )	5	Lilly pilly ( <i>Acmena smithii</i> )	3	Red bloodwood ( <i>C. gummiifera</i> )	5	Coachwood ( <i>Ceratopetalum apetalum</i> )	3	Sydney peppermint ( <i>E. piperita</i> )
3	Acacia species	5	Coachwood ( <i>Ceratopetalum apetalum</i> )	3	Acacia species	5	Silky oak ( <i>Grevillea robusta</i> )	3	Red bloodwood ( <i>C. gummiifera</i> )
		5	Silky oak ( <i>Grevillea robusta</i> )						

**Table 13 Canopy tree species with evidence of koala use within the South Coast KMA (after Phillips 2000; DECC 2008)**

Results are summarised from studies undertaken for research, assessment and regulatory purposes (see Table 2 for references and koala experts consulted for personal opinions).

	Documented high use	Documented significant use	Documented irregular use	Documented low use					
Species	South Coast general (Reed et al. 1990)	Eden region (Jurskis et al. 1994) (summary of scat surveys and radiotracking)	Eden region (Lumney et al. 1997) ('Based upon records per broad Vegetation Types')	Eden region (Jurskis and Potter. 1997)	Eden region (Jurskis et al. 2001) (Inferred from broad Vegetation Type descriptions)	Mumbulla-Bermagui 2007-09 (Allen et al. 2010)	Mumbulla-Bermagui 2012-14 (Allen et al. 2014)	Bega (Allen 2010)	South coast (Gow-Carey 2012)
<b>Sub-Genus Symphyomyrtus</b>									
<b>Section Latoangulatae (blue gums, red mahoganies, grey gums) – limited evidence of use of grey gum on the South Coast</b>									
Grey gum ( <i>E. punctata</i> )									
<b>Section Similares – a high use species on the South Coast</b>									
Woollybutt ( <i>E. longifolia</i> )									
<b>Section Maidenaria (white gums, manna gums, ribbon gums, apple boxes) – two important species for South Coast koalas</b>									
Maiden's gum ( <i>E. maidenii</i> )									
Mountain grey gum ( <i>E. cypellocarpa</i> )									
Ribbon gum ( <i>E. viminalis</i> )									
<b>Section Adnataria (boxes, ironbarks) – two important species for South Coast koalas</b>									
Coastal grey box ( <i>E. bosistoana</i> )									
Blue box ( <i>E. baueriana</i> )									
Red ironbark ( <i>E. tricarpa</i> )									
<b>Sub-Genus Eucalyptus</b>									
<b>Section Aromatica (peppermints) – evidence of notable use of river peppermint</b>									
River peppermint ( <i>E. elata</i> )									
<b>Section Capillulus (stringybarks) – extensive use of three species; possible localised use of others (see below)</b>									
Yellow stringybark ( <i>E. muelleriana</i> )									
White stringybark ( <i>E. globoidea</i> )									
Blue-leaved stringybark ( <i>E. agglomerata</i> )									
<b>Section Eucalyptus (green-leaved ashes) – associate to significant use of two species</b>									
Brown barrel ( <i>E. fastigata</i> )									
Messmate ( <i>E. obliqua</i> )									
<b>Section Cineracea (snow gum and blue-leaved ashes) – silvertop ash is regionally important, yertchuk appears locally important</b>									
Silvertop ash ( <i>E. sieberi</i> )									
Yertchuk ( <i>E. consideniana</i> )									
<b>Non-Eucalypts</b>									
<b>Corymbia (Bloodwoods, Spotted Gums) – some use of two species</b>									
Red bloodwood ( <i>C. gummifera</i> )									
Spotted gum ( <i>C. maculata</i> )									
<b>Angophoras – widespread use of rough-barked apple, presumably predominantly for shelter</b>									
Rough-barked apple ( <i>A. floribunda</i> )									
<b>Allocasuarinas and Casuarinas</b>									
Black she-oak ( <i>A. littoralis</i> )									
<b>Acacias</b>									
Acacia species									
<b>Others</b>									
Lilly pilly ( <i>Acmena smithii</i> )									

**Table 14 Koala use classes assigned to tree species with BioNet VIS records for the South Coast KMA (as of September 2017) & ranked in order of total records**

Regional high use	High use	Significant use	Irregular use	Low use	No sourced evidence of use
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**a) Eucalypts – listed within sub-genera**

Species	VIS records	Species	VIS records
<b>Sub-Genus Symphyomyrtus (Symphyomyrts)</b>		<b>Sub-Genus Symphyomyrtus (cont.)</b>	
1 <i>Eucalyptus cypellocarpa</i>	2,010	47 <i>Eucalyptus largiflorens</i>	1
2 <i>Eucalyptus longifolia</i>	1,371	48 <i>Eucalyptus nicholii</i>	1
3 <i>Eucalyptus botryooides</i>	1,139	49 <i>Eucalyptus sideroxylon</i>	1
4 <i>Eucalyptus bosistoana</i>	935	50 <i>Eucalyptus sp. aff. globoidea</i>	1
5 <i>Eucalyptus paniculata</i>	923	<b>Sub-Genus Eucalyptus ('Monocalypts')</b>	
6 <i>Eucalyptus tereticornis</i>	677	1 <i>Eucalyptus globoidea</i>	2,999
7 <i>Eucalyptus smithii</i>	592	2 <i>Eucalyptus sieberi</i>	2,786
8 <i>Eucalyptus maidenii</i>	519	3 <i>Eucalyptus muelleriana</i>	2,160
9 <i>Eucalyptus angophoroides</i>	450	4 <i>Eucalyptus agglomerata</i>	1,352
10 <i>Eucalyptus baueriana</i>	434	5 <i>Eucalyptus pilularis</i>	1,273
11 <i>Eucalyptus viminalis</i>	378	6 <i>Eucalyptus elata</i>	1,116
12 <i>Eucalyptus punctata</i>	361	7 <i>Eucalyptus fastigata</i>	809
13 <i>Eucalyptus tricarpa</i>	340	8 <i>Eucalyptus piperita</i>	774
14 <i>Eucalyptus scias</i>	315	9 <i>Eucalyptus obliqua</i>	637
15 <i>Eucalyptus saligna</i>	246	10 <i>Eucalyptus consideriana</i>	600
16 <i>Eucalyptus sturgissiana</i>	221	11 <i>Eucalyptus sclerophylla</i>	476
17 <i>Eucalyptus fibrosa</i>	195	12 <i>Eucalyptus radiata</i>	460
18 <i>Eucalyptus robusta</i>	163	13 <i>Eucalyptus fraxinoides</i>	284
19 <i>Eucalyptus ovata</i>	145	14 <i>Eucalyptus eugenioides</i>	220
20 <i>Eucalyptus polyanthemos</i>	132	15 <i>Eucalyptus baxteri</i>	140
21 <i>Eucalyptus mannifera</i>	105	16 <i>Eucalyptus langleyi</i>	114
22 <i>Eucalyptus quadrangulata</i>	88	17 <i>Eucalyptus pauciflora</i>	85
23 <i>Eucalyptus nitens</i>	69	18 <i>Eucalyptus dives</i>	81
24 <i>Eucalyptus melliodora</i>	64	19 <i>Eucalyptus paliformis</i>	67
25 <i>Eucalyptus dalrympleana</i>	62	20 <i>Eucalyptus spectatrix</i>	65
26 <i>Eucalyptus amplifolia</i>	53	21 <i>Eucalyptus triflora</i>	64
27 <i>Eucalyptus wilcoxii</i>	50	22 <i>Eucalyptus dendromorpha</i>	62
28 <i>Eucalyptus pseudoglobulus</i>	38	23 <i>Eucalyptus stricta</i>	60
29 <i>Eucalyptus badjensis</i>	28	24 <i>Eucalyptus stenostoma</i>	57
30 <i>Eucalyptus beyeriana</i>	28	25 <i>Eucalyptus croajingolensis</i>	55
31 <i>Eucalyptus baeuerlenii</i>	25	26 <i>Eucalyptus obstans</i>	55
32 <i>Eucalyptus resinifera</i>	21	27 <i>Eucalyptus imitans</i>	48
33 <i>Eucalyptus conspicua</i>	20	28 <i>Eucalyptus kybeanensis</i>	37
34 <i>Eucalyptus ignorabilis</i>	18	29 <i>Eucalyptus ligustrina</i>	37
35 <i>Eucalyptus bridgesiana</i>	14	30 <i>Eucalyptus ralla</i>	34
36 <i>Eucalyptus imlayensis</i>	14	31 <i>Eucalyptus latiuscula</i>	27
37 <i>Eucalyptus moluccana</i>	14	32 <i>Eucalyptus olsenii</i>	26
38 <i>Eucalyptus globulus</i>	13	33 <i>Eucalyptus deuaensis</i>	21
39 <i>Eucalyptus rubida</i>	12	34 <i>Eucalyptus multicaulis</i>	21
40 <i>Eucalyptus parvula</i>	6	35 <i>Eucalyptus blaxlandii</i>	19
41 <i>Eucalyptus cinerea</i>	4	36 <i>Eucalyptus capitellata</i>	12
42 <i>Eucalyptus aggregata</i>	2	37 <i>Eucalyptus sparsifolia</i>	10
43 <i>Eucalyptus camaldulensis</i>	1	38 <i>Eucalyptus oblonga</i>	9
44 <i>Eucalyptus camphora</i>	1	39 <i>Eucalyptus sp. aff. radiata</i>	9
45 <i>Eucalyptus hypostomatica</i>	1	40 <i>Eucalyptus macrorhyncha</i>	6
46 <i>Eucalyptus kartzoffiana</i>	1	41 <i>Eucalyptus yangoura</i>	6

Species	VIS records	Species	VIS records
<b>Sub-Genus Eucalyptus (cont.)</b>		<b>Sub-Genus Eucalyptus (cont.)</b>	
42 <i>Eucalyptus gregsoniana</i>	5	46 <i>Eucalyptus delegatensis</i>	2
43 <i>Eucalyptus moorei</i>	5	47 <i>Eucalyptus haemastoma</i>	1
44 <i>Eucalyptus stellulata</i>	4	48 <i>Eucalyptus rossii</i>	1
45 <i>Eucalyptus cephalocarpa</i>	3	49 <i>Eucalyptus umbra</i>	1

**b) Non-eucalypts – listed within genera or ‘others’ with evidence of koala use**

Species	VIS records	Species	VIS records
<b>Acacias (species not assigned)</b>		<b>Callitris</b>	
<i>Acacia mearnsii</i>	2,005	<i>Callitris endlicheri</i>	11
<i>Acacia falciformis</i>	1,501	<b>Casuarinas</b>	
<i>Acacia irrorata</i>	701	<i>Casuarina glauca</i>	774
<i>Acacia melanoxylon</i>	665	<i>Casuarina cunninghamiana</i>	221
<i>Acacia cognata</i>	391	<b>Corymbias</b>	
<i>Acacia floribunda</i>	364	<i>Corymbia gummifera</i>	2,130
<i>Acacia dealbata</i>	214	<i>Corymbia maculata</i>	1,415
<i>Acacia falcata</i>	123	<i>Corymbia eximia</i>	45
<i>Acacia parramattensis</i>	42	<b>Lophostemons</b>	
<i>Acacia decurrens</i>	16	<i>Lophostemon confertus</i>	1
<b>Allocasuarinas</b>		<b>Melaleucas</b>	
<i>Allocasuarina littoralis</i>	3,151	<i>Melaleuca linariifolia</i>	310
<i>Allocasuarina torulosa</i>	17	<i>Melaleuca styphelioides</i>	124
<b>Angophoras</b>		<i>Melaleuca hypericifolia</i>	119
<i>Angophora floribunda</i>	2,236	<i>Melaleuca salignus</i>	35
<i>Angophora costata</i>	96	<i>Melaleuca quinquenervia</i>	1
<i>Angophora bakeri</i>	33	<b>Syncarpia</b>	
<i>Angophora subvelutina</i>	1	<i>Syncarpia glomulifera</i>	1,054
<b>Banksias</b>		<b>Others</b>	
<i>Banksia serrata</i>	936	<i>Acmena smithii</i>	1,425
<i>Banksia integrifolia</i>	586		

**Table 15 A ranking of canopy trees with sourced evidence of use in the South Coast KMA**

Regional high use (>2 areas in region)		Local high use		Significant use		Irregular use		Low use	
Rank	Species	Rank	Species	Rank	Species	Rank	Species	Rank	Species
1	Woollybutt ( <i>E. longifolia</i> )	4	Grey gum ( <i>E. punctata</i> )	1	Mountain grey gum ( <i>E. cypellocarpa</i> )	4	Ribbon gum ( <i>E. viminalis</i> )	1	Red ironbark ( <i>E. tricarpa</i> )
1	White stringybark ( <i>E. globoidea</i> )	4	Blue box ( <i>E. baueriana</i> )	1	Maiden’s gum ( <i>E. maidenii</i> )	4	Blue-leaved stringybark ( <i>E. agglomerata</i> )	1	White stringybark ( <i>E. globoidea</i> )
2	Coastal grey box ( <i>E. bosistoana</i> )	4	Red bloodwood ( <i>C. gummifera</i> )	2	Coastal grey box ( <i>E. bosistoana</i> )	4	Spotted gum ( <i>C. maculata</i> )	2	Yellow stringybark ( <i>E. muelleriana</i> )
2	Yellow stringybark ( <i>E. muelleriana</i> )	4	Spotted gum ( <i>C. maculata</i> )	2	Yellow stringybark ( <i>E. muelleriana</i> )	5	River peppermint ( <i>E. elata</i> )	2	Messmate ( <i>E. obliqua</i> )
3	Messmate ( <i>E. obliqua</i> )	5	River peppermint ( <i>E. elata</i> )	3	Messmate ( <i>E. obliqua</i> )	5	Brown barrel ( <i>E. fastigata</i> )	3	Silvertop ash ( <i>E. sieberi</i> )
3	Silvertop ash ( <i>E. sieberi</i> )	5	Brown barrel ( <i>E. fastigata</i> )	3	Silvertop ash ( <i>E. sieberi</i> )	5	Black she-oak ( <i>A. littoralis</i> )	3	Yertchuk ( <i>E. consideniana</i> )
3	Yertchuk ( <i>E. consideniana</i> )	5	Black she-oak ( <i>A. littoralis</i> )	3	Yertchuk ( <i>E. consideniana</i> )	5	Acacia species	3	Rough-barked apple ( <i>A. floribunda</i> )
3	Rough-barked apple ( <i>A. floribunda</i> )	5	Acacia species	3	Rough-barked apple ( <i>A. floribunda</i> )	5	Lilly pilly ( <i>Acmena smithii</i> )	3	





Species	'Northern Tablelands' (Reed et al. 1990)	In-care – feeding experiment (Pahl & Hume 1990)	Nowendoc area (Krockenberger 1993)	Combined (Carney 1995, Heinz 1999, Ede et al. 2016, D Carr pers. comm.)	LLS Cool Country: Inverell – Delungra (Cristescu and Frere 2017)	LLS Cool Country: Armidale – Walcha – Nowendoc (Carr et al. 2017)
Broad-leaved stringybark ( <i>E. caliginosa</i> )						
<b>Section Eucalyptus (green-leaved ashes) – patchy use of messmate across Northern Tablelands KMA</b>						
Messmate ( <i>E. obliqua</i> )						
<b>Section Longitudinales (black sallies) – patchy use of black sally across Northern Tablelands KMA</b>						
Black sally ( <i>E. stellulata</i> )						
<b>Section Cineracea (snow gum and blue-leaved ashes) – relatively broad scale use of snow gum</b>						
Snow gum or white sally ( <i>E. pauciflora</i> )						
New England blackbutt ( <i>E. andrewsii</i> )						
New England blackbutt ( <i>E. campanulata</i> )						
<b>Non-Eucalypts</b>						
<b>Angophoras – evidence of notable use locally</b>						
Rough-barked apple ( <i>A. floribunda</i> )						
Broad-leaved apple ( <i>A. subvelutina</i> )						
<b>Allocasuarinas and Casuarinas</b>						
Black she-oak ( <i>A. littoralis</i> )						
<b>Acacias</b>						
Acacia species						
<b>Banksias</b>						
Banksia species						
<b>Callitris</b>						
White cypress-pine ( <i>C. glaucophylla</i> )						

**Table 17 Koala use classes assigned to tree species with BioNet VIS records for the Northern Tablelands KMA (as of September 2017) & ranked in order of total records**

Regional high use	High use	Significant use	Irregular use	Low use	No sourced evidence of use
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**a) Eucalypts – listed within sub-genera**

Species	VIS records	Species	VIS records
<b>Sub-Genus Alveolata</b>		<b>Sub-Genus Symphyomyrtus (cont.)</b>	
1 <i>Eucalyptus microcorys</i>	522	44 <i>Eucalyptus dwyeri</i>	40
		45 <i>Eucalyptus pilligaensis</i>	40
<b>Sub-Genus Symphyomyrtus ('Symphyomyrts')</b>		46 <i>Eucalyptus goniocalyx</i>	36
1 <i>Eucalyptus melliodora</i>	2,535	47 <i>Eucalyptus rubida</i>	36
2 <i>Eucalyptus blakelyi</i>	2,136	48 <i>Eucalyptus magnificata</i>	34
3 <i>Eucalyptus albens</i>	1,999	49 <i>Eucalyptus nitens</i>	34
4 <i>Eucalyptus dealbata</i>	1,576	50 <i>Eucalyptus cypellocarpa</i>	33
5 <i>Eucalyptus camaldulensis</i>	1,231	51 <i>Eucalyptus resinifera</i>	32
6 <i>Eucalyptus crebra</i>	1,084	52 <i>Eucalyptus bicostata</i>	26
7 <i>Eucalyptus prava</i>	1,016	53 <i>Eucalyptus viridis</i>	24
8 <i>Eucalyptus saligna</i>	979	54 <i>Eucalyptus camphora</i>	19
9 <i>Eucalyptus nobilis</i>	957	55 <i>Eucalyptus nubila</i>	18
10 <i>Eucalyptus moluccana</i>	930	56 <i>Eucalyptus bakeri</i>	17
11 <i>Eucalyptus dalrympleana</i>	905	57 <i>Eucalyptus exserta</i>	17
12 <i>Eucalyptus caleyi</i>	873	58 <i>Eucalyptus fusiformis</i>	17
13 <i>Eucalyptus viminalis</i>	836	59 <i>Eucalyptus dawsonii</i>	15
14 <i>Eucalyptus tereticornis</i>	822	60 <i>Eucalyptus glaucina</i>	15
15 <i>Eucalyptus bridgesiana</i>	799	61 <i>Eucalyptus bancroftii</i>	14
16 <i>Eucalyptus brunnea</i>	534	62 <i>Eucalyptus scoparia</i>	12
17 <i>Eucalyptus biturbinata</i>	483	63 <i>Eucalyptus deanei</i>	11
18 <i>Eucalyptus nova-anglica</i>	443	64 <i>Eucalyptus praecox</i>	9
19 <i>Eucalyptus acaciiformis</i>	350	65 <i>Eucalyptus seeana</i>	6
20 <i>Eucalyptus banksii</i>	275	66 <i>Eucalyptus grandis</i>	4
21 <i>Eucalyptus nicholii</i>	200	67 <i>Eucalyptus polyanthemus</i>	4
22 <i>Eucalyptus punctata</i>	187	68 <i>Eucalyptus aenea</i>	3
23 <i>Eucalyptus sideroxylon</i>	186	69 <i>Eucalyptus paniculata</i>	2
24 <i>Eucalyptus elliptica</i>	178	70 <i>Eucalyptus sp. aff. cypellocarpa sp. nov.</i>	2
25 <i>Eucalyptus propinqua</i>	164	71 <i>Eucalyptus baueriana</i>	1
26 <i>Eucalyptus amplifolia</i>	163	72 <i>Eucalyptus beyeriana</i>	1
27 <i>Eucalyptus malacoxylon</i>	149	73 <i>Eucalyptus largeana</i>	1
28 <i>Eucalyptus chloroclada</i>	147	74 <i>Eucalyptus mannifera</i>	1
29 <i>Eucalyptus conica</i>	145	75 <i>Eucalyptus pseudoglobulus</i>	1
30 <i>Eucalyptus nortonii</i>	140	76 <i>Eucalyptus volcanica</i>	1
31 <i>Eucalyptus dorrigoensis</i>	131		
32 <i>Eucalyptus michaeliana</i>	120	<b>Sub-Genus Eucalyptus ('Monocalypts')</b>	
33 <i>Eucalyptus quadrangulata</i>	109	1 <i>Eucalyptus campanulata</i>	2,453
34 <i>Eucalyptus quinniorum</i>	101	2 <i>Eucalyptus caliginosa</i>	1,975
35 <i>Eucalyptus siderophloia</i>	86	3 <i>Eucalyptus laevopinea</i>	1,918
36 <i>Eucalyptus dunnii</i>	83	4 <i>Eucalyptus obliqua</i>	1,274
37 <i>Eucalyptus notabilis</i>	74	5 <i>Eucalyptus cameronii</i>	1,134
38 <i>Eucalyptus populnea</i>	59	6 <i>Eucalyptus melanophloia</i>	1,044
39 <i>Eucalyptus fibrosa</i>	56	7 <i>Eucalyptus radiata</i>	958
40 <i>Eucalyptus microcarpa</i>	52	8 <i>Eucalyptus andrewsii</i>	792
41 <i>Eucalyptus scias</i>	47	9 <i>Eucalyptus macrorhyncha</i>	722
42 <i>Eucalyptus oresbia</i>	42	10 <i>Eucalyptus pauciflora</i>	602
43 <i>Eucalyptus canaliculata</i>	41	11 <i>Eucalyptus youmanii</i>	417

Species	VIS records	Species	VIS records
<b>Sub-Genus Eucalyptus (cont.)</b>		<b>Sub-Genus Eucalyptus (cont.)</b>	
12 <i>Eucalyptus eugenioides</i>	373	31 <i>Eucalyptus interstans</i>	29
13 <i>Eucalyptus subtilior</i>	320	32 <i>Eucalyptus agglomerata</i>	22
14 <i>Eucalyptus fastigata</i>	211	33 <i>Eucalyptus rossii</i>	22
15 <i>Eucalyptus mckieana</i>	196	34 <i>Eucalyptus signata</i>	20
16 <i>Eucalyptus stellulata</i>	194	35 <i>Eucalyptus globoidea</i>	18
17 <i>Eucalyptus williamsiana</i>	158	36 <i>Eucalyptus apothalassica</i>	17
18 <i>Eucalyptus retinens</i>	157	37 <i>Eucalyptus pilularis</i>	17
19 <i>Eucalyptus acmenoides</i>	144	38 <i>Eucalyptus dissita</i>	15
20 <i>Eucalyptus codonocarpa</i>	125	39 <i>Eucalyptus boliviana</i>	14
21 <i>Eucalyptus carnea</i>	118	40 <i>Eucalyptus sp. aff. macrorhyncha</i>	12
22 <i>Eucalyptus olida</i>	114	41 <i>Eucalyptus subcaerulea</i>	9
23 <i>Eucalyptus tindaliae</i>	82	42 <i>Eucalyptus panda</i>	8
24 <i>Eucalyptus sparsifolia</i>	73	43 <i>Eucalyptus blaxlandii</i>	7
25 <i>Eucalyptus ligustrina</i>	71	44 <i>Eucalyptus serpentinicola</i>	7
26 <i>Eucalyptus pyrocarpa</i>	52	45 <i>Eucalyptus scopulorum</i>	5
27 <i>Eucalyptus oreades</i>	46	46 <i>Eucalyptus oblonga</i>	4
28 <i>Eucalyptus planchoniana</i>	31	47 <i>Eucalyptus approximans</i>	2
29 <i>Eucalyptus conjuncta</i>	30	48 <i>Eucalyptus umbra</i>	2
30 <i>Eucalyptus dives</i>	29	49 <i>Eucalyptus psammitica</i>	1

## b) Non-eucalypts – listed within genera or ‘others’ with evidence of koala use

Species	VIS records	Species	VIS records
<b>Acacias (species not assigned)</b>		<b>Casuarinas</b>	
<i>Acacia melanoxylon</i>	706	<i>Casuarina cunninghamiana</i>	654
<i>Acacia irrorata</i>	638	<i>Casuarina cristata</i>	25
<i>Acacia falciformis</i>	607	<i>Casuarina glauca</i>	5
<i>Acacia dealbata</i>	339	<b>Corymbias</b>	
<i>Acacia floribunda</i>	114	<i>Corymbia gummifera</i>	122
<i>Acacia falcata</i>	95	<i>Corymbia intermedia</i>	120
<i>Acacia parramattensis</i>	12	<i>Corymbia dolichocarpa</i>	113
<i>Acacia decurrens</i>	4	<i>Corymbia maculata</i>	106
<i>Acacia mearnsii</i>	2	<i>Corymbia trachyphloia</i>	61
<b>Allocasuarinas</b>		<i>Corymbia variegata</i>	30
<i>Allocasuarina littoralis</i>	1,147	<i>Corymbia tessellaris</i>	17
<i>Allocasuarina torulosa</i>	1,228	<i>Corymbia henryi</i>	12
<b>Angophoras</b>		<b>Lophostemons</b>	
<i>Angophora floribunda</i>	3,109	<i>Lophostemon confertus</i>	363
<i>Angophora subvelutina</i>	455	<i>Lophostemon suaveolens</i>	28
<i>Angophora leiocarpa</i>	268	<b>Melaleucas</b>	
<i>Angophora exul</i>	10	<i>Melaleuca salignus</i>	41
<i>Angophora woodsiana</i>	4	<i>Melaleuca styphelioides</i>	9
<i>Angophora costata</i>	1	<i>Melaleuca nodosa</i>	3
<b>Banksias (species not assigned)</b>		<i>Melaleuca sieberi</i>	1
<i>Banksia integrifolia</i>	1,063	<b>Syncarpia</b>	
<b>Callitris</b>		<i>Syncarpia glomulifera</i>	19
<i>Callitris glaucophylla</i>	2,137		
<i>Callitris endlicheri</i>	1,834		
<i>Callitris columellaris</i>	3		

**Table 18 A ranking of canopy trees with sourced evidence of use in the Northern Tablelands KMA**

Regional high use (>2 areas in region)		Local high use		Significant use		Irregular use		Low use	
Rank	Species	Rank	Species	Rank	Species	Rank	Species	Rank	Species
1	Ribbon gum ( <i>E. viminalis</i> )	3	New England black peppermint ( <i>E. nova-anglica</i> )						
2	Mountain blue gum ( <i>E. brunnea</i> )	3	White box ( <i>E. albens</i> )						
2	Orange gum ( <i>E. prava</i> )	3	Large-leaved stringybark ( <i>E. williamsiana</i> )						
2	Tumbledown red gum ( <i>E. dealbata</i> )	3	Snow gum or white sally ( <i>E. pauciflora</i> )						
2	Blakely's red gum ( <i>E. blakelyi</i> )	3	Rough-barked apple ( <i>A. floribunda</i> )						
2	Forest red gum ( <i>E. tereticornis</i> )	3	Broad-leaved apple ( <i>A. subvelutina</i> )						
2	River red gum ( <i>E. camaldulensis</i> )	4	Grey gum ( <i>E. biturbinata</i> )						
2	Wattle-leaved peppermint ( <i>E. acaciiformis</i> )	4	Grey box ( <i>E. moluccana</i> )						
2	Narrow-leaved black peppermint ( <i>E. nicholii</i> )	4	Messmate ( <i>E. obliqua</i> )						
2	Apple box ( <i>E. bridgesiana</i> )	4	New England blackbutt ( <i>E. andrewsii</i> )						
2	Ribbon gum ( <i>E. nobilis</i> )	5	Brittle or Hillgrove gum ( <i>E. michaeliana</i> )						
2	Mountain gum ( <i>E. dalrympleana</i> )	5	Ovenden's ironbark ( <i>E. caleyi</i> )						
2	Yellow box ( <i>E. melliodora</i> )	5	Silver-leaved ironbark ( <i>E. melanophloia</i> )						
2	Narrow-leaved peppermint ( <i>E. radiata</i> )	5	Mugga ironbark ( <i>E. sideroxylon</i> )						
2	Silver-top stringybark ( <i>E. laevopinea</i> )	5	Diehard stringybark ( <i>E. cameronii</i> )						
2	Red stringybark ( <i>E. macrorhyncha</i> )	5	New England blackbutt ( <i>E. campanulata</i> )						
2	Youman's stringybark ( <i>E. youmanii</i> )	5	Black she-oak ( <i>A. littoralis</i> )						
2	Broad-leaved stringybark ( <i>E. caliginosa</i> )	5	Acacia species						
3	Cabbage gum ( <i>E. amplifolia</i> )	5	Banksia species						
3	Black sally ( <i>E. stellulata</i> )	5	White cypress-pine ( <i>C. glaucophylla</i> )						

**Table 19 Canopy tree species with evidence of koala use within the Central and Southern Tablelands KMA (after Phillips 2000; DECC 2008)**

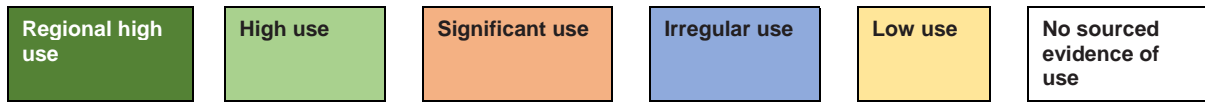
Results are summarised from studies undertaken for research, assessment and regulatory purposes (see Table 2 for references and koala experts consulted for personal opinions).

	Documented high use	Documented significant use	Documented irregular use	Documented low use
<b>Species</b>				
		Central Tablelands (Bathurst – Price 1996; Steven Cox unpubl. data)	Southern Tablelands (Reed et al. 1990)	Southern Tablelands (Windellema – Monaro – Varney’s Ridge regions – Southern Tablelands (Cooma–Monaro – Allen 2014; Gruber et al. 2014)
<b>Sub-Genus Sympomyrtus</b>				
<b>Section Latoangulatae (blue gums, red mahoganies, grey gums) – marginal occurrence in region</b>				
Grey gum ( <i>E. punctata</i> )				
<b>Section Exsertaria (red gums) – Blakely’s is relatively common; the others are marginal to region</b>				
Blakely’s red gum ( <i>E. blakelyi</i> )				
<b>Section Maidenaria (white gums, manna gums, ribbon gums, apple boxes) – widespread use</b>				
Brittle gum ( <i>E. mannifera</i> )				
Apple box ( <i>E. bridgesiana</i> )				
Mountain grey gum ( <i>E. cypellocarpa</i> )				
Large-flowered bundy ( <i>E. nortonii</i> )				
Bundy ( <i>E. goniocalyx</i> )				
Ribbon gum ( <i>E. viminalis</i> )				
Mountain gum ( <i>E. dalrympleana</i> )				
Candlebark ( <i>E. rubida</i> )				
<b>Section Adnataria (boxes, ironbarks) – mixed and relatively minor use across region</b>				
Red box ( <i>E. polyanthemos</i> )				
Mugga ironbark ( <i>E. sideroxylon</i> )				
Yellow box ( <i>E. melliodora</i> )				
<b>Sub-Genus Eucalyptus</b>				
<b>Section Aromatica (peppermints) – evidence of widespread use</b>				
Narrow-leaved peppermint ( <i>E. radiata</i> )				
Broad-leaved peppermint ( <i>E. dives</i> )				
<b>Section Capillulus (stringybarks) – mixed use of a number of species, some high use</b>				
Red stringybark ( <i>E. macrorhyncha</i> )				
White stringybark ( <i>E. globoidea</i> )				
Thin-leaved stringybark ( <i>E. eugenoides</i> )				
Blue-leaved stringybark ( <i>E. agglomerata</i> )				
<b>Section Eucalyptus (green-leaved ashes) – messmate is locally high use</b>				
Messmate ( <i>E. obliqua</i> )				
<b>Section Cineracea (snow gum and blue-leaved ashes) – includes two high use species</b>				
Snow gum or white sally ( <i>E. pauciflora</i> )				
Silvertop ash ( <i>E. sieberi</i> )				
Scribbly gum ( <i>E. rossii</i> )				
Sydney peppermint ( <i>E. piperita</i> )				
<b>Non-Eucalypts</b>				
<b>Allocasuarinas</b>				
Black she-oak ( <i>A. littoralis</i> )				
<b>Acacias</b>				
Acacia species				



Species	Central Tablelands (Bathurst – Price 1996; Steven Cox unpubl. data)	Southern Tablelands (Reed et al. 1990)	Southern Tablelands (Windellena – Monaro – Varney’s Ridge regions –	Southern Tablelands (Cooma–Monaro – Allen 2014; Gruber et al. 2014)
<b>Callitris</b>				
White cypress-pine ( <i>C. glaucophylla</i> )				
Black cypress-pine ( <i>C. endlicheri</i> )				
Fuzzy box ( <i>E. conica</i> ), yellow stringybark ( <i>E. muelleriana</i> )				
<b>Eucalypts not listed as koala food trees or stringybarks/supplementary species in any KMA</b>				
Red ironbark ( <i>E. fibrosa</i> ), brown barrel ( <i>E. fastigata</i> )				

**Table 20 Koala use classes assigned to tree species with BioNet VIS records for the Central and Southern Tablelands KMA (as of September 2017) and ranked in order of total records**



**a) Eucalypts – listed within sub-genera**

Species	VIS records	Species	VIS records
<b>Sub-Genus Symphyomyrtus ('Symphyomyrts')</b>		<b>Sub-Genus Symphyomyrtus (cont.)</b>	
1 <i>Eucalyptus melliodora</i>	3,090	31 <i>Eucalyptus pulverulenta</i>	126
2 <i>Eucalyptus viminalis</i>	2,910	32 <i>Eucalyptus moluccana</i>	125
3 <i>Eucalyptus dalrympleana</i>	2,742	33 <i>Eucalyptus smithii</i>	120
4 <i>Eucalyptus bridgesiana</i>	2,598	34 <i>Eucalyptus canobolensis</i>	112
5 <i>Eucalyptus mannifera</i>	2,594	35 <i>Eucalyptus praecox</i>	106
6 <i>Eucalyptus blakelyi</i>	2,091	36 <i>Eucalyptus microcarpa</i>	105
7 <i>Eucalyptus rubida</i>	2,010	37 <i>Eucalyptus parvula</i>	98
8 <i>Eucalyptus polyanthemos</i>	1,628	38 <i>Eucalyptus kartzoffiana</i>	93
9 <i>Eucalyptus goniocalyx</i>	1,487	39 <i>Eucalyptus bosistoana</i>	92
10 <i>Eucalyptus cypellocarpa</i>	1,434	40 <i>Eucalyptus badjensis</i>	60
11 <i>Eucalyptus punctata</i>	1,231	41 <i>Eucalyptus nubila</i>	54
12 <i>Eucalyptus albens</i>	898	42 <i>Eucalyptus perriniana</i>	49
13 <i>Eucalyptus nortonii</i>	635	43 <i>Eucalyptus caleyi</i>	48
14 <i>Eucalyptus cinerea</i>	430	44 <i>Eucalyptus beyeriana</i>	46
15 <i>Eucalyptus fibrosa</i>	399	45 <i>Eucalyptus glaucescens</i>	46
16 <i>Eucalyptus crebra</i>	377	46 <i>Eucalyptus corticosa</i>	43
17 <i>Eucalyptus aggregata</i>	359	47 <i>Eucalyptus globulus</i>	41
18 <i>Eucalyptus camaldulensis</i>	305	48 <i>Eucalyptus conica</i>	32
19 <i>Eucalyptus tereticornis</i>	301	49 <i>Eucalyptus camphora</i>	25
20 <i>Eucalyptus ovata</i>	298	50 <i>Eucalyptus deanei</i>	23
21 <i>Eucalyptus sideroxylon</i>	262	51 <i>Eucalyptus recurva</i>	21
22 <i>Eucalyptus dealbata</i>	260	52 <i>Eucalyptus parramattensis</i>	20
23 <i>Eucalyptus camphora</i>	217	53 <i>Eucalyptus chapmaniana</i>	19
24 <i>Eucalyptus bicostata</i>	203	54 <i>Eucalyptus fergusonii</i>	19
25 <i>Eucalyptus amplifolia</i>	166	55 <i>Eucalyptus baeuerlenii</i>	17
26 <i>Eucalyptus maidenii</i>	163	56 <i>Eucalyptus saxatilis</i>	16
27 <i>Eucalyptus nitens</i>	140	57 <i>Eucalyptus pseudoglobulus</i>	14
28 <i>Eucalyptus angophoroides</i>	130	58 <i>Eucalyptus notabilis</i>	13
29 <i>Eucalyptus dawsonii</i>	129	59 <i>Eucalyptus macarthurii</i>	11
30 <i>Eucalyptus dwyeri</i>	127	60 <i>Eucalyptus alligatrix</i>	10

Species	VIS records	Species	VIS records
<b>Sub-Genus Symphyomyrtus (cont.)</b>		<b>Sub-Genus Eucalyptus (cont.)</b>	
61 <i>Eucalyptus nobilis</i>	8	19 <i>Eucalyptus niphophila</i>	321
62 <i>Eucalyptus paniculata</i>	6	20 <i>Eucalyptus elata</i>	314
63 <i>Eucalyptus michaeliana</i>	4	21 <i>Eucalyptus stricta</i>	189
64 <i>Eucalyptus saligna</i>	4	22 <i>Eucalyptus fraxinoides</i>	183
65 <i>Eucalyptus baueriana</i>	3	23 <i>Eucalyptus consideriana</i>	178
66 <i>Eucalyptus longifolia</i>	3	24 <i>Eucalyptus sclerophylla</i>	176
67 <i>Eucalyptus scias</i>	3	25 <i>Eucalyptus oreades</i>	141
68 <i>Eucalyptus denticulata</i>	2	26 <i>Eucalyptus gregsoniana</i>	90
69 <i>Eucalyptus aenea</i>	1	27 <i>Eucalyptus tenella</i>	79
70 <i>Eucalyptus biturbinata</i>	1	28 <i>Eucalyptus debeuzevillei</i>	67
71 <i>Eucalyptus elliptica</i>	1	29 <i>Eucalyptus laevopinea</i>	56
72 <i>Eucalyptus intertexta</i>	1	30 <i>Eucalyptus muelleriana</i>	54
73 <i>Eucalyptus melanophloia</i>	1	31 <i>Eucalyptus moorei</i>	45
74 <i>Eucalyptus populnea</i>	1	32 <i>Eucalyptus lacrimans</i>	42
75 <i>Eucalyptus prava</i>	1	33 <i>Eucalyptus ligustrina</i>	41
76 <i>Eucalyptus quadrangulata</i>	1	34 <i>Eucalyptus sp. aff. radiata</i>	41
77 <i>Eucalyptus socialis</i>	1	35 <i>Eucalyptus laophila</i>	39
78 <i>Eucalyptus tricarpa</i>	1	36 <i>Eucalyptus kybeanensis</i>	30
79 <i>Eucalyptus triplex</i>	1	37 <i>Eucalyptus multicaulis</i>	30
		38 <i>Eucalyptus oblonga</i>	29
		39 <i>Eucalyptus dendromorpha</i>	23
<b>Sub-Genus Eucalyptus ('Monocalypts')</b>		40 <i>Eucalyptus latiuscula</i>	18
1 <i>Eucalyptus macrorhyncha</i>	4,101	41 <i>Eucalyptus racemosa</i>	14
2 <i>Eucalyptus pauciflora</i>	3,769	42 <i>Eucalyptus mackintii</i>	12
3 <i>Eucalyptus dives</i>	3,505	43 <i>Eucalyptus stenostoma</i>	12
4 <i>Eucalyptus rossii</i>	2,466	44 <i>Eucalyptus bensonii</i>	11
5 <i>Eucalyptus radiata</i>	2,023	45 <i>Eucalyptus apiculata</i>	10
6 <i>Eucalyptus sieberi</i>	1,809	46 <i>Eucalyptus croajingolensis</i>	8
7 <i>Eucalyptus fastigata</i>	1,396	47 <i>Eucalyptus triflora</i>	8
8 <i>Eucalyptus robertsonii</i>	1,061	48 <i>Eucalyptus olsenii</i>	7
9 <i>Eucalyptus stellulata</i>	897	49 <i>Eucalyptus pilularis</i>	7
10 <i>Eucalyptus obliqua</i>	878	50 <i>Eucalyptus prominula</i>	6
11 <i>Eucalyptus globoidea</i>	747	51 <i>Eucalyptus cunninghamii</i>	5
12 <i>Eucalyptus sparsifolia</i>	664	52 <i>Eucalyptus imitans</i>	5
13 <i>Eucalyptus delegatensis</i>	580	53 <i>Eucalyptus obstans</i>	5
14 <i>Eucalyptus agglomerata</i>	534	54 <i>Eucalyptus acmenoides</i>	3
15 <i>Eucalyptus blaxlandii</i>	519	55 <i>Eucalyptus burgessiana</i>	1
16 <i>Eucalyptus piperita</i>	516	56 <i>Eucalyptus paliformis</i>	1
17 <i>Eucalyptus cannonii</i>	455	57 <i>Eucalyptus ralla</i>	1
18 <i>Eucalyptus eugenioides</i>	347		

## b) Non-eucalypts – listed within genera or 'others' with evidence of koala use

Species	VIS records	Species	VIS records
<b>Acacias (species not assigned)</b>		<b>Acacias (cont.)</b>	
<i>Acacia dealbata</i>	4,182	<i>Acacia irrorata</i>	54
<i>Acacia melanoxylon</i>	2,051	<i>Acacia cognata</i>	6
<i>Acacia falciformis</i>	1,528	<b>Allocauarinas</b>	
<i>Acacia mearnsii</i>	1,136	<i>Allocauarina littoralis</i>	830
<i>Acacia decurrens</i>	381	<i>Allocauarina torulosa</i>	159
<i>Acacia parramattensis</i>	342	<b>Angophoras</b>	
<i>Acacia floribunda</i>	63	<i>Angophora floribunda</i>	632
<i>Acacia falcata</i>	61	<i>Angophora costata</i>	112

Species	VIS records	Species	VIS records
<b>Angophoras (cont.)</b>		<b>Corymbias</b>	
<i>Angophora bakeri</i>	16	<i>Corymbia trachyphloia</i>	81
<i>Angophora euryphylla</i>	8	<i>Corymbia gummifera</i>	63
<i>Angophora subvelutina</i>	2	<i>Corymbia eximia</i>	22
<b>Callitris</b>		<i>Corymbia maculata</i>	1
<i>Callitris endlicheri</i>	1,230	<b>Melaleucas</b>	
<i>Callitris glaucophylla</i>	164	<i>Melaleuca styphelioides</i>	25
<b>Casuarinas</b>		<i>Melaleuca linariifolia</i>	17
<i>Casuarina cunninghamiana</i>	249	<i>Melaleuca salignus</i>	10
<i>Casuarina cristata</i>	1	<i>Melaleuca nodosa</i>	2
<i>Casuarina glauca</i>	1	<i>Melaleuca hypericifolia</i>	1
		<b>Syncarpia</b>	
		<i>Syncarpia glomulifera</i>	82

**Table 21 A ranking of canopy trees with sourced evidence of use in the Central and Southern Tablelands KMA**

Regional high use (>2 areas in region)		Local high use		Significant use		Irregular use		Low use	
Rank	Species	Rank	Species	Rank	Species	Rank	Species	Rank	Species
1	Brittle gum ( <i>E. mannifera</i> )	4	Mountain gum ( <i>E. dalrympleana</i> )	4	Red box ( <i>E. polyanthemus</i> )	4	Yellow box ( <i>E. melliodora</i> )	4	Narrow-leaved peppermint ( <i>E. radiata</i> )
1	Scribbly gum ( <i>E. rossii</i> )	4	Red box ( <i>E. polyanthemus</i> )	4	Yellow box ( <i>E. melliodora</i> )	4	Narrow-leaved peppermint ( <i>E. radiata</i> )	4	White stringybark ( <i>E. globoidea</i> )
2	Ribbon gum ( <i>E. viminalis</i> )	4	Yellow box ( <i>E. melliodora</i> )	4	Narrow-leaved peppermint ( <i>E. radiata</i> )	4	White stringybark ( <i>E. globoidea</i> )	4	Blue-leaved stringybark ( <i>E. agglomerata</i> )
2	Broad-leaved peppermint ( <i>E. dives</i> )	4	Narrow-leaved peppermint ( <i>E. radiata</i> )	4	White stringybark ( <i>E. globoidea</i> )	4	Blue-leaved stringybark ( <i>E. agglomerata</i> )	4	Messmate ( <i>E. obliqua</i> )
2	Red stringybark ( <i>E. macrorhyncha</i> )	4	White stringybark ( <i>E. globoidea</i> )	4	Blue-leaved stringybark ( <i>E. agglomerata</i> )	4	Messmate ( <i>E. obliqua</i> )	4	Snow gum or white sally ( <i>E. pauciflora</i> )
3	Grey gum ( <i>E. punctata</i> )	4	Blue-leaved stringybark ( <i>E. agglomerata</i> )	4	Messmate ( <i>E. obliqua</i> )	4	Snow gum or white sally ( <i>E. pauciflora</i> )	4	Silvertop ash ( <i>E. sieberi</i> )
3	Thin-leaved stringybark ( <i>E. eugenoides</i> )	4	Messmate ( <i>E. obliqua</i> )	4	Snow gum or white sally ( <i>E. pauciflora</i> )	4	Silvertop ash ( <i>E. sieberi</i> )	4	Acacia species
3	Sydney peppermint ( <i>E. piperita</i> )	4	Snow gum or white sally ( <i>E. pauciflora</i> )	4	Silvertop ash ( <i>E. sieberi</i> )	4	Acacia species	4	White cypress-pine ( <i>C. glaucophylla</i> )
4	Blakely's red gum ( <i>E. blakelyi</i> )	4	Silvertop ash ( <i>E. sieberi</i> )	4	Acacia species	4	White cypress-pine ( <i>C. glaucophylla</i> )	4	Black cypress-pine ( <i>C. endlicheri</i> )
4	Apple box ( <i>E. bridgesiana</i> )	4	Acacia species	4	White cypress-pine ( <i>C. glaucophylla</i> )	4	Black cypress-pine ( <i>C. endlicheri</i> )	5	Mugga ironbark ( <i>E. sideroxylon</i> )
4	Mountain grey gum ( <i>E. cypellocarpa</i> )	4	White cypress-pine ( <i>C. glaucophylla</i> )	4	Black cypress-pine ( <i>C. endlicheri</i> )	5	Mugga ironbark ( <i>E. sideroxylon</i> )	5	Black she-oak ( <i>A. littoralis</i> )
4	Large-flowered bundy ( <i>E. nortonii</i> )	4	Black cypress-pine ( <i>C. endlicheri</i> )	5	Mugga ironbark ( <i>E. sideroxylon</i> )	5	Black she-oak ( <i>A. littoralis</i> )		
4	Bundy ( <i>E. goniocalyx</i> )	5	Mugga ironbark ( <i>E. sideroxylon</i> )						
4	Candlebark ( <i>E. rubida</i> )	5	Black she-oak ( <i>A. littoralis</i> )						

**Table 22 Canopy tree species with evidence of koala use within the Western Slopes and Plains KMA (after Phillips 2000; DECC 2008)**

Results are summarised from studies undertaken for research, assessment and regulatory purposes (see Table 2 for references and koala experts consulted for personal opinions).

	Documented high use	Documented significant use	Documented irregular use	Documented low use
<b>Species</b>	Gunnedah – Smith 1992; Lunney et al. 2012b; Crowther et al. 2014; Greenloaning & Phillips 2013; North West Ecological 2016	Pilliga – Kavanagh & Barrott 2001; Kavanagh et al. 2007; Niche Environment & Heritage 2013; David Paul (unpublished data)	Moree – Parsons Brinkerhoff 2008	Liverpool Plains – Moriyama 2016
				Narrabri – Moree – Lightning Ridge – Walgett (Phil Spark unpublished data)
				'North West Slopes' (Hawkes 1978; Reed et al. 1990)
<b>Sub-Genus Symphyomyrtus</b>				
<b>Section Exsertaria (red gums) – important group with evidence of regional and local high use (also see below)</b>				
Tumbledown red gum ( <i>E. dealbata</i> )				
Dirty gum ( <i>E. chloroclada</i> )				
Blakely's red gum ( <i>E. blakelyi</i> )				
River red gum ( <i>E. camaldulensis</i> )				
<b>Section Adnataria (boxes, ironbarks) – important group with mixed evidence of use (high to associate)</b>				
Coolibah ( <i>E. coolabah</i> )				
Black box ( <i>E. largiflorens</i> )				
Bimble or poplar box ( <i>E. populnea</i> )				
Narrow-leaved grey box ( <i>E. pilligaensis</i> )				
Western grey box ( <i>E. microcarpa</i> )				
Grey box ( <i>E. moluccana</i> )				
White box ( <i>E. albens</i> )				
Silver-leaved ironbark ( <i>E. melanophloia</i> )				
Narrow-leaved ironbark ( <i>E. crebra</i> )				
Mugga ironbark ( <i>E. sideroxylon</i> )				
Yellow box ( <i>E. melliodora</i> )				
<b>Non-Eucalypts</b>				
<b>Angophoras</b>				
Rough-barked apple ( <i>A. floribunda</i> )				
<b>Casuarinas</b>				
Belah ( <i>C. cristata</i> )				
<b>Acacias</b>				
Acacia species				
<b>Callitris – white cypress-pine is a high use species in some locations</b>				
White cypress-pine ( <i>C. glaucophylla</i> )				
<b>Others</b>				
Belah ( <i>Casuarina cristata</i> )				
Wilga ( <i>Geijera parviflora</i> )				
Kurrajong ( <i>Brachychiton populneus</i> )				

**Table 23 Koala use classes assigned to tree species with BioNet VIS records for the Western Slopes and Plains KMA (as of September 2017) and ranked in order of total records**

Regional high use	High use	Significant use	Irregular use	Low use	No sourced evidence of use
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**a) Eucalypts – listed within sub-genera**

Species	VIS records	Species	VIS records
<b>Sub-Genus Symphyomyrtus (Symphyomyrts)</b>		<b>Sub-Genus Symphyomyrtus (cont.)</b>	
1 <i>Eucalyptus populnea</i>	3,949	44 <i>Eucalyptus elliptica</i>	12
2 <i>Eucalyptus albens</i>	3,373	45 <i>Eucalyptus rubida</i>	10
3 <i>Eucalyptus crebra</i>	2,582	46 <i>Eucalyptus tereticornis</i>	10
4 <i>Eucalyptus coolabah</i>	2,179	47 <i>Eucalyptus porosa</i>	9
5 <i>Eucalyptus microcarpa</i>	2,145	48 <i>Eucalyptus praecox</i>	9
6 <i>Eucalyptus blakelyi</i>	2,128	49 <i>Eucalyptus caleyi</i>	8
7 <i>Eucalyptus melliodora</i>	2,073	50 <i>Eucalyptus bicostata</i>	5
8 <i>Eucalyptus dwyeri</i>	1,937	51 <i>Eucalyptus cypellocarpa</i>	5
9 <i>Eucalyptus camaldulensis</i>	1,859	52 <i>Eucalyptus oleosa</i>	5
10 <i>Eucalyptus largiflorens</i>	1,597	53 <i>Eucalyptus camphora</i>	4
11 <i>Eucalyptus sideroxylon</i>	1,370	54 <i>Eucalyptus bakeri</i>	2
12 <i>Eucalyptus dealbata</i>	950	55 <i>Eucalyptus bancroftii</i>	2
13 <i>Eucalyptus intertexta</i>	840	56 <i>Eucalyptus cinerea</i>	2
14 <i>Eucalyptus socialis</i>	811	57 <i>Eucalyptus interstans</i>	1
15 <i>Eucalyptus melanophloia</i>	774	58 <i>Eucalyptus leucoxylon</i>	1
16 <i>Eucalyptus chloroclada</i>	758	59 <i>Eucalyptus malacoxylon</i>	1
17 <i>Eucalyptus fibrosa</i>	652	60 <i>Eucalyptus panda</i>	1
18 <i>Eucalyptus dumosa</i>	640	61 <i>Eucalyptus rubida</i>	1
19 <i>Eucalyptus viridis</i>	562	62 <i>Eucalyptus saligna</i>	1
20 <i>Eucalyptus pilligaensis</i>	473		
21 <i>Eucalyptus nubila</i>	466	<b>Sub-Genus Eucalyptus ('Monocalypts')</b>	
22 <i>Eucalyptus polyanthemos</i>	324	1 <i>Eucalyptus macrorhyncha</i>	1,126
23 <i>Eucalyptus conica</i>	320	2 <i>Eucalyptus rossii</i>	370
24 <i>Eucalyptus gracilis</i>	284	3 <i>Eucalyptus laevopinea</i>	235
25 <i>Eucalyptus bridgesiana</i>	280	4 <i>Eucalyptus pauciflora</i>	72
26 <i>Eucalyptus goniocalyx</i>	197	5 <i>Eucalyptus sparsifolia</i>	50
27 <i>Eucalyptus leptophylla</i>	163	6 <i>Eucalyptus stellulata</i>	38
28 <i>Eucalyptus vicina</i>	125	7 <i>Eucalyptus andrewsii</i>	35
29 <i>Eucalyptus morrisii</i>	123	8 <i>Eucalyptus dives</i>	14
30 <i>Eucalyptus dalrympleana</i>	107	9 <i>Eucalyptus robertsonii</i>	9
31 <i>Eucalyptus nortonii</i>	104	10 <i>Eucalyptus subtilior</i>	4
32 <i>Eucalyptus volcanica</i>	100	11 <i>Eucalyptus youmanii</i>	4
33 <i>Eucalyptus beyeriana</i>	81	12 <i>Eucalyptus caliginosa</i>	3
34 <i>Eucalyptus nobilis</i>	76	13 <i>Eucalyptus eugenioides</i>	2
35 <i>Eucalyptus polybractea</i>	64	14 <i>Eucalyptus oblonga</i>	2
36 <i>Eucalyptus viminalis</i>	64	15 <i>Eucalyptus sieberi</i>	2
37 <i>Eucalyptus moluccana</i>	58	16 <i>Eucalyptus agglomerata</i>	1
38 <i>Eucalyptus behriana</i>	50	17 <i>Eucalyptus cameronii</i>	1
39 <i>Eucalyptus prava</i>	39	18 <i>Eucalyptus campanulata</i>	1
40 <i>Eucalyptus nandewarica</i>	30	19 <i>Eucalyptus fastigata</i>	1
41 <i>Eucalyptus ochrophloia</i>	25	20 <i>Eucalyptus obliqua</i>	1
42 <i>Eucalyptus dawsonii</i>	22	21 <i>Eucalyptus radiata</i>	1
43 <i>Eucalyptus mannifera</i>	17		

**b) Non-eucalypts – listed within genera or ‘others’ with evidence of koala use**

Species	VIS records	Species	VIS records
<b>Acacias (species not assigned)</b>		<b>Callitris</b>	
<i>Acacia dealbata</i>	266	<i>Callitris glaucophylla</i>	8,774
<i>Acacia melanoxylon</i>	65	<i>Callitris endlicheri</i>	3,436
<i>Acacia falciformis</i>	20	<i>Callitris columellaris</i>	22
<i>Acacia mearnsii</i>	20	<b>Casuarinas</b>	
<i>Acacia decurrens</i>	9	<i>Casuarina cristata</i>	1,814
<i>Acacia parramattensis</i>	9	<i>Casuarina cunninghamiana</i>	340
<i>Acacia irrorata</i>	4	<i>Casuarina glauca</i>	1
<i>Acacia falcata</i>	2	<b>Corymbias</b>	
<b>Allocasuarinas</b>		<i>Corymbia trachyphloia</i>	1,078
<i>Allocasuarina littoralis</i>	13	<i>Corymbia tessellaris</i>	122
<i>Allocasuarina torulosa</i>	3	<i>Corymbia tumescens</i>	91
<b>Angophoras</b>		<i>Corymbia dolichocarpa</i>	72
<i>Angophora floribunda</i>	1,424	<b>Melaleucas</b>	
<i>Angophora leiocarpa</i>	280	<i>Melaleuca nodosa</i>	3
<i>Angophora melanoxylon</i>	87	<i>Melaleuca styphelioides</i>	1
<i>Angophora subvelutina</i>	1	<b>Others</b>	
		<i>Brachychiton populneus</i>	1,103
		<i>Geijera parviflora</i>	4,421

**Table 24 A ranking of canopy trees with sourced evidence of use in the Western Slopes and Plains KMA**

Regional high use (>2 areas in region)		Local high use		Significant use		Irregular use		Low use	
Rank	Species	Rank	Species	Rank	Species	Rank	Species	Rank	Species
1	River red gum ( <i>E. camaldulensis</i> )	3	Western grey box ( <i>E. microcarpa</i> )	3	Grey box ( <i>E. moluccana</i> )	4	Mugga ironbark ( <i>E. sideroxylon</i> )	5	Narrow-leaved ironbark ( <i>E. crebra</i> )
2	Tumbledown red gum ( <i>E. dealbata</i> )	3	Yellow box ( <i>E. melliodora</i> )	4	Silver-leaved ironbark ( <i>E. melanophloia</i> )	5	Rough-barked apple ( <i>Angophora floribunda</i> )	5	Wilga ( <i>Geijera parviflora</i> )
2	Dirty gum ( <i>E. chloroclada</i> )	3	Belah ( <i>Casuarina cristata</i> )	4	Mugga ironbark ( <i>E. sideroxylon</i> )	5	Kurrajong ( <i>Brachychiton pupulneus</i> )	5	Acacia species
2	Blakely's red gum ( <i>E. blakelyi</i> )	3	Narrow-leaved ironbark ( <i>E. crebra</i> )	4	Belah ( <i>Casuarina cristata</i> )	5	Rough-barked apple ( <i>Angophora floribunda</i> )		
2	Coolibah ( <i>E. coolabah</i> )	3	Silver-leaved ironbark ( <i>E. melanophloia</i> )	4	Mugga ironbark ( <i>E. sideroxylon</i> )	5	Wilga ( <i>Geijera parviflora</i> )		
2	Black box ( <i>E. largiflorens</i> )	3	Belah ( <i>Casuarina cristata</i> )	4	Belah ( <i>Casuarina cristata</i> )	5	Kurrajong ( <i>Brachychiton pupulneus</i> )		
2	Bimble or poplar box ( <i>E. populnea</i> )	3	Silver-leaved ironbark ( <i>E. melanophloia</i> )	4	Mugga ironbark ( <i>E. sideroxylon</i> )	5	Acacia species		
2	Narrow-leaved grey box ( <i>E. pilligaensis</i> )	3	Yellow box ( <i>E. melliodora</i> )	4	Belah ( <i>Casuarina cristata</i> )	5			
2	White box ( <i>E. albens</i> )	3	Belah ( <i>Casuarina cristata</i> )	4	Belah ( <i>Casuarina cristata</i> )	5			
2	White cypress-pine ( <i>C. glaucophylla</i> )	3	Western grey box ( <i>E. microcarpa</i> )	4	Mugga ironbark ( <i>E. sideroxylon</i> )	5			



**Table 25 Canopy tree species expected to be used within the Far West and South West KMA (after Phillips 2000; DECC 2008)**

Based on the indicative LGA-based lists of Mitchell (2015), vegetation associations predicted to be used by koalas in western New South Wales (OEH Threatened Species website) and from evidence of use in published south-west Queensland koala habitat studies; see Table 2 for references.

Documented high use	Likely high use	Likely significant use	Likely irregular use	Likely low use
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Species	Likely use of Eucalyptus associations mapped for Inland Riverine Forests (e.g. Murrumbidgee, Murray) & North-west Floodplain Woodlands (e.g. Darling, Paroo) with patchy koala records (OEH website)	South West Queensland (Wu et al. 2012, Sullivan et al. 2003) – possibly indicative for western NSW	South west Qld (Smith et al. 2013) – possibly indicative for western NSW	Murray Valley National Park information
<b>Sub-Genus Symphyomyrtus</b>				
<b>Section Exsertaria – river red gum is an important species for western NSW koalas</b>				
River red gum ( <i>E. camaldulensis</i> )				
<b>Section Adnataria (boxes, ironbarks) – several box species are likely to be important across the region</b>				
Coolibah ( <i>E. coolabah</i> )				
Gum coolibah ( <i>E. intertexta</i> )				
Black box ( <i>E. largiflorens</i> )				
Bimble or poplar box ( <i>E. populnea</i> )				
Western grey box ( <i>E. microcarpa</i> )				
White box ( <i>E. albens</i> )				
Silver-leaved ironbark ( <i>E. melanophloia</i> )				
Yellow box ( <i>E. melliodora</i> )				
<b>Non-Eucalypts</b>				
<b>Callitris – white cypress may be important across the region</b>				
White cypress-pine ( <i>C. glaucophylla</i> )				

**Table 26 Koala use classes assigned to tree species with BioNet VIS records for the Far West and South West KMA (as of September 2017) and ranked in order of total records**

Regional high use	High use	Significant use	Irregular use	Low use	No sourced evidence of use
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**a) Eucalypts – listed within sub-genera**

Species	VIS records	Species	VIS records
<b>Sub-Genus Symphyomyrtus ('Symphyomyrts')</b>		<b>Sub-Genus Symphyomyrtus (cont.)</b>	
1 <i>Eucalyptus camaldulensis</i>	2,652	23 <i>Eucalyptus vicina</i>	24
2 <i>Eucalyptus socialis</i>	1,503	24 <i>Eucalyptus ochrophloia</i>	19
3 <i>Eucalyptus largiflorens</i>	1,326	25 <i>Eucalyptus sideroxylon</i>	16
4 <i>Eucalyptus dumosa</i>	1,227	26 <i>Eucalyptus leucoxylon</i>	15
5 <i>Eucalyptus gracilis</i>	934	27 <i>Eucalyptus nortonii</i>	12
6 <i>Eucalyptus costata</i> subsp. <i>murrayana</i>	449	28 <i>Eucalyptus cinerea</i>	5
7 <i>Eucalyptus microcarpa</i>	443	29 <i>Eucalyptus bicostata</i>	3
8 <i>Eucalyptus melliodora</i>	436	30 <i>Eucalyptus calycogona</i>	3
9 <i>Eucalyptus oleosa</i>	382	31 <i>Eucalyptus obtusa</i>	2
10 <i>Eucalyptus leptophylla</i>	333	32 <i>Eucalyptus rubida</i>	2
11 <i>Eucalyptus albens</i>	249	33 <i>Eucalyptus viminalis</i>	2
12 <i>Eucalyptus blakelyi</i>	231	34 <i>Eucalyptus behriana</i>	1
13 <i>Eucalyptus coolabah</i>	117	35 <i>Eucalyptus globulus</i>	1
14 <i>Eucalyptus dwyeri</i>	74	36 <i>Eucalyptus mannifera</i>	1
15 <i>Eucalyptus populnea</i>	71	37 <i>Eucalyptus viridis</i>	1
16 <i>Eucalyptus polyanthemos</i>	67		
17 <i>Eucalyptus porosa</i>	55	<b>Sub-Genus Eucalyptus ('Monocalypts')</b>	
18 <i>Eucalyptus bridgesiana</i>	50	1 <i>Eucalyptus macrorhyncha</i>	114
19 <i>Eucalyptus dealbata</i>	40	2 <i>Eucalyptus rossii</i>	3
20 <i>Eucalyptus gillii</i>	40	3 <i>Eucalyptus dives</i>	2
21 <i>Eucalyptus intertexta</i>	39	4 <i>Eucalyptus williamsiana</i>	1
22 <i>Eucalyptus goniocalyx</i>	29		

**b) Non-eucalypts – listed within genera or 'others' with evidence of koala use**

Species	VIS records	Species	VIS records
<b>Acacias</b>		<b>Casuarinas</b>	
<i>Acacia dealbata</i>	116	<i>Casuarina cristata</i>	72
<i>Acacia mearnsii</i>	4	<i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i>	9
<i>Acacia falciformis</i>	3	<b>Corymbias</b>	
<i>Acacia decurrens</i>	1	<i>Corymbia tumescens</i>	22
<i>Acacia melanoxylon</i>	1	<i>Corymbia maculata</i>	1
<b>Banksias</b>		<b>Melaleucas</b>	
<i>Banksia integrifolia</i>	3	<i>Melaleuca styphelioides</i>	2
<b>Callitris</b>		<b>Others</b>	
<i>Callitris glaucophylla</i>	798	<i>Geijera parviflora</i>	318
<i>Callitris endlicheri</i>	58		
<i>Callitris columellaris</i>	2		

**Table 27 A ranking of canopy trees with sourced evidence of use in the Far West and South West KMA**

Known regional high use	Likely high use	Likely significant use	Likely irregular use	Likely low use
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Rank	Species	Rank	Species
1	River red gum ( <i>E. camaldulensis</i> )	L3	Silver-leaved ironbark ( <i>E. melanophloia</i> )
L2	Coolibah ( <i>E. coolabah</i> )	L3	Yellow box ( <i>E. melliodora</i> )
L2	Black box ( <i>E. largiflorens</i> )	L4	White box ( <i>E. albens</i> )
L3	Bimble or poplar box ( <i>E. populnea</i> )	L4	White cypress-pine ( <i>C. glaucophylla</i> )
L3	Western grey box ( <i>E. microcarpa</i> )	L5	Gum coolibah ( <i>E. intertexta</i> )

## Appendix 2. Canopy trees listed by previous studies in New South Wales as koala use trees (feed or shelter)

Canopy trees listed by previous studies in New South Wales as koala use trees (feed or shelter) by DECC (2008), NSW Planning & Environment (2016) (Explanation of Intended Effect: State Environmental Planning Policy 44 – Koala Habitat Protection) or Youngentob (2014), or recorded as koala use trees in this evidence-based review. Taxonomy and order follows Brooker (2000), modified to adopt the separation of *Angophora* and *Corymbia* (Ladiges and Udovicic 2000 and Harden 2002). Other variations from Brooker (2000) are in accordance with NSW PlantNET. (KMA: NSW Koala Management Area (see Figure 2); P: primary; S: secondary; Str: stringybark)

Common name	Species	Koala food tree status (KMA) (DECC 2008)	Koala food tree status (NSW Planning & Environment 2016)	Youngentob (2014)
<b>Sub-Genus Alveolata</b>				
Tallowwood	<i>Eucalyptus microcorys</i>	P- 1, 2	Y	Y
<b>Sub-Genus Symphyomyrtus</b>				
<b>Section Racemus</b>				
Brittle or Hillgrove gum	<i>Eucalyptus michaeliana</i>	S- 1, 4	N	Y
<b>Section Latoangulatae (blue gums, red mahoganies, grey gums)</b>				
Mountain blue gum	<i>Eucalyptus deanei</i>	N	N	N
Mountain blue gum	<i>Eucalyptus brunnea</i>	N	N	N
Flooded gum	<i>Eucalyptus grandis</i>	N	N	Y
Sydney blue gum	<i>Eucalyptus saligna</i>	N	N	Y
Large-fruited red mahogany	<i>Eucalyptus scias</i>	S- 2, 4	Y	Y
Mountain mahogany	<i>Eucalyptus notabilis</i>	1 ,2, 4	Y	Y
Red mahogany	<i>Eucalyptus resinifera</i>	S- 1, 2	N	Y
Swamp mahogany	<i>Eucalyptus robusta</i>	P- 1, 2	Y	Y
Bangalay	<i>Eucalyptus botryoides</i>	N	N	Y
Grey gum	<i>Eucalyptus major</i>	N	N	Y
Small-fruited grey gum	<i>Eucalyptus propinqua</i>	S- 1, 2	Y	Y
Grey gum	<i>Eucalyptus biturbinata</i>	S- 1	Y	Y
Large-fruited grey gum	<i>Eucalyptus canaliculata</i>	S- 1	Y	Y
Grey gum	<i>Eucalyptus punctata</i>	S- 2	Y	Y
<b>Section Similares</b>				
Woollybutt	<i>Eucalyptus longifolia</i>	S- 2, 3	Y	Y

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Common name	Species	Koala food tree status (KMA) (DECC 2008)	Koala food tree status (NSW Planning & Environment 2016)	Youngentob (2014)
<b>Section Liberivalvae (red gums)</b>				
Narrow-leaved red gum	<i>Eucalyptus seeana</i>	S- 1	N	Y
Red gum	<i>Eucalyptus interstans</i>	S- 4	Y	Y
Orange gum	<i>Eucalyptus prava</i>	S- 4, 6	Y	Y
Orange gum	<i>Eucalyptus bancroftii</i>	P- 1	Y	Y
Parramatta red gum	<i>Eucalyptus parramattensis</i>	P- 1, 2	Y	Y
<b>Section Exsertaria</b>				
Mallee red gum	<i>Eucalyptus nandewarica</i>	S- 6	Y	Y
Dwyer's red gum	<i>Eucalyptus dwyeri</i>	S- 2, 4, 6	Y	Y
Tumbledown red gum	<i>Eucalyptus dealbata</i>	S- 4, 5, 6	Y	Y
Manara Hills red gum	<i>Eucalyptus vicina</i>	S- 6	Y	Y
Dirty gum	<i>Eucalyptus chloroclada</i>	S- 6	Y	Y
Blakely's red gum	<i>Eucalyptus blakelyi</i>	S- 4, 5, 6, 7	Y	Y
Slaty red gum	<i>Eucalyptus glaucina</i>	S- 1, 2	N	Y
Cabbage gum	<i>Eucalyptus amplifolia</i>	P- 1, 2	Y	Y
Forest red gum	<i>Eucalyptus tereticornis</i>	P- 1, 2, 3, 4	Y	Y
River red gum	<i>Eucalyptus camaldulensis</i>	P- 6, 7	Y	Y
Yellow messmate	<i>Eucalyptus exserta</i>	N	N	Y
<b>Section Maidenaria (white gums, manna gums, ribbon gums, apple boxes)</b>				
Swamp gum	<i>Eucalyptus ovata</i>	S- 2, 3	Y	Y
Broad-leaved sally	<i>Eucalyptus camphora</i>	S- 2, 4, 5	Y	Y
Wattle-leaved peppermint	<i>Eucalyptus acaciiformis</i>	S- 4	N	Y
Narrow-leaved black peppermint	<i>Eucalyptus nicholii</i>	S- 4	Y	Y
Brittle gum	<i>Eucalyptus mannifera</i>	S- 2, 3, 4, 5	Y	Y
Brittle gum	<i>Eucalyptus praecox</i>	S- 2, 4	N	Y
Dorrigo white gum	<i>Eucalyptus dorrigoensis</i>	N	N	N
Argyle apple	<i>Eucalyptus cinerea</i>	S- 5	Y	Y
New England black peppermint	<i>Eucalyptus nova-anglica</i>	S- 4	Y	Y
Dunn's white gum	<i>Eucalyptus dunnii</i>	N	N	Y
Apple box	<i>Eucalyptus bridgesiana</i>	S- 3, 4, 5, 6	Y	Y
Moonbi apple box	<i>Eucalyptus malacoxylon</i>	S- 4	N	Y
Ironbark peppermint / gully gum	<i>Eucalyptus smithii</i>	N	N	N
Maiden's gum	<i>Eucalyptus maidenii</i>	S- 2, 3, 5	Y	Y
Bastard eurabbie	<i>Eucalyptus pseudoglobulus</i>	S- 3	Y	Y
Eurabbie	<i>Eucalyptus bicostata</i>	S- 4, 5	Y	Y
White-topped box	<i>Eucalyptus quadrangulata</i>	S- 1, 2, 4	Y	Y
Mountain grey gum	<i>Eucalyptus cypellocarpa</i>	S- 2, 3, 4, 5	Y	Y
Hillgrove box	<i>Eucalyptus retinens</i>	S- 4	N	Y

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Common name	Species	Koala food tree status (KMA) (DECC 2008)	Koala food tree status (NSW Planning & Environment 2016)	Youngentob (2014)
Large-flowered bundy	<i>Eucalyptus nortonii</i>	S- 4, 5	Y	Y
Bundy	<i>Eucalyptus goniocalyx</i>	S- 2, 4, 5	Y	Y
Tenterfield woollybutt	<i>Eucalyptus banksii</i>	S- 4	N	Y
Ribbon gum	<i>Eucalyptus viminalis</i>	P- 2, 3, 4, 5	Y	Y
Ribbon gum	<i>Eucalyptus nobilis</i>	N	Y	Y
Mountain gum	<i>Eucalyptus dalrympleana</i>	S- 4, 5	Y	Y
Candlebark	<i>Eucalyptus rubida</i>	S- 3, 4	Y	Y
–	<i>Eucalyptus volcanica</i>	S- 4, 6	Y	Y
Wallangarra white gum	<i>Eucalyptus scoparia</i>	N	N	Y
<b>Section Adnataria (boxes, ironbarks)</b>				
Coolibah	<i>Eucalyptus coolabah</i>	P- 6, 7	Y	Y
Steel box	<i>Eucalyptus rummeryi</i>	S- 1	N	Y
Craven grey box	<i>Eucalyptus largeana</i>	S- 1, 2	N	Y
Gum coolibah	<i>Eucalyptus intertexta</i>	N	N	N
Black box	<i>Eucalyptus largiflorens</i>	S- 6, 7	Y	Y
Bimble or poplar box	<i>Eucalyptus populnea</i>	S- 5, 6	Y	Y
Narrow-leaved grey box	<i>Eucalyptus pilligaensis</i>	S- 6	Y	Y
Western grey box	<i>Eucalyptus microcarpa</i>	S- 2, 6, 7	Y	Y
Yapunyah	<i>Eucalyptus ochrophloia</i>	N	N	Y
White box	<i>Eucalyptus albens</i>	S- 4, 5, 6	Y	Y
Grey box	<i>Eucalyptus moluccana</i>	S- 1, 2, 4	Y	Y
Coastal grey box	<i>Eucalyptus bosistoana</i>	S- 2,3	Y	Y
Red ironbark	<i>Eucalyptus fibrosa</i>	N	N	Y
Grey ironbark	<i>Eucalyptus siderophloia</i>	N	N	Y
Narrow-leaved ironbark	<i>Eucalyptus crebra</i>	N	N	Y
Silver-leaved ironbark	<i>Eucalyptus melanophloia</i>	N	N	Y
Rudder's box	<i>Eucalyptus rudderii</i>	S- 1, 2	N	Y
Fuzzy box	<i>Eucalyptus conica</i>	S- 2, 4, 6	Y	Y
Blue box	<i>Eucalyptus baueriana</i>	S- 2, 3	Y	Y
Red box	<i>Eucalyptus polyanthemus</i>	S- 3, 4, 5, 6	Y	Y
Grey ironbark	<i>Eucalyptus paniculata</i>	N	N	Y
Grey ironbark	<i>Eucalyptus placita</i>	N	N	N
Ovenden's ironbark	<i>Eucalyptus caleyi</i>	N	N	N
Mugga ironbark	<i>Eucalyptus sideroxylon</i>	N	N	Y
Red ironbark	<i>Eucalyptus tricarpa</i>	N	N	N
Yellow box	<i>Eucalyptus melliodora</i>	S- 4, 5, 6, 7	Y	Y
Yellow gum	<i>Eucalyptus leucoxydon</i>	N	N	Y



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<b>Sub-Genus Eucalyptus</b>				
<b>Section Amentum (white mahoganies)</b>				
White mahogany	<i>Eucalyptus acmenoides</i>	N	N	Y
Bastard white mahogany	<i>Eucalyptus psammitica</i>	N	N	N
Bastard white mahogany	<i>Eucalyptus umbra</i>	N	N	N
Broad-leaved white mahogany	<i>Eucalyptus carnea</i>	N	N	Y
<b>Section Pseudophlouis (pseudo-stringybarks)</b>				
Blackbutt	<i>Eucalyptus pilularis</i>	N	N	Y
<b>Section Aromatica (peppermints)</b>				
River peppermint	<i>Eucalyptus elata</i>	N	N	Y
Narrow-leaved peppermint	<i>Eucalyptus radiata</i>	N	Y	Y
Broad-leaved peppermint	<i>Eucalyptus dives</i>	N	N	Y
<b>Section Capillulus (stringybarks)</b>				
Yellow stringybark	<i>Eucalyptus muelleriana</i>	Str- 2, 3, 4, 5	N	Y
Silver-top stringybark	<i>Eucalyptus laevopinea</i>	Str- 4	N	Y
Red stringybark	<i>Eucalyptus macrorhyncha</i>	Str- 4, 5, 6, 7	Y	Y
–	<i>Eucalyptus cannonii</i>	Str- 2	N	Y
Large-leaved stringybark	<i>Eucalyptus williamsiana</i>	Str- 4	N	Y
Youman's stringybark	<i>Eucalyptus youmanii</i>	Str- 4	N	Y
Brown stringybark	<i>Eucalyptus capitallata</i>	Str- 2, 3	N	Y
Diehard stringybark	<i>Eucalyptus cameronii</i>	Str- 1, 4	N	Y
White stringybark	<i>Eucalyptus globoidea</i>	Str- 1, 3	Y	Y
Broad-leaved stringybark	<i>Eucalyptus caliginosa</i>	Str- 4	N	Y
Thin-leaved stringybark	<i>Eucalyptus eugenioides</i>	Str- 1, 2	N	Y
Narrow-leaved stringybark	<i>Eucalyptus sparsifolia</i>	Str- 2	N	Y
–	<i>Eucalyptus tenella</i>	Str- 2	N	Y
McKie's stringybark	<i>Eucalyptus mckieana</i>	Str- 4	N	Y
Privet-leaved stringybark	<i>Eucalyptus ligustrina</i>	Str- 4	N	Y
Tindale's stringybark	<i>Eucalyptus tindaliae</i>	Str- 1	N	Y
Blue-leaved stringybark	<i>Eucalyptus agglomerata</i>	Str- 1, 2, 3	Y	Y
Blaxland's stringybark	<i>Eucalyptus blaxlandii</i>	Str- 2	N	Y
Heart-leaved stringybark	<i>Eucalyptus camfieldii</i>	Str- 2	N	Y
Benson's stringybark	<i>Eucalyptus bensonii</i>	Str- 2	N	Y
Illawarra stringybark	<i>Eucalyptus imitans</i>	Str- 2	N	Y
Brown stringybark	<i>Eucalyptus baxteri</i>	Str- 3	N	Y
–	<i>Eucalyptus subtilior</i>	Str- 4	N	Y
–	<i>Eucalyptus stannicola</i>	Str- 4	N	Y
Southern white stringybark	<i>Eucalyptus yangoura</i>	Str- 3	N	Y

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Common name	Species	Koala food tree status (KMA) (DECC 2008)	Koala food tree status (NSW Planning & Environment 2016)	Youngentob (2014)
Stringybark	<i>Eucalyptus conjuncta</i>	Str- 4	N	Y
Stringybark	<i>Eucalyptus prominula</i>	Str- 2	N	Y
(Sandstone) stringybark	<i>Eucalyptus oblonga</i>	Str- 2	Y	Y
–	<i>Eucalyptus ralla</i>	Str- 2	N	Y
Silver-leaved stringybark	<i>Eucalyptus cephalocarpa</i>	N	N	Y
Brown stringybark	<i>Eucalyptus odorata</i>	N	N	Y
<b>Section Eucalyptus (green-leaved ashes)</b>				
Brown barrel	<i>Eucalyptus fastigata</i>	N	N	Y
Messmate	<i>Eucalyptus obliqua</i>	N	N	Y
<b>Section Longitudinales (black sallies)</b>				
Black sally	<i>Eucalyptus stellulata</i>	N	N	N
<b>Section Cineracea (snow gum &amp; blue-leaved ashes)</b>				
Snow gum or white sally	<i>Eucalyptus pauciflora</i>	S- 3, 4, 5	Y	Y
Silvertop ash	<i>Eucalyptus sieberi</i>	N	Y	Y
Yertchuk	<i>Eucalyptus consideriana</i>	S- 2, 3	Y	Y
New England blackbutt	<i>Eucalyptus campanulata</i>	N	N	Y
Scribbly gum	<i>Eucalyptus signata</i>	N	N	
Scribbly gum	<i>Eucalyptus sclerophylla</i>	N	N	
Narrow-leaved scribbly gum	<i>Eucalyptus racemosa</i>	N	N	Y
Broad-leaved scribbly gum	<i>Eucalyptus haemastoma</i>	N	N	Y
Inland scribbly gum	<i>Eucalyptus rossii</i>	N	Y	Y
Sydney peppermint	<i>Eucalyptus piperita</i>	N	N	Y
<b>Section Insolitae</b>				
Bastard tallowwood	<i>Eucalyptus planchoniana</i>	N	N	–
<b>Corymbia (Bloodwoods, Spotted Gums)</b>				
Yellow bloodwood	<i>Corymbia eximia</i>	N	N	Y
Red bloodwood	<i>Corymbia gummifera</i>	N	N	Y
Pink bloodwood	<i>Corymbia intermedia</i>	N	N	Y
Spotted gum	<i>Corymbia variegata</i>	N	N	N
Spotted gum	<i>Corymbia henryi</i>	N	N	Y
Spotted gum	<i>Corymbia maculata</i>	N	N	Y
<b>Lophostemons</b>				
Brushbox	<i>Lophostemon confertus</i>	N	N	–
Swamp turpentine	<i>Lophostemon suaveolens</i>	N	N	–
<b>Syncarpias</b>				
Turpentine	<i>Syncarpia glomulifera</i>	N	N	–
<b>Angophoras</b>				
Rough-barked apple	<i>Angophora floribunda</i>	N	N	–

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Common name	Species	Koala food tree status (KMA) (DECC 2008)	Koala food tree status (NSW Planning & Environment 2016)	Youngentob (2014)
Smooth-barked apple	<i>Angophora costata</i>	N	N	–
Broad-leaved apple	<i>Angophora subvelutina</i>	N	N	–
Narrow-leaved apple	<i>Angophora bakeri</i>	N	N	–
<b>Allocasuarinas and Casuarinas</b>				
Black she-oak	<i>Allocasuarina littoralis</i>	N	N	–
Forest oak	<i>Allocasuarina torulosa</i>	N	Y	–
Swamp oak	<i>Casuarina glauca</i>	N	N	–
Belah	<i>Casuarina cristata</i>	N	N	–
<b>Acacias</b>				
Acacia species	<i>Acacia sp.</i>	N	N	–
<b>Banksias</b>				
Banksia species	<i>Banksia sp.</i>	N	N	–
<b>Callitris</b>				
White cypress-pine	<i>Callitris glaucophylla</i>	N	N	–
Black cypress-pine	<i>Callitris endicheri</i>	N	Y	–
Coast cypress-pine	<i>Callitris columellaris</i>	N	N	–
<b>Melaleucas</b>				
Willow bottlebrush	<i>Melaleuca salignus</i>	N	N	–
Broad-leaved paperbark	<i>Melaleuca quinquinervia</i>	N	N	–
Prickly-leaved paperbark	<i>Melaleuca nodosa</i>	N	N	–
Red-flowered paperbark	<i>Melaleuca hypericifolia</i>	N	N	–
<b>Others</b>				
Camphor laurel	<i>Cinnamomum camphora</i>	N	N	–
Elliott's pine	<i>Pinus elliotii</i>	N	N	–
Red ash	<i>Alphitonia excelsa</i>	N	N	–
Rainforest species	Various	N	N	
Lilly pilly	<i>Acmena smithii</i>	N	N	–
Coachwood	<i>Ceratopetalum apetalum</i>	N	N	–
Silky oak	<i>Grevillea robusta</i>	N	N	–
Wilga	<i>Geijera parviflora</i>	N	N	–
Kurrajong	<i>Brachychiton populneus</i>	N	N	–