

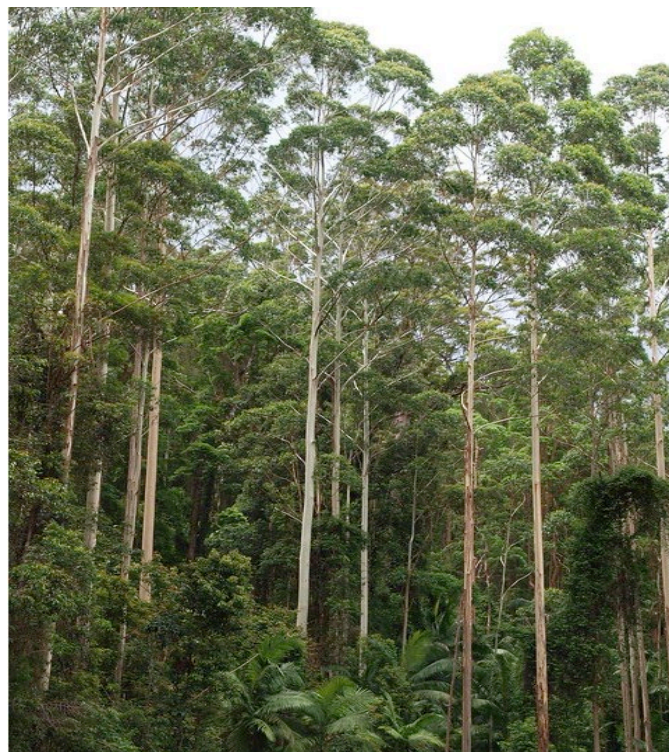


## Draft Conservation Advice for the Dunn's white gum (*Eucalyptus dunnii*) moist forest in north-east New South Wales and south-east Queensland

*This draft document is being released for consultation on the description, listing eligibility and conservation actions of the ecological community.*

The purpose of this consultation document is to elicit additional information to better understand the definition and status of the ecological community and help inform conservation actions. The draft assessment below should therefore be considered **tentative** at this stage, as it may change as a result of responses to this consultation process.

This document combines the conservation advice and listing assessment for the threatened ecological community. It provides a foundation for conservation action and further planning.



An example of the Dunn's white gum moist forest © Luis Shelter

The Dunn's white gum moist forest occurs within country (the traditional lands) of the Bundjalung and Gumbainggir peoples. We acknowledge their culture and continuing link to the ecological community and the country it inhabits.

### Proposed Conservation Status

The Dunn's white gum moist forest is proposed to be listed in the **Endangered** category of the threatened ecological communities list under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)(EPBC Act).

# Draft Conservation Advice for the Dunn's white gum (*Eucalyptus dunnii*) moist forest in north-east New South Wales and south-east Queensland

## About this document

This document describes the ecological community and where it can be found (section 1); outlines information to assist in identifying the ecological community and important occurrences of it (section 2); and describes its cultural significance (section 3).

In line with the requirements of section 266B of the EPBC Act, it sets out the grounds on which the ecological community is eligible to be listed as threatened (section 6); outlines the main factors that cause it to be eligible for listing (section 4); and provides information about what could appropriately be done to stop its decline and/or support its recovery (section 5).

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# 1 Ecological community name and description

## 1.1 Name

The name of the ecological community is the Dunn's white gum (*Eucalyptus dunnii*) moist forest in north-east New South Wales and south-east Queensland (hereafter referred to as the "Dunn's white gum moist forest" or "the ecological community"). The name refers to a key dominant canopy species, typical vegetation structure and geographic area that characterises the ecological community.

The ecological community was originally placed on the 2020 Finalised Priority Assessment List as the "*Eucalyptus dunnii* moist forest in north-east NSW and south-east Queensland".

### Consultation Questions on the Name

- Do you agree with the proposed name of the ecological community? If not, please propose an alternative and explain your reasoning.

## 1.2 Description of the ecological community and the area it inhabits

The EPBC Act defines an ecological community as an assemblage of native species that inhabit a particular area in nature. This section describes the species assemblage and area in nature that comprises the Dunn's white gum moist forest.

The ecological community described in this conservation advice is the assemblage of plants, animals, and other organisms associated with a type of forest that is found in north-east New South Wales and south-east Queensland. It is a wet sclerophyll forest with a tall, open canopy of eucalypts, notably *Eucalyptus dunnii* (Dunn's white gum), and an understorey of rainforest trees, shrubs, palms, vines, ferns and herbs.

This section describes the range of natural states of the ecological community. More information to assist in identifying patches of the ecological community is provided in [Section 2](#). Because of past loss or degradation, not all current patches of the ecological community are in a completely natural state. [Section 2.3](#) provides information to identify which patches that retain sufficient conservation values to be considered a matter of national environmental significance.

### 1.2.1 Location and physical environment

Dunn's white gum moist forest occurs in the NSW North Coast bioregion and adjacent bioregions in South Eastern Queensland and New England Tablelands (DoE 2012), with a scattered distribution north from Dorrigo and Coffs Harbour in New South Wales to Warwick and Canungra in Queensland (Benson & Hager 1993). The ecological community typically occurs on deep, fertile soils (Boland et al. 2006; Harden 1990; Stanley & Ross 1989), and is largely confined to fertile basaltic derived soils, or fine-grained sediments of colluvium or alluvium depending on upstream environments (Boland et al. 2006). In New South Wales, the ecological community occurs in the IBRA<sup>1</sup> subregions of Cataract, Coffs Coast and Escarpment, Dalmorton, Mummel Escarpment, Rocky River Gorge and Washpool. In Queensland, the ecological

<sup>1</sup> Interim Biogeographical Regionalisation of Australia Version 7 (DoE 2012)

community occurs in the IBRA subregions of Scenic Rim and Woodenbong (Queensland Government 1998).

The ecological community is more commonly found at the margins of rainforests on the lower slopes of hills and escarpments and in the valley bottoms (Clarke et al. 2009). Dunn's white gum moist forest may also occur on upper slopes and basalt ridges (Benson & Hager 1993) but is typically less common on north-western-facing slopes (NSW Government 2019). The community mostly occurs at elevations between 400–650 m above sea level (ASL), but can also occur beyond that range at elevations from 200–800 m ASL (Benson & Hager 1993; Booth et al. 1989). Conditions suitable for the ecological community mostly occur in areas that have an average annual rainfall pattern of 1000–1500 mm (Benson & Hager 1993; NSW EPA 2016).

#### Consultation Questions on the location and physical environment

- Do you agree with the proposed location, physical environment and boundaries for the ecological community? If not please provide your reasons and provide any supporting evidence. In particular, do you have any insight into how far south this ecological community occurs?
- Does the altitude range and described soils accurately capture the full range where this ecological community can be found?
- Can you provide any specific information on the distribution of this ecological community in Queensland?

### 1.2.2 Description of the assemblage

#### 1.2.2.1 VEGETATION STRUCTURE

Dunn's white gum moist forest is a structurally complex, layered wet sclerophyll forest that generally occupies an ecotone between rainforest and drier eucalypt forest (Benson & Hager 1993). The structure of the ecological community is generally a tall, structurally complex, open forest<sup>1</sup> with a multi-stratum understory of rainforest trees, shrubs and vines (typically mesic). The canopy of the ecological community may occur as pure stands of *Eucalyptus dunnii* (Dunn's white gum), though more often the canopy is co-dominated by Dunn's white gum with *E. saligna* (Sydney blue gum), *E. grandis* (Flooded gum), *E. microcorys* (Tallowwood) and/or *Lophostemon confertus* (Brush box) (Baur 1966; Benson & Hager 1993). The canopy cover can vary from multi-layered and closed, to irregular and open depending on the disturbance history.

The understorey can be structurally complex and include rainforest trees of typically up to 20 m (though undisturbed stands could exceed this) in height (Benson & Hager 1993). Species complexity and the growth stages of the understorey will vary depending on fire frequency and disturbance history, with undisturbed stands supporting a diverse range of rainforest trees and shrubs (typically tall mesic shrubs), palms, vines, ferns, and herbs. More recently disturbed stands may be lower, closed forest or scrub, with a canopy height of <30 m, a simpler understory and may contain both native and introduced species. Some highly disturbed sites may have a

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<sup>1</sup> A "tall open forest" has a canopy of trees that are over 30 meters in height with a foliage cover of 30–70% (Specht 1970).

depauperate understorey, particularly with mesic species largely absent (NSW Government 2019).

#### 1.2.2.2 FLORA

##### 1.2.2.2.1 Canopy species

The canopy consists of *Eucalyptus dunnii* (Dunn's white gum) in pure stands or in combination with *E. saligna* (Sydney blue gum), *E. grandis* (Flooded gum), *E. microcorys* (Tallowwood) and *Lophostemon confertus* (Brush box) (Baur 1966; Benson & Hager 1993). Some of the rainforest trees more typically found in the mid-layer (see [section 1.2.2.2.2](#)) can also occur in the canopy.

A more comprehensive list of canopy species likely to occur in the ecological community, are in [Appendix A - Species lists](#).

##### 1.2.2.2.2 Understorey species – Mid Layer

In most cases, the understorey is composed of regenerating eucalypt species and mature rainforest species including *Araucaria cunninghamii* (Hoop pine), *Diploglottis australis* (Large leaf tamarind), and *Toona ciliata* var. *australis* (Australian red cedar) (Benson & Hager 1993). The understorey may also contain colonising rainforest species in the families Myrtaceae, Euphorbiaceae, Lauraceae, and Meliaceae (Benson & Hager 1993), as well as tall shrubs and vines. These include *Neolitsea australiensis* (Green bolly gum), *N. dealbata* (Hairy-leaved bolly gum), *Alectryon subcinereus* (Native quince), *Cryptocarya rigida* (Rose maple), *C. glaucescens* (Forest maple), *Diospyros australis* (Black plum), *Polyscias elegans* (Celery wood), *Acacia maidenii* (Maiden's wattle), the critically endangered *Rhodamnia rubescens* (Scrub turpentine), *Syzygium smithii* (Common lilly pilly), *Croton verreauxii* (Native cascarilla), *Cordyline petiolaris* (Palm lily), *C. stricta* (Slender palm lily), *Cissus hypoglauca* (Native grape), and *C. antarctica* (Kangaroo vine) (Benson & Hager 1993).

##### 1.2.2.2.3 Understorey species – Ground Layer

In patches of the ecological community that have not been burnt for more than 30 years, the ground layer is dominated by ferns (commonly including: *Adiantum formosum*, *Lastreopsis* spp., *Hypolepis glanduligera*, *Doodia aspera*, and *Dennstaedtia davalliodes*), vines (commonly including: *Solori involuta*, *Palmeria scandens*, and *Rubus hillii*), and forbs (commonly including: *Polia cristata*, *Aplina caerulea*, and *Alocasia brisbanensis*) (Benson & Hager 1993). For sites that have either been recently or more regularly burnt (c. every 10 ), or occur at drier sites, a lower diversity of ground layer species may be present, see [Section 1.2.4.1](#) and [Section 1.2.4.2](#).

A more comprehensive list of understorey species likely to occur in the ecological community are in [Appendix A - Species lists](#).

#### 1.2.2.3 FAUNA

Dunn's white gum moist forest is a wet sclerophyll forest that is particularly important as an ecotonal community between rainforests and drier ecosystems. This ecological community contains a diverse array of fauna, though these components of the community are poorly documented. However, there are many fauna species that are recognised as using resources associated with the ecological community. These fauna play an important role in the maintenance and function of the ecological community by facilitating nutrient cycling, pollination, seed dispersal, pest control and decomposition. The vegetation structures of the ecological community provide habitat and resources to many mammal, bird, reptile, amphibian and invertebrate species.

### 1.2.2.3.1 Mammals

The canopy of Dunn's white gum moist forest, like other diverse eucalypt moist forests support arboreal mammal species such as *Trichosurus vulpecula* (Common brushtail possum), *Vespadelus pumilus* (Eastern forest bat), and *Chalinolobus picatus* (Little pied bat).

A number of tree-dwelling mammal species listed as threatened at the national and state level are a part of Dunn's white gum moist forest, including *Cercartetus nanus* (Eastern pygmy-possum), *Falsistrellus tasmaniensis* (Eastern false pipistrelle), *Phoniscus papuensis* (Golden-tipped bat), *Pteropus poliocephalus* (Grey-headed flying fox), *Miniopterus australis* (Little bentwinged-bat), *Myotis macropus* (Large-footed myotis), *Mormopterus beccarii* (Beccari's freetail-bat), *Petaurus australis* (Yellow-bellied glider), *Phascogale tapoatafa* (Brush-tailed phascogale), *Pteropus poliocephalus* (Grey-headed flying-fox), *Petauriodes volans* (Southern greater glider) and *Scoteanax rueppellii* (Greater broad-nosed bat). These species often inhabit large eucalypts in the canopy layer of the ecological community. The prevalence of eucalypts in the ecological community, particularly Tallowwood, act as important food resource and habitat for *Phascolarctos cinereus* (Koala). Wet ecotone forests are important to many animal species as they act as a transition between two ecosystem and are considered areas of great environmental importance (Kark 2013).

The complex understorey supports a vast array of macropod species such as *Wallabia bicolor* (Swamp wallaby), *Notamacropus dorsalis* (Black-striped wallaby), and *Macropus rufogriseus* (Red-necked wallaby). In several regions where Dunn's white gum moist forest occurs, the number of mammal species has been found in the past to be greater than any other area of comparable size in Australia (Calaby 1966).

Ground-dwelling mammal species listed as threatened at the national and state level such as *Dasyurus maculatus* (Spotted-tailed quoll), *Macropus parma* (Parma wallaby), *Thylogale stigmatica* (Red-legged pademelon), *Potorous tridactylus* (Long-nosed potoroo) may occupy the gullies and understorey of the ecological community and play a vital role in the ecological community by assisting with nutrient cycling and water infiltration.

A more comprehensive list of mammal species likely to occur in the ecological community, including threatened fauna, are in

Appendix A - Species lists.

### 1.2.2.3.2 Birds

The canopy trees in Dunn's white gum moist forest provides nesting hollows for the critically endangered (in NSW) *Calyptorhynchus banksii banksia* (Red-tailed black-cockatoo). The diverse canopy and understorey plants in the ecological community provide year-round resources for other state or nationally threatened bird species that are known to occur in the ecological community, including *Calyptorhynchus lathami* (Glossy black-cockatoo), *Coracina lineata* (Barred cuckoo-shrike), *Menura alberti* (Albert's lyrebird – in part of the range), *Ninox strenua* (Powerful owl), *Ptilinopus magnificus* (Wompoo fruit-dove), *P. regina* (Rose-crowned fruit-dove), *P. superbus* (Superb fruit-dove), and *Tyto tenebricosa* (Sooty owl). These birds, among other more common species, such as *Alectura lathami* (Australian brush turkey), *Podargus strigoides* (Tawny frogmouth) and *Alisterus scapularis* (Australian king parrot), are important ecosystem engineers and help in seed dispersal.

A more comprehensive list of bird species likely to occur in the ecological community, including threatened fauna, are in



Appendix A - Species lists.

## 1.2.2.3.3 Amphibians &amp; reptiles

The diversity of ground layer plant species in the ecological community, coupled with the abundant leaf litter and moist environment, provide habitat and resources for frogs, including the threatened *Litoria brevipalmata* (Green-thighed frog), *L. subglandulosa* (Glandular frog), *Mixophyes balbus* (Stuttering barred frog), *M. fleayi* (Fleay's barred frog), and *Philoria kundagungan* (Mountain frog).

Reptile species that expected to occur in the Dunn's white gum moist forest include *Varanus varius* (Lace monitor), *Egernia cunninghami* (Cunningham's skink), *Morelia spilota* (Carpet python), and *Pseudechis porphyriacus* (Red bellied black snake). The hollow-bearing canopy trees in the ecological community likely also support the vulnerable *Hoplocephalus stephensii* (Stephen's banded snake).

A more comprehensive list of amphibian and reptile species likely to occur in the ecological community, including threatened fauna, are in

Appendix A - Species lists.

## 1.2.2.3.4 Invertebrates

The ecological community also includes many invertebrate fauna species (e.g. mature and larval forms of butterflies, flies, wasps, beetles, spiders and worms) that have ecologically important roles such as pollination, predation, decomposition, herbivory and distribution of seeds, as well as being food for a range of other fauna, but these are less well documented.

## Consultation Questions on the species assemblage

- Do you agree with the vegetation description? If not, how can it be clarified?
- Are the height categories for the canopy and understorey layers in 1.2.2.1 sound?
- Are there any flora species that you think should be removed, added or described differently to accurately represent the proposed ecological community? The focus should be on characteristic, functionally significant &/or commonly occurring species. Please provide your reasons (and references if available).
- Do you agree with the fauna information? If not, how can it be clarified?
- Is there additional information on fauna you would like to see included, particularly commonly encountered fauna, characteristic invertebrates and with relation to the ecological function of the community?
- Are there any narrowly endemic fauna or threatened fauna you know of that may occur in the ecological community?

## 1.2.3 Functionally important species within the ecological community

The dominant canopy species in the ecological community is *Eucalyptus dunnii* (Dunn's white gum), a tall forest tree with a scattered and restricted distribution from Dorrigo and Coffs Harbour in New South Wales to Warwick and Canungra in Queensland (Benson & Hager 1993). This tree species plays a major role in defining the ecological community and is vital in sustaining the community. Mature trees are often hollow bearing, providing essential shelter for bird and arboreal mammal fauna (see [Section 1.2.2.3](#)).

Generation length of long-lived or key species believed to play a major role in sustaining the ecological community is used to define future timeframes in the assessment criteria; for

example, by considering the mean age of the parents of the current cohort of seedlings (TSSC 2017). The generation length of Dunn's white gum is likely to be similar to other eucalypt species, somewhere between a range of 60-100 years, more often reported as 70 years (Fensham et al. 2020).

#### Consultation Questions on the functionally important species

- All species within the ecological community play a role, but do you know of any other functionally important species that play a major role in sustaining for the ecological community? If so, could you please identify them for us and suggest any key references you know of that support their role in the ecological community.

#### 1.2.4 Relevant biology and ecology

##### 1.2.4.1 ECOSYSTEM DYNAMICS

Dunn's white gum moist forest is a structurally diverse ecological community, containing a canopy of sclerophyll species, and a dense understorey and mid-strata of rainforest species. While the eucalypts in this system can, at times, benefit from infrequent canopy fires, many of the rainforest species are fire sensitive and may fail to re-establish post fire. Wet forest communities occur less commonly on west-facing slopes due to the exposure to westerly winds and western sun in the hottest time of the day, more rapid and extreme drying, and greater exposure to severe fire. Likewise, northern slopes also experience drier microclimates due to increased sun exposure in the drier months of winter and spring. If Dunn's white gum moist forest undergoes frequent and/or severe fires, stands of the ecological community may be lost, undergoing a transition to an open, grassy or woody sclerophyll dominated understorey.

Frequent fires in the ecological community (between 15-20 years) will favour the sclerophyllous species over the rainforest elements, with the forest tending towards dry sclerophyll forest or even scrub.

##### 1.2.4.2 VARIATION IN THE ECOLOGICAL COMMUNITY

The ecological community may show variation in the floristic composition across sites with different, discontinuous geographic locations and neighbouring communities, though the greatest dissimilarities are largely attributed to different disturbance regimes (particularly related to logging and fire regimes (Benson & Hager 1993)). Fire frequency is expected to be low for Dunn's white gum moist forest to persist, given that it occurs in moist sites and contains many non-flammable rainforest species (Benson & Hager 1993).

For *Eucalyptus dunnii*, the dominant canopy species in Dunn's white gum moist forest, infrequent canopy fire may promote seedling germination and establishment, but recruitment may occur infrequently with small-scale disturbances such as large tree falls. Frequent and/or intense fires may result in long-lasting changes in species composition and ecosystem structure. While the *Eucalyptus* species in the ecological community are capable of epicormic resprouting following severe fire events (Boland et al. 2006; Nicolle 2006), many of the rainforest species that occur in the ecological community are unable to survive and recover from fires in this way. In sites where fire disturbance has been severe and/or frequent, some understorey species that are not capable of resprouting, or that have much slower recovery times post-fire, may be depleted in the ecological community (Bowman et al. 2013; Fairman et al. 2015). In these instances, Dunn's white gum moist forest sites may appear to be species poor or simplified, and thus not meeting the typical description for the ecological community. However, these may still



be viable sites for restoration and conservation as the species may be represented below ground in the seed bank or as bulbs, corms, rhizomes or rootstocks.

Likewise, a number of fauna species may be absent from, or difficult to detect at sites with recent fire history, due to fire vulnerability, shortage of resources and/or mortality (including Rufous scrub-bird, Gang-gang cockatoo, Parma wallaby, Yellow-bellied glider, Brush-tailed rock wallaby (DAWE 2020)). These species may return as the vegetation structure develops with time since fire, providing adequate nesting and foraging habitat once again. Species that rely on the resources produced by non-resprouting plants may likewise be rare or absent until such plants reach maturity.

#### Consultation Questions on the relevant biology and ecology

- Are there any relevant functional biology and ecology elements you think are important to include in this document? If so, please explain your reasons and provide any supporting evidence or references you have.

## 2 Identifying areas of the ecological community

Section 1.2 describes this ecological community and the area it inhabits. This section provides additional information to assist with the identification of the ecological community and important occurrences of it.

The Dunn's white gum moist forest intergrades with other vegetation types and ecological communities (see Section 2.2.6). Key diagnostic characteristics are used to identify an area of native vegetation as being the Dunn's white gum moist forest, and define the features that distinguish it from other communities, noting that additional information to assist with identification is provided in the other sections of this document, particularly the description (Section 1.2) and Appendix A - Species lists.

### 2.1 Key diagnostic characteristics

The key diagnostic characteristics are designed to allow identification of the ecological community irrespective of the season.

Areas of vegetation that do not meet the key diagnostics are not the nationally listed ecological community.

The ecological community is defined as areas of native vegetation matching the description in Section 1.2 that meet the following key diagnostic characteristics:

- Occur within north-eastern New South Wales and south-eastern Queensland, in the IBRA<sup>1</sup> subregions of Cataract, Chaelundi, Coffs Coast and Escarpment, Dalmorton, Mummel Escarpment, Rocky River Gorge or Washpool (NSW), or in Woodenbong or Scenic Rim (QLD);

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<sup>1</sup> Interim Biogeographical Regionalisation of Australia Version 7 (DoE 2012)

- Typically occur at the margins of rainforests on sheltered slopes of hills and escarpments, between 200 and 850m ASL, most commonly between 400 and 650 m ASL;
- Typically occur on relatively fertile soils derived from basalt or fine-grained sediments<sup>1</sup>;
- Typically appears as a tall open forest with a tree canopy that has a crown cover<sup>2</sup> of 30% or more in its undisturbed form<sup>3</sup>.
- Has a tree canopy containing *Eucalyptus dunnii*, either as a dominant<sup>4</sup> or co-dominant with *E. saligna*, *E. grandis*, *E. microcorys* and/or *Lophostemon confertus*;
- Has a dense, wet forest understorey, in which the mid-layer is typically dominated by 'rainforest' trees and tall shrubs (from the families Myrtaceae, Euphorbiaceae, Lauraceae, and Meliaceae), and broad-leaf species<sup>5</sup>; and
- Has a sparse to fairly dense ground cover of ferns and shade-tolerant herbs with few graminoids.

#### Consultation Questions on the key diagnostic characteristics

- Do you agree that these statements will clearly identify when the ecological community is present?
- Are the key diagnostic characteristics sufficient to differentiate the ecological community from other ecological communities? If not, how should they be modified?
- Is the percentage of crown cover appropriate for this ecological community?
- What percentage of graminoids would be contra-indicative of this ecological community?

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<sup>1</sup> A small proportion of the ecological community may occur on other soil classifications such as colluvium or alluvium influenced by the presence of basalt or fine-grained substrates that occur upstream. Therefore, if all other diagnostics are met, but the soil classification is not specifically basalt, the ecological community may still be present. In this case, check for basalt parent material and fine grained sediments in the nearby area.

<sup>2</sup> Crown cover is measured as the % covered by the total area of the tree crowns, where the tree crowns are considered to be solid (as per the National Committee on Soil and Terrain (Hnatiuk et al. 2009)).

<sup>3</sup> Recent disturbance, such as fire, may remove the living canopy and cause a shift to a regenerative state. Under these circumstances, the loss is likely to be a temporary phenomenon, if natural regeneration is not disrupted. This temporary regenerative state is included as part of the ecological community when the other key diagnostic characteristics are met, even when crown cover is temporarily less than 30 percent. In these cases, there should be evidence that the canopy species will regenerate from seedlings, saplings, lignotubers or from epicormic regrowth. See [Section 2.2.5](#) for more information on determining this.

<sup>4</sup> Canopy dominance is where one or a combination of these species are collectively the most abundant trees in the canopy — in terms of either crown cover (i.e. at least 50 percent of the canopy cover), or stem density (i.e. at least 50 percent of the trees).

<sup>5</sup> In cases where the site has been recently burned or logged, the understorey may be relatively species poor.

## 2.2 Additional information to assist in identifying the ecological community

The following information should also be taken into consideration when applying the key diagnostic characteristics to assess if a site may include the ecological community.

### 2.2.1 *Identifying a patch*

A patch is a discrete and mostly continuous area of the ecological community, as defined by the key diagnostics, but can include small-scale variations, gaps and disturbances within this area. The smallest patch size that can be identified is 0.1 ha, as the key diagnostics cannot reliably be identified for smaller areas than this. Where a larger area has been mapped or classified as a different vegetation type, localised areas of the Dunn's white gum moist forest greater than 0.1 ha may be present within this larger area.

### 2.2.2 *Breaks in a patch*

When it comes to defining a patch of the ecological community allowances are made for "breaks" up to 30 metres between areas that meet the key diagnostics. Such breaks may be the result of watercourses or drainage lines, tracks, paths, roads, gaps made by exposed areas of soil, leaf litter or cryptogams, and areas of localised variation in vegetation that do not meet the key diagnostics. For example, a single patch could include two areas of the ecological community that meet the key diagnostics, but which are separated by a narrow strip of riparian vegetation lining a watercourse. Such breaks do not significantly alter the overall functionality of the ecological community and form a part of the patch. Watercourses or drainage lines, water bodies, gaps made by exposed areas of soil or leaf litter, and areas of localised variation in vegetation should be included in the calculation of the size of the patch and be taken into account when determining the overall condition of the patch. Tracks, paths, roads or other man-made surfaces should be excluded from the calculation of patch size and condition.

Where there is a break in the ecological community of 30 metres or more (e.g. due to permanent artificial structures, wide roads or other barriers, water bodies or other types of vegetation) then the gap indicates that separate patches are present.

### 2.2.3 *Variation within a patch*

Patches of the ecological community may contain areas that vary in structural or biological characteristics. For example, one part of a patch may consist of mostly eucalyptus species, whereas another part of the same patch may be dominated by regenerating rainforest and/or eucalyptus species; or one part of a patch may have been more recently burnt and therefore at a different stage of regeneration. Variation in vegetation across a patch should not be considered to be evidence of multiple patches, so long as it meets the key diagnostics.

### 2.2.4 *Revegetation and regrowth*

Restored (including reconstructed) sites, or areas of regrowth are part of the listed ecological community, as long as the patch meets the key diagnostic characteristics.

Where ecological restoration is planned, the aim should be for recovery of as many key biodiversity and ecosystem attributes as practical for a particular site, so that the ecological community is on a trajectory to recovery and is self-sustaining. This should be based on identifying appropriate reference site(s) for the ecological community following the *National*

*Standards for the Practice of Ecological Restoration in Australia* (Standards Reference Group SERA 2021) (also see [Section 5.4.2](#)).

#### 2.2.5 *Survey requirements*

Patches of the ecological community can vary markedly in their shape, size, condition and features. Thorough and representative on-ground surveys are essential to accurately assess the extent and condition of a patch. The Australian Soil and Land Survey Field Handbook (National Committee on Soil and Terrain, 2009), New South Wales BioNet Vegetation Classification User Manual (NSW Office of Environment and Heritage 2017) and the Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland (Neldner et al 2020) may provide guidance.

The size, number and spatial distribution of plots or transects must be adequate to represent variation across the patch. Sampling should address likely variation in species composition and significant variation in the vegetation (including areas of different condition), landscape qualities and management history (where known) across the patch.

Record the survey date/s and the survey effort involved. Record the number of person hours spent per plot/transect and across the entire patch; along with the surveyor's level of expertise and limitations at the time of survey. Include a map with adequate details to locate surveyed areas (such as an orthophoto of sufficient transparency not to obscure other information and geographic coordinates).

Whilst identifying the ecological community and its condition is possible at most times of the year, consideration must be given to the role that season, rainfall and disturbance history may play in an assessment. For example, after a fire one or more vegetation layers, the crown cover in the canopy, or groups of species (e.g. obligate seeders), may not be evident for a time. Timing of surveys should allow for a reasonable interval after a disturbance (natural or human-induced) to allow for regeneration of species to become evident and be timed to enable diagnostic species to be identified. At a minimum, it is important to note climate conditions and what kind of disturbance may have happened within a patch, and when that disturbance occurred.

#### 2.2.6 *Mapping and vegetation classifications*

There are a number of mapping and vegetation classification schemes used in New South Wales and Queensland. Although none directly map areas of the ecological community according to the key diagnostics, they can still provide useful information on the likely occurrence of the ecological community. [Appendix B - Relationship to other vegetation classification and mapping systems](#).

[Table 1](#) below outlines the map units or classifications from the state mapping and classification systems that best relate to the ecological community. Additional vegetation types similar to or adjoining Dunn's white gum moist forest can be found in [Appendix B - Relationship to other vegetation classification and mapping systems](#).

Table 1: State map units that best relate to the ecological community

Code / Number	Name	Key distinguishing features
<b>Map units representing the ecological community</b>		
PCT3173	Northern Ranges Dunn's Gum-Brush Box Wet Forest	<ul style="list-style-type: none"> <li>Equivalent to the ecological community in NSW where <i>Eucalyptus dunnii</i> is present and dominant in the canopy. This mapping unit extends south of the range in which <i>E. dunnii</i> grows, thus is only valid for ranges north of Coffs Harbour.</li> </ul>
RE 12.8.11	<i>Eucalyptus dunnii</i> tall open forest on Cainozoic igneous rocks	<ul style="list-style-type: none"> <li>Equivalent to the ecological community in QLD.</li> </ul>

Source: NSW PCT and QLD RE databases

### 2.2.7 Other relevant listed ecological communities

Dunn's white gum moist forest is very similar to the New South Wales listed "White gum moist forest in the NSW North Coast Bioregion". The ecological community in this conservation advice encompasses the NSW listed endangered ecological community, but also extends into south-eastern Queensland (NSW Government 2019).

There are also other nationally-listed threatened ecological communities that occur in, or close to, the same areas as the Dunn's white gum moist forest. These include:

- Grey Box (*Eucalyptus moluccana*) - Grey Gum (*Eucalyptus propinqua*) Wet Forest of Subtropical Eastern Australia (currently under assessment) – also listed in NSW as the Grey Box-Grey Gum Wet Sclerophyll Forest in the NSW North Coast Bioregion
- Lowland rainforest of subtropical Australia (critically endangered) – also listed in NSW as the Lowland Rainforest on Floodplain in the NSW North Coast bioregion (NSW TSSC 2019)

#### Consultation Questions on the additional identification information

- How could we improve on the information provided to assist with identifying the ecological community?
- Is 0.1ha appropriate as a size threshold for the smallest patch size of the ecological community that can be identified?
- Is 30 m an appropriate size gap between areas of the ecological community to still be considered part of the same patch?
- Please comment on survey requirements, including post fire survey.
- Is the list of corresponding map units complete and accurate?
- The ecological community likely only corresponds to a small fraction of these map units. Do you have any information on the proportion of these map units that are likely to represent the ecological community?
- Have all relevant listed ecological communities been included?

## 2.3 Condition classes, categories and thresholds

Land-use and disturbance history will influence the state and condition in which a patch of the ecological community is currently expressed. National listing focuses legal protection on patches of the ecological community that are the most functional and in comparatively good condition. These patches are identified through *minimum condition thresholds*.

*Condition classes* are also used to distinguish between patches of the ecological community of different qualities, to aid environmental management decisions.

In order to be protected as a matter of national environmental significance areas of the ecological community must meet both:

- the key diagnostic characteristics ([Section 2.1](#)) AND
- at least the minimum condition thresholds ([Table 2](#)).

[Table 2](#) outlines the different condition classes and categories that apply to the ecological community. The minimum condition thresholds are designed to identify those patches that retain sufficient conservation values to be considered a matter of national environmental significance, to which the referral, assessment, approval and compliance provisions of national environment law (the EPBC Act) apply. These include all patches in Classes A, B and C.

Patches that do not meet the minimum condition thresholds for at least Class C are excluded from protection under the EPBC Act. In many cases, the loss and degradation are irreversible because natural characteristics have been permanently removed. However, although not protected under the EPBC Act, many of these patches may still retain important natural values and may be protected through state and local laws or planning schemes.

In addition, patches that can be restored should not be excluded from recovery and other management actions. Suitable recovery and management actions may improve a patch's condition, such that it subsequently can be included as part of the ecological community fully protected under the EPBC Act. Management actions should be designed to restore patches to high quality condition where practical.

When assessing condition of a patch of the ecological community it is important to also consider the key diagnostics ([Section 2.1](#)) and patch definition information ([Section 2.2](#)).

Recent disturbance by fire is likely to result in the ecological community presenting in a temporarily altered state that may include severely reduced canopy cover, simplified vegetation structure, resprouting trees and shrubs that have been partially or completely top-killed and may lack several fire-killed plant species that must either recolonise from external seed sources or replenish their seed bank following fire. This condition is likely to be transient and, if effects are severe, one should consider postponing survey until a later date, or else projections should be made by inference from species life history.



**Table 2: Condition classes, categories and thresholds**

Patch size thresholds →		Large patch ≥ 2 ha	Small contiguous patch <sup>5</sup> ≥ 0.1 ha within an area of native vegetation ≥ 2 ha	Small patch 0.1-2 ha
Biotic thresholds ↓				
<b>High condition</b>  >20 large trees <sup>1</sup> per ha <b>AND/OR</b> an intact and diverse subcanopy <sup>6</sup>  <b>AND</b>  Total of ≥ 10 native understorey <sup>2</sup> species per plot <sup>3</sup> from Appendix A - Species lists  <b>AND</b>  Total of ≥ 80% understorey <sup>2</sup> plant cover per plot <sup>3</sup> is native species		<b>CLASS A</b>  Large or contiguous patch of high condition	<b>CLASS B1</b>  Small patch of high condition	
<b>Good condition</b>  At least 15 large trees <sup>1</sup> per ha <b>AND/OR</b> an intact and diverse subcanopy <sup>6</sup>  <b>AND</b>  Total of ≥ 6 native understorey <sup>2</sup> species per plot <sup>3</sup> from Appendix A - Species lists  <b>AND</b>  Total of ≥ 50% understorey <sup>2</sup> plant cover per plot <sup>3</sup> is native species		<b>CLASS B2</b>  Large or contiguous patch of good condition	<b>CLASS C1</b>  Small patch of good condition	
<b>Moderate condition</b>  Total of ≥ 4 native understorey <sup>2</sup> species per plot <sup>3</sup> from Appendix A - Species lists  <b>AND</b>  Total of ≥ 30% understorey <sup>2</sup> plant cover per plot <sup>3</sup> is native species		<b>CLASS C2</b>  Large or contiguous patch moderate condition	<b>Not protected</b>	

<sup>1</sup> Large trees are greater than 45 cm [diameter at breast height (dbh)]. This is used as a surrogate for tree hollows and habitat values. This should be measured across the patch as a whole, or for large patches, in plots of at least 0.1ha.

<sup>2</sup>Understorey is inclusive of all flora below canopy layer, including the ground layer and the juvenile forms of canopy species and fire-/drought-affected canopy trees that are resprouting.

<sup>3</sup>The minimum acceptable plot size is 0.01 ha

<sup>5</sup>Contiguous patches are connected to other patches of native vegetation, or are within 30 m of other native vegetation

<sup>6</sup>An intact and diverse subcanopy is assessed as having a canopy cover of >30% and a presence of more than three species in the subcanopy and canopy layers.

### Consultation Questions on the condition classes, categories and thresholds

- How can we improve on the proposed condition information?
- Are the proposed *measures* (large trees, canopy diversity, understorey species richness, weediness and connectivity of smaller patches) appropriate to distinguish between patches of different condition?
- Are the proposed *thresholds* for these measures appropriate to distinguish the different condition classes?

## 2.4 Habitat critical to the survival of the ecological community

The habitat or areas most critical to the survival of the ecological community are those patches that are in the best condition (i.e. Classes A and B in [Table 2](#)), and some areas that are currently in lower condition classes (Class C, see below). These represent those parts of the ecological community closest to the benchmark state of the ecological community; they are the patches that retain the highest diversity and most intact structure and ecological function and have the highest chance of persisting in the long-term.

However, other patches (i.e. Class C in [Table 2](#)) may occur in locations or landscape positions that are particularly important for biodiversity or function and/or may contain suites of species

or habitat features that are important in a regional or local context (see [Section 2.5](#)). Hence these areas can also be critical to the survival of the ecological community.

#### Consultation Questions on the habitat critical to the survival

- Can you provide any information on particular locations or habitat that would be *critical* to the survival of this ecological community?
- How likely is it that the Canungra Military Area (Kokoda Barracks) contains Critical Habitat for this ecological community?
- Does the ecological community occur within any areas of Commonwealth Land? If so, which of those areas should be considered for the Critical Habitat Register under section 207A of the EPBC Act upon listing this ecological community?

## 2.5 Areas of high value - surrounding environment and landscape context

For natural resource management activities or actions that may have 'significant impacts' and require approval under the EPBC Act, it is important to consider the entire landscape context and environment surrounding patches of the ecological community. Patches of the ecological community do not occur in isolation. The surrounding vegetation and other landscape considerations will also influence how important any given patch is to the ecological community as a whole.

Patches that are larger and less disturbed are likely to provide greater biodiversity value. Patches that are spatially linked, whether ecologically or by proximity, are particularly important as wildlife habitat and to the viability of those patches of the ecological community into the future. However, this still does not necessarily consider the full landscape context. For example, in heavily cleared areas, some patches that meet the minimum condition thresholds occur in isolation. Such patches require protection and could benefit from revegetation activities to link them with other patches. In other areas, patches that are interconnected to other native vegetation may not, in their current state, meet the minimum condition thresholds, but have high conservation value. Such patches could benefit from restoration works to improve their condition so that they do meet the minimum condition thresholds.

The ecological community often occurs in association with other native vegetation types. Patches of the ecological community that remain connected with other native vegetation have a better chance of future survival and restoration success, because connected patches are buffered from disturbance by the surrounding native vegetation.

The following indicators of high-value should be considered when assessing the impacts of proposed actions under the EPBC Act, or when determining priorities for protection, recovery, management and funding.

- Patches that meet, or are closest to the high quality (Class A) condition for this ecological community. These may be based on on-site observations or known past management history.
- Patches with no sign of "Bell miner associated dieback" or other significant canopy dieback, or areas likely to be more suitable and resilient to the impacts of continuing climate change.
- Patches with a larger area to boundary ratio – such patches are more resilient to edge effect disturbances such as weed invasion and human impacts.

- Patches that occur in areas where the ecological community has been most heavily cleared and degraded such as lower slopes or low-lying flatter areas, particularly if they contain large, mature trees.
- Patches within or near to a larger native vegetation remnant and that contribute to a mosaic of vegetation types present at a site. Areas of mosaic native vegetation provide a wider range of habitats that benefit flora and fauna diversity. Other patches are important as linkages among remnants, acting as 'stepping stones' of native remnants in the landscape. Connectivity includes actual or potential connectivity to restoration works (e.g. native plantings).
- Patches that occur in areas where the ecological community has been most heavily cleared and degraded, or that are at the natural edge of its range, particularly where there is genetic distinction, or absence of some threats. These may include unique variants of the ecological community, e.g. with a unique flora and/or fauna composition, or a patch that contains flora or fauna that have largely declined across the broader ecological community or region.
- Patches that show evidence of recruitment of key native plant species or the presence of a range of age cohorts (including through successful assisted regeneration or management of sites).
- Patches with good faunal habitat as indicated by diversity of landscape, diversity of plant species and vegetation structure, diversity of age class, presence of movement corridors, mature trees (particularly those with hollows), logs, watercourses, etc.
- Patches containing nationally or state-listed threatened species.
- Patches with high species richness, as shown by the variety of native understorey plant species, or high number of native fauna species (vertebrates and/or invertebrates).
- Patches with relatively low levels of weeds and feral animals or areas where these can be managed efficiently.

#### Consultation Questions on the areas of high value

- Can you provide any information on qualities that would denote areas of particularly high conservation value?

## 3 Cultural significance

### 3.1 Indigenous values and uses of the ecological community

The Dunn's white gum moist forest occurs within country (the traditional lands) of the Bundjalung and Gumbainggir peoples. We acknowledge their culture and continuing link to the ecological community and the country it inhabits.

The significance of the ecological community, particular species, spiritual and other cultural values are diverse and varied for the First Nations peoples that live in the vicinity and care for Country. This section describes some examples of this significance but is not intended to be comprehensive or applicable to, or speak for, all Indigenous people. Such knowledge may be only held by Indigenous groups and individuals who are the custodians of this knowledge.

Consultation is ongoing, and we are seeking feedback from Traditional Owners on Indigenous cultural values, preferred ways to present the information, as well as permissions to include such information. Information included in the Conservation Advice can highlight cultural values and inform future management.

The Bundjalung people used the area encompassing and surrounding the Dunn's white gum moist forest for ceremonial purposes for thousands of years.

A wide variety of plant and animal resources from within the Dunn's white gum moist forest are traditionally used for food, medicine and materials by the Bundjalung people. For example, many of the eucalypts in the ecological community have a variety of uses and cultural significance. The bark of the **dil** (*E. microcorys*), **mungurra** (*E. tereticornis*) and **buddul** (*E. grandis*) were used for constructing huts. The bark of **danduru** (*E. siderophloia*), when burnt, was used as a to create a very permanent black paint which was used in many ceremonial settings including colouring newly born babies and colouring mothers after returning to their camp after childbirth. The ash was also used for cleansing mothers after childbirth and applied to the young babies once every two days for a week after childbirth. Poultices were created from the powdered ironbark ashes and applied to a woman's breasts to purify milk. **Danduru**, along with young **dabilbello** (*Lophostemon confertus*) were also useful species for creating spears. **Djomba/dhom'ba** (*E. propinqua*) and **bool lugi** (*E. salgina*) were important trees for making burl cups.

Sources: Fensham 2021; Darragh & Fensham 2013.

#### Consultation Questions on the cultural significance

For Traditional Custodians:

- Do you have any information you are willing to share about the cultural significance of the ecological community, forests in the area generally or the country that supports the ecological community?
- Do you know any people or organisations we could contact in the NSW Northern Rivers or South East Queensland who may have information they are willing to share?
- Do you know of any books, articles or online resources about Bundjalung and Gumbainggiri Peoples relationships with forests or the landscape you think would be sources of appropriate information?
- There seems to be some contention about the inclusion on Githabul as a larger grouping of tribes within Bundjalung – should we include a section and acknowledgement specifically to the Githabul people?

## 4 Threats

Dunn's white gum moist forest has been historically impacted by land clearing and selective harvesting of the dominant canopy species. The remaining remnants continue to be under threat from ongoing degradation caused by weedy invasions, bell-miner associated dieback, continued land clearing for agriculture and plantation farming, and inappropriate fire regimes.

### 4.1 Threat table

Table 3 outlines the key threats facing the ecological community. The key threats faced by the ecological community are described to help explain why this ecological community merits listing

as threatened and supports the assessment against the criteria at [Section 6](#). Although presented as a list, in reality these threats often interact, rather than act independently.

**Table 3: Summary of threats facing the ecological community**

Threat	Threat Status*	Threat Impacts
<b>Invasive plant species</b>	<i>Timing: ongoing</i> <i>Severity: major</i> <i>Scope: majority</i>	<p>Common and prolific weed species include <i>Lantana camara</i> (lantana), and <i>Ageratina adenophora</i> (crofton weed). Lantana is the most significant weed threat in many areas that Dunn's white gum moist forest occupy (NSW Government 2021). It can arrest succession within the ecological community following disturbance by increasing shade in the understorey and out-competing native plant species during recruitment. Lantana also changes the structure, fire dynamics, and nutrient cycles of forest ecosystems (Taws 1996). Crofton weed is also found to occur throughout the range of Dunn's white gum moist forest, but its recorded distribution is much smaller (NSW Government 2021). It suppresses native flora through direct competition and the secretion of soil-borne allelopathic compounds (Trounce &amp; Dyason 2003).</p> <p>The invasive plants <i>Ochna serrulata</i> (ochna) and <i>Senna septemtrionalis</i> (Winter senna) have been recorded in the ecological community and contribute to the competitive exclusion of native plants (Benson &amp; Hager 1993).</p> <p>Clearing activity, forest dieback, grazing, frequent burning and other disturbances accelerate the invasion of weeds into Dunn's white gum moist forest (Graham &amp; Taylor 2018).</p>
<b>Bell miner associated dieback</b>	<i>Timing: ongoing</i> <i>Severity: major</i> <i>Scope: majority</i>	<p>Dunn's white gum moist forest is currently threatened by severe <i>Eucalyptus</i> forest dieback associated with an over-abundance of psyllid insects associated with the behaviour of bell miners (<i>Manorina melanophrys</i>), often in forests that have been logged and/or infested with Lantana (DEC 2007; Wardell-Johnson et al. 2006).</p> <p>Bell miner associated dieback (BMAD) causes substantial changes in the composition and structure of the ecological community (both flora and fauna), predominately through the defoliation and eventual death of canopy eucalypts, causing increased densities of mid-stratum plant species and decline in diversity of small forest birds. High prevalence of BMAD in the ecological community indicates a large reduction in the ecological function of the community (Wardell-Johnson 2006). BMAD has been found to have a significant effect to Dunn's white gum moist forest across all land tenures, including many stands that occur in National Parks (NSW Government 2019).</p>
<b>Other pests and diseases</b>	<i>Timing: ongoing</i> <i>Severity: major</i> <i>Scope: majority</i>	<p>The dominant tree species of Dunn's white gum moist forest (<i>Eucalyptus dunnii</i>) is associated with a number of prevalent insect and fungal pest species that can cause moderate to severe defoliation and necrosis, which can have cascading effects on the ecological community. These insect pest species include chrysomelid beetles, flea beetles, leaf beetles, micro-moth larvae, sap-sucking bugs, and leafblister sawflies (Whyte et al. 2011). Saplings are particularly sensitive to pests and are likely to be more susceptible to pest invasions post-disturbance (Stone 2005).</p> <p>Infection by myrtle rust (<i>Austropuccinia psidii</i>) is also potentially a threat to trees and shrubs in the Myrtaceae family in the ecological community, including some of the common midstorey rainforest species, including Scrub turpentine (<i>Rhodamnia rubescens</i>) that is listed as Critically Endangered (Makinson 2018).</p> <p>Chytrid fungus is also a threat to the various frogs of the ecological community.</p>

Threat	Threat Status*	Threat Impacts
<b>Timber harvesting</b>	<i>Timing: past and ongoing</i> <i>Severity: major</i> <i>Scope: majority</i>	Dunn's white gum moist forest has undergone substantial changes in structure and function as a result of timber harvesting. Its dominant tree species ( <i>Eucalyptus dunnii</i> ) is one of the fastest growing eucalypts', making it desirable for timber harvesting (Benson & Hager 1993). Much of the ecological community is currently in a state of regrowth after past logging activity, however logging operations are ongoing in many of the remaining stands of Dunn's white gum moist forest which occur in state forest and private land (DEC 2007). There appears to be a strong relationship between BMAD symptoms and prior timber harvesting activity (Wardell-Johnson 2006).
<b>Clearing and fragmentation</b>	<i>Timing: past and ongoing</i> <i>Severity: major</i> <i>Scope: majority</i>	The area encompassing and surrounding the ecological community has been extensively cleared, resulting in a high loss of biodiversity and increased fragmentation (COAG Standing Council on Environment and Water 2012). The ecological community continues to be threatened by clearing where it occurs on fertile soils in valleys and on river flats that are considered suitable for agriculture and plantation forestry (DEC 2007).
<b>Inappropriate fire regimes (including fires which cause decline in biota)</b>	<i>Timing: ongoing</i> <i>Severity: major</i> <i>Scope: majority</i>	<p>The <i>Eucalyptus</i> canopy of Dunn's white gum moist forest is fast growing and regenerates well after disturbance (Benson &amp; Hager 1993); however, predictions of increased fire frequency and severity (BOM 2021) increases the risk of decline in the ecological community, particularly for the fire-intolerant understorey of rainforest species. An increased incidence of fire may decrease the structural complexity and functional diversity, and the integrity of the ecological community (Andrew et al. 2000; Harris et al. 2003; Henderson &amp; Keith 2002; York 1999; York &amp; Tarnawski 2004).</p> <p>Understanding and responding to the different components of altered fire regimes will help determine the vulnerability of this threat to the ecological community. These include fire frequency, intensity, seasonality, type (ground level, canopy, below-ground impacts), as well as severity, extent, patchiness, and ignition type (DAWE 2022).</p> <p>Mega-fires, such as those experienced in the 2019-2020 fire season, can burn a significant proportion of the ecological community and surrounding vegetation in a single fire event (e.g., an estimated 50 percent of the ecological community was within the extent of the 2019-20 bushfires (DAWE 2020)).</p> <p>Beyond the threat of wildfire, frequent prescribed burning of the understorey occurs in state forests and private land containing the ecological community to assist with cattle and timber production (NSW Government 2019). This causes a gradual transformation of vegetation structure and species composition.</p>
<b>Climate change</b>	<i>Timing: ongoing/future</i> <i>Severity: major</i> <i>Scope: majority</i>	<p>Projections of future changes in climate for northern NSW and southern QLD include higher average temperatures, more intense but likely reduced annual average rainfall, increased temperature extremes and higher evaporative demand (BOM 2021; Hennessy 2011). These changes are likely to lead to greater intensity and frequency of fires, more severe droughts, reduced river runoff and water availability, regional flooding and increased erosion.</p> <p>Climate change may significantly affect biodiversity by changing population size and distribution of species, modifying species composition, and altering the geographical extent of habitats and ecosystems (Weiskopf et al. 2020).</p>



Threat	Threat Status*	Threat Impacts
<b>Damage by feral herbivores and domestic livestock</b>	<i>Timing: ongoing</i> <i>Severity: major</i> <i>Scope: minority</i>	Dunn's white gum moist forest has been historically subject to grazing on its out regions, and this continues to be a threat to the ecological community. Cattle grazing is practiced in large areas of freehold and leasehold eucalypt forest in north-east NSW, including within the ecological community. Frequent grazing has been found to be associated with changes in the structure, diversity and composition of a range of eucalypt forest communities (Andrew et al. 2000; Harris et al. 2003; Henderson & Keith 2002; York 1999; York & Tarnawski 2004).  Feral pigs have been increasing in distribution and density in both NSW and Queensland and have established in several areas of Dunn's white gum moist forest (QLD Government 2004, NSW Government 2005). Feral pigs impact the ecological community through grazing, predation on native fauna, and habitat destruction through trampling and soil disturbance, competition and disease and weed transmission.  Feral goats, deer and rabbits occasionally occur throughout the ecological community (NSW Government 2018). They are known to alter the composition of the understorey and compete with native animals for food and habitat resources (QLD DAF 2020) and leave the ecological community open to erosion and weed invasion.
<b>Feral predators</b>	<i>Timing: ongoing</i> <i>Severity: minor</i> <i>Scope: minority</i>	The ecological community is also subject to predation, disease transmission and spread of invasive plant species by dogs, foxes, cats, and other feral (or domestic) predators.
<b>Genetic pollution</b>	<i>Timing: unknown</i> <i>Severity: unknown</i> <i>Scope: unknown</i>	<i>Eucalyptus dunnii</i> , the dominant canopy species in Dunn's white gum moist forest, is grown in commercial timber plantations throughout northern NSW (NSW Government 2019). Until relatively recently, these plantations were grown from seed that was harvested from wild populations, however, an increasing proportion of seed is now produced from controlled breeding stock in seed orchards (H. J. Smith & Henson 2007). The level of gene flow from plantation stock into wild populations is currently unknown, as is the impact of genetic contamination from controlled breeding stock on fitness and genetic diversity of wild populations.
<p><b>*Timing</b> – the threat occurs in the <b>past</b> (and unlikely to return), is <b>ongoing</b> (present/continuing), is likely to occur/return in the <b>future</b>, or timing is <b>unknown</b></p> <p><b>Severity</b> – the threat causes or has the potential to cause impacts that are <b>extreme</b> (leading to loss or transformation of affected patches/occurrences), <b>major</b> (leading to degradation of affected patches/occurrences), <b>minor</b> (impacting some components of affected patches/occurrences), <b>negligible</b> or <b>unknown</b></p> <p><b>Scope</b> – the threat is affecting the <b>whole</b> (&gt;90%), a <b>majority</b> (&gt;50%), a <b>minority</b> (&lt;50%), a <b>negligible</b> amount, or <b>unknown</b> amount of the ecological community</p>		

#### 4.1.1 Key threatening processes

The EPBC Act provides for the identification and listing of key threatening processes. A process is defined as a key threatening process if it threatens or may threaten the survival, abundance or evolutionary development of a native species or ecological community.

The following are EPBC-listed key threatening processes, current at the date of writing, that may be relevant to the ecological community or specific plants and animals that comprise it:

- Land clearance;
- Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases;

- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants;
- Novel biota and their impact on biodiversity;
- Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs;
- Competition and land degradation by unmanaged goats;
- Competition and land degradation by rabbits;
- Predation by European red fox;
- Predation by feral cats;
- Infection of amphibians with chytrid fungus resulting in chytridiomycosis.

Any approved threat abatement plans or advice associated with these items provides information to help landowners manage these threats and reduce their impacts to biodiversity. These can be found at <http://www.environment.gov.au/cgi-bin/sprat/public/publicgetkeythreats.pl>.

#### Consultation Questions on the threats

- Do you agree with the information in the Threats table?
- Are exotic vines a threat in this ecological community?
- Are any of the listed threats more, or less, severe or of different timing or scope than currently proposed for this ecological community?
- Are any threats (current or potential) missing, and if so please specify?
- Please provide additional examples of threat impacts, including potential threats.

## 5 Conservation of the ecological community

### 5.1 Primary conservation objective

To prevent the extinction of the Dunn's white gum moist forest and help recover its biodiversity and function through protecting it from significant impacts as a Matter of National Environmental Significance under national environmental law, and by guiding implementation of management and recovery, consistent with the recommended priority conservation and research actions set out in this advice.

### 5.2 Existing protection and management plans

#### 5.2.1 Existing protections

##### 5.2.1.1 EXISTING PROTECTION AS OTHER MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

The Moreton Bay Ramsar wetlands may intersect with or be immediately downstream of the ecological community. Whilst the ecological community occurs near this Ramsar site, its Ecological Character Description does not list the ecological community as a critical component of the site, contributing to its ecological character.

The ecological community occupies and/or adjoins areas of the Gondwana Rainforests World Heritage Area; formerly known as the Central Eastern Rainforest Reserves (Australia). Its

natural values include geological, ecological and biological processes and significant natural habitats. The Gondwana Rainforests were severely impacted by the 2019-2020 bushfires, placing these highly diverse communities at risk of further decline.

#### 5.2.1.2 *EXISTING PROTECTION IN RESERVES*

Despite a number of reserves containing the ecological community, its position in the landscape means only a small area of small, disjointed patches of the ecological community have been included in formal conservation reserves.

It is estimated that around 29 percent of the remaining ecological community occurs in conservation reserves. These include:

- Conservation Parks: Spicers Gap Road
- Flora Reserves: Twelve Sixty
- National Parks: Boonoo Boonoo, Border Ranges, Cataract, Cunnawarra, Gumbaynggirr, Koreelah, Main Range, Mallanganee, Maryland, Mount Barney, Mount Clunie, Mount Nothofagus, Mount Pikapene, Nymboi-Binderay, Nymboida, Richmond Range, Timbarra, Tooloom, Toonumbar, Washpool, Yabbra
- Nature Reserves: Captains Creek, Hortons Creek, North Obelisk

#### 5.2.2 *Existing management plans*

The following list may not be comprehensive. It is intended to help guide where some other information relevant to the management of the ecological community and broader landscape may be found.

Much of this ecological community in New South Wales corresponds to the NSW endangered ecological community listing of the "White gum moist forest in the NSW North Coast Bioregion". A management plan associated with this listing has been developed under the Saving Our Species program:

- Saving Our Species (2019):  
<https://www.environment.nsw.gov.au/savingourspeciesapp/ViewFile.aspx?ReportProjectID=1036&ReportProfileID=20100>

Other relevant plans:

- NSW DECCW (2010c). Northern Rivers Regional Biodiversity Management Plan, National Recovery Plan for the Northern Rivers Region, Department of Environment, Climate Change and Water NSW, Sydney. Available from:  
[www.environment.gov.au/system/files/resources/4b79fa42-5c8f-4dfe-9e79-07ed5832a056/files/northern-rivers.pdf](http://www.environment.gov.au/system/files/resources/4b79fa42-5c8f-4dfe-9e79-07ed5832a056/files/northern-rivers.pdf)
- Makinson (2018). Myrtle Rust in Australia – a draft Action Plan. Plant Biosecurity Cooperative Research Centre. [www.anpc.asn.au/myrtle-rust/](http://www.anpc.asn.au/myrtle-rust/)  
<https://www.anpc.asn.au/myrtle-rust/>

### Consultation Questions on existing protections and management plans

- Are there other existing protections you know of that are not covered in the above sections?
- Do you know of any other management plans relevant to the ecological community or the broader landscape?

## 5.3 Principles and standards for conservation

To undertake priority actions to meet the conservation objective, the overarching principle is that it is preferable to maintain existing areas of the ecological community that are relatively intact and of high quality. There are good, practical reasons to do so. It is typically more cost-effective to retain an intact remnant than to allow degradation and then attempt to restore it or another area. The more disturbed and modified a patch of the ecological community, the greater the recovery effort that is required. Also, intact remnants are likely to retain a fuller suite of native plant and animal species, and ecological functions. Certain species may not be easy to recover in practice, if lost from a site.

This principle is highlighted in the *National Standards for the Practice of Ecological Restoration in Australia* (Standards Reference Group SERA, 2021):

***“Ecological restoration is not a substitute for sustainably managing and protecting ecosystems in the first instance.***

*The promise of restoration cannot be invoked as a justification for destroying or damaging existing ecosystems because functional natural ecosystems are not transportable or easily rebuilt once damaged and the success of ecological restoration cannot be assured.”*

*Standards Reference Group SERA (2021) – Appendix 2.*

The principle discourages ‘offsets’ where intact remnants are removed with an undertaking to set aside and/or restore other, lesser quality, sites. The destruction of intact sites represents a net loss of the functional ecological community because there is no guarantee all the species and ecological functions of the intact site can be replicated elsewhere.

Where restoration is to be undertaken, it should be planned and implemented with reference to the *National Standards for the Practice of Ecological Restoration in Australia*. These Standards guide how ecological restoration actions should be undertaken and are available online from the Standards Reference Group SERA (2021). They outline the principles that convey the main ecological, biological, technical, social and ethical underpinnings of ecological restoration practice.

## 5.4 Priority conservation and research actions

Priority actions are recommended for the abatement of threats and supporting recovery of the ecological community. They are designed to provide guidance for:

- planning, management and restoration of the ecological community by landholders, Traditional custodians, NRM and community groups and other land managers;
- conditions of approval for relevant controlled actions under national environment law (the EPBC Act); and

- prioritising activities in applications for Australian Government funding programs.

Detailed advice on actions may be available in specific plans, such as management plans for weeds, fire or certain parks or regions. The most relevant at the time this conservation advice was developed are listed in [Section 5.2](#).

This conservation advice identifies priority conservation actions under the following key approaches:

- PROTECT the ecological community to prevent further losses;
- RESTORE the ecological community by active abatement of threats, appropriate management, restoration and other conservation initiatives;
- COMMUNICATE, ENGAGE WITH AND SUPPORT people to increase understanding of the value and function of the ecological community and encourage their efforts in its protection and recovery; and
- RESEARCH AND MONITORING to improve our understanding of the ecological community and the best methods to aid its management and recovery.

These approaches overlap in practice; and form part of an iterative approach to management that includes research, planning, management, monitoring and review.

The actions below do not necessarily encompass all actions in detail that may benefit the ecological community. They highlight general but key actions required to at least maintain survival of the ecological community at the time of preparing this Conservation Advice.

#### 5.4.1 *PROTECT the ecological community*

This key approach includes priorities intended to protect the ecological community by preventing further losses of occurrences.

- The ecological community should be protected during the early stages of zoning and development planning decisions, including strategic planning documents at state, regional and local levels.
- Liaise with local councils and State authorities to ensure that cumulative impacts on the ecological community are reduced as part of broader strategic planning or large projects (e.g. road works, developments).
- Undertake activities to mitigate future climate change and therefore reduce the impacts of climate stress on this ecological community.

##### 5.4.1.1 *CONSERVE REMAINING PATCHES*

There should be no further clearance and deliberate damage to patches of this ecological community that meet the minimum condition thresholds because it has been greatly reduced in its extent and integrity.

- Protect and conserve remaining areas of the ecological community.
- Retain other native vegetation remnants near patches of the ecological community, where they are important for connectivity, diversity of habitat and act as buffer zones between the ecological community and threats or development zones.
- Protect patches identified as of regional importance in formal conservation reserves. Consider other remnants for less formal conservation tenures, preferably ones that aim

for protection over the long-term. This includes investigating formal conservation arrangements, joint management agreements with Traditional custodians, and co-management agreements and covenants to protect patches on private land. This is particularly important for high quality, good quality and larger patches or areas that link to other patches of native vegetation.

- Where regeneration is occurring, provide measures that will support the regeneration to maturity (e.g. provide fencing to minimise grazing/trampling damage risk).
- Protect mature and over-mature trees and stags, particularly with hollows. Large and old trees typically have numerous hollows or fissures that provide shelter and support a diversity of animals.

#### 5.4.1.2 *MANAGE ACTIONS TO MINIMISE IMPACTS*

Apply the mitigation hierarchy to avoid, then mitigate, then offset potential impacts on the ecological community from development or other actions. The priority is to avoid further clearance and fragmentation of remnants with offsetting as the last resort.

- Plan projects to avoid the need to offset, by avoiding significant impacts to the ecological community.
- In circumstances where impacts cannot be totally avoided, then they should be minimised by:
  - retaining and avoiding damage to high quality patches, which should be managed to retain their benchmark state; and
  - protecting important habitat features, such as large mature trees or stags with hollows as these take many decades to develop and cannot be quickly replaced.
- Where impacts are unavoidable, offsets should be used as a last resort to compensate for the adverse impacts of the action deemed unavoidable. The outcomes of offsetting activities are generally highly uncertain. Any proposals considering offsets for this ecological community should aim to:
  - minimise the need to offset the ecological community by designing development around the ecological community and applying buffers (see [Section 5.4.1.3](#));
  - retain moderate, good and high-quality patches (Classes A, B, C) of the ecological community, rather than offset them (particularly with lower quality offset sites);
  - manage and protect offset areas in perpetuity in areas dedicated for conservation purposes - including ongoing management of threats that may reduce their size, condition and ecological function in the future;
  - select offset sites as close as possible to the impact site, to allow for local and regional variation in the ecological community;
  - increase the area and improve ecological function of existing patches, for example by enhancing landscape connectivity, habitat diversity and condition;
  - focus on the restoration of lower quality patches of the ecological community to achieve higher quality condition (see [Table 2](#));
  - extend protection to otherwise unprotected sites (e.g. sites that are currently too small or degraded to meet the minimum size and condition thresholds, but can



reasonably be restored to a larger, better, more intact condition that does meet the thresholds);

- maintain a register of offsets for the ecological community; and
- monitor offset areas and the outcomes they deliver over the long-term, to manage them adaptively and improve understanding of the best ways to manage offsets to delivery biodiversity benefits.
- Minimise the risk of indirect impacts to the ecological community from actions outside but near to patches of the ecological community, for example avoid building fire-sensitive infrastructure in or immediately adjacent to patches of the community that will encourage fire-hazard reduction activities.
- Prior to removal of any trees or use of heavy machinery that may also damage the understorey, ensure comprehensive flora and fauna surveys have identified threatened or locally important species on site and their potential shelter and nesting sites (for example hollows, burrows, rocks and tree crevices, as well as visible nests). Damage to these should be avoided altogether, but if approved for removal, care should be taken to appropriately relocate or otherwise protect fauna, and avoid undertaking the works during important times, such as during breeding seasons.

#### 5.4.1.3 *APPLY BUFFER ZONES*

- Protect and apply appropriate buffers, particularly of other native vegetation, around patches of the ecological community to minimise off-site impacts. A buffer zone is a contiguous area adjacent to a patch that is important for protecting the integrity of the ecological community. As the risk of indirect damage to an ecological community is usually greater where actions occur close to a patch, the purpose of the buffer zone is to minimise this risk by guiding land managers to be aware that the ecological community is nearby and take extra care. For instance, the buffer zone will help protect the root zone of edge trees and other components of the ecological community from spray drift (fertiliser, pesticide or herbicide sprayed in adjacent land), weed invasion, polluted water runoff and other damage. The best buffer zones are typically comprised of other native vegetation. Fire breaks and other built asset protection zones do not typically provide a suitable buffer and should be additional to a vegetated buffer.
- The recommended minimum buffer zone is 50 m from the outer edge of the patch as this distance accounts for likely influences upon the root zone. A larger buffer zone (e.g. 100 m) should be applied, where practical, to protect patches that are of very high conservation value or depending on the threat. Judgement should be exercised to determine an appropriate buffer distance, depending on circumstances and how a patch may be detrimentally impacted.

#### 5.4.1.4 *PREVENT THE INTRODUCTION AND SPREAD OF EXOTIC SPECIES*

- Support strong border biosecurity and avoid importing or accidentally introducing invasive species and pathogens that may have a serious adverse impact on this ecological community.
- Prevent planting of known or potentially invasive species in gardens, developments and landscaping near the ecological community.

- Prevent dumping of garden waste into bushland, especially in or near patches of the ecological community.
- Avoid the sale and planting of known invasive species in areas where the ecological community occurs. Review the planting schedule for new developments and landscaping to ensure that potential weeds or other inappropriate plants (e.g. native plants likely to contaminate the local gene pool) are not included.
- Control runoff during nearby construction activities to prevent movement of weeds and pathogens into the ecological community.
- When conducting activities in or around the ecological community, practice good biosecurity hygiene to avoid spreading weeds or pathogens (see DoE, 2015).
- Minimise unnecessary soil disturbance that may facilitate weed establishment.
- If new invasive species incursions do occur, detect and control them early, as small infestations are more likely to be eradicated.
- Limit or prevent access of grazing animals to patches of the ecological community (e.g. construct fences) where practicable. Provide advice and support to landholders to assist with this.
- Limit or prevent access of vehicles to patches of the ecological community.
- Prevent further incursions of feral animals into the ecological community and, where possible, contain pets in nearby residential areas.

#### 5.4.2 *RESTORE and MANAGE the ecological community*

This key approach includes priorities to restore and maintain the remaining occurrences of the ecological community by active abatement of threats, appropriate management, restoration and other conservation initiatives.

- Liaise with landholders and undertake and promote programs that ameliorate threats such as grazing, invasive species and human disturbance.
- Identify and prioritise other specific threats and undertake appropriate on-ground site management strategies where required.

##### 5.4.2.1 *MANAGE WEEDS, PESTS AND DISEASES*

Implement effective integrated control and management techniques for weeds, pests and diseases affecting the ecological community and manage sites to prevent the introduction of new, or further spread of, invasive species.

- Identify potential new weed incursions early and manage for local eradication, where possible.
- Prioritise weeds and patches for which management is most urgent.
- Control programs should be risk-assessed and managed to avoid impacting non-target species or having unintended consequences (e.g. consider habitat requirements of native species and likelihood of erosion, effects on water bodies or increased access before removing weeds). Also consider the likelihood of increasing required effort for weed treatment (e.g. by clearing woody weeds and allowing growth of herbaceous weeds: plan a strategic approach to total weed management).

- Target control of key weeds that threaten the ecological community using appropriate methods that avoid impacts to non-target species. Target weeds include lantana (*Lantana camara*), crofton weed (*Ageratina Adenophora*), ochna (*Ochna serrulata*) and winter senna (*Senna septemtrionalis*). Plan and budget for both initial weed management and for follow up treatment for as long as this is needed.
- Encourage appropriate use of local native plant species in developments and gardens in the region through local government and industry initiatives and best practice strategies.
- Ensure chemicals, or other mechanisms used to manage weeds, do not have significant adverse, off-target impacts on the ecological community or adjacent native vegetation or waterbodies.
- Control introduced pest animals through coordinated landscape-scale control programs. Target pests include pigs, foxes, cats.
- Implement controls to prevent or reduce infection by fungal pathogens, especially myrtle rust (*Austropuccinia psidii*). In particular, maintaining hygiene protocols when undertaking any work such as fire management, planting and weeding is critical.

#### 5.4.2.2 *MANAGE TRAMPLING, BROWSING AND GRAZING*

- Any livestock grazing which may be occurring in the ecological community should cease and fencing may be required for exclusion of stock.
- Low level grazing, firewood cutting and other uses which may be acceptable in dry forests are not appropriate to maintain the integrity of this ecological community.

#### 5.4.2.3 *MANAGE ACTIVITIES AND ACCESS*

- Cease/prohibit and monitor wood collection, such as for firewood or fencing, that leads to the loss and damage of trees, stags, logs or disturbs the natural litter layer.
- Cease/prohibit and monitor bush rock collection, movement or damage, that leads to the loss and damage of rocky habitat that is required by many vertebrate and invertebrate fauna.
- Cease/prohibit and monitor destructive activities such as off-road trail bike, quad bike, four-wheel-driving and construction of unauthorised bicycle trails.
- Cease/prohibit and monitor wildflower, invertebrate and other fauna collection.
- Cease/prohibit and monitor rubbish dumping.
- Cease/prohibit access by domestic pets, by containing them in nearby residential areas or keeping them on leashes.

#### 5.4.2.4 *MANAGE APPROPRIATE FIRE REGIMES*

- Implement appropriate fire management regimes for the ecological community and for the landscapes surrounding the ecological community. Take into account Indigenous knowledge and scientific research results.
- Where hazard reduction burns or prescribed fires are undertaken in areas near to the ecological community, ensure that the potential for the fire to escape is appropriately risk assessed and management responses are in place to protect the ecological community.

- Use a landscape-scale approach and available local knowledge on fire histories to identify sites that would benefit from reinstating appropriate fire frequency to prevent further declines of patches affected by either too low, or too high, fire frequency.
  - For areas of the ecological community affected by too high fire frequency, identify options for reducing the frequency of fires and protecting important features, such as habitat trees.
  - Fire management strategies at each location should take into account patch size, habitat features (e.g. protect hollow-bearing trees and large logs), vegetation structure and the surrounding landscape (including property protection) to minimise damage, maintain refuges for fauna (during and after fire) and increase habitat variability
- Fires (including planned burns nearby) must be managed to: maintain the integrity of the ecological community and avoid disruption of the life cycles of the component species; support rather than degrade the habitat; avoid invasion of exotic species; and avoid increased detrimental impacts of other threats such as drought, grazing or predation by feral predators. Isolated faunal populations, the rainforest understorey, and threatened plants are particularly vulnerable to local extinction following intense fires combined with other threats.
  - Ensure that an invasive species risk assessment and management program is planned and budgeted for ahead of proposed burning.
  - Use available ecological information to avoid detrimental fire impacts on key and susceptible species in the ecological community. For instance, do not undertake planned burns in areas adjacent to the ecological community when key, threatened or functionally important flora and fauna (that may be adversely impacted) are flowering, nesting or otherwise reproducing.
  - Consider weather conditions. Do not burn adjacent to the ecological community when soil moisture is low, or dry conditions are predicted for the coming season because flora and fauna will already be stressed, recovery will be too slow and erosion may occur; or, weeds may become established while vegetation cover is reduced.
  - Monitor the outcomes of fire and the consequences of other threats. Manage these within an appropriate timescale (e.g. immediately: put in place erosion control measures; limit access by feral predators and grazers; control weeds as they first appear with follow up treatments as necessary, until native vegetation has regenerated); consider shelter and food needs of native fauna. Ensure monitoring results are taken into account when planning and implementing future fire regimes.

#### 5.4.2.5 UNDERTAKE RESTORATION

- Undertake restoration, including bush regeneration and revegetation, of poorer and moderate quality patches to restore them to good and high quality, including restoration of patches that don't currently meet the minimum condition thresholds for protection to a condition that does (see [Table 2](#)).

- Restoration to improve the condition of degraded patches should aspire to the 5 Star Standard of the SERA Standards. Land managers should aim for the highest and best recovery of the ecological community to maximise biodiversity and ecological function based on appropriate metrics for each site (see Condition Thresholds at [Table 2](#) and SERA (2021) for guidance on implementing appropriate standards). This is particularly the case for sites that are being restored or reconstructed from highly altered states (see also [Section 2.2.4](#)).
  - Work with landholders to restore and reconnect patches of the ecological community and other adjacent or nearby native vegetation (including buffer areas)
  - Support opportunities for natural regeneration before planning and implementing replanting programs.
  - Use suitable local native species in restoration/revegetation projects for the ecological community and restore understorey vegetation to a structure and diversity appropriate to the site.
  - In general, use locally collected seeds, where available, to revegetate native plant species. However, choosing sources of seed closer to the margins of their range may increase resilience to climate change. Take into account key plant species' growing seasons to successfully achieve seed set.
  - For species that are problematic to propagate, targeted research/investigations will be necessary to solve regeneration issues. This may be the case for many rainforest taxa.
  - Ensure commitment to follow up after planting, such as the care of newly planted vegetation by watering, mulching, weeding and use/removal of tree guards.
  - Consider the landscape context and other relevant species and communities when planning restoration works. For example, ensure adjacent ecological communities and threatened and migratory species are not adversely impacted by tree planting or other restoration activities for the ecological community.
  - Close and rehabilitate unnecessary roads and tracks and otherwise control access to restored patches.
- For fauna, where appropriate habitat is available, and predators and competitors can be sufficiently controlled, re-introduction of some species, including those supporting important ecological functions may be possible.
    - Consider the size of the gene pool and interactions with naturally occurring populations when introducing fauna.
    - Where key ecological services formerly provided by fauna are known to be limited or missing, consider any opportunities to replicate these.
    - Maintain stags, logs, and mature and old-growth trees with hollows as they provide important structure and habitat for fauna.
    - If necessary, supplement, (but do not replace) habitat as part of restoration projects by placing hollow logs, large rocks or other habitat features (such as artificial hollows or various sized nest boxes) in or near to, the ecological

community. This may be particularly important after disturbance such as a severe fire event.

#### 5.4.3 *COMMUNICATE, engage with and support*

This key approach includes priorities to promote the ecological community to build awareness and encourage people and groups to contribute to its recovery. This includes communicating, engaging with and supporting the public and key stakeholders to increase their understanding of the value and function of the ecological community and to encourage and assist their efforts in its protection and recovery. Key groups to communicate with include landholders, land managers, land use planners, researchers, community members and Indigenous communities.

##### 5.4.3.1 *RAISE AWARENESS*

- Communicate with landholders/managers, relevant agencies and the public to emphasise the value of the ecological community, the key threats, its significance, and appropriate management. Encourage landholders to talk with local NRM organisations and other knowledgeable groups.
- Undertake effective community engagement and education to highlight the importance of minimising disturbance (e.g. during recreational activities) and of minimising pollution and littering (e.g. via signage).
- Inform landholders about incentives, such as conservation agreements, stewardship projects, funding and government NRM programs etc. that may apply to help look after sites on private lands.
- With permission, include culturally appropriate information on traditional knowledge and values in education and awareness programs, publications and signage.

##### 5.4.3.2 *PROVIDE INFORMATION*

- Develop education programs, information products and signage to help the public recognise the presence and importance of the ecological community, and their responsibilities under state and local regulations and national environment law (the EPBC Act).
- Improve understanding of Traditional Ecological Knowledge and where agreed by the knowledge-holders, identify and support culturally appropriate mechanisms to share and maintain this knowledge to protect and restore the ecological community
- Install signage to discourage damaging activities such as the removal of dead timber, dumping garden waste and other rubbish, creating informal paths and tracks, and the use of off-road vehicles in patches of the ecological community.
- Install significant vegetation markers along roads to designate areas of the ecological community to protect and prevent inappropriate road side maintenance from occurring.
- Promote knowledge about local weeds and what garden plants to avoid planting. Recommend local native species for revegetation and landscaping or safe alternative garden plants.

##### 5.4.3.3 *COORDINATE EFFORTS*

- Encourage local participation in restoration and 'landcare' efforts through local conservation groups, creating 'friends of' groups, field days and planting projects, etc.



- Liaise with local fire management authorities and agencies and engage their support in fire management of the ecological community. Ensure land managers are given information about how to manage fire risks to conserve this and other threatened ecological communities and species.
- Develop coordinated incentive projects to encourage conservation and stewardship of the ecological community on private land, and link with other programs and activities, especially those managed by regional Natural Resource Management groups.
- Support opportunities for Traditional Owners/custodians or other members of the Indigenous community to manage the ecological community.
- Promote awareness and protection of the ecological community with relevant agencies and industries. For example with:
  - state and local government planning authorities, to ensure that planning takes the protection of remnants into account; infrastructure or development works involving substrate or vegetation disturbance do not adversely impact the ecological community; maintenance activities (e.g. roads and roadsides) avoid the introduction or spread of weeds; with due regard to principles for long-term conservation;
  - land owners and developers, to minimise threats associated with land conversion and development;
  - Natural Resource Management organisations, conservation organisations and groups volunteering time for restoration and ecological management.

#### 5.4.4 *RESEARCH and monitoring*

This key approach includes priorities for research into the ecological community, and monitoring, to improve understanding of the ecological community and the best methods to aid its recovery through restoration and protection. Relevant and well-targeted research and other information gathering activities are important in informing the protection and management of the ecological community.

##### 5.4.4.1 *MAPPING*

- Collate existing vegetation mapping information and associated data for this ecological community and identify gaps in knowledge.
- Comprehensively map the extent and condition of the ecological community across its range:
  - support field survey and interpretation of other data such as aerial photographs and satellite images to more accurately document current extent, condition, threats, function, presence and use by regionally significant or threatened species.
  - support and enhance existing programs to model the pre-1750 extent across the entire range of the ecological community to inform restoration;
  - identify the most intact, high conservation value remnants and gain a better understanding of variation across the ecological community;

- identify and map the fire interval status of the ecological community and surrounding fire-dependent and/or fire sensitive vegetation;
- collate existing information on populations of fauna characteristic of the ecological community across its range.

#### 5.4.4.2 *OPTIONS FOR MANAGEMENT*

- Investigate key ecological interactions, such as the role of fauna in pollination, seed dispersal and nutrient cycling.
- Research into appropriate and integrated methods to manage pests and weeds that affect the ecological community.
- Assess the vulnerability of the ecological community to climate change and investigate ways to improve resilience through other threat abatement and management actions.
- Conduct research leading to the development of effective landscape-scale restoration techniques for the ecological community. Investigate the interaction between disturbance types, such as fire and invasion by weeds and feral animals, to determine how an integrated approach to threat management can be implemented.
- Investigate the most cost-effective options for restoring landscape function, including re-vegetation or assisted regeneration of priority areas, potentially buffering, connecting and protecting existing remnants.
- Research strategies for post-fire management of native fauna species to maximise persistence in the short and long term.

#### 5.4.4.3 *MONITORING*

- It is important that any monitoring is planned before management commences and considers what data are required to address research questions. Monitoring must also be resourced for management activities, especially for those using a novel approach, and applied during and following the management action.
  - Monitor for signs of decline, in terms of known problems e.g. Bell miner associated dieback or new incursions of invasive species or disease.
  - Monitor changes in the condition, composition, structure and function of the ecological community, including responses to climate change and all types of management actions and use this information to increase understanding of the ecological community and inform recommendations for future management.

#### Consultation Questions on the priority actions

- Is this list of proposed priority actions to conserve this ecological community complete and appropriate? Can you provide any additional information or advice to improve this section, including an indication of what are the highest priorities and why?
- Is there any evidence to inform fire management that would maintain the ecological community? Do you have an opinion about appropriate fire-regimes that would maintain both the rainforest understorey and canopy layer?

## 6 Listing assessment

The Threatened Species Scientific Committee has provided this draft assessment for consultation.

### 6.1 Reason for assessment

This assessment follows prioritisation of a nomination from the Threatened Species Scientific Committee in response to the impacts of the 2019-2020 bushfires.

### 6.2 Eligibility for listing

This assessment uses the criteria set out in the [EPBC Regulations](#) and TSSC [Guidelines for Nominating and Assessing Threatened Ecological Communities](#), as in force at the time of the assessment.

#### 6.2.1 Criterion 1 – decline in geographic distribution

Eligible for listing as **Vulnerable** or **Not eligible** under Criterion 1

	Category		
	Critically Endangered	Endangered	Vulnerable
Its decline in geographic distribution is:	very severe	severe	substantial
<i>decline relative to the longer-term/1750 timeframe</i>	≥90%	≥70%	≥50%
<i>decline relative to the past 50 years</i>	≥80%	≥50%	≥30%

Source: TSSC 2017

**Evidence:** Since European settlement, Dunn's white gum moist forest has undergone considerable reduction in its geographic distribution in the areas of NSW where it has been studied (DEC 2007). Estimates of reduction in the distribution of the ecological community varies from 33% (NPWS 1999) to 50% (Wall 2005). These estimates are likely conservative, as they are 16-22 years old and it is thought that the initial extent of the community prior to the clearing may have been underestimated (DEC 2007; NSW Government 2019).

Isolated patches of the ecological community have been recorded along Duck, Koreelah, Lindsay, Boomi and Beaury creeks, which are indicative of what could have historically been a far greater occurrence of the community, prior to land clearing (DEC 2007).

In the NSW North Coast and South East Queensland IBRA regions, the closest Plant Community Type (PCT 3173) and Regional Ecosystem (RE 12.8.11) that are likely to contain the ecological community have been cleared by an estimated 10.14% since 1750. However, these map units represent broader vegetation types than the ecological community and this figure likely underestimates the actual loss of the ecological community.

On balance and taking into account that the condition of the remaining patches of Dunn's white gum moist forest has been severely degraded and many patches may no longer meet the condition thresholds for the ecological community, the geographic distribution of the ecological community may have declined by up to 50% since 1750, which is just at the threshold for vulnerable. However, the plausible range of estimates lies mostly below this 50% threshold.

Following preliminary assessment of the data the Committee has determined that the ecological community may be eligible for listing as vulnerable or is not eligible for listing under any category under Criterion 1.

#### 6.2.2 Criterion 2 – limited geographic distribution coupled with demonstrable threat

Eligible for listing as **Endangered** under Criterion 2

Its geographic distribution is:		very restricted	restricted	limited
<i>Extent of occurrence (EOO)</i>		< 100 km <sup>2</sup> = <10,000 ha	<1,000 km <sup>2</sup> = <100,000 ha	<10,000 km <sup>2</sup> = <1,000,000 ha
<i>Area of occupancy (AOO)</i>		< 10 km <sup>2</sup> = <1,000 ha	<100 km <sup>2</sup> = <10,000 ha	<1,000 km <sup>2</sup> = <100,000 ha
AND the nature of its distribution makes it likely that the action of a threatening process could cause it to be lost in:				
the immediate future	10 years or 3 generations (up to a maximum of 60 years)	<b>Critically endangered</b>	<b>Endangered</b>	<b>Vulnerable</b>
the near future	20 years or 5 generations (up to a maximum of 100 years)	<b>Endangered</b>	<b>Endangered</b>	<b>Vulnerable</b>
the medium term future	50 years or 10 generations (up to a maximum of 100 years)	<b>Vulnerable</b>	<b>Vulnerable</b>	<b>Vulnerable</b>

Source: TSSC 2017

#### Evidence:

The distribution for this ecological community has been calculated based on best matching vegetation mapping: Dunn's White Gum map unit in Vegetation Map for the Northern Rivers CMA VIS\_ID 524 (© State Government of NSW and Department of Planning, Industry and Environment 2010) in New South Wales, and Regional Ecosystems (RE) 12.8.11 (Queensland Herbarium 2021) in Queensland. Restrictions were made to remove mapping units that occurred outside of the range of *Eucalyptus dunnii* (south of the Bellingen River).

The estimated Extent of Occupancy (EOO) for the Dunn's white gum moist forest is 8,110 km<sup>2</sup>. This is indicative of a **limited** geographic distribution. The estimated Area of Occupancy (AOO) for the ecological community is approximately 970 ha (or 9.7km<sup>2</sup>). This represents a **very restricted** geographic distribution. While *E. dunnii* is not considered to be threatened as a species at this time, it does have a very narrow distribution (Benson & Hager 1993; Boland et al. 2006; Specht 1995), thus restricting the potential distribution of the ecological community as a whole.

The ecological community's highly patchy distribution occurs largely (approximately 75% of the total area) outside of conservation reserves. The highly patchy distribution makes management initiatives and actions difficult to coordinate across its range and increases the ecological community's susceptibility to immediate threats such as logging or agricultural expansion and degradation through inappropriate management.

A continued decrease in the geographic distribution is likely due to cumulative losses, given that approximately one-third of the remaining extent in NSW occurs on private land, the majority of which has been assessed as high- or medium-capability rural land (DEC 2007). The nature of its distribution makes it highly susceptible to edge effects and the impacts of various threats, particularly weedy invasions, shifts in microclimate to less favourable conditions, decreases in species richness and abundance, and changes to vegetation structure (Laurance 2000). These threats may cause fundamental changes to ecological community, such that patches may no longer retain the characteristics of the community. While logging operations have slowed since 1991, the main canopy species (*E. dunnii*) is of commercial value as a timber species, thus

harvesting continues in stands of the community on state forest and private land (NSW Government 2019). This harvesting further adds to the cumulative losses experienced by this ecological community.

With climate change likely to increase the duration, frequency and intensity of fires (BOM 2021), Dunn's white gum moist forest will continue to be at risk of a further decline in its geographic distribution and the integrity of remaining areas. The vast majority of the ecological community being contained in patches smaller than 10 ha (86%), the more flammable edges of this patchy ecological community increase the likelihood of loss of the fire sensitive rainforest understorey to the point where patches of the community may no longer meet the description in [Section 1.2](#) or the key diagnostics in [Section 2.1](#).

The cumulative impact from continued harvesting and altered fire regimes has the potential to cause the loss of the ecological community within 100 years (five generations of *E. dunnii* (see [section 1.2.3](#))).

This represents a **very restricted** geographic distribution, and the nature of this distribution makes it likely that the action of a threatening process could cause it to be lost in the **near** future. The Committee therefore considers that the ecological community may have met the relevant elements of Criterion 2 to make it eligible for listing as **Endangered**.

#### 6.2.3 Criterion 3 – decline of functionally important species

**Insufficient data** to determine eligibility under Criterion 3

	Category		
	Critically Endangered	Endangered	Vulnerable
For a population of a native species that is likely to play a major role in the community, there is a:	very severe decline	severe decline	substantial decline
<i>Estimated decline over the last 10 years or three generations, whichever is longer</i>	80%	50%	20%
to the extent that restoration of the community is not likely to be possible in:	the immediate future	the near future	the medium-term future
<i>timeframe</i>	10 years or 3 generations (up to a maximum of 60 years)	20 years or 5 generations (up to a maximum of 100 years)	50 years or 10 generations (up to a maximum of 100 years)

Source: TSSC 2017

#### Evidence:

Within the Dunn's white gum moist forest, there has been a decline in the dominant canopy species, *Eucalyptus dunnii*. Due to targeting logging over time, very few large, mature individuals of Dunn's white gum remain. While *E. dunnii* is not considered to be threatened nationally at this time, it does have a very narrow distribution (Benson & Hager 1993; Boland et al. 2006; Specht 1995) and is listed as a vulnerable species in Queensland under the *Nature Conservation Act 1992*.

Given that *E. dunnii* is critical to the definition and functioning of the ecological community, a loss of this species would result in the loss of the ecological community. While there is undoubtedly a decline in this functionally important species within the ecological community, there is not currently sufficient data to support specific analysis against Criterion 3 and its

indicative thresholds, for the loss of this functionally important species within the current extent of the ecological community.

The Committee considers that there is insufficient information to determine the eligibility of the ecological community for listing in any category under Criterion 3.

#### 6.2.4 Criterion 4 – reduction in community integrity

Eligible under Criterion 4 for listing as **Endangered** under Criterion 4

	Category		
	Critically Endangered	Endangered	Vulnerable
The reduction in its integrity across most of its geographic distribution is:	very severe	severe	substantial
as indicated by degradation of the community or its habitat, or disruption of important community processes, that is:	very severe	severe	substantial
<i>such that restoration is unlikely (even with positive human intervention) within</i>	<i>the <u>immediate</u> future (10 years or 3 generations up to a maximum of 60 years)</i>	<i>the <u>near future</u> (20 years or 5 generations up to a maximum of 100 years)</i>	<i>the <u>medium-term</u> future (50 years or 10 generations up to a maximum of 100 years)</i>

Source: TSSC 2017

#### Evidence:

The Dunn's white gum moist forest has undergone severe changes in structure and function as a result of the threats outlined in [Section 4](#). The ecological community has experienced a reduction in integrity across most of its extent primarily because of:

- loss of mature canopy trees,
- weeds and bell-miner associated dieback,
- increased fire frequency and severity, and
- fragmentation legacies and edge effects.

#### Loss of mature canopy trees

Through the ecological community, there has been a loss of large, mature, hollow-bearing canopy trees, particularly the defining canopy species, *Eucalyptus dunnii*. These large trees provide important fauna habitat, and structural integrity to the ecological community (Benson & Hager 1993).

Observations from NSW indicate that large hollows do not form in many *Eucalyptus* species that are less than 200 years old, and that hollows become limiting to possums and gliders when there are less than three hollow trees per hectare (Mackowski 1984; Scotts 1991). The loss of these hollow bearing trees has resulted in a commensurate reduction in the hollow-dwelling species, and therefore a reduction in all the functions they provide such as pollination, seed dispersal and predation.

A combination of threats has led to this loss of large *E. dunnii* individuals from the ecological community. Due to the value of *E. dunnii* in commercial timber harvesting, it is rare to find any "old growth" of Dunn's white gum remaining in the canopy (Benson & Hager 1993). Of the

remaining Dunn's white gum moist forest in 1991, 87% of the *E. dunnii* trees were less than 0.5 m diameter at breast height (Benson & Hager 1993), indicating most patches of the ecological community are in a state of regrowth after these past logging events. This extensive logging prior to 1991 has not only reduced the overall distribution of the ecological community, but also the age and condition of the remaining patches.

### **Weeds and Bell miner associated dieback**

Integrity of this ecological community is further reduced by the positive feedback loop attributed to weed invasions (particularly lantana) and Bell miner associated dieback (BMAD) acting together to impact *E. dunnii* growth, persistence and reproduction (Silver & Carnegie 2017).

The establishment of lantana in the ecological community has been implicated eucalypt dieback (Wardell-Johnson et al. 2006). A *Eucalyptus* forest system that contains a dense understorey of exotic lantana is a preferred habitat for Bell miners and thus facilitates BMAD. The reduction in the canopy cover then assists the establishment of lantana by the increased availability of light (Fensham et al. 1994).

BMAD substantially contributes to the loss of hollow-bearing eucalypts (Stone et al. 2008). (Fensham et al. 1994). Lantana was recorded in 40% of 43 documented sites of Dunn's white gum moist forest surveys conducted in NSW (NSW Government 2019). It was found to be dominating the mid stratum at most of these sites.

Of the 628 ha of Dunn's white gum (*E. dunnii*) mapped within NSW state forests in 2018, 172 ha was affected by BMAD, in addition to the 66 ha of infestation mapped in 2004. Taken together these total 238 ha of BMAD, representing 35 percent of the total extent of ecological community in state forests in the NSW region (Pugh 2018; Wardell-Johnson et al. 2006). It is likely that this is indicative of the degree of impact across the entire range of the ecological community.

### **Fire impacts**

Available data on fire history across the ecological community is sparse. Analysis of vegetation mapping units that were impacted by fire from 2001-2020, derived from MCD64A1 v006 MODIS/Terra+Aqua Burned Area Monthly dataset show that between 2-10% of the ecological community has experienced habitat loss due to fire in the last 20 years.

The 2019-2020 bushfires had impacts on areas known to support stands of the ecological community. From the available data, 42% of the ecological community experienced fire severity categorised as high or very high (DPIE 2020) during this fire season. Given the known fire sensitivity of the rainforest understorey of Dunn's white gum moist forest the extensive burning from this one significant event has impacted the ecological integrity across most of its geographical range.

### **Fragmentation legacies and edge effects**

These threats that are exacerbated by the small and fragmented nature of the ecological community. The reduction in integrity of the ecological community via fragmentation and loss can cause patch isolation and exacerbate existing threats due to increased edge effects. One measure of fragmentation is the reduction of "core area" where "core" is defined as the area of forest free of edge effects (Laurance & Yenson 1991). Spatial data representing the expected distribution of the ecological community shows that an estimated 5,719 ha or 22 percent of the ecological community represents core habitat (when calculated with an edge width of 50m).



This indicates that an estimated 78% of the ecological community is vulnerable to detrimental edge effects.

## Conclusion

The combination of these threat impacts has impacted the structure, species assemblage and ecological function across the range of the ecological community.

This represents a **severe** reduction in integrity across most of its geographic distribution, as indicated by a **severe** degradation of the community of its habitat. The Committee therefore considers that the ecological community has met the relevant elements of Criterion 4 to make it eligible for listing as **Endangered**.

### 6.2.5 Criterion 5 – rate of continuing detrimental change

**Insufficient data** to determine eligibility under Criterion 5

	Category		
	Critically Endangered	Endangered	Vulnerable
Its rate of continuing detrimental change is: as indicated by:	very severe	severe	substantial
(a) rate of continuing decline in its geographic distribution, or a population of a native species that is believed to play a major role in the community, that is: OR	very severe	severe	serious
(b) intensification, across most of its geographic distribution, in degradation, or disruption of important community processes, that is:	very severe	severe	serious
<i>an observed, estimated, inferred or suspected detrimental change over the immediate past, or projected for the immediate future (10 years or 3 generations), of at least:</i>	<i>80%</i>	<i>50%</i>	<i>30%</i>

Source: TSSC 2017

## Evidence:

Although continuing detrimental change is occurring within this ecological community, particularly with BMAD and fire impacts, data on the rate of this change is not available to support specific analysis against Criterion 5 and its indicative thresholds.

The Committee considers that there is insufficient information to determine the eligibility of the ecological community for listing in any category under Criterion 5.

### 6.2.6 Criterion 6 – quantitative analysis showing probability of extinction

**Insufficient data** to determine eligibility under Criterion 6

	Category		
	Critically Endangered	Endangered	Vulnerable
A quantitative analysis shows that its probability of extinction, or extreme degradation over all of its geographic distribution, is:	at least 50% in the immediate future	at least 20% in the near future	at least 10% in the medium-term future

	Category		
	Critically Endangered	Endangered	Vulnerable
<i>timeframes</i>	<i>10 years or 3 generations (up to a maximum of 60 years)</i>	<i>20 years or 5 generations (up to a maximum of 100 years)</i>	<i>50 years or 10 generations (up to a maximum of 100 years)</i>

Source: TSSC 2017

**Evidence:**

Quantitative analysis of the probability of extinction or extreme degradation over all its geographic distribution has not been undertaken. Therefore, there is insufficient information to determine the eligibility of the ecological community for listing in any category under this criterion.

## Consultation Questions on the listing assessment

- Do you agree with the draft conclusions against the listing criteria? If not, why not?
- How could the analysis against each of the criteria be improved?
- Can you provide any additional data or evidence to support the assessment against the criteria?

## Appendix A - Species lists

This Appendix lists the assemblage of native species that characterises the ecological community throughout its range at the time of listing, particularly characteristic and frequently occurring vascular plants at [Table 4](#) and macroscopic animals at [Table 5](#). The ecological community also includes fungi, cryptogamic plants and other species; however, these are relatively poorly documented.

The species listed may be abundant, rare, or not necessarily be present in any given patch of the ecological community, and other native species not listed here may be present. The total list of species that may be found in the ecological community is considerably larger than the species listed here.

Species presence and relative abundance varies naturally across the range of the ecological community based on factors such as historical biogeography, soil properties (e.g. moisture, chemical composition, texture, depth and drainage), topography, hydrology and climate. They also change over time, for example, in response to disturbance (by logging, fire, or grazing), or to the climate and weather (e.g. seasons, floods, drought and extreme heat or cold). The species recorded at a particular site can also be affected by sampling scale, season, effort and expertise. In general, the number of species recorded is likely to increase with the size of the site.

Scientific names used in this Appendix are nationally accepted names as per the Atlas of Living Australia, as at the time of writing.

### A1 Flora

Table 4: Characteristic, frequently occurring or threatened flora

Scientific name	Common name/s	EPBC status	NSW status	Qld status
Canopy tree species				
<i>Argyrodendron actinophyllum</i> Syn: <i>Heritiera antinophylla</i>	Black Booyong / Black Jack	-	-	-
<i>Corymbia maculata</i> Syn: <i>Eucalyptus maculata</i>	Spotted gum	-	-	-
<i>Eucalyptus dunnii</i>	White gum	-	-	Vulnerable
<i>Eucalyptus grandis</i>	Flooded gum / Rose gum	-	-	-
<i>Eucalyptus microcorys</i>	Tallowwood	-	-	-
<i>Eucalyptus propinqua</i>	Small-fruited grey gum / Grey gum	-	-	-
<i>Eucalyptus saligna</i>	Sydney blue gum	-	-	-
<i>Eucalyptus siderophloia</i>	Grey Ironbark / Mugga Ironbark	-	-	-
<i>Eucalyptus tereticornis</i>	Forest Red gum	-	-	-
<i>Lophostemon confertus</i>	Brush box	-	-	-
<i>Syncarpia australe - glomulifera</i>	Turpentine	-	-	-
<i>Araucaria cunninghamii</i>	Hoop Pine	-	-	-
<i>Casuarina cunninghamiana</i>	River Oak / River Sheoak	-	-	-
<i>Cryptocarya obovata</i>	Pepperberry	-	-	-
<i>Cryptocarya erythroxylon</i>	Rose Maple / Pigeonberry Ash	-	-	-
<i>Dendrocnide excelsa</i>	Giant Stinging Tree	-	-	-
<i>Dendrocnide photinophylla</i>	Shiny-leaved Stinging Tree	-	-	-
<i>Endiandra muelleri</i>	Green -leaved Rose Walnut	-	-	-

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Scientific name	Common name/s	EPBC status	NSW status	Qld status
Understorey tree and shrub species				
<i>Cinnamomum oliveri</i>	Oliver's Sassafras	-	-	-
<i>Claoxylon australe</i>	Brittlewood	-	-	-
<i>Cleistanthus cunninghamii</i>	Cleistanth's / Omega	-	-	-
<i>Clerodendrum tomentosum</i>	Hairy Clerodendrum / Downy Chance Tree	-	-	-
<i>Coatesia paniculata</i>	Axe-Breaker	-	Endangered	-
<i>Cordyline petiolaris</i>	Coast Banksia	-	-	-
<i>Cordyline stricta</i>	Narrow-leaved palm lily	-	-	-
<i>Croton verreauxii</i>	Creen Cascarilla	-	-	-
<i>Cryptocarya obovata</i>	Pepperberry	-	-	-
<i>Cryptocarya erythroxylon</i>	Rose Maple / Pigeonberry Ash	-	-	-
<i>Cryptocarya glaucescens</i>	Jackwood	-	-	-
<i>Cryptocarya microneura</i>	Murrogun	-	-	-
<i>Cryptocarya rigida</i>	Forest Maple	-	-	-
<i>Cupaniopsis parvifolia</i>	Small-leaved Tuckerroo	-	-	-
<i>Daphnandra micrantha</i>	Socketwood	-	-	-
<i>Dendrocnide excelsa</i>	Giant Stinging Tree	-	-	-
<i>Dendrocnide photinophylla</i>	Shiny-leaved Stinging Tree	-	-	-
<i>Denhamia bilocularis</i> Syn: <i>Maytenus bilocularis</i>	Orangebark	-	-	-
<i>Denhamia silvestris</i> Syn: <i>Maytenus silvestris</i>	Narrow-leaved Orangebark / Orange bush / Orange Bark	-	-	-
<i>Diospyros australis</i>	Black Plum / Yellow Persimmon / Grey Plum	-	-	-
<i>Diospyros pentamera</i>	Myrtle Ebony / Grey Persimmon / Black Myrtle / Grey Plum	-	-	-
<i>Diploglottis australis</i>	Native Tamarind	-	-	-
<i>Doryphora sassafras</i>	Sassafras	-	-	-
<i>Drypetes deplanchei</i> Syn: <i>Drypetes australasica</i>	Yellow tulipwood / Greybark / Yellow yulip / Grey Boxwood / White myrtle / Grey Bark	-	-	-
<i>Duboisia myoporoides</i>	Corkwood / Eye opening tree / Poisonous corkwood / Yellow Basswood	-	-	-
<i>Dysoxylum fraserianum</i>	Rosewood / Rose Mahogany	-	-	-
<i>Dysoxylum rufum</i>	Hairy Rosewood	-	-	-
<i>Ehretia acuminata</i>	Koda	-	-	-
<i>Elaeocarpus obovatus</i>	Hard Quandong / Blueberry Ash / Whitewood / Grey Carabeen / Freckled Oliveberry	-	-	-
<i>Elaeodendron australe</i> Syn: <i>Cassine australis</i>	No name in PlantNET	-	-	-
<i>Elattostachys nervosa</i>	Beetroot tree / Green tamarind	-	-	-
<i>Endiandra muelleri</i>	Green -leaved Rose Walnut	-	-	-
<i>Endiandra sieberi</i>	Hard Corkwood	-	-	-
<i>Eupomatia laurina</i>	Bolwarra / Copper Laurel / Guava	-	-	-
<i>Euroschinus falcatus</i> var. <i>falcatus</i> Syn: <i>E.falcata</i> var. <i>falcata</i>	Ribbonwood	-	-	-
<i>Ficus coronata</i>	Creek Sandpaper fig	-	-	-
<i>Ficus watkinsiana</i>	Strangling fig	-	-	-
<i>Geijera salicifolia</i>	Scrub Wilga	-	-	-

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Scientific name	Common name/s	EPBC status	NSW status	Qld status
<i>Glochidion sumatranum</i> Syn: <i>Glochidion perakense</i>	Umbrella Cheese Tree	-	-	-
<i>Goodia lotifolia</i>	Golden tip / Clover tree	-	-	-
<i>Gossia bidwillii</i> SYN: <i>Austromyrtus bidwillii</i> .	Python Tree	-	-	-
<i>Grevillea robusta</i>	Silky Oak	-	-	-
<i>Guioa semiglauca</i>	Guioa	-	-	-
<i>Hedycarya angustifolia</i>	Native mulberry	-	-	-
<i>Hibiscus heterophyllus</i> subsp. <i>heterophyllus</i>	Native Rosella	-	-	-
<i>Hodgkinsonia ovatiflora</i>	Golden Ash	-	-	-
<i>Homalanthus populifolius</i> Syn: <i>Omalthus populifolius</i>	Bleeding heart / Native poplar	-	-	-
<i>Hymenosporum flavum</i>	Native frangipani	-	-	-
<i>Indigofera australis</i>	Australian Indigo	-	-	-
<i>Lantana camara</i>	Lantana	-	-	-
<i>Linospadix monostachyos</i> Syn: <i>Linospadix monostachya</i>	Walking Stick Palm	-	-	-
<i>Livistona australis</i>	Cabbage fan palm / Cabbage tree palm	-	-	-
<i>Mallotus philippensis</i>	Red Kamala / Orange Kamala	-	-	-
<i>Melaleuca bracteata</i>	Black Tea-tree	-	-	-
<i>Melia azedarach</i>	White cedar / Chinaberry Tree	-	-	-
<i>Melicope micrococca</i> Syn: <i>Euodia micrococca</i>	Hairy-leaved Doughwood / White Euodia	-	-	-
<i>Myrsine howittiana</i> Syn: <i>Rapanea howittiana</i>	Brush Muttonwood	-	-	-
<i>Myrsine variabilis</i> Syn: <i>Rapanea variabilis</i>	Muttonwood	-	-	-
<i>Neolitsea australiensis</i>	Green bolly gum	-	-	-
<i>Neolitsea dealbata</i>	Hairy-leaved bolly gum / White Bolly Gum	-	-	-
<i>Notelaea venosa</i>	Veined Mock-olive / Smooth Mock-olive / Large-leaved Mock-olive	-	-	-
<i>Ozothamnus rufescens</i>	Soft Dogwood	-	-	-
<i>Pennantia cunninghamii</i>	Brown Beech	-	-	-
<i>Persoonia media</i> Syn: <i>Persoonia attenuata</i>	No name in PlantNET	-	-	-
<i>Phaleria chermsideana</i>	Scrub Daphne	-	-	-
<i>Pimelea ligustrina</i>	Tall rice-flower	-	-	-
<i>Pimelea pauciflora</i>	Poison rice-flower	-	-	-
<i>Pittosporum multiflorum</i>	Orange thorn	-	-	-
<i>Pittosporum revolutum</i>	Wild yellow jasmine / Rough fruit Pittosporum	-	-	-
<i>Pittosporum spinescens</i> Syn: <i>Citriobatus pauciflorus</i>	Wallaby Apple / Large-fruited Orange Thorn	-	-	-
<i>Pittosporum undulatum</i>	Native Daphne / Sweet Pittosporum / Snowdrop Tree / Mock Orange	-	-	-
<i>Planchonella australis</i>	Black Apple / Wild Plum / Yellow Buttonwood / Black Plum / Yellow Bulletwood	-	-	-
<i>Plectranthus parviflorus</i>	Cockspur Flower	-	-	-
<i>Polyscias elegans</i>	Celery wood / Silver Basswood / Black pencil cedar	-	-	-

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Scientific name	Common name/s	EPBC status	NSW status	Qld status
<i>Polyscias murrayi</i>	Pencil cedar / Umbrella tree / White Basswood / Pencilwood	-	-	-
<i>Psychotria daphnoides</i>	Smooth Psychotria	-	-	-
<i>Psychotria loniceroides</i>	Hairy Psychotria	-	-	-
<i>Rhodamnia rubescens</i>	Scrub Turpentine / Brown Malletwood	-	Critically Endangered	Critically Endangered
<i>Rhodomyrtus psidioides</i>	Native Guava	-	Critically Endangered	Critically Endangered
<i>Rubus rosifolius</i>	Rose-leaf bramble / Native Raspberry	-	-	-
<i>Santalum obtusifolium</i>	Blunt Sandalwood / Sandalwood	-	-	-
<i>Sarcomelicope simplicifolia</i>	Bauerella / Hard Apen / Yellow-wood	-	-	-
<i>Sarcopteryx stipata</i> Syn: <i>Sarcopteryx stipitata</i>	Steelwood / Corduroy	-	-	-
<i>Scolopia braunii</i>	Flintwood / Mountain Cherry / Brown Birch / Scolopia	-	-	-
<i>Senna septemtrionalis</i> Syn: <i>Senna floribunda</i>	Arsenic Bush	-	-	-
<i>Solanum aviculare</i>	Kangaroo apple / Poroporo	-	-	-
<i>Solanum campanulatum</i>	No name in PlantNET	-	-	-
<i>Solanum cinereum</i>	Narrawa Burr	-	-	-
<i>Solanum mauritianum</i>	Wild tobacco bush	-	-	-
<i>Solanum stelligerum</i>	Devil's Needles	-	-	-
<i>Symplocos thwaitesii</i>	Buff Hazelwood	-	-	-
<i>Synoum glandulosum</i> subsp. <i>glandulosum</i>	Scentless Rosewood	-	-	-
<i>Syzygium australe</i>	Brush Cherry	-	-	-
<i>Syzygium oleosum</i>	Blue Lilly Pilly / Blue Cherry	-	-	-
<i>Tasmannia insipida</i>	Brush Peppermint / Dorriggo Pepper	-	-	-
<i>Toona ciliata</i> Syn: <i>Toona australis</i>	Red Cedar / Santhana vembu	-	-	-
<i>Trema tomentosa</i> var. <i>aspera</i> Syn: <i>Trema aspera</i>	Peach-leaf Poison-bush / Native Peach / Poison Peach	-	-	-
<i>Tristaniaopsis laurina</i>	Water gum / Kanooka / Kanuka	-	-	-
<i>Wikstroemia indica</i>	Bootlace Bush / Tie Bush	-	-	-
<i>Zanthoxylum brachyacanthum</i>	Thorny Yellow-wood / Satinwood	-	-	-
Fern species				
<i>Adiantum formosum</i>	Black Stem Maidenhair	-	-	-
<i>Lastreopsis</i> spp	Shield Fern	-	-	-
<i>Hypolepis glanduligera</i>	Downy Grounder-Fern	-	-	-
<i>Doodia aspera</i>	Prickly Rasp Fern	-	-	-
<i>Dennstaedtia davalliodes</i>	Lacy Ground Fern	-	-	-
Herb and orchid and sedge/graminoid species				
<i>Ageratina adenophora</i>	Crofton Weed	-	-	-
<i>Urtica incisa</i>	Stinging Nettle	-	-	-
Scrambler/climber/epiphyte species				
<i>Cayratia clematidea</i>	Native Grape	-	-	-
<i>Celastrus subspicatus</i>	Large-leaved Staff Vine	-	-	-
<i>Cephalalaria cephalobotrys</i>	Climbing Panax	-	-	-
<i>Cissus antarctica</i>	Kangaroo Vine / Water vine	-	-	-
<i>Cissus hypoglauca</i>	Giant water vine	-	-	-

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Scientific name	Common name/s	EPBC status	NSW status	Qld status
<i>Cissus sterculifolia</i>	Yaroong	-	-	-
<i>Clematis aristata</i>	Old man's beard	-	-	-
<i>Clematis glycinoides</i>	Headache vine	-	-	-
<i>Gynochthodes jasminoides</i> Syn: <i>Morinda jasminoides</i>	Sweet Morinda	-	-	-
<i>Legnephora moorei</i>	Round-leaf vine	-	-	-
<i>Maclura cochinchinensis</i>	Cockspur Thorn	-	-	-
<i>Marsdenia flavescens</i>	Hairy milk vine	-	-	-
<i>Marsdenia lloydii</i> Syn: <i>Marsdenia suberosa</i>	Corky Mardenia	-	-	-
<i>Melodinus australis</i>	Southern Melodinus / Bellbird Vine	-	-	-
<i>Neoachmandra cunninghamii</i> Syn: <i>Zehneria cunninghamii</i>	Slender Cucumber	-	-	-
<i>Palmeria scandens</i>	Anchor Vine / Pomegranate Vine	-	-	-
<i>Pandorea pandorana</i>	Wonga wonga vine	-	-	-
<i>Parsonsia fulva</i>	Furry Silkpod	-	-	-
<i>Parsonsia straminea</i>	Common Silkpod / Monkey Rope	-	-	-
<i>Parsonsia velutina</i>	Hairy Silkpod	-	-	-
<i>Passiflora edulis</i>	Common Passionfruit	-	-	-
<i>Passiflora foetida</i>	Stinking Passionflower	-	-	-
<i>Passiflora subpeltata</i>	White Passionflower	-	-	-
<i>Psydrax odorata</i> Syn: <i>Canthium buxifolium</i>	Shiny-leaved canthium	-	-	-
<i>Ripogonum album</i>	White Supplejack	-	-	-
<i>Ripogonum discolor</i>	Prickly Supplejack	-	-	-
<i>Ripogonum elseyanum</i>	Hairy Supplejack	-	-	-
<i>Rubus moluccanus</i> var. <i>trilobus</i> Syn: <i>Rubus hillii</i>	Molucca Bramble	-	-	-
<i>Sarcopetalum harveyanum</i>	Pearl Vine	-	-	-
<i>Solori involuta</i>	Fish poison vine	-	-	-
<i>Stephania japonica</i> var. <i>discolor</i>	Snake Vine	-	-	-
<i>Tetrastigma nitens</i>	Native Grape Vine / Shiny Leaved Grape / Three Leaf Water Vine	-	-	-
<i>Trophis scandens</i> Syn: <i>Malaisia scandens</i>	Burny Vine	-	-	-
<i>Uvaria leichhardtii</i> Syn: <i>Rauwenhoffia leichhardtii</i>	Zig Zag Vine	-	-	-

## A2 Fauna

Table 5: Fauna recorded in the ecological community

Scientific name	Common name/s	EPBC status	NSW status	QLD status
Mammals				
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	-	Vulnerable	-
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	-	-	Vulnerable
<i>Chalinolobus nigrogriseus</i>	Hoary Wattled Bat	-	-	Vulnerable
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Endangered	Vulnerable	-

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Scientific name	Common name/s	EPBC status	NSW status	QLD status
<i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll (SE Mainland population)	Endangered	-	Endangered
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	-	Vulnerable	Vulnerable
<i>Macropus dorsalis</i>	Black-striped Wallaby	-	Endangered	-
<i>Macropus parma</i>	Parma Wallaby	-	Vulnerable	Vulnerable
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	-	-	-
<i>Miniopterus australis</i>	Little Bentwinged-bat	-	Vulnerable	-
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	-	-	-
<i>Mormopterus beccarii</i>	Beccari's Freetail-bat	-	Vulnerable	-
<i>Myotis macropus</i> (was <i>M. adversus</i> )	Large-footed Myotis	-	Vulnerable	-
<i>Nyctimene robinsoni</i>	Eastern Tube-nosed Bat	Vulnerable	Vulnerable	Vulnerable
<i>Nyctophilus bifax</i>	Eastern Long-eared Bat	Vulnerable	Vulnerable	Vulnerable
<i>Ozimops lumsdenae</i>	Northern Free-tailed Bat	Vulnerable	Vulnerable	Vulnerable
<i>Petauroides volans</i>	Greater Glider	-	-	-
<i>Petaurus australis</i>	Yellow-bellied Glider	-	Vulnerable	Endangered
<i>Petaurus norfolcensis</i>	Squirrel Glider	Vulnerable	Vulnerable	Vulnerable
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	Endangered	Endangered	Endangered
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	-	Vulnerable	-
<i>Phascolarctos cinereus</i>	Koala	Vulnerable	Vulnerable	Vulnerable
<i>Phoniscus papuensis</i> (Syn: <i>Kerivoula papuensis</i> )	Golden-tipped Bat	-	Vulnerable	-
<i>Planigale maculata</i>	Common Planigale	-	Vulnerable	Vulnerable
<i>Potorous tridactylus</i>	Long-nosed Potoroo	-	Vulnerable	Vulnerable
<i>Pseudomys oralis</i>	Hastings River Mouse	-	-	-
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Vulnerable	Vulnerable	-
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	-	Vulnerable	-
<i>Syconycteris australis</i>	Common Blossom-bat	-	-	-
<i>Thylogale stigmatica</i>	Red-legged Pademelon	-	Vulnerable	-
<b>Birds</b>				
<i>Amaurornis moluccana</i>	Pale-vented Bush-hen	-	Vulnerable	Vulnerable
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	-	Vulnerable	Vulnerable
<i>Atrichornis rufescens</i>	Rufous Scrub-bird	-	-	Vulnerable
<i>Burhinus grallarius</i>	Bush Stone-curlew	-	Endangered	Endangered
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	-	Vulnerable	Vulnerable
<i>Calyptorhynchus banksii banksii</i>	Red-tailed Black-cockatoo (coastal subspecies)	-	Critically Endangered	-



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Scientific name	Common name/s	EPBC status	NSW status	QLD status
<i>Calyptorhynchus lathami</i>	Glossy Black-cockatoo	-	Vulnerable	Vulnerable
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	-	-	Vulnerable
<i>Coracina lineata</i>	Barred Cuckoo-shrike	-	Vulnerable	Vulnerable
<i>Cyclopsitta diophthalma coxeni</i>	Coxen's Fig-parrot or Double-eyed Fig Parrot (Coxen's)	Endangered	Critically Endangered	Endangered
<i>Daphoenositta chrysoptera</i>	Varied Sittella	-	Vulnerable	Vulnerable
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	Endangered	Endangered	Endangered
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	-	Endangered	Endangered
<i>Erythrotriorchis radiatus</i>	Red Goshawk	Vulnerable	Endangered	Critically Endangered
<i>Glossopsitta pusilla</i>	Little Lorikeet	-	Vulnerable	Vulnerable
<i>Grantiella picta</i>	Painted Honeyeater	-	Vulnerable	Vulnerable
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	-	Vulnerable	Vulnerable
<i>Hieraaetus morphnoides</i>	Little Eagle	-	Vulnerable	Vulnerable
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	Vulnerable	Vulnerable
<i>Ixobrychus flavicollis</i>	Black Bittern	-	Vulnerable	Vulnerable
<i>Lathamus discolor</i>	Swift Parrot	Endangered	Endangered	Endangered
<i>Lophoictinia isura</i>	Square-tailed Kite	-	Vulnerable	Vulnerable
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	-	Vulnerable	Vulnerable
<i>Menura alberti</i>	Albert's Lyrebird	-	Vulnerable	Vulnerable
<i>Ninox connivens</i>	Barking Owl	-	Vulnerable	Vulnerable
<i>Ninox strenua</i>	Powerful Owl	-	Vulnerable	Vulnerable
<i>Pachycephala olivacea</i>	Olive Whistler	-	Vulnerable	Vulnerable
<i>Pedionomus torquatus</i>	Plains-wanderer	Endangered	Endangered	Endangered
<i>Petroica phoenicea</i>	Flame Robin	-	Vulnerable	Vulnerable
<i>Podargus ocellatus</i>	Marbled Frogmouth	-	Vulnerable	Vulnerable
<i>Ptilinopus magnificus</i>	Wompoo Fruit-dove	-	Vulnerable	Vulnerable
<i>Ptilinopus regina</i>	Rose-crowned Fruit-dove	-	Vulnerable	Vulnerable
<i>Ptilinopus superbus</i>	Superb Fruit-dove	-	Vulnerable	Vulnerable
<i>Turnix melanogaster</i>	Black-breasted Button-quail	Critically Endangered	Critically Endangered	Critically Endangered
<i>Tyto novaehollandiae</i>	Masked Owl	-	Vulnerable	Vulnerable
<i>Tyto tenebricosa</i>	Sooty Owl	-	Vulnerable	Vulnerable
Reptiles and Amphibians				
<i>Assa darlingtoni</i>	Pouched Frog			
<i>Coeranoscincus reticulatus</i>	Three-toed Snake-tooth Skink		Vulnerable	Vulnerable

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Scientific name	Common name/s	EPBC status	NSW status	QLD status
<i>Hoplocephalus bitorquatus</i>	Pale-headed Snake		Vulnerable	
<i>Hoplocephalus stephensii</i>	Stephens' Banded Snake		Vulnerable	
<i>Litoria brevipalmata</i>	Green-thighed Frog	Endangered	Endangered	Endangered
<i>Litoria piperata</i>	Peppered Tree Frog	Critically Endangered	Critically Endangered	Critically Endangered
<i>Litoria subglandulosa</i>	Glandular Frog		Vulnerable	Vulnerable
<i>Mixophyes balbus</i>	Stuttering Barred Frog		Vulnerable	Vulnerable
<i>Mixophyes fleayi</i>	Fleay's Barred Frog	Endangered	Endangered	Endangered
<i>Mixophyes iteratus</i>	Giant Barred Frog	Endangered	Endangered	Endangered
<i>Phyloria kundagungan</i>	Mountain Frog	Endangered	Endangered	Endangered
<i>Phyloria loveridgei</i>	Loveridge's Frog		Vulnerable	Vulnerable
<i>Phyloria pughii</i>	Phyloria pughii	Endangered	Endangered	Endangered
<i>Phyloria richmondensis</i>	Unnamed Mountain Frog	Endangered	Endangered	Endangered
<i>Phyloria sphagnicolus</i>	Sphagnum Frog	Endangered	Endangered	Endangered
Invertebrates				
<i>Nurus atlas</i>	Atlas Rainforest Ground-beetle	-	Endangered	Endangered
<i>Nurus brevis</i>	Shorter Rainforest Ground-beetle	-	Endangered	Endangered

Sources: Atlas of Living Australia, NSW Government 2019

## Consultation Questions on the species lists

- Are the lists of flora and fauna accurate? If not, what species should be added or removed?

## Appendix B - Relationship to other vegetation classification and mapping systems

Ecological communities are complex to classify. States and Territories apply their own systems to classify vegetation communities. Reference to vegetation and mapping units as equivalent to the ecological community, at the time of listing, should be taken as indicative rather than definitive. A unit that is generally equivalent may include elements that do not meet the key diagnostics and minimum condition thresholds. Conversely, areas mapped or described as other units may sometimes meet the key diagnostics for the ecological community. Judgement of whether the ecological community is present at a particular site should focus on how the site meets the description ([Section 1.2](#)), the key diagnostic characteristics ([Section 2.1](#)) and minimum condition thresholds ([Section 2.3](#)).

State vegetation mapping units are not the ecological community being listed. However, for many sites (but not all) certain vegetation map units will correspond sufficiently to provide indicative mapping for the national ecological community, where the description matches.

On-ground assessment is vital to finally determine if any patch is part of the ecological community.

### B1 Key features distinguishing the ecological community from other similar vegetation types

Code / Number	Name	Key distinguishing features
<b>Map units representing the ecological community</b>		
<i>PCT3173</i>	Northern Ranges Dunn's Gum-Brush Box Wet Forest	<ul style="list-style-type: none"> <li>Equivalent to the ecological community in NSW where <i>Eucalyptus dunnii</i> is present and dominant in the canopy. This mapping unit extends south of the range in which <i>E. dunnii</i> grows, thus is only valid for ranges north of Coffs Harbour.</li> </ul>
<i>RE 12.8.11</i>	<i>Eucalyptus dunnii</i> tall open forest on Cainozoic igneous rocks	<ul style="list-style-type: none"> <li>Equivalent to the ecological community in QLD.</li> </ul>
<b>Map units representing other similar wet forest types that include <i>Eucalyptus dunnii</i></b>		
<i>PCT 3172</i>	Northern Ranges Brush Box-Flooded Gum Wet Forest	<ul style="list-style-type: none"> <li>The <b>wet sclerophyll</b> canopy is typically comprised of one or more of the trees <i>Lophostemon confertus</i>, which is very frequent and usually has the highest cover and <i>Eucalyptus grandis</i> or <i>E. microcorys</i>, which are both occasionally present. If <i>E. dunnii</i> is present, it's usually in low abundance and never dominant.</li> <li>This PCT tends to occur in warmer and wetter sites than the Dunn's white gum moist forest – receiving 1130-1750 mm mean annual rainfall, at moderate elevations of 210-590 metres ASL.</li> </ul>
<i>PCT 3070</i>	Far North Hinterland Kamala-Coogera Dry Rainforest	<ul style="list-style-type: none"> <li>The <b>rainforest</b> canopy typically includes various mixes of four dominant species: <i>Mallotus philippinensis</i> and <i>Capparis arborea</i> are almost always present, very frequently with <i>Arytera divaricata</i> and <i>Aphananthe philippinensis</i>. If <i>E. dunnii</i> is present, it's usually in low abundance and is never dominant.</li> <li>This PCT occurs in warm, moderately wet locations receiving 930-1380 mm mean annual rainfall, at moderate elevations of 50-700 metres ASL.</li> </ul>

Code / Number	Name	Key distinguishing features
PCT 3003	Border Ranges Black Booyong Subtropical Rainforest	<ul style="list-style-type: none"> <li>The dense, <b>rainforest</b> tree canopy has variable composition, but very frequently includes <i>Heritiera actinophylla</i> and/or commonly <i>Heritiera trifoliolata</i>, both with the highest foliage cover in the canopy.</li> <li>Rarely contains eucalypts, though sometimes <i>Eucalyptus grandis</i> occur either as emergents or in the canopy. If <i>E. dunnii</i> is present (though this is quite rare), it's usually in low abundance.</li> <li>This PCT occurs in warm, wet locations receiving 1140-1420 mm mean annual rainfall, at mid altitudes of 230-640 metres ASL.</li> </ul>
PCT 3139	Border Ranges Brush Box-Tallowood Wet Forest	<ul style="list-style-type: none"> <li>The <b>wet sclerophyll</b> canopy commonly includes one or more of <i>Corymbia intermedia</i>, <i>Lophostemon confertus</i> or <i>Eucalyptus microcorys</i>, commonly with a sub-canopy of <i>Allocasuarina torulosa</i>. If <i>E. dunnii</i> is present, it's usually in low abundance and is never dominant.</li> <li>The understorey contains graminoids and soft grasses.</li> <li>This PCT occurs in warm, wet locations receiving 1090-1760 mm mean annual rainfall at moderate elevations of 140-540 metres ASL.</li> </ul>
PCT 3020	Northern Hinterland River Oak Sheltered Forest	<ul style="list-style-type: none"> <li>The <b>forested wetland</b> canopy generally contains very tall to extremely tall <i>Casuarina cunninghamiana</i> open forest. If <i>E. dunnii</i> is present, it's usually in low abundance and is never dominant.</li> <li>This PCT occurs mainly on alluvial substrates, in a wide range of climates, including locations receiving 890-2080 mm mean annual rainfall, and at elevations of 50-800 metres ASL.</li> </ul>
RE 12.8.8 (and 12.8.8a)	<i>Eucalyptus saligna</i> or <i>E. grandis</i> tall open forest on Cainozoic igneous rocks	<ul style="list-style-type: none"> <li>The <b>wet sclerophyll</b> canopy is dominated by <i>Eucalyptus saligna</i> or <i>E. grandis</i> tall open forest. If <i>E. dunnii</i> is present, it's usually in low abundance and is never dominant.</li> </ul>
RE 12.11.2	<i>Eucalyptus saligna</i> or <i>E. grandis</i> , <i>E. microcorys</i> , <i>Lophostemon confertus</i> tall open forest on metamorphics +/- interbedded volcanics	<ul style="list-style-type: none"> <li>The <b>wet sclerophyll</b> canopy is a tall open forest dominated by <i>Eucalyptus saligna</i> or <i>E. grandis</i>, alongside <i>Lophostemon confertus</i>. If <i>E. dunnii</i> is present, it's usually in low abundance and is never dominant.</li> <li>Occurs on Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics (not basalt derived).</li> </ul>
RE 11.12.4	Semi-evergreen vine thicket and microphyll vine forest on igneous rocks	<ul style="list-style-type: none"> <li>Canopy largely contains <i>Araucaria cunninghamii</i> as an emergent from the general canopy layer. If <i>E. dunnii</i> is present, it's usually in low abundance and is never dominant.</li> <li>Occurs on low hills, ranges and boulder strewn slopes formed from Mesozoic to Proterozoic igneous rocks including granite.</li> </ul>

Code / Number	Name	Key distinguishing features
<b>Map units representing dry forest types containing <i>Eucalyptus dunnii</i></b>		
<i>PCT 3312</i>	Acacia Creek Grassy Forest	<ul style="list-style-type: none"> <li>The <b>grassy woodlands</b> canopy contains extremely tall eucalypt sclerophyll open forest with a layered mid-stratum of soft-leaved shrubs and small trees, with a ground layer of grasses and vines. If <i>E. dunnii</i> is present, it's usually in low abundance and is never dominant.</li> <li>The mid-dense to dense ground layer is mainly comprised of graminoids, soft-leaved forbs, vines and grasses. Dunn's white gum moist forest does not contain grasses in the understorey.</li> <li>This PCT occurs on mid-slopes with underlying basalt or on sediments with basalt upslope, in warm moist locations receiving typically over 840 mm mean annual rainfall.</li> </ul>
<i>PCT 3080</i>	Killarney Dry Rainforest	<ul style="list-style-type: none"> <li>The <b>dry rainforest</b> canopy contains a mixture of dry rainforest, western and temperate species. If <i>E. dunnii</i> is present, it's usually in low abundance and is never dominant.</li> <li>This community is located in small remnants in an extensively cleared area which were affected by herbicide spraying and available data are constrained by those effects.</li> <li>This community occurs on sandstone downslope from a basalt hill, in a location receiving 920-1100 mm mean annual rainfall, at elevations of 620-720 metres ASL.</li> </ul>
<b>Other wet forest types that DO NOT contain <i>Eucalyptus dunnii</i> in the canopy</b>		
<i>PCT 3233</i>	Far North Hinterland Grey Gum Grassy Forest	<ul style="list-style-type: none"> <li>The <b>wet sclerophyll</b> canopy frequently includes <i>Eucalyptus propinqua</i>, commonly <i>Eucalyptus microcorys</i> and occasionally with <i>Corymbia maculata</i> (incorporating <i>Corymbia variegata</i>), <i>Eucalyptus moluccana</i>, <i>Corymbia intermedia</i> and <i>Eucalyptus siderophloia</i>, which are only sometimes locally dominant.</li> <li>The understorey can contain grasses.</li> <li>This PCT occurs mainly in moderately warm, moderately wet locations receiving 1090-1390 mm mean annual rainfall, at mid elevations of 280-580 metres ASL.</li> </ul>
<i>PCT 3069</i>	Far North Hinterland Grey Box-Grey Gum Wet Forest	<ul style="list-style-type: none"> <li>The <b>wet sclerophyll</b> canopy includes one or more of the species <i>Eucalyptus moluccana</i>, <i>Eucalyptus propinqua</i> and <i>Eucalyptus siderophloia</i>, which have the highest cover, or occasionally <i>Lophostemon confertus</i>.</li> <li>The understorey contains grassy sub-formations</li> <li>This PCT occupies warm, moderately wet locations receiving 870-1260 mm mean annual rainfall at mid elevations of 140-530 metres ASL.</li> </ul>
<i>PCT 3251</i>	Northern Gorges Diverse Grassy Forest	<ul style="list-style-type: none"> <li>The <b>wet sclerophyll</b> canopy includes a mix of species although collectively it very frequently includes mahoganies (<i>Eucalyptus carnea</i> and <i>Eucalyptus acmenoides</i>), with <i>Eucalyptus siderophloia</i> and grey gums (<i>Eucalyptus propinqua</i> or <i>Eucalyptus biturbinata</i>) commonly present.</li> <li>It has a grassy ground layer</li> <li>This PCT is widespread in the steep hinterland hills from the Macleay Valley to the Upper Richmond, with scattered occurrences as far south as Stroud. These hinterland hills have a hot, wet environment with mean annual rainfall typically between 1000-1370 mm.</li> </ul>

Code / Number	Name	Key distinguishing features
RE 12.3.9	<i>Eucalyptus nobilis</i> open forest on alluvial plains	<ul style="list-style-type: none"> <li>The <b>riverine wetland</b> ecosystem has a canopy dominated by <i>Eucalyptus nobilis</i></li> <li>Occurs at headwaters of streams on Quaternary alluvial plains usually forming a narrow fringing community.</li> </ul>
RE 12.8.9	<i>Lophostemon confertus</i> open forest on Cainozoic igneous rocks	<ul style="list-style-type: none"> <li>The <b>wet sclerophyll</b> canopy contains <i>Lophostemon confertus</i>.</li> <li>Occurs on Cainozoic igneous rocks. Tends to occur mostly in gullies and on exposed ridges on basalt.</li> </ul>
RE 12.12.15	<i>Corymbia intermedia</i> +/- <i>Eucalyptus propinqua</i> , <i>E. siderophloia</i> , <i>E. microcorys</i> , <i>Lophostemon confertus</i> open forest on Mesozoic to Proterozoic igneous rocks	<ul style="list-style-type: none"> <li>The <b>open forest/woodland</b> canopy contains <i>Corymbia intermedia</i> +/- <i>Eucalyptus propinqua</i>, <i>E. siderophloia</i>, <i>E. microcorys</i>, <i>Lophostemon confertus</i>.</li> <li>Occurs on Mesozoic to Proterozoic igneous rocks.</li> </ul>
<b>Other dry forest types that DO NOT contain <i>Eucalyptus dunnii</i> in the canopy</b>		
RE 12.8.14	<i>Eucalyptus eugenioides</i> , <i>E. biturbinata</i> , <i>E. melliodora</i> +/- <i>E. tereticornis</i> , <i>Corymbia intermedia</i> open forest on Cainozoic igneous rocks	<ul style="list-style-type: none"> <li>The <b>dry open woodland</b> canopy contains <i>Eucalyptus eugenioides</i>, <i>E. biturbinata</i>, <i>E. melliodora</i> +/- <i>E. tereticornis</i>, <i>Corymbia intermedia</i>, <i>E. crebra</i>.</li> <li>Occurs on Cainozoic igneous rocks, especially basalt.</li> </ul>
RE 12.11.18	<i>Eucalyptus moluccana</i> woodland on metamorphics +/- interbedded volcanics	<ul style="list-style-type: none"> <li>The <b>dry open woodland</b> canopy contains <i>Eucalyptus moluccana</i> woodland +/- <i>Corymbia citriodora</i> subsp. <i>variegata</i>, <i>E. tereticornis</i>, <i>E. siderophloia</i> or <i>E. crebra</i>, <i>E. longirostrata</i>, <i>C. intermedia</i>, <i>E. carnea</i>.</li> <li>Occurs on Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.</li> <li>Occurs as scattered occurrences in a range of topographic positions from ridgetops to lower slopes. (BVG1M: 13d)</li> </ul>
RE 12.8.16	<i>Eucalyptus crebra</i> +/- <i>E. melliodora</i> , <i>E. tereticornis</i> woodland on Cainozoic igneous rocks	<ul style="list-style-type: none"> <li>The <b>grassy open woodland</b> canopy contains <i>Eucalyptus crebra</i>, generally with <i>E. melliodora</i> and <i>E. tereticornis</i> +/- <i>E. albens</i>.</li> <li>Grassy understorey</li> <li>Occurs on dry hillslopes on Cainozoic igneous rocks, especially basalt.</li> </ul>

#### Consultation Questions on map units

- Does the list of current and superseded map units and classifications include all those that may be related to the ecological community?
- Are the key distinguishing features sufficient to differentiate other vegetation types from the ecological community?

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