



Draft Conservation Advice for the Grey Box (*Eucalyptus moluccana*) - Grey Gum (*Eucalyptus propinqua*) Wet Forest of Subtropical Eastern Australia

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 occurrence of the ecological community in Northern New South Wales. © Andy Baker

The Grey Box (*Eucalyptus moluccana*)-Grey Gum (*Eucalyptus propinqua*) Wet Forest of Subtropical Eastern Australia occurs within country (the traditional lands) of the Bundjalung peoples. We acknowledge their culture and continuing link to the ecological community and the country it inhabits.

Proposed Conservation Status

The Grey Box (*Eucalyptus moluccana*)-Grey Gum (*Eucalyptus propinqua*) Wet Forest of Subtropical Eastern Australia 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 Grey Box (*Eucalyptus moluccana*) - Grey Gum (*Eucalyptus propinqua*) Wet Forest of Subtropical Eastern Australia

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).

CONTENTS

1	Ecological community name and description	3
1.1	Name.....	3
1.2	Description of the ecological community and the area it inhabits.....	3
2	Identifying areas of the ecological community.....	7
2.1	Key diagnostic characteristics.....	7
2.2	Additional information to assist in identifying the ecological community	8
2.3	Condition classes, categories and thresholds	11
2.4	Habitat critical to the survival of the ecological community	13
2.5	Areas of high value - surrounding environment and landscape context.....	13
3	Cultural and community significance	15
3.1	Indigenous values and uses of the ecological community	15
3.2	Community values associated with the ecological community	15
4	Threats.....	15
4.1	Threat table.....	16
5	Conservation of the ecological community	21
5.1	Primary conservation objective.....	21
5.2	Existing protection and management plans.....	21
5.3	Principles and standards for conservation.....	22
5.4	Priority conservation and research actions	23
6	Listing assessment.....	32
6.1	Reason for assessment.....	32
6.2	Eligibility for listing.....	32
	Appendix A - Species lists.....	40
	Appendix B - Relationship to other vegetation classification and mapping systems.....	49
	References.....	52

1 Ecological community name and description

1.1 Name

The name of the ecological community is Grey Box (*Eucalyptus moluccana*) - Grey Gum (*Eucalyptus propinqua*) Wet Forest of Subtropical Eastern Australia (hereafter referred to as the “Grey Box-Grey Gum Wet Forest” or “the ecological community”). The name refers to the typical dominant canopy species, vegetation structure and geographic area that characterizes the ecological community. The ecological community was originally placed on the 2020 Finalised Priority Assessment List as the ‘Grey Box-Grey Gum Wet Sclerophyll Forest in northern NSW and southern 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 inhabits a particular area in nature. This section describes the species assemblage and area in nature that comprises the Grey Box-Grey Gum Wet Forest.

The ecological community described in this conservation advice is an assemblage of plants, animals and other organisms constituting a type of eucalypt forest with an understorey that typically includes significant cover of species with dry rainforest affiliations. Its canopy is dominated by *Eucalyptus moluccana* (Grey Box) with *E. propinqua* (Small-fruited Grey Gum) and less commonly *E. biturbinata* (Grey Gum), *E. siderophloia* (Grey Ironbark) and/or *Araucaria cunninghamii* (Hoop Pine). It is found from near Coffs Harbour in NSW to the border regions of south-eastern Queensland, predominately on the escarpment slopes and foothills of inland hinterland ranges. It is most common in localities where there is a mosaic of grassy eucalypt forests with dry rainforest.

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 retain sufficient conservation values to be considered a matter of national environmental significance.

1.2.1 Location and physical environment

The ecological community is limited to the New South Wales North Coast and South Eastern Queensland IBRA Bioregions¹ from near Coffs Harbour NSW north to the border regions of south-eastern Queensland within the Scenic Rim and Moreton Basin IBRA subregions. It occurs mainly in the Richmond and Clarence River Catchments NSW (DEC 2008) with some possible occurrences in adjacent catchments in NSW and Qld.

Major occurrences are in the hilly to mountainous inland areas north from around the towns of Malanganee and Drake in NSW and north-west of Kyogle in the Woodenbong and Cataract IBRA

¹ Interim Biogeographical Regionalisation of Australia Version 7 (DoE 2012)

subregions in NSW. In these areas significant occurrences are known particularly from around Woodenbong, in Mt. Lindsay, Unumgar and Bald Knob State Forests and their surrounds.

The ecological community typically occurs on escarpment slopes and foothills, on inland hills and ranges between 100m and 600m altitude. It is mainly associated with areas where mean annual rainfall exceeds approximately 1000mm (DECC 2008a) and does not exceed 1260mm (DPIE 2021). It may occur in areas with somewhat lower or higher rainfall than this where topography or other factors create a suitable microclimate.

Soils that support the ecological community are relatively fertile, well drained (NSW TSSC 2011) and are derived mostly from fine-grained sedimentary rocks, sometimes with local volcanic influence. The ecological community may occur on soils derived from other geologies especially where they have fine grained sedimentary or volcanic influence.

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.
- Does the altitude range and described soils accurately capture the full range where this ecological community can be found?

1.2.2 Description of the assemblage

1.2.2.1 VEGETATION STRUCTURE

The Grey Box-Grey Gum Wet Forest at maturity typically has a tall to very tall open canopy dominated by its characteristic *Eucalyptus* species with or without Hoop pine (*Araucaria cunninghamii*). It has a simple to structurally complex understorey (consisting of all vegetation below the canopy, including juvenile trees and the ground layer) including woody flora with dry rainforest affiliations, and sometimes also flora with grassy sclerophyll forest affiliations. The understorey may occur in various stages of post-fire regeneration, with or without young eucalypts, and with a more prominent grassy component in the post-fire regenerative phases. Woody rainforest life-forms typically include trees, shrubs, lianas and vines. Palms and treeferns are typically absent and palm-lilies uncommon. In the absence of recent disturbance, the ground-layer of the understorey is typically sparse with a high percentage of leaf litter cover, but also with ferns, bryophytes, graminoids including relatively shade-tolerant grasses, herbs, and/or seedlings of the woody vegetation layers at varying densities. Epiphytes and lithophytes, including ferns, orchids and bryophytes, may be sparse to abundant.

By the Walker and Hopkins (1990) classification the ecological community is a tall to extremely tall mid-dense to dense forest. The Benson (2006) equivalent is Rainforest: Dry (RD) and *Eucalyptus* Tall Wet Shrub Forest of Eastern Coastal Lowlands on Soils of Higher Fertility (TWFEF).

1.2.2.1.1 Influence of disturbance on structure

The structure varies between sites depending on the nature, timing, and intensity of past disturbances including fires, storms and logging. After disturbance the understorey may be simplified (NSW TSSC 2011) or temporarily absent. Following an intense fire, seedlings or saplings of canopy eucalypts may be prominent, in some cases with sclerophyll shrubs and shade-intolerant grasses and graminoids whose growth and recruitment is promoted by open conditions. Typically, however, there is also evidence of a significant proportion of dry rainforest species resprouting or regenerating as a range of rainforest species are known to resprout after fire (Fensham et al. 2003).

1.2.2.2 FLORA

1.2.2.2.1 Canopy species

The canopy of the ecological community is dominated by one or a combination of species and always includes *Eucalyptus moluccana* (Grey Box) with *E. propinqua* (Small-fruited Grey Gum) and/or *E. biturbinata* (Grey Gum). In addition, it commonly includes *E. siderophloia* (Grey Ironbark) and/or *Araucaria cunninghamii* (Hoop Pine) (DECC 2008a). Other eucalypt and rainforest species may occur in the canopy less frequently.

A comprehensive list of canopy species known to occur in the ecological community, is provided in [Appendix A - Species lists](#).

1.2.2.2.2 Understorey species

The understorey flora species typically have dry rainforest affiliations but following disturbance they may also include species with open grassy forest affiliations such as *Acacia* spp and *Dodonaea* spp. and shade intolerant grasses. The understorey may support *Eucalyptus* species depending upon the stage of regeneration. Species most frequently recorded in the understorey include the small to medium-sized trees *Psydrax odorata* (Shiny-leaved Canthium), *Denhamia bilocularis* (Orange Bark) and *Cupaniopsis parvifolia* (Small-leaved Tuckeroo), the shrubs *Psychotria daphnoides* (Smooth Psychotria) and *Alyxia ruscifolia* (Chain-fruit), the vines and lianas *Celastrus subspicatus* (Large-leaved Staff Vine), *Soluri involuta* (Native Derris) and *Maclura cochinchinensis* (Cock-spur), the grasses and sedges *Gahnia aspera* (Sword Sedge), *Cyperus gracilis* (Slender Flat-sedge) and *Ottlochloa gracillima* (Pademelon Grass) (EPA 2016). Ferns such as *Doodia aspera* (Rasp Fern) (NSW TSSC 2011) and *Pellaea falcata* (Sickle Fern) also occur. Relatively shade tolerant grass species such as *Ottlochloa gracillima* (pademelon grass), *Oplismenus* spp. (basket grasses) are often present whilst relatively shade intolerant grasses may occur where sufficient sunlight reaches the ground following disturbance. 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

The ecological community supports fauna assemblages that are a mix of dry rainforest and grassy open forest species.

The eucalypt-dominated canopy of the ecological community provides suitable habitat and forage for threatened species such as *Phascolarctos cinereus* (Koalas) and *Petauroides volans* (Greater glider [southern and central]), and *Petaurus australis* (Yellow-bellied glider). Both grey box and grey gum are used as sap-feeding trees by yellow-bellied gliders (NPWS 2003, Eyre and Goldingday 2005). *Eucalyptus* species also provide floral resources used by a variety of dry-sclerophyll affiliated honeyeaters and other fauna such as bats and insects. The hollows and crevices of mature trees of the ecological community, particularly the dominant eucalypts, provide important nesting and shelter sites for birds and arboreal mammals, including greater gliders and yellow-bellied gliders. The habitat features of the ecological community are also suitable for *Notamacropus parma* (Parma Wallaby) which is listed as Vulnerable in NSW. This species favours eucalypt forest with thick, shrubby understorey with nearby grassy areas and the northern portion of its range overlaps with the distribution of the Grey Box-Grey Gum Wet Forest (Maynes 1977, Maynes 2008).

Fleshy fruit-bearing plants with rainforest affiliations in the understorey provide resources for rainforest fruit doves and other frugivorous birds including *Ptilinopus magnificus* (Wompoo Fruit Dove) and *Ptilinopus regina* (Rose-Crowned Fruit Dove) which are both threatened species in NSW. The dense understorey, abundant leaf litter and extensive root-systems of long-

unburned patches of the ecological community all play a role in intercepting, storing and recycling carbon and nutrients. A broad range of invertebrates (and fungi) are associated with the decomposition cycles in the moist, shaded conditions in such patches. This invertebrate-rich, structurally complex environment provides the shelter and forage favored by many rainforest understorey bird species such as *Orthonyx temminckii* (Australian Logrunners), *Psophodes olivaceus*, (Eastern Whip Birds), *Sericornis* spp. (Scrub Wrens) and *Menura* spp. (Lyrebirds)

A number of narrowly endemic fauna have distributions and habitat requirements that overlap with the ecological community. The Albert's Lyrebird (*Menura alberti*) is endemic to an area which includes northern part of the distribution of the ecological community. Five narrowly endemic frogs in the genus *Phyllorhina* occur in various distinct parts of the distribution of the Grey Box-Grey Gum wet forest.

The ecological community also includes many invertebrate fauna species 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 (e.g., mature and larval forms of moths and butterflies, flies, wasps, beetles, spiders and worms).

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

Consultation Questions on the species assemblage

- Do you agree with the vegetation description? If not, how can it be clarified?
- 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? Do the *Menura* spp and *Phyllorhina* spp. mentioned occur within the ecological community where appropriate habitat niches occur?

1.2.3 Functionally important species within the ecological community

Consultation Questions on the functionally important species

- Do you know of any 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 FIRE ECOLOGY

Fire promotes the recruitment of canopy *Eucalyptus* species. Intervals between fires must however be long enough to allow for the regeneration of the rainforest components of the understorey.

Some rainforest species, which occupy the understorey of the ecological community, are known to persist after fire, resprouting from stems or underground structures (Fensham et al. 2003). However, high fire frequency can lead to the decline or loss of resprouting species. Rainforest

species not capable of resprouting (obligate seeders) are known to have been eliminated after as little as 2 closely spaced fires (Fensham et al. 2003). This suggests with frequent fires, patches of the ecological community may be lost by undergoing a transition to an understorey without a significant rainforest affiliated component.

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
- Do you have any specific information on decline in Eucalypt canopy species in long-unburnt wet sclerophyll forests in the subtropics?

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 Grey Box-Grey Gum Wet 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 Grey Box-Grey Gum Wet 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 matching the description in Section 1.2 that meet the following key diagnostic characteristics:

- Occurs within the NSW North Coast or South East Queensland IBRA Bioregions²;
- Occurs at elevations between 100m and 600m above sea level (ASL);
- Typically appears as a forest with a tree canopy that has a crown cover³ of 20% or more⁴;

² Interim Biogeographical Regionalisation of Australia Version 7 (DoE 2012)

³ 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)).

⁴ 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 (up to five years post-fire) is included as part of the ecological community when the other key diagnostic characteristics are met, even when crown cover is temporarily less than 20 percent. In these cases, there should be evidence that the canopy species will regenerate from seedlings, saplings, lignotubers or from epicormic regrowth.

- Has a tree canopy that contains both *Eucalyptus mollucana* (Grey box) and Grey Gum (*E. propinqua* (Small Fruited Grey Gum) and/or *E. biturbinata* (Grey Gum));
- Has a tree canopy dominated⁵ by one or a combination of *E. moluccana*, *E. propinqua*, *E. biturbinata*, *E. siderophloia*, and/or *Araucaria cunninghamii* (Hoop Pine); and
- Has an understorey⁶ typically with dry rainforest affiliated flora⁷ including vines and lianas OR a combination of these flora with grassy open forest affiliated flora.

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 elevation range in the Key Diagnostic Criteria of 100-600m appropriate? Is it too broad or would there be occurrences outside this range?
- Would designating a % cover threshold for rainforest species in the understorey be useful for separating the ecological community from similar forest types?
- Do you have suggestions for how to word the understorey criterion given that this community varies in understorey composition significantly especially in relation to duration since the last fire?

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 Grey Box-Grey Gum Wet Forest greater than 0.1 ha may be present within this larger area.

2.2.2 Breaks in a patch

The definition of a patch of the ecological community allows 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, or leaf litter, 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

⁵ 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).

⁶ The understorey consists of all vegetation below the canopy, including juvenile trees and the ground layer.

⁷ Species typically associated with dry rainforests and related vine forest, thicket or scrub communities have been annotated with # in [Appendix A - Species lists](#), but other rainforest species not on this list may also be present within the ecological community.

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 typically 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 have an understorey consisting of entirely mature rainforest species, whereas another recently burned part of the same patch may be dominated by regenerating eucalyptus in combination with resprouting rainforest species. 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*

Revegetated or otherwise restored sites or areas of regrowth are not excluded from the listed ecological community so 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) 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.

Recording the search effort (identifying 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) is useful for future reference.

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 the understorey layer of the Grey Box- Grey Gum

Wet Forest may not be evident for a time. The rainforest understorey of the ecological community is fire sensitive. While many rainforest species are capable of resprouting after fire (Fensham et al. 2003) their above ground parts may be destroyed and therefore not evident temporarily. Rainforest obligate seeders not capable of resprouting may not recruit back into the site until seasonal conditions allow fruiting, dispersal and germination.

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.

Table 1 Outlines current mapping units most likely to represent or contain the ecological community. See Appendix B - Relationship to other vegetation classification and mapping systems for a full list of largely equivalent mapping units and vegetation classifications including past/superseded classifications, and a summary of how the ecological community can be distinguished from other related and adjacent vegetation types.

Table 1: Current mapping units most likely to represent or contain the Grey Box-Grey Gum Wet Forest

Code / Number	Name	Key Distinguishing Features
Current mapping units most likely to represent or contain the ecological community		
PCT 3069 (NSW)	Far North Hinterland Grey Box-Grey Gum Wet Forest	• This PCT is largely equivalent to the ecological community
QLD RE 12.9-10.3	<i>Eucalyptus moluccana</i> open forest on sedimentary rocks	• Areas or patches of this may be the ecological community where they meet the key diagnostic criteria.
QLD RE 12.8.14a	<i>Eucalyptus moluccana</i> open forest +/- <i>E. tereticornis</i> , <i>Eucalyptus siderophloia</i> or <i>E. crebra</i>	• Areas or patches of this RE may be the ecological community where they meet the key diagnostic criteria.

Source: DPIE (2021).

2.2.7 Other relevant listed ecological communities

Grey Box-Grey Gum Wet Forest is largely equivalent to the New South Wales listed “Grey Box-Grey Gum Wet Sclerophyll Forest in the NSW North Coast Bioregion”.

There are also other nationally-listed threatened ecological communities that occur in, or close to, the same areas as the Grey Box-Grey Gum Wet Forest. These include:

- Dunn’s White Gum (*Eucalyptus dunnii*) Moist Forest in north-east New South Wales and south-east Queensland (currently under assessment) – also listed in NSW as the White Gum Moist Forest in the NSW North Coast Bioregion. This ecological community occupies a similar geographic range to the Grey Box-Grey Gum Wet Forest, but its canopy is taller at maturity and typified by the presence of *Eucalyptus dunnii* and more mesic rainforest understorey trees and shrubs.

- 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). It differs from the ecological community by having a diverse closed canopy dominated by rainforest flora with eucalypts being absent or rare.
- Subtropical eucalypt forest on the floodplains of eastern Australia (under assessment) – largely equivalent to the *Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion* listed in NSW. This community may share similar species, but is restricted to alluvial flats, edges of waterways and floodplain margins.

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? Have all mapping units representing or likely to contain the ecological community been included?
- Are the key distinguishing features sufficient to differentiate other vegetation types from the ecological community?
- The ecological community likely only corresponds to a small fraction of map units RE 12.9-10.3 and 12.8.14a. Do you have any information on the proportion or geographic segments of these map units that are likely to represent the ecological community (i.e., likely to support an understorey with dry rainforest elements)?
- Have all relevant listed ecological communities been included? Do you have suggestions for additions of, or deletions of, adjacent or related ecological communities?

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 the EPBC Act apply. These include all patches in Class 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](#)).

Table 2: Condition classes, categories and thresholds

<div>Patch size threshold →</div> <div>Biotic thresholds ↓</div>		Large Patch: Patch size ≥ 2 ha	Small Contiguous ¹ Patch Patch ≥ 0.1 ha within area of native vegetation ≥ 5 ha	Small patch in non-native matrix Patch 0.1-2ha
High Condition ≥ 80% of its total perennial understorey vegetation cover ² is comprised of native species	With ≥ 20 large trees ³ per ha	Class A1 Patch with a high condition understorey and high density of large trees		
	With < 20 large trees ³ per ha	Class A2 Large or contiguous patch with a high condition understorey	Class B1 Small patch with a high condition understorey	
Good Condition ≥ 50% of its total perennial understorey vegetation cover ² is comprised of native species	With ≥ 10 large trees ³ per ha	Class B2 Large or contiguous patch with a good condition understorey and good density of large trees	Class C1 Small patch with a good condition understorey and good density of large trees	
Moderate Condition ≥ 20% of its total perennial understorey vegetation cover ² is comprised of native species		Class C2 Large or contiguous patch with a moderate condition understorey	Not protected	
Notes: 1 Contiguous means the patch is connected to, or in close proximity to (i.e., within 30 m of), another area of native vegetation (i.e., an area where the total perennial vegetation cover is dominated (50 percent or more) by native plant species). 2 Perennial understorey vegetation cover includes vascular plant species of all layers below the canopy with a life-cycle of more than two growing seasons. It includes herbs (graminoids and forbs), grasses, shrub, vines, lianas and juvenile plants of canopy species, but does not include annual plants, cryptogams, plant litter or exposed soil. This should be estimated across a minimum plot size of 1ha where the patch size is ≥ 1 ha or estimated across the entire patch where the patch is <1ha. 3 Large eucalypt 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 in a minimum 1ha plot where the patch size is ≥ 1 ha or calculated out from density in the entire patch where the patch is <1ha.				

Consultation Questions on the condition classes, categories and thresholds

- How can we improve on the proposed condition information?
- Are the proposed *measures* (large trees, and weediness,) appropriate to distinguish between patches of different condition? Are there other measures that could be included?
- 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](#)). 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. Hence these areas can still be critical to the survival of the ecological community depending on their surrounding environment and landscape context (see Section 2.5).

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?
- Does the ecological community occur in any areas of Commonwealth Land and if so, should those areas be placed on 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 whole 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 best quality (Class A and B) condition for this ecological community. These may be based on on-site observations or known past management history.
- Patches with large area to boundary ratios – such patches are more resilient to edge effect disturbances such as weed invasion and human impacts.
- 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 utilised by 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 and community significance

3.1 Indigenous values and uses of the ecological community

The TEC occurs within country (the traditional lands) of the Bundjalung 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.

3.2 Community values associated with the ecological community

The Northern Rivers region of NSW and adjoining Scenic Rim in QLD are known for their scenic beauty and biological diversity. The ecological community is a tall forest with a dark green, diverse understorey supporting charismatic flora and fauna. It thus contributes to the scenic quality and diversity of parts of those areas. A series of self-guided tourist drives known as “The Rainforest Way” were created so that tourists could enjoy the landscapes and vegetation of these places. A number of the routes of the rainforest way pass through or adjacent to areas occupied by the Grey Box-Grey Gum Wet Forest.

Consultation Questions on the cultural and community 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? Particularly around Drake, Malanganee, Woodenbong NSW and The Scenic Rim Region in QLD
- Do you know of any books, articles or online resources about Bundjalung Peoples relationships with forests or the landscape you think would be sources of appropriate information?

4 Threats

Grey Box-Grey Gum Wet Forest was primarily impacted by historic land clearing and the selective harvesting of the canopy species and associated impacts. The remaining remnants continue to be under threat from ongoing degradation caused by weed invasions, pests, inappropriate grazing and fire regimes and climate change.

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
Clearing and fragmentation legacies	<i>Timing: ongoing</i> <i>Severity: extreme</i> <i>Scope: majority</i>	<p>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).</p> <p>Since 1750 Grey Box - Grey Gum Wet Forest has been subject to a severe reduction in geographic distribution due to clearing. It primarily occurs on relatively well-drained, moderately fertile soils on lower slopes and foothills in a relatively well-watered part of Australia. This distribution made, and continues to make, the ecological community vulnerable to clearing for agriculture (NSW Scientific Committee 2009).</p> <p>The highly fragmented distribution of the Grey Box-Grey Gum Wet Forest resulting from historic land-clearing makes it susceptible to gradual attrition through continued small-scale clearing associated with land and infrastructure development and management activities (DECC 2008).</p>

Threat	Threat Status*	Threat Impacts
Inappropriate fire regimes (including fires which cause a decline in the biota)	<p><i>Timing: ongoing</i></p> <p><i>Severity: major</i></p> <p><i>Scope: majority</i></p>	<p>Whilst fire is essential for the regeneration of the canopy eucalypts, short interval, or high intensity fires can be a threat to the ecological community.</p> <p>Fire frequency, intensity and size are expected to increase under climate change as temperatures rise, rainfall variability increases and droughts become more severe (Andrade et al., 2019; Lucas et al. 2007; Nolan et al., 2020). Inappropriate fire regimes pose a threat to the ecological community by limiting regeneration of the rainforest components of the understorey or doing damage to mature trees leading to their decline.</p> <p>Fire regimes imposed by land managers are also a major threat. Understorey burning (e.g., to encourage grass for cattle) is a frequently used management practice in forested lands of northern NSW and southeast Qld, while broad-acre aerial ignitions are increasingly applied in fire management operations.</p> <p>Frequent fires have been shown to modify the structure and composition of forests in the region in a way that poses a threat to the Grey Box-Grey Gum wet forest. Tasker (2002) found that in northern NSW un-grazed/unburnt patches of <i>Eucalyptus</i> forest supported many more fern, climber, and small tree species than their more frequently burnt counterparts. Many species in these groups were found exclusively or almost exclusively in unburnt patches, and many of them had rainforest affinities. This study shows how frequent burning in northern NSW is detrimental to understorey rainforest species in eucalypt forests including the ecological community.</p> <p>Mega-fires, such as those experienced in the 2019-2020 fire season, can burn a significant proportion of the ecological community and the surrounding vegetation in a single event (an estimated 22.5 percent of the ecological community was burnt in the 2019-20 bushfires (DAWE 2020). Large fires like these have the potential to compound the detrimental impacts from inappropriate burns and fire regimes that occur on smaller spatial scales</p> <p>Fires also have effects on biotic interactions, such as herbivore-plant interactions (e.g. altering resource availability), predator-prey interactions (e.g. facilitating easier access for feral predators to native fauna) and abiotic interactions, such as combined drought and fire, which may have compounding effects on rates of plant mortality and regenerative capacity (DAWE, 2021). Fire is also known to facilitate invasion of the significant environmental weed lantana in similar ecological communities (Gentle and Duggin 1998).</p>

Threat	Threat Status*	Threat Impacts
Invasive Plant Species	<p><i>Timing: ongoing</i></p> <p><i>Severity: major</i></p> <p><i>Scope: majority</i></p>	<p>Clearing, grazing, frequent burning and other disturbances have facilitated establishment of invasive flora in Grey Box - Grey Gum Wet Forest. These include exotic trees, shrubs, perennial grasses, vines and other life-forms.</p> <p>The most significant of these is the scrambling shrub <i>Lantana camara</i> (lantana). Lantana is regarded as one of the ten most invasive plants in the world and a Weed of National Significance in Australia (Department of Natural Resources, Mines and Energy 2004).</p> <p>Lantana and other invasive flora are known to prevent regeneration of native species after disturbances through mechanisms such as shading, smothering, allelopathy, changes to fire dynamics and altered nutrient cycles (Taws 1996, Department of Natural Resources, Mines and Energy 2004).</p> <p>Lantana and other weeds such as invasive vines can also smother established vegetation. The ecological community often has an understorey made up of shrubs and smaller trees. Due to their smaller stature, they are particularly vulnerable to smothering by Lantana and invasive vines. In addition, the relatively fertile and moderately well-watered soils supporting the ecological community tend to support very dense stands of invasive species where they establish. The presence of dense weeds suppresses the regeneration of all layers of Grey Box-Grey Gum Wet Forest and therefore is a significant threat.</p> <p>Lantana infestations have been known to facilitate fire incursions in dry rainforest (Fensham et al. 1994) The mechanism by which lantana facilitates such incursions is by introducing more fuel and a more continuous fuel load (Berry et al. 2011). The prevalence of lantana in the ecological community therefore increases the risk of fire to the understorey of the ecological community over significant areas, heightening the risk of loss of the fire sensitive dry rainforest elements of the understorey and therefore the community itself. In addition, a study by Gentle and Duggin (1998) shows that fires can facilitate lantana invasion. Taken together, these studies, showing the ability of lantana to promote fire and the ability of fire to promote lantana invasion supports the Fire-Lantana Cycle Hypothesis by Hiremath and Sundaram (2005). This suggests that positive lantana-fire feedback loops may be operating within the ecological community, contributing to its further degradation.</p>
Timber Harvesting	<p><i>Timing: ongoing</i></p> <p><i>Severity: major</i></p> <p><i>Scope: minority</i></p>	<p>The canopy of the Grey Box-Grey Gum Wet Forest supports a number of commercially valuable timber species. A significant proportion of the remaining stands in NSW are outside the conservation estate and have been subject to timber harvesting in the past leading to structural changes including a loss of hollow bearing trees (NSW Scientific Committee 2009).</p> <p>Timber harvesting in the ecological community has also led to disturbances such as road and track construction and significant disturbance of the understorey by heavy machinery. Disturbances like these have contributed to weed invasion of the understorey (NSW Scientific Committee 2009).</p> <p>Within NSW State Forests the risk of degradation or loss from timber harvesting in the ecological community remains active where it is misidentified or poorly mapped. Outside of State Forests and the conservation estate it faces the threat of ongoing attrition through timber harvesting due to lack of community awareness.</p>

Threat	Threat Status*	Threat Impacts
Invasive animals	<p><i>Timing:</i> ongoing</p> <p><i>Severity:</i> minor</p> <p><i>Scope:</i> majority</p>	<p>Invasive animals are known to have a number of impacts on threatened species and ecological communities in the region where Grey Box-Grey Gum Wet Forest occurs. These include the direct effects of herbivory, predation, habitat degradation and competition, as well as trampling, wallowing and other forms of disturbance. <i>Bufo marinus</i> (Cane Toad) is known to cause poisoning of native wildlife through ingestion (NRRBMP 2010). Threats from invasive fauna thus include both degradation of vegetation and soil and watercourse structure as well as direct impacts on populations of species that make up the ecological community.</p> <p>Feral pigs are now established in several areas within the distribution of the Grey Box-Grey Gum wet forest and have been increasing in distribution and density (QLD Government 2004, NSW Government 2005). Feral pigs can cause severe habitat degradation to the ecological community and can also act as a vector for exotic agricultural diseases.</p> <p>Feral goats, deer and rabbits occur within the distribution of the ecological community (NSW Government 2018). They are known to alter the structure and composition of understorey through trampling, browsing and grazing and compete with native animals for food and habitat resources.</p> <p>Predation, disease transmission and spread of invasive plant species by dogs, foxes, cats, and other non-native predators are also known threats within the distribution of the ecological community.</p> <p>Competition and mortality of native wildlife from interactions with cane toads, feral honeybees, over-abundant noisy miners and other aggressive birds and insects are known threats across the distribution of the ecological community.</p>
Livestock and Livestock Management	<p><i>Timing:</i> ongoing</p> <p><i>Severity:</i> major</p> <p><i>Scope:</i> minority</p>	<p>The presence of livestock in the ecological community leads to habitat loss resulting from impacts including grazing/browsing, trampling, soil compaction and erosion (Lindenmayer & Fischer 2006; Steinfeld et al. 2006; Tasker & Bradstock 2006). Where livestock have access to remnants of the ecological community these impacts can result in reduced or eliminated regeneration and thinning or destruction of the understorey. These impacts make weed invasion and fire incursion more likely. Management activity associated with livestock grazing can also exacerbate this degradation through native vegetation clearing, inappropriate burning regimes and weed dispersal (NRRBMP 2010).</p> <p>A feature of the ecological community at maturity is a structurally complex understorey of rainforest species. Tasker and Bradstock (2006) found that grazing practices had the greatest impact on the complexity of understorey vegetation of all factors measured. Grazed sites had significantly lower vegetation complexity, reduced or absent shrub layers and different dominant species. These sites were more open, simplified, and grassy compared with un-grazed sites. They concluded that management for cattle grazing in eucalypt forests and associated frequent fire-regimes can have major impacts on the structure and composition of forests at a regional level.</p>
Pathogens	<p><i>Timing:</i> ongoing</p> <p><i>Severity:</i> minor</p> <p><i>Scope:</i> unknown</p>	<p>The ecological community includes a diversity of frogs that are at high risk from Chytridiomycosis caused by chytrid fungus (<i>Batrachochytrium dendrobatidis</i>) (DoEE 2016a).</p> <p>There are 2 species of threatened parrots (Coxen's Fig Parrot and Swift Parrot) and a number of other parrots, cockatoos (including the threatened Glossy Black Cockatoo) and lorikeets which have ranges and habitat preferences that include the ecological community. These all may be affected by Psittacine beak and feather disease (Psittacine Circoviral Disease) (DoEE 2016b).</p>

Threat	Threat Status*	Threat Impacts
Climate Change	<i>Timing:</i> ongoing <i>Severity:</i> major <i>Scope:</i> whole	<p>There are uncertainties about the ways in which climate change will impact the ecological community. Projections of future changes in climate for Northern NSW and Southern QLD include higher temperatures, more intense but likely reduced annual average rainfall, increased temperature extremes and higher evaporative demand (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. All of these climate change stressors threaten the ecological community. The impacts of these changes are likely to play out through interactions with other threatening processes (Auld & Keith 2009; Dunlop & Brown 2008).</p> <p>Perhaps most significantly for the ecological community, climate change is intensifying drought events (Dai 2012; Mitchell et al. 2016), heat waves and fire weather (Lucas et al. 2007). This has the potential to degrade or impact the regeneration of its dry-rainforest understorey. It may also result in the mortality of species that make up the ecological community. Some functionally important fauna species groups of the ecological community, such as Flying Foxes can suffer heat stress, with reported deaths when temperatures exceed 42°C.</p> <p>Latitudinal and altitudinal shift in the distribution of this ecological community is a plausible response to climate change, but the area to shift into may not be available or suitable, because of agricultural development, soil types or competition with other vegetation communities (Paice & Chambers 2016).</p>
Bell Miner Associated Dieback (BMAD)	<i>Timing:</i> future <i>Severity:</i> unknown <i>Scope:</i> unknown	<p>Bell Miner associated dieback (BMAD) is a potential threat to the ecological community. BMAD is primarily associated with changes to forest structure from disturbance. These changes have led to Psyllid and Bell Miner populations increasing and flow on negative impacts to the ecological community such as exclusion of other native fauna species and dieback of canopy Eucalyptus species.</p> <p>Whilst BMAD has not yet been documented in the ecological community, it is very common in some areas surrounding known occurrences. In addition, many of the risk factors associated with BMAD are common within the ecological community (DECC 2008a).</p>
<p>*Timing – the threat occurs in the past (and unlikely to return), is ongoing (present/continuing), is likely to occur/return in the future, or timing is unknown</p> <p>Severity – the threat causes or has the potential to cause impacts that are extreme (leading to loss or transformation of affected patches/occurrences), major (leading to degradation of affected patches/occurrences), minor (impacting some components of affected patches/occurrences), negligible or unknown</p> <p>Scope – the threat is affecting the whole (>90%), a majority (>50%), a minority (<50%), a negligible amount, or unknown 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 threatening processes, current at the date of writing, that may be relevant to the ecological community or specific plants and animals that comprise it:

- Competition and land degradation by rabbits
- Competition and land degradation by unmanaged goats
- Infection of amphibians with chytrid fungus resulting in chytridiomycosis
- Land clearance
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants

- Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases
- Novel biota and their impact on biodiversity
- Predation by European red fox
- Predation by feral cats
- Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs
- The biological effects, including lethal toxic ingestion, caused by Cane Toads (*Bufo marinus*)

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 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.
- Are there other weed species or classes that are a particular threat to this ecological community?
- Are there any new or emerging weeds that pose a particular threat to this community in future?

5 Conservation of the ecological community

5.1 Primary conservation objective

To prevent the extinction of the Grey Box -Grey Gum Wet 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 as other matters of national environmental significance*

Approximately 126ha (1.9%) of the estimated area of ecological community is within the Gondwana Rainforests of Australia World Heritage Area; formerly known as the Central Eastern Rainforest Reserves (Australia).

5.2.2 *Existing Protection in reserves*

It is estimated that around 83% of the remaining ecological community occurs outside the conservation estate. Approximately 1000ha (15%) of its remaining area is within National Parks, 13ha (0.2%) within state conservation areas, 4.7ha (0.07%) in nature refuges and 131ha (2%) within nature reserves.

5.2.3 Existing Legislative Protection

The largely equivalent *Grey Box—Grey Gum Wet Sclerophyll Forest in the NSW North Coast Bioregion* is listed as an Endangered Ecological Community under the *NSW Biodiversity Conservation Act 2016*

5.2.4 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.

- NRRBMP 2010 Northern Rivers Regional Biodiversity Management Plan
- Fire Frequency Guidelines and the Vegetation of the Northern Rivers Region Draft 2 Dr Penny Watson Project Ecologist January 2006

Consultation Questions on existing protections and management plans

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

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 (2017). 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 5.2.4](#).

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 properly taken into account 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., fire management, 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 an extremely limited extent and had been greatly reduced in its integrity.

- Protect and conserve remaining areas of the ecological community.
- Cease/prohibit timber harvesting within 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, management agreements and covenants to protect patches on private land. This is particularly important for 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 damage risk).
- Protect mature and over-mature trees and stags, particularly **those** 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;
 - retain medium and higher quality patches 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 - avoid risks that reduce may 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 high 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 condition thresholds, but can reasonably be restored to a 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. 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 plants and animals 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.
- Plan and budget for both initial weed management and for follow up treatment for as long as this is needed.
- Target control of key weeds that threaten the ecological community using appropriate methods that avoid impacts to non-target species.
- Encourage appropriate use of local native plant species in developments 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.
- Implement controls to prevent or reduce infection by fungal pathogens, especially myrtle rust (*Austropuccinia psidii*).
- Control introduced pest animals through coordinated landscape-scale control programs, with a particular focus on feral pigs,

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 in 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 destructive activities such as off-road trail bike or four-wheel-driving
- 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 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.
- There is uncertainty about appropriate fire regimes for the ecological community. Planned burns should generally be avoided unless there is strong evidence to support the need for one. It is likely that longer intervals (>50 years) will be required for the regeneration of the rainforest elements in the understorey of the ecological community, especially between high intensity fires. Any fire management should take into account the latest research and the impacts of a changing climate.
- 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 facilitating regeneration and revegetation, of poorer and medium quality patches to restore them to 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)
- Maintain stags, logs, and mature and old-growth trees with hollows as they provide important 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.
- Use 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.
- 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.
- Explore the potential for carbon mitigation investment activities to also restore this ecological community through reforestation of farmland. This should be in line with appropriate reforestation methodologies such as those developed under the *Carbon Credits (Carbon Farming Initiative) Act 2011*. As part of any such initiatives, investigate the potential for biodiversity credits.

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).
- With permission, include culturally appropriate information on traditional knowledge and values in education and awareness programs, publications and 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.

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 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 roadside 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 in the surrounding areas 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, update and validate 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;
 - gain a better understanding of variation across the ecological community and identify the most intact, high conservation value remnants;
 - identify and map at high accuracy and spatial resolution the fire history of the ecological community and surrounding fire-dependent and/or fire sensitive vegetation;
 - Undertake new surveys and collate existing information on populations of fauna characteristic of the ecological community across its range.

5.4.4.2 *OPTIONS FOR MANAGEMENT*

- Research ecosystem dynamics and life history processes of component flora and fauna to define appropriate fire regimes for their long-term persistence.
- Research the effects of climate change on the community to ensure viable adaptation measures are identified.
- Improve understanding of seed bank dynamics and regeneration ecology of component species.
- Improve understanding of habitat requirements of resident and transient fauna.

- 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 increase 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.

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., *Phytophthora* dieback, and new incursions, e.g., myrtle rust.
 - Monitor changes in the condition, composition, structure and function of the ecological community, including response 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.
 - Monitor the responses of the ecological community to fire to inform fire management regimes.

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. Information on listing eligibility under the IUCN Red List for Ecosystems criteria (Bland et al. 2017) is included for information only.

6.2.1 Criterion 1 – decline in geographic distribution

Eligible under Criterion 1 for listing as **Vulnerable or Endangered**

	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:

Estimates from NSW indicate that the ecological community had undergone a substantial (69%) decline from its pre-European extent by 1999 (NPWS 1999a). It likely has declined further since this time.

In QLD the Regional Ecosystem (RE) most likely to contain patches of the ecological community (RE 12.9-10.3) has undergone a decline of 55% in the border regions adjacent to the NSW occurrences (Scenic Rim and Moreton Basin IBRA subregions). The second Regional Ecosystem most likely to contain patches of the ecological community (RE 12.8.14a) has undergone a 21% decline over the longer term in these subregions. However only a small proportion of the original extent of the ecological community is likely to have occurred in Queensland and these REs also include many areas that would not be included in the ecological community.

Given these estimates, the geographic distribution of the ecological community has declined by 50-70%, indicating a vulnerable status. Taking into account that the condition of some of the remaining mapped patches of the ecological community may be so degraded (see criterion 4) they no longer meet the condition thresholds for the ecological community, the geographic distribution of the ecological community may have declined by more than 70% since 1750, which is the threshold for endangered.

This represents a **substantial** to **severe** decline in geographic distribution. The Committee therefore considers that the ecological community is likely to meet the relevant elements of Criterion 1 to make it eligible for listing for **Vulnerable** or possibly **Endangered**.

6.2.2 Criterion 2 – limited geographic distribution coupled with demonstrable threat

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

Its geographic distribution is:		very restricted	restricted	limited
<i>Extent of occurrence (EOO)</i>		< 100 km ² = <10,000 ha	<1,000 km ² = <100,000 ha	<10,000 km ² = <1,000,000 ha
<i>Area of occupancy (AOO)</i>		< 10 km ² = <1,000 ha	<100 km ² = <10,000 ha	<1,000 km ² = <100,000 ha
<i>Average patch size</i>		< 0.1 km ² = <10 ha	< 1 km ² = <100 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)	Critically endangered	Endangered	Vulnerable
the near future	20 years or 5 generations (Up to a maximum of 100 years)	Endangered	Endangered	Vulnerable
the medium-term future	50 years or 10 generations (Up to a maximum of 100 years)	Vulnerable	Vulnerable	Vulnerable

Source: TSSC 2017

Evidence:

The indicative geographic distribution for this ecological community has been calculated from the Plant Community Types (DPIE 2021) in New South Wales and Regional Ecosystems (Queensland Herbarium 2021) in Queensland that most closely match the description of the ecological community. This includes PCT 3069 in New South Wales and REs 12.9-10.3 and 12.8.14a in Queensland where they occur between 140 and 530m ASL within the Scenic Rim and Moreton Basin IBRA subregions.

The estimated extent of occurrence of the Grey Box-Grey Gum wet forest is 2,045,619 ha (20,456 km²), which is not indicative of limited distribution. It's estimated total area of occupancy is 6,633 ha (66 km²), which is indicative of a restricted distribution. This restricted area of occupancy is patchy in its distribution across the extent of occurrence of the ecological community.

Around 82.6% of the ecological community occurs outside of the conservation estate on various tenures. These tenures include freehold, leasehold, state forest, infrastructure reserves and stock routes. This combined with a patchy distribution makes management initiatives and actions difficult to coordinate across its range. This increases its vulnerability to the cumulative impacts of numerous significant threats such as inappropriate fire regimes, grazing impacts, clearing and the cumulative losses of patches. As of 2009 the ecological community was still considered to face a continued threat from small-scale clearing, especially on fertile sites suitable for agriculture. (NSW Scientific Committee 2009).

Risk of loss resulting from timber harvesting

The NSW state listing as a threatened ecological community will have reduced the threat to the ecological community from timber harvesting within State Forests in NSW. However, it still faces the risk of degradation or loss from timber harvesting within state forests where it is misidentified or mis-mapped. Outside of state forests it faces potential losses and degradation through small scale timber harvesting activities leading to changes in community composition and structure. Lack of community awareness combined with its patchy distribution could lead to significant ongoing attrition through timber harvesting, especially within small patches on privately managed land and where it is mis-identified on state land.

Risk of loss resulting from edge effects and fragmentation impacts

The ecological community's patchy distribution also makes it extremely susceptible to edge effects including exposure to drying winds, weed invasion, domestic and invasive fauna incursion and others. Fragmentation analysis of the indicative distribution for this ecological community by DAWE based on spatial pattern analysis described by McGarigal (2015) found that 77% of the estimated area of the Grey Box-Grey Gum Wet Forest occurs <50m from an edge, exposing a high proportion of its total area to external threats. Non-native vegetation makes up 26% of vegetation adjoining patches of the ecological community. These interfaces with non-native vegetation are commonly occupied by human land-uses including agricultural and residential land. These land-uses can be a heightened source of several threats, including incursion by domestic animals including livestock, invasion by exotic species, extractive activities such as firewood harvesting, exposure to intentional or unintentional burning, small-scale clearing and "tidying" of bushland near infrastructure, fuel reduction, dumping of refuse and chemicals and other disturbances.

Risk of loss resulting from altered fire regimes

Climate change is likely to an increase in the frequency and intensity of fires in Australia (BOM 2021; Andrade et al., 2019; Lucas et al. 2007; Nolan, Boer, et al., 2020). Such changes to fire regimes would likely lead to continued risk of a further decline in the geographic distribution of

the ecological community through the loss of dry rainforest elements in its understorey to the point where patches of the community no longer meet the description in [section 1.2](#) or the key diagnostics in [section 2.12.1](#).

The ecological community typically has a fire-sensitive understorey that relies on long intervals between fire to persist. Therefore, recurring burns with short intervals could lead to the severe degradation or loss of the ecological community. Wet sclerophyll communities have been shown to respond to extreme fire weather with dramatically increased fire intensity relative to more moderate fire weather, unlike pure stands of rainforest which are only slightly to moderately sensitive to these differences (Clarke et al. 2014). This suggests the ecological community's rainforest understorey is more susceptible to extreme fire than a pure stand of these rainforest species under the same conditions.

Fire is also known to facilitate lantana invasion in dry rainforest-open forest ecotones (Duggin and Gentle, 1998). In this study it was shown that the increase in light availability, and to a lesser extent nutrient availability, from the disturbance of the shrub and canopy layers by fire led to an increase in lantana germination, survival and growth. Therefore, escalating fire impacts from climate change are likely to further facilitate and maintain lantana infestation in the ecological community. This is likely to lead to further losses of the ecological community through suppression of regeneration and succession.

In addition, lantana infestations have been known to facilitate fire incursions in dry rainforest (Fensham et al. 1994) -The mechanism by which lantana facilitates such incursions is by introducing more fuel and a more continuous fuel load (Berry et al. 2011). The prevalence of lantana in the ecological community therefore increases the risk of fire to the understorey of the ecological community over significant areas, heightening the risk of loss of the fire sensitive dry rainforest elements of the understorey and therefore the community itself. Taken together, these studies, showing the ability of lantana to promote fire and the ability of fire to promote lantana invasion supports the Fire-Lantana Cycle Hypothesis by Hiremath and Sundaram (2005). This suggests that positive lantana-fire feedback loops may be operating within the ecological community, contributing to its further degradation.

Lucas et al. 2007 project that in Australia by the year 2050 extreme fire weather days will have increased by +100–300 %. The high end of the projections suggest 'Very extreme' fire weather days may have a four to five-fold increase in frequency at many sites across southeastern Australia. This modelling suggests that fire seasons will commence earlier and end slightly later, whilst being in general more intense throughout.

Given a significant percentage (approximately 22.5%) of the ecological community burned in the 2019-2020 fires (DAWE 2020) during extreme fire weather, it is reasonable to expect the projected increases in the frequency and severity of extreme to very extreme fire weather will drive detrimental change to the ecological community over a significant and increasing proportion of its geographic distribution. The fragmented current distribution of the ecological community makes it particularly susceptible to such changes.

Any increase in the frequency and intensity of large-scale fires at a similar scale to the 2019-2020 bushfires raises the possibility that a significant proportion of the ecological community will be impacted to the point that recovery may not be possible in those areas.

Conclusion

The ecological community has a **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**. Following preliminary assessment, the Committee therefore considers that the

ecological community is likely to meet 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:

The relationship between all the various species of this ecological community is important to maintain its ecological function, but specific data related to the decline of individual key species or their functional importance within this ecological community are not available.

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**

	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</u> future (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 Grey Box-Grey Gum Wet 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:

- Timber harvesting and the loss of mature trees;
- Cattle grazing and associated forest management, including burning;
- Fire impacts; and

- Weed invasion.

Clearing and fragmentation

Clearing and resulting fragmentation of the ecological community has resulted in 88% of patches being less than 10ha. This fragmentation is also reflected in the loss of core interior area (>50m from a patch edge), which has undergone a 57% reduction since 1750. Currently only 23% of the estimated area of remaining of the Grey Box–Grey Gum Wet Forest consists of core area with 77% of the ecological community consisting of areas that are degraded through a variety of edge effects.

The alteration of the landscape surrounding the ecological community compounds the effects of clearing and fragmentation. Impacts from surrounding land uses include changes to the quality and integrity of the understorey through invasion by exotic flora and fauna, incursion by domestic animals including livestock, extractive activities such as firewood harvesting, exposure to intentional or unintentional burning, small-scale clearing and “tidying” of bushland near infrastructure including for fuel reduction purposes, dumping of refuse and chemicals and other disturbances.

Most (55.5%) of the adjoining vegetation is native open sclerophyll vegetation. A significant proportion this is managed for timber extraction and as such can be exposed to threats associated with this activity. These can include inappropriate or poorly implemented management burns, weed introduction and spread, clearing, thinning, log extraction, erosion, and sedimentation.

Timber harvesting and loss of mature trees

The loss of hollow bearing trees along with other structural changes across such a large proportion of the range of the ecological community through timber harvesting and partial clearing have resulted in a significant disruption of ecological processes (NSW Scientific Committee 2009).

A significant proportion of the remaining stands in NSW are within public lands and have been subject to timber harvesting in the past leading to structural changes including a loss of hollow bearing trees (NSW Scientific Committee 2009). DECC (2008) indicates based on 2001 mapping (NPWS, 2001) and plot data (DECC YETI 2007) that 56.25 % of the stands in NSW had a low structural integrity exhibiting moderately high to very high levels of disturbance. A further 37.5 % of stands exhibited moderate disturbance levels and levels of structural integrity. Leaving just 6.25% of stands undisturbed or with low levels of disturbance. The stands were ranked on disturbance based on the criteria for identifying candidate old growth forest adopted by (NPWS1999b) and expert opinion.

The canopy of the ecological community in NSW are almost always dominated by younger trees with very few mature or senescent stag trees in areas surveyed (DECC 2008a). The loss of hollow bearing trees along with other structural changes across such a large proportion of the range of the ecological community through timber harvesting and partial clearing are indicative of a significant disruption of ecological processes within the community (NSW Scientific Committee 2009). Old, hollow and crevice bearing trees are essential nesting and shelter resources for a variety of arboreal mammals and birds. Hollow nesting mammals and birds perform important ecological functions such as pollination and apex predation. Such a significant loss of these old trees is likely to have disrupted these processes across most of its geographic range.

Domestic stock grazing and associated forest management

Historically in north-east NSW cattle grazing has occurred across large areas of freehold and leasehold eucalypt forest including within the ecological community (DECC 2008a). Frequent burning of the understorey has been carried out for forest management related to grazing. There is evidence that this frequent burning has resulted in changes to the structure, composition and diversity of a range of eucalypt forest communities in northern NSW, including Grey Box - Grey Gum Wet Forest (York 1999, 2000; Andrew *et al.* 2000; Henderson and Keith 2002; Harris *et al.* 2003; York and Tarnawski 2004; Tasker and Bradstock 2006).

Fire impacts

The 2019-2020 Black-Summer Bushfires had impacts on areas known to support stands of the ecological community. Analysis of vegetation mapping intersected with the Australian Google Earth Engine Burnt Area Map (DAWE 2020) show that approximately 22.5% of the estimated area of the ecological community was burned during these fires. However, southern parts of the range of the ecological community burned disproportionately. In areas south from around Pikapene National Park NSW 73% of the ecological community was burnt. This southern part of its distribution is also where the ecological community is less abundant and more fragmented in the landscape and therefore likely less able to recover.

Whilst not all these areas burned at high intensity, research shows that even moderate to low intensity fires can enhance the persistence and spread of *lantana* thickets (Gentle and Duggin 1997) which is a major threat to the ecological community.

Weeds

Lantana camara (*lantana*) is one of the most common weeds where the ecological community occurs (DECC 2007; DECC 2008b, DECC 2008c). *Lantana* was recorded in 95% of vegetation sites surveyed of Grey Box - Grey Gum Wet Sclerophyll Forest (DECC 2008a). *Lantana* infestation is known to prevent regeneration of native species through mechanisms such as shading, smothering (Lamb 1991) and allelopathy (Gentle and Duggin, 1997) and lead to declines in native flora diversity, especially where it occurs at high densities (Gooden *et al.* 2009). The relatively fertile and moderately well-watered soils supporting the ecological community typically support dense stands of invasive weeds when they establish. The presence of dense weeds can suppress the regeneration of all layers of Grey Box-Grey Gum Wet Forest. The documented prevalence of *lantana* within the ecological community and its impacts on ecological succession and understorey development and native flora diversity indicates a very severe reduction in community integrity across most of its geographic distribution.

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 or its habitat or disruption of important community processes. Following preliminary assessment, the Committee therefore considers that the ecological community is likely to meet 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, 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
<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 6](#). 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 ⁸	NSW status	Qld status
Canopy tree species				
<i>Angophora subvelutina</i>	Rough-barked Apple			
<i>Araucaria cunninghamii</i>	Hoop Pine			
<i>Corymbia intermedia</i>	Pink Bloodwood			
<i>Corymbia variegata</i>	Spotted Gum			
<i>Eucalyptus rummeryi</i>	Steel Box			
<i>Eucalyptus acmenoides</i>	White Mahogany			
<i>Eucalyptus biturbinata</i>	Grey Gum			
<i>Eucalyptus carnea</i>	Broad-Leaved White Mahogany			
<i>Eucalyptus crebra</i>	Narrow-leaved Grey Ironbark			
<i>Eucalyptus microcorys</i>	Tallowwood			
<i>Eucalyptus moluccana</i>	Grey Box			
<i>Eucalyptus propinqua</i>	Small-fruited Grey Gum			
<i>Eucalyptus siderophloia</i>	Grey Iron Bark			
<i>Eucalyptus tereticornis</i>	River Red-Gum			
<i>Lophostemon confertus</i>	Brush-Box			
Understorey tree and shrub species				
<i>Abutilon oxycarpum</i>	Flannel Weed			
<i>Acacia fimbriata</i>	Brisbane Wattle			
<i>Acacia irrorata</i>	Green Wattle			
<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>				

⁸ Species listed under the EPBC Act at the time this document was prepared. Source:

<https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

Grey Box-Grey Gum Wet Forest of Subtropical Eastern Australia Conservation Advice
Consultation Draft

Scientific name	Common name/s	EPBC status ⁸	NSW status	Qld status
<i>Acacia maidenii</i>	Maiden's Wattle			
<i>Acalypha nemorum</i> #				
<i>Acronychia oblongifolia</i> #	Common Acronychia			
<i>Actephila lindleyi</i> #				
<i>Alchornea ilicifolia</i> #	Holly-wood			
<i>Alectryon subcinereus</i> #	Wild Quince			
<i>Alectryon subdentatus</i> f. <i>subdentatus</i> #				
<i>Alectryon tomentosus</i> #	Hairy Alectryon			
<i>Alphitonia excelsa</i>	Soap-tree			
<i>Alyxia ruscifolia</i> #	Chain Fruit			
<i>Anthocarapa nitidula</i> #	Incense Cedar			
<i>Aphananthe philippinensis</i> #	Rough-leaved Elm			
<i>Araucaria cunninghamii</i> #	Hoop Pine			
<i>Archirhodomyrtus beckleri</i> #	Rose Myrtle			
<i>Arytera divaricata</i> #	Coogera			
<i>Astrotricha latifolia</i>				
<i>Backhousia myrtifolia</i> #	Cinnamon Myrtle			
<i>Breynia oblongifolia</i>	Breynia			
<i>Bridelia exaltata</i> #	Scrub Ironbark			
<i>Bursaria spinosa</i>	Bursaria			
<i>Capparis arborea</i> #	Native Caper			
<i>Carronia multiseppala</i> #				
<i>Casearia multinervosa</i> #				
<i>Celastrus subspicata</i> #	Large-leaved Staff Vine			
<i>Claoxylon australe</i> #				
<i>Corchorus cunninghamii</i> #	Native Jute	E	E	E
<i>Cordyline petiolaris</i> #	Broad-leaved Palm-lily			
<i>Cordyline rubra</i> #	Red-fruited Palm-lily			
<i>Cordyline stricta</i> #	Narrow-leaved Palm-lily			
<i>Croton acronychioides</i> #				
<i>Croton insularis</i> #	Silver Croton			
<i>Croton verreauxii</i> #	Native Cascarilla			
<i>Cupaniopsis newmanii</i> #	Long-leaved Tuckerroo			
<i>Cupaniopsis parvifolia</i> #	Small-leaved Tuckerroo			
<i>Denhamia bilocularis</i> #	Orange Bark			
<i>Denhamia pittosporoides</i> subsp. <i>pittosporoides</i> #				
<i>Denhamia silvestris</i> #				
<i>Diospyros australis</i> #	Yellow Persimmon			
<i>Diospyros pentamera</i> #	Grey Ebony			
<i>Dodonaea viscosa</i>	Sticky Hop-bush			
<i>Drypetes deplanchei</i> #	Yellow Tulip			
<i>Elaeodendron austral</i> #	Red Olive-berry			
<i>Endiandra virens</i> #				
<i>Eupomatia bennettii</i> #	Small Bolwarra			
<i>Euroschinus falcatus</i> #	Ribbonwood			
<i>Excoecaria dallachyana</i> #				
<i>Geijera latifolia</i> #	Broad-leaved Scrub wilga			
<i>Geijera salicifolia</i> #	Scrub Wilga			
<i>Gossia acmenoides</i> #				
<i>Gossia bidwillii</i> #	Python Tree			
<i>Guilfoylia monostylis</i> #	Guilfoylia			
<i>Guioa semiglauc</i> #	Guoia			
<i>Harnieria hygrophiloides</i>	White Karambal		E	

Grey Box-Grey Gum Wet Forest of Subtropical Eastern Australia Conservation Advice
Consultation Draft

Scientific name	Common name/s	EPBC status ⁸	NSW status	Qld status
<i>Hibiscus heterophyllus</i> #	Native Rosella			
<i>Hymenosporum flavum</i> #	Native Frangipani			
<i>Indigofera australis</i>	Native Indigo			
<i>Jagera pseudorhus</i> #	Jagera			
<i>Leucopogon ericoides</i>				
<i>Leucopogon juniperinus</i>				
<i>Maclura cochinchinensis</i> #	Cock-spur			
<i>Mallotus claoxyloides</i> #	Green Kamahla			
<i>Mallotus philippensis</i> #	Red Kamahla			
<i>Melaleuca salicina</i>	Willow Bottlebrush			
<i>Melicope micrococca</i> #				
<i>Myoporum betcheanum</i>				
<i>Myoporum montanum</i>	Mountain Boobialla			
<i>Myrsine variabilis</i> #	Muttonwood			
<i>Notelaea longifolia</i> #	Long-leaved Mock-olive			
<i>Olearia stellulata</i>				
<i>Phaleria chermsideana</i> #	Scrub Daphne			
<i>Pimelea ligustrina</i>				
<i>Pimelea neo-anglica</i>				
<i>Pittosporum lancifolium</i> #				
<i>Pittosporum multiflorum</i> #	Orange-thorn			
<i>Pittosporum revolutum</i> #	Hairy Pittosporum			
<i>Pittosporum undulatum</i> #	Native Mock-orange			
<i>Polyscias elegans</i> #	Celerywood			
<i>Psychotria daphnoides</i> #	Smooth Psychotria			
<i>Psychotria simmondsiana</i> #	Creeping Psychotria			
<i>Psydrax odorata</i> #	Shiny-leaved Canthium			
<i>Rhodamnia rubescens</i> #	Scrub Turpentine	CE	CE	CE
<i>Rhodomyrtus psidioides</i> #	Native Guava	CE	CE	CE
<i>Rubus rosifolius</i> #	Native Strawberry			
<i>Sarcomelicope simplicifolia</i> subsp. <i>simplicifolia</i> #				
<i>Sida platycalyx</i>	Sida			
<i>Solanum hapalum</i>				
<i>Solanum stelligerum</i>	Devil's Needles			
<i>Tabernaemontana pandacaqui</i> #	Banana Bush			
<i>Trema tomentosa</i> var. <i>aspera</i> #	Poison-peach			
<i>Wikstroemia indica</i> #	Bootlace Bark			
<i>Wilkiea huegeliana</i> #	Veiny Wilkiea			
Fern species				
<i>Adiantum aethiopicum</i>	Maidenhair Fern			
<i>Adiantum formosum</i>				
<i>Adiantum hispidulum</i> #	Rough Maidenhair Fern			
<i>Arachniodes aristata</i>				
<i>Asplenium australasicum</i>	Crow's Nest Fern			
<i>Asplenium polyodon</i>				
<i>Blechnum neohollandicum</i>				
<i>Davallia solida</i> var. <i>pyxidata</i>	Hare's-foot Fern			
<i>Dictymia brownie</i> #				
<i>Doodia aspera</i> #	Rasp Fern			
<i>Lastreopsis acuminata</i>				
<i>Lastreopsis decomposita</i>	Shield Fern			
<i>Pellaea falcata</i> #	Sickle Fern			
<i>Pellaea paradoxa</i> #				
<i>Platynerium bifurcatum</i> #	Elkhorn			

Grey Box-Grey Gum Wet Forest of Subtropical Eastern Australia Conservation Advice
Consultation Draft

Scientific name	Common name/s	EPBC status ⁸	NSW status	Qld status
<i>Platycterium superbum</i> #	Staghorn			
<i>Pteris tremula</i>	Jungle Brake			
<i>Pyrrosia confluens</i> var. <i>confluens</i> #	Robber Fern			
<i>Pyrrosia rupestris</i> #	Robber Fern			
Graminoid species				
<i>Aristida gracilipes</i>				
<i>Austrostipa ramosissima</i>				
<i>Carex breviculmis</i>				
<i>Carex hubbardii</i>				
<i>Cymbopogon refractus</i>				
<i>Cyperus enervis</i>				
<i>Cyperus gracilis</i> #	Slender Flat-sedge			
<i>Cyperus polystachyos</i>				
<i>Dianella caerulea</i> #	Blue Flax-lily			
<i>Entolasia stricta</i>				
<i>Gahnia aspera</i> #	Sword Sedge			
<i>Gahnia melanocarpa</i>				
<i>Imperata cylindrica</i>	Blady Grass			
<i>Lepidosperma laterale</i>	Variable Sword Sedge			
<i>Lomandra filiformis</i>				
<i>Lomandra longifolia</i> #	Long-leaved Matt-rush			
<i>Lomandra multiflora</i> subsp. <i>multiflora</i>				
<i>Lomandra spicata</i> #				
<i>Microlaena stipoides</i>				
<i>Oplismenus aemulus</i> #				
<i>Oplismenus imbecillis</i> #				
<i>Ottocloa gracillima</i> #	Pademelon Grass			
<i>Panicum pygmaeum</i> #	Pygmy Panic			
<i>Paspalidium distans</i>				
<i>Poa labillardierei</i> var. <i>labillardierei</i>				
<i>Schoenus apogon</i>				
<i>Scleria mackaviensis</i>				
<i>Sorghum leiocladum</i>				
<i>Themeda triandra</i>	Kangaroo Grass			
Herbs and Forbs				
<i>Aneilema biflorum</i> #				
<i>Brunoniella australis</i> #				
<i>Chenopodium carinatum</i>				
<i>Commelina cyanea</i> #	Native Commelina			
<i>Desmodium rhytidophyllum</i>				
<i>Dianella brevipedunculata</i>				
<i>Dichondra repens</i> #	Dichondra			
<i>Einadia hastata</i>				
<i>Gymnostachys anceps</i> #				
<i>Hybanthus stellarioides</i>	Spade-flower			
<i>Lobelia purpurascens</i> #	White-root			
<i>Nyssanthus diffusa</i> #				
<i>Oxalis chnoodes</i>				
<i>Peperomia blanda</i> var. <i>floribunda</i> #				
<i>Peperomia tetraphylla</i> #				
<i>Phyllanthus similis</i>				
<i>Plectranthus parviflorus</i> #				

Grey Box-Grey Gum Wet Forest of Subtropical Eastern Australia Conservation Advice
Consultation Draft

Scientific name	Common name/s	EPBC status ⁸	NSW status	Qld status
<i>Pseuderanthemum variabile</i> #	Love Flower			
<i>Sigesbeckia orientalis</i> subsp. <i>orientalis</i>				
<i>Solanum prinophyllum</i>				
<i>Swainsona galegifolia</i>				
<i>Tripladenia cunninghamii</i> #				
<i>Vernonia cinerea</i>				
<i>Veronica plebeia</i> #	Trailing Speedwell			
<i>Viola hederacea</i> #	Native Violet			
Vines and Lianas				
<i>Aphanopetalum resinosum</i> #				
<i>Austrosteenisia blackii</i> var. <i>blackii</i> #	Blood Vine			
<i>Callerya megasperma</i> #	Native Wisteria			
<i>Capparis sarmentosa</i> #				
<i>Cayratia clematidea</i> #				
<i>Cissus antarctica</i> #	Water Vine			
<i>Cissus hypoglauca</i> #				
<i>Clematicissus opaca</i> #				
<i>Clematis fawcettii</i> #	Northern Clematis	V	V	V
<i>Clematis glycinoides</i> #	Headache Vine			
<i>Cynanchum elegans</i> #				
<i>Derris involuta</i> #	Native Derris			
<i>Desmodium varians</i>				
<i>Dioscorea transversa</i> #	Native Yam			
<i>Embelia australiana</i> #	Embelia			
<i>Eustrephus latifolius</i> #	Wombat Berry			
<i>Geitnoplesium cymosum</i> #	Scrambling Lily			
<i>Glycine clandestina</i>				
<i>Gynochthodes jasminoides</i> #				
<i>Jasminum volubile</i> #	Stiff Jasmine			
<i>Legnephora moorei</i> #				
<i>Marsdenia flavescens</i> #				
<i>Marsdenia llyodii</i> #	Slender Marsdenia	V	E	-
<i>Marsdenia longiloba</i> #	Slender Marsdenia	V	E	V
<i>Marsdenia rostrata</i> #				
<i>Muehlenbeckia gracillima</i> #				
<i>Pandorea baileyana</i> #				
<i>Pandorea jasminoides</i> #	Bower of Beauty			
<i>Pandorea pandorana</i> #	Wonga Vine			
<i>Parsonsia lanceolata</i> #				
<i>Parsonsia longipetiolata</i> #				
<i>Parsonsia rotata</i> #				
<i>Parsonsia straminea</i> #	Monkey-rope Vine			
<i>Parsonsia velutina</i> #				
<i>Passiflora herbertiana</i> subsp. <i>herbertiana</i> #				
<i>Petermannia cirrose</i> #				
<i>Rhynchosia acuminatissima</i> #	Pointed Trefoil		V	
<i>Ripogonum album</i> #				
<i>Ripogonum brevifolium</i> #				
<i>Rubus moluccanus</i> #	Native Raspberry			
<i>Sarcopetalum harveyanum</i> #				
<i>Secamone elliptica</i> #				
<i>Smilax australis</i> #	Barbed-wire Vine			

Scientific name	Common name/s	EPBC status ⁸	NSW status	Qld status
<i>Stephania japonica</i> var. <i>discolor</i> #				
<i>Tetrastigma nitens</i> #	Native Grape			
<i>Tinospora smilacina</i> #	Tinospora Vine		E	
<i>Tinospora tinoporoides</i> #	Arrow-head Vine		V	
<i>Tragia novae-hollandiae</i> #	Stinging Vine			
<i>Trophis scandens</i> subsp. <i>Scandens</i> #	Burny Vine			
<i>Tylophora grandiflora</i> #	Small-leaved Tylophora			
<i>Tylophora paniculata</i> #				
<i>Uvaria leichhardtii</i> #	Zig-zag Vine			
Orchids				
<i>Cymbidium madidum</i> #				
<i>Cymbidium suave</i> #				
<i>Dendrobium aemulum</i> #				
<i>Dendrobium fairfaxii</i> #				
<i>Dendrobium gracilicaule</i> #				
<i>Dendrobium kingianum</i> #				
<i>Dendrobium schoeninum</i> #				
<i>Dendrobium speciosum</i> #				
<i>Dendrobium taberi</i> #				
<i>Dendrobium teretifolium</i> #				
<i>Plectorrhiza tridentata</i> #				
<i>Sarcophilus hillii</i> #				

Sources: EPA (2016); DPIE (2021); Lui Weber Pers.Comm (2021); NSW TSSC (2011); OEH (2012) Appendix 8; ID Guide GBGGWSF NSW OEH;

A2 Fauna

Table 6: Fauna recorded in the ecological community

Scientific name	Common name/s	EPBC	NSW	Qld
Mammals and monotremes				
<i>Aepyprymnus rufescens</i>	Rufous Bettong			
<i>Cercartetus nanus</i>	Eastern Pygmy-possum			
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat			
<i>Chalinolobus nigrogriseus</i>	Hoary Wattled Bat			
<i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll	E	V	E
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle			
<i>Macropus dorsalis</i>	Black-striped Wallaby	Not Listed	E	LC
<i>Macropus parma</i>	Parma Wallaby			
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat			
<i>Miniopterus orianae oceanensis</i>	Large Bentwing-bat	Not Listed	V	LC
<i>Miniopterus australis</i>	Little Bentwing-bat	Not Listed	V	LC
<i>Mormopterus beccarii</i>	Beccari's Freetail-bat			
<i>Myotis macropus</i>	Southern Myotis	Not Listed	V	LC
<i>Nyctimene robinsoni</i>	Eastern Tube-nosed Bat	.		
<i>Nyctophilus bifax</i>	Eastern Long-eared Bat			
<i>Ozimops lumsdenae</i>	Northern Free-tailed Bat			

Grey Box-Grey Gum Wet Forest of Subtropical Eastern Australia Conservation Advice
Consultation Draft

Scientific name	Common name/s	EPBC	NSW	Qld
<i>Petauroides volans</i>	Greater Glider			
<i>Petaurus australis subs.</i>	Yellow-bellied Glider	Not Listed	V	LC
<i>Petaurus norfolcensis</i>	Squirrel Glider	Not Listed	V	LC
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby			
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	Not Listed	V	LC
<i>Phascolarctos cinereus</i>	Koala	V	V	V
<i>Phoniscus papuensis</i>	Golden-tipped Bat	Not Listed	V	LC
<i>Planigale maculata</i>	Common Planigale			
<i>Potorous tridactylus</i>	Long-nosed Potoroo	V	V	V
<i>Pseudomys oralis</i>	Hastings River Mouse			
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	LC
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Not Listed	V	LC
<i>Syconycteris australis</i>	Common Blossom-bat			
<i>Thylogale stigmatica</i>	Red-legged Pademelon			
Birds				
<i>Amaurornis moluccana</i>	Pale-vented Bush-hen			
<i>Artamus cyanopterus</i>	Dusky Woodswallow			
<i>Atrichornis rufescens</i>	Rufous Scrub-bird			
<i>Burhinus grallarius</i>	Bush Stone-curlew			
<i>Calyptorhynchus banksii</i>	Red-tailed Black-cockatoo (coastal			
<i>Calyptorhynchus lathamii</i>	Glossy Black-cockatoo			
<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	Not Listed	V	V
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)			
<i>Coracina lineata</i>	Barred Cuckoo-shrike	Not Listed	V	LC
<i>Coracina lineata</i>	Barred Cuckoo-shrike			
<i>Cthonicola sagittata</i>	Speckled Warbler	Not Listed	V	LC
<i>Cyclopsitta diophthalma</i>	Coxen's Fig-Parrot			
<i>Daphoenositta chrysoptera</i>	Varied Sittella			
<i>Dasyornis brachypterus</i>	Eastern Bristlebird			
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork			
<i>Erythrotriorchis radiatus</i>	Red Goshawk			
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle			
<i>Glossopsitta pusilla</i>	Little Lorikeet			
<i>Grantiella picta</i>	Painted Honeyeater			
<i>Hieraaetus morphnoides</i>	Little Eagle			
<i>Hirundapus caudacutus</i>	White-throated Needletail			
<i>Ixobrychus flavicollis</i>	Black Bittern			
<i>Lathamus discolor</i>	Swift Parrot			

Grey Box-Grey Gum Wet Forest of Subtropical Eastern Australia Conservation Advice
Consultation Draft

Scientific name	Common name/s	EPBC	NSW	Qld
<i>Lophoictinia isura</i>	Square-tailed Kite			
<i>Melanodryas cucullata</i>	Hooded Robin (south-eastern form)			
<i>Menura alberti</i>	Albert's Lyrebird			
<i>Ninox connivens</i>	Barking Owl	Not Listed	V	LC
<i>Ninox strenua</i>	Powerful Owl	Not Listed	V	V
<i>Pachycephala olivacea</i>	Olive Whistler			
<i>Pedionomus torquatus</i>	Plains-wanderer			
<i>Petroica phoenicea</i>	Flame Robin			
<i>Podargus ocellatus</i>	Marbled Frogmouth			
<i>Ptilinopus magnificus</i>	Wompoo Fruit-Dove	Not Listed	V	LC
<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	Not Listed	V	LC
<i>Ptilinopus superbus</i>	Superb Fruit-dove			
<i>Turnix melanogaster</i>	Black-breasted Button-quail			
<i>Tyto novaehollandiae</i>	Masked Owl			
<i>Tyto tenebricosa</i>	Sooty Owl	Not Listed	V	LC
Reptiles and Amphibians				
<i>Assa darlingtoni</i>	Pouched Frog			
<i>Coeranoscincus reticulatus</i>	Three-toed Snake-tooth Skink			
<i>Hoplocephalus bitorquatus</i>	Pale-headed Snake			
<i>Hoplocephalus stephensii</i>	Stephens Banded Snake	Not Listed	V	LC
<i>Hoplocephalus stephensii</i>	Stephens' Banded Snake			
<i>Litoria brevipalmata</i>	Green-thighed Frog			
<i>Litoria piperata</i>	Peppered Tree Frog			
<i>Litoria subglandulosa</i>	Glandular Frog			
<i>Mixophyes balbus</i>	Stuttering Barred Frog			
<i>Mixophyes fleayi</i>	Fleay's Barred Frog			
<i>Mixophyes iteratus</i>	Giant Barred Frog	E	E	V
<i>Philoria kundagungan</i>	Mountain Frog			
<i>Philoria loveridgei</i>	Loveridge's Frog			
<i>Philoria pughii</i>	Philoria pughii			
<i>Philoria richmondensis</i>	Richmond Range Mountain Frog			
<i>Philoria sphagnicolus</i>	Sphagnum Frog			
<i>Podargus ocellatus</i>	Marbled Frogmouth			
Invertebrates				
<i>Nurus atlas</i>	Atlas Rainforest Ground-beetle			
<i>Nurus brevis</i>	Shorter Rainforest Ground-beetle			
<i>Ornithoptera richmondensis</i>	Richmond Birdwing Butterfly			
<i>Phyllodes imperialis smithersi</i>	Southern Pink Underwing Moth	E	E	

Sources: NSW TSSC (2011); 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?
- Are there any listed species that aren't noted as listed in the right-hand columns?
- Are the flora species in Table 4 annotated with # appropriate to indicate those typically associated with dry rainforests and related vine forest, thicket or scrub communities (see key diagnostic criteria)? Should any species in the list have the # removed or added?
- Are there any indigenous names for flora or fauna in these lists that you know of?

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 State Mapping Classifications that equate to the ecological community

Code / Number	Name	Classification System	Notes
NSW PCT 3069	Far North Hinterland Grey Box- Grey Gum Wet Forest	NSW PCT Classification (DPIE 2020)	The ecological community is largely equivalent to this PCT in the South Eastern Queensland and New South Wales North Coast IBRA bioregions.
QLD RE 12.9-10.3	<i>Eucalyptus moluccana</i> open forest on sedimentary rocks	Regional Ecosystem Classification QLD	<ul style="list-style-type: none"> • Areas or patches of this RE may be the ecological community where they meet the key diagnostic criteria.
QLD RE 12.8.14a	<i>Eucalyptus moluccana</i> open forest +/- <i>E. tereticornis</i> , <i>Eucalyptus siderophloia</i> or <i>E. crebra</i> .	Regional Ecosystem Classification QLD	<ul style="list-style-type: none"> • Areas or patches of this RE may be the ecological community where they meet the key diagnostic criteria.
1000-1665	Grey Gum - Grey Box - Hoop Pine shrubby open forest on hinterland hills of the Richmond and Clarence catchments	Vegetation Classification for the Northern Rivers Catchment Management Area of New South Wales NSW Office of Environment and Heritage 2012	<ul style="list-style-type: none"> • This vegetation classification did not have corresponding mapping completed for it.
171	Grey Box - Small-fruited Grey Gum shrubby forest of the far north of the North Coast	Review of Biometric Vegetation Type Names and Species Information in the PVP Developer – EcoLogical 2007 NSW Office of Environment and Heritage 2012	

Code / Number	Name	Classification System	Notes
62	Grey Box - Northern Grey Gum	North East NSW Forest Ecosystems NSW National Parks and Wildlife Service 1999	
81	Grey Box - Northern Grey Gum ¹	Forest Types in New South Wales Forestry Commission of N.S.W. Baur 1965	
PCT 857	Grey Box - Small Fruited Grey Gum shrubby forest of the far north of NSW North Coast Bioregion	PVP Developer - NSW Catchment Management Authority Equivalent to Forest Ecosystem 81 above	

B2 Other related and adjacent vegetation types

Code / Number	Name	Key Distinguishing Features
Other related or adjacent vegetation types		Key Distinguishing Features from Grey Box-Grey Gum Wet Forest
PCT 3070 (NSW)	Far North Hinterland Kamala-Coogera Dry Rainforest	<ul style="list-style-type: none"> Has a closed canopy with Eucalypts absent or in very low densities in canopy or as emergents. Has a diverse canopy of broad-leaved fire-sensitive rainforest flora.
PCT 3003 (NSW)	Border Ranges Black Booyong Subtropical Rainforest	
PCT 3233 (NSW)	Far North Hinterland Grey Gum Grassy Forest	<ul style="list-style-type: none"> <i>Acacia irrorata</i> is very frequent in the understorey Has a ground layer frequently dominated by shade intolerant grasses such as blady grass (<i>Imperata cylindrica</i>), forbs and herbs. Where rainforest elements occur in the understorey they are scattered and not dominant. Usually occupies more frequently-burnt, ridgetop, upper slope or otherwise more exposed sites.
PCT 3251	Northern Gorges Diverse Grassy Forest	<ul style="list-style-type: none"> Has a sparse mid-stratum that almost always includes one or more <i>Allocasuarina</i> spp. +/- one or more <i>Acacia</i> species Has a dense to mid-dense grassy ground layer including shade intolerant grasses, forbs and twiners such as <i>Themeda triandra</i>, <i>Vernonia cinerea</i> and <i>Desmodium</i> spp.
PCT 3456	Clarence Gorges Grey Gum-Ironbark Grassy Forest	
PCT 3465	Northern Gorges Red Gum Grassy Forest	
PCT 3466	Northern Gorges Red Gum-Stringybark Forest	
PCT 3422	Clarence Sandstone Rises Spotted Gum Grassy Forest	

Code / Number	Name	Key Distinguishing Features
PCT 3420	Clarence Lowland Ironbark-Spotted Gum Grassy Forest	<ul style="list-style-type: none"> • Has a sparse mid-stratum of small trees including <i>Alphitonia excelsa</i> and almost always, <i>Acacia</i> spp., commonly including <i>Acacia concurens</i> • Has a mid-dense ground layer typically including shade intolerant grasses, forbs, twiners and vines. <i>Imperata cylindrica</i> is almost always present with <i>Lobelia purpurascens</i>, <i>Eustrephus latifolius</i>, <i>Vernonia cinerea</i>, <i>Themeda triandra</i> and <i>Entolasia stricta</i> very frequent. • Occurs below 80 metres ASL
PCT 3329	Northern Hinterland Valleys Red Gum Grassy Forest	<ul style="list-style-type: none"> • The canopy almost always includes red gums (<i>Eucalyptus tereticornis</i> or <i>Eucalyptus amplifolia</i>). • The mid-stratum very frequently includes acacias of which <i>Acacia implexa</i> or <i>Acacia melanoxylon</i> are most frequent, • The mid-dense to dense ground layer is mainly comprised of shade intolerant grasses, soft-leaved forbs, twiners +/- hardy ferns,
PCT 3312	Acacia Creek Grassy Forest	
PCT 3322	Far North Ranges Red Gum Grassy Forest	<ul style="list-style-type: none"> • The canopy very frequently includes <i>Eucalyptus tereticornis</i>, <i>Corymbia intermedia</i> and <i>Eucalyptus microcorys</i>, commonly associated with <i>Acacia melanoxylon</i> and <i>Angophora subvelutina</i>. • The shrub layer is sparse with scattered individuals of <i>Breynia oblongifolia</i> being very frequent. • The dense ground layer is typically comprised of shade intolerant grasses, twiners, forbs, ferns and vines.
PCT 3323	Far North Lowland Basalt Grassy Forest	<ul style="list-style-type: none"> • <i>Corymbia intermedia</i> is very frequent in the canopy, commonly in association with <i>Eucalyptus tereticornis</i>. • Has a sparse small tree and shrub layer • The mid-dense ground layer is typically composed of grasses, twiners, forbs, ferns and vines, almost always including <i>Imperata cylindrica</i>, <i>Geitonoplesium cymosum</i>, <i>Oplismenus aemulus</i> and <i>Lobelia purpurascens</i>
3326	Glenugie Peak Grassy Forest	<p>Only occurs on Glenugie Peak NSW</p> <p>Has <i>Eucalyptus crebra</i> and <i>Eucalyptus tereticornis</i> in the canopy. Smaller rainforest trees may be present however ground layer typically includes shade-intolerant grasses, forbs and twiners.</p>

Consultation Questions on map units

- Does the list of current and superseded map units and classifications include all those that may be a current or former classification of the ecological community?
- Are there any other map units that you know of that are included by the ecological community?
- Are there any other map units that you know of that include the ecological community in part?

References

- Andrade, C. F., Duarte, J. B., Barbosa, M. L. F., Andrade, M. D., Oliveira, R. O., Delgado, R. C., Pereira, M. G., Batista, T. S., & Teodoro, P. E. (2019). Fire outbreaks in extreme climate years in the State of Rio de Janeiro, Brazil. *Land Degradation & Development*, 30(11), 1379-1389. <https://doi.org/10.1002/ldr.3327>
- Baur, G.N. 1965. Forest Types in New South Wales. NSW Forestry Commission.
- Berry ZC, Wevill K & Curran TJ (2011). The invasive weed *Lantana camara* increases fire risk in dry rainforest by altering fuel beds. *Weed Research* 51, 525–533.
- Bland L, Keith D, Miller R, Murray N and Rodriguez J (eds) (2017). *Guidelines for the application of IUCN Red List of Ecosystem Categories and Criteria, Version 1.1*. IUCN, Switzerland. Available at <https://www.iucn.org/es/content/guidelines-application-iucn-red-list-ecosystems-categories-and-criteria>
- Bowman, D. M. J. S., Kolden, C. A., Abatzoglou, J. T., Johnston, F. H., van der Werf, G. R., & Flannigan, M. (2020). Vegetation fires in the Anthropocene. *Nature Reviews Earth & Environment*, 1(10), 500-515. <https://doi.org/10.1038/s43017-020-0085-3>
- Clarke, P.J., Knox, K.J.E., Bradstock, R.A., Munoz-Robles, C. and Kumar, L. (2014). Vegetation, terrain and fire history shape the impact of extreme weather on fire severity and ecosystem response. *Journal of Vegetation Science*, Vol. 25, No. 4 (July 2014), pp. 1033-1044
- COAG Standing Council on Environment and Water (2012) Australia's Native Vegetation Framework.
- Dai A (2012). Increasing drought under global warming in observations and models. *Nature Climate Change* 3, 52–58. <https://doi.org/10.1038/NCLIMATE1633>
- DAWE [Department of Agriculture, Water and the Environment] 2020 The Australian Google Earth Engine Burnt Area Map (AUS GEEBAM) dataset. Developed by The Remote Sensing and Landscape Science Branch, Science Economics and Insights Division, New South Wales Department of Planning, Industry and Environment. <http://www.environment.gov.au/fed/catalog/search/resource/details.page?uuid=%7B8CE7D6BE-4A82-40D7-80BC-647CB1FE5C08%7D>
- DAWE [Department of Agriculture, Water and the Environment] 2021. Fire regimes that cause biodiversity decline: amendments to the list of Key Threatening Processes. DRAFT version. Canberra.
- DoE [Department of the Environment] (2015). *Arrive Clean, Leave Clean. Guidelines to help prevent the spread of invasive plant diseases and weeds threatening our native plants, animals and ecosystems*. Commonwealth of Australia. Available at <https://www.environment.gov.au/biodiversity/invasive-species/publications/arrive-clean-leave-clean>
- Department of Environment and Climate Change 2007, *Northern Rivers Region Pest Management Strategy 2008-2011*, DECC, Sydney.
- DECC (2008a) Nomination to list Grey Box (*Eucalyptus moluccana*) Grey Gum (*Eucalyptus propinqua/Eucalyptus punctata*) wet sclerophyll forest in the NSW North Coast Bioregion as an Endangered Ecological Community under the NSW TSC Act 1995. Department of Environment and Climate Change, Coffs Harbour. Commonwealth of Australia
- DECC YETI (2007) - Bedward, M., Ellis M. and Gleeson P. Yet another vegetation survey database V3.1 (YETI) NSW NPWS, Access 2000 database, containing systematic plot based floristic data.
- Department of Environment and Climate Change 2008b, *Mid North Coast Region Pest Management Strategy 2008-2011*, DECC, Sydney.
- Department of Environment and Climate Change 2008c, *North Coast Region Pest Management Strategy 2008-2011*, DECC, Sydney.
- Department of Natural Resources, Mines and Energy 2004, *Lantana Control Manual: Current Management and Control Options for Lantana (Lantana camara) in Australia*, Department of Natural Resources, Mines and Energy, Brisbane

- DPIE (2021) NSW State Vegetation Type Map (SVTM). Pre-Release v1.1.0 Eastern NSW Extant Plant Community Type. Full package <https://datasets.seed.nsw.gov.au/dataset/nsw-state-vegetation-type-map>
- Duggin J.A. and Gentle C.B. 1998. Experimental evidence on the importance of disturbance intensity for invasion of *Lantana camara* L. in dry rainforest–open forest ecotones in north-eastern NSW, Australia. *For. Ecol. Manag.* 109, 279–292
- Ellis, R. (1985). The relationships among eucalypt forest, grassland and rainforest in a highland area in north-eastern Tasmania. *Austral Ecology*, 10, 297–314. <https://doi.org/10.1111/j.1442-9993.1985.tb00891.x>
- EPA 2016 Assessment of Grey Box Grey Gum Wet Sclerophyll Forest TEC on NSW Crown Forest Estate. Environment Protection Authority (NSW)
- Eyre TJ & Goldingay RL (2005) Characteristics of sap trees used by yellow-bellied gliders in southern Queensland. *Wildlife Research* 32, 23-35.
- Fensham RJ, Fairfax RJ & Cannell RJ (1994) The invasion of *Lantana camara* L. in Forty Mile Scrub National Park, north Queensland. *Australian Journal of Ecology* 19, 297–305.
- Fensham, R.J., Fairfax, R. J, Butler, D. W., and Bowman, D. M. J. S. 2003 Effects of Fire and Drought in a Tropical Eucalypt Savanna Colonized by Rain Forest, *Journal of Biogeography*, Sep, 2003, Vol. 30, No. 9 (Sep. 2003), pp. 1405-1414
- Forestry Commission of NSW (1989a) Forest preservation in state forests of New South Wales. Research Note No. 47. (Forestry Commission of NSW: Sydney)
- Gentle, C. B. and Duggin, J. A. (1997) Source: Allelopathy as a Competitive Strategy in Persistent Thickets of *Lantana camara* L. in Three Australian Forest Communities Author. *Plant Ecology*, 1997, Vol. 132, No. 1 (1997), pp. 85-95
- Gooden, B., French, K., Turner, P. J., & Downey, P. O. (2009). Impact threshold for an alien plant invader, *Lantana camara* L., on native plant communities. *Biological conservation*, 142(11), 2631-2641.
- Harvest, T., Davidson, N., & Close, D. (2008). Is decline in high altitude eucalypt forests related to rainforest understorey development and altered soil bacteria following the long absence of fire? *Austral Ecology*, 33, 880–890. <https://doi.org/10.1111/j.1442-9993.2008.01859.x>
- Henderson M, Keith DA (2002) Correlation of burning and grazing indicators with the composition of the woody understorey flora of dells in a temperate eucalypt forest. *Austral Ecology* 27, 121-131.
- Hiremath A.J., & Sundaram, B., (2005) The fire-lantana cycle hypothesis in Indian forests. *Conservation and Society* 3, 26–42.
- Keith, D.A. (2004) Ocean shores to desert dunes: the native vegetation of NSW and ACT. Department of Environment and Conservation (NSW).
- Kirchmeier-Young, M. C., Gillett, N. P., Zwiers, F. W., Cannon, A. J., & Anslow, F. S. (2019). Attribution of the Influence of Human-Induced Climate Change on an Extreme Fire Season. *Earth's Future*, 7(1), 2-10. <https://doi.org/10.1029/2018ef001050>
- Krishnan et al. 2018 Without management interventions, endemic wet-sclerophyll forest is transitioning to rainforest in World Heritage listed K'gari (Fraser Island), Australia
- Lamb D. 1991. Forest regeneration research for reserve management: some questions deserving answers. *Tropical Rainforest Research in Australia: Present Status and Future Directions for the Institute for Tropical Rainforest Studies* (ed. by Goudberg N., Bonell M. and Benzaken D.). Institute for Tropical Rainforest Studies, Townsville, Qld, Australia, 177–181.
- Lindenmayer, D & Fischer, J 2006, *Habitat Fragmentation and Landscape Change: An Ecological and Conservation Synthesis*, Island Press, Washington DC.
- Maynes GM (1977) Distribution and aspects of the biology of the parma wallaby, *Macropus parma* in New South Wales. *Australian Wildlife Research* 4, 109–125.
- Maynes G (2008) Parma Wallaby *Macropus parma*, in S Van Dyck & R Strahan (eds), *The Mammals of Australia*. Reed New Holland. Chatswood, New South Wales. pp. 200–50.

- McGarigal K (2015) FRAGSTATS Spatial Pattern Analysis Program for Categorical Maps. <https://www.umass.edu/landeco/research/fragstats/documents/fragstats.help.4.2.pdf>
- Mitchell PJ, O'Grady AP, Pinkard EA, Brodribb TJ, Arndt SK, Blackman CJ, Duursma RA, Fensham RJ, Hilbert DW, Nitschke CR, Norris J, Roxburgh SH, Ruthrof KX, Tissue DT (2016). An ecoclimatic framework for evaluating the resilience of vegetation to water deficit. *Global Change Biology* 22, 1677–1689. <https://doi.org/10.1111/gcb.13177>
- National Committee on Soil and Terrain (2009). The Australian Soil and Land Survey Field Handbook. CSIRO.
- Nolan, R. H., Boer, M. M., Collins, L., Resco de Dios, V., Clarke, H., Jenkins, M., Kenny, B., & Bradstock, R. A. (2020). Causes and consequences of eastern Australia's 2019-20 season of mega-fires. *Glob Chang Biol*, 26, 1039-1041.
- NPWS (National Parks and Wildlife Service) (2003) *Recovery Plan for the Yellow-bellied Glider* (Petaurus Australis) National Parks and Wildlife Service (NSW), Hurstville.
- NSW Government (2005) Gibraltar Range Group of Parks Plan of Management
- NPWS (2001), Completion of GIS Products For The Upper North East CRAFTI Structural And Floristic Layers, NSW Government.
- NPWS (1999a) Forest ecosystem classification and mapping for the upper and lower north east Comprehensive Regional Assessment. Report to Resource and Conservation Division, Department of Urban Affairs and Planning, Sydney.
- NPWS NSW (1999b) Old-growth Forest related projects - Upper and Lower North East CRA Regions) Unpublished report for Resource and Conservation Division, Department of Urban Affairs and Planning (RACD)
- NSW Government (2019) *White gum moist forest in the NSW North Coast Bioregion - endangered ecological community listing*. Available at: <https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2008-2010/white-gum-moist-forest-nsw-north-coast-bioregion-endangered-ecological-community-list>
- NSW TSSC (New South Wales Threatened Species Scientific Committee) 2011 Grey Box - Grey Gum Wet Sclerophyll Forest in the NSW North Coast Bioregion Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act
- NSW National Parks and Wildlife Service (1999) Forest Ecosystem Classification and Mapping for the Upper and Lower North East CRA regions. A project undertaken for the Joint Commonwealth NSW Regional Forest Agreement Steering Committee as part of the NSW Comprehensive Regional Assessments. Project number NA35/EH. CRA Unit, Northern Zone NPWS, Coffs Harbour.
- (NSW IDENTIFICATION GUIDE GBGGWSF) Grey Box - Grey Gum Wet Sclerophyll Forest in the NSW North Coast Bioregion– identification guidelines for the endangered ecological communities
- NSW Scientific Committee (2006) Final Determination to list the Invasion, establishment and spread of Lantana (*Lantana camara* L. sens. lat) as a Key Threatening Process under the Threatened Species Conservation Act 1995 Viewed October 2007 http://www.nationalparks.nsw.gov.au/npws.nsf/Content/lantana_ktp
- NSW Scientific Committee (2009) Grey Box - Grey Gum Wet Sclerophyll Forest in the NSW North Coast Bioregion - endangered ecological community listing Department of Environment and Climate Change Sydney
- NRRBMP 2010 Northern Rivers Regional Biodiversity Management Plan
- OEH (2012) Vegetation Classification for the Northern Rivers Catchment Management Area of NSW. NSW Office of Environment and Heritage.
- QLD Government (2004) Queensland Feral Pig Management Strategy
- Queensland Herbarium (2021) Regional Ecosystem Description Database (REDD). Version 12 (March 2021) (DES: Brisbane).

- Standards Reference Group SERA (2017). *National Standards for the Practice of Ecological Restoration in Australia*. Second Edition. Society for Ecological Restoration Australasia. Available from <http://www.seraustralasia.com/pages/standards.html>
- Steinfeld, H, Gerber, P, Wassenaar, T, Castel, V, Rosales, M & de Haan, C 2006, *Livestock's Long Shadow: Environmental Issues and Options*, Food and Agricultural Organisation of the United Nations, Rome.
- Tasker EM, Bradstock RA (2006) Influence of cattle grazing practices on forest understorey structure in north-eastern New South Wales. *Austral Ecology* 31, 490-502.
- Tasker E. M. (2002) The ecological impacts of cattle grazing and associated grazer burning in the eucalypt forests of Northern NSW (PhD Thesis). University of Sydney, Sydney.
- Tasker E. M. & Dickman C. R. (2004) Small mammal community composition in grazed and frequently-burnt eucalypt forests of the northern tablelands of New South Wales. In: *Conservation of Australia's Forest Fauna*, 2nd edn (ed. D.Lunney) pp. 721-40. Royal Zoological Society, NSW.
- TSSC [Threatened Species Scientific Committee] (2017) *Guidelines for nominating and assessing the eligibility for listing of ecological communities as threatened according to the Environment Protection and Biodiversity Conservation Act 1999 and the EPBC Regulations 2000*. Department of the Environment and Energy. Available from <http://www.environment.gov.au/biodiversity/threatened/nominations/forms-and-guidelines>
- Thomas B. Smith, Robert K. Wayne, Derek J. Girman and Michael W. Bruford. A Role for Ecotones in Generating Rainforest Biodiversity Science, Jun. 20, 1997, New Series, Vol. 276, No. 5320 (Jun. 20, 1997), pp. 1855-1857
- Walker, J. Hopkins, M.S. (1990) *Vegetation Australian Soil and Land Survey Field Handbook* Inkata Press
- Wardell-Johnson G, Stone C, Recher H, Lynch J (2006) Bell Miner Associated Dieback (BMAD) Independent Scientific Literature Review. A review of eucalypt dieback associated with Bell miner habitat in north-eastern New South Wales. Occasional Paper DEC 2006/116. NSW Department of Environment and Conservation, Coffs Harbour.
- York A (1999) Long-term effects of repeated prescribed burning on forest invertebrates: management implications for the conservation of biodiversity. pp 181-266 in: 'Australia's biodiversity - responses to fire: plants, birds and invertebrates' (Eds. AM Gill, JCZ Woinarski, A York). Biodiversity Technical Paper No. 1. Environment Australia, Canberra.
- York A, Tarnawski J (2004) Impacts of grazing and burning on terrestrial invertebrate assemblages in dry eucalypt forests of north-eastern New South Wales: Implications for biodiversity conservation. pp. 845-859 in: 'Conservation of Australia's Forest Fauna' (Ed. D Lunney). Second edition. Royal Zoological Society of NSW, Mosman.



Ownership of intellectual property rights

Unless otherwise noted, copyright (and any other intellectual property rights) in this publication is owned by the Commonwealth of Australia (referred to as the Commonwealth).

Creative Commons licence

All material in this publication is licensed under a [Creative Commons Attribution 4.0 International Licence](https://creativecommons.org/licenses/by/4.0/) except content supplied by third parties, logos and the Commonwealth Coat of Arms.

Inquiries about the licence and any use of this document should be emailed to copyright@awe.gov.au.

Cataloguing data

This publication (and any material sourced from it) should be attributed as: Department of Agriculture, Water and the Environment 2021, DRAFT *Conservation advice for Grey Box-Grey Gum Wet Forest of Subtropical Eastern Australia*, Canberra.

Department of Agriculture, Water and the Environment
GPO Box 858, Canberra ACT 2601
Telephone 1800 900 090
Web awe.gov.au

The Australian Government acting through the Department of Agriculture, Water and the Environment has exercised due care and skill in preparing and compiling the information and data in this publication. Notwithstanding, the Department of Agriculture, Water and the Environment, its employees and advisers disclaim all liability, including liability for negligence and for any loss, damage, injury, expense or cost incurred by any person as a result of accessing, using or relying on any of the information or data in this publication to the maximum extent permitted by law.

Version history table

Document type	Title	Date [dd mm yyyy]
–	–	–
–	–	–