



Draft Conservation Advice for the Subtropical eucalypt forest on the floodplains of 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 draft conservation advice and listing assessment for the threatened ecological community. It provides a foundation for conservation action and further planning.



An example of the ecological community at the Brisbane Entertainment Centre © Nikki Ward

The Subtropical eucalypt forest on the floodplains of eastern Australia occurs on country (the traditional lands) for several Indigenous / First Nations peoples including the: Biripi, Dainggatti, Gumbaynggirr, Bundjalung, Yuggera, Waka Waka, Gubbi Gubbi, Badtjala, Gureng Gureng, Gangula and Bayali. We acknowledge their culture and continuing link to the ecological community and the country it inhabits.

Proposed Conservation Status

The Subtropical eucalypt forest on the floodplains of 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).

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About this document

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

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

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1 Ecological community name and description

1.1 Name

The name of the ecological community is the Subtropical eucalypt forest on the floodplains of eastern Australia (also referred to as Subtropical floodplain eucalypt forest' or 'the ecological community'). The name refers to its climate zone, dominant canopy species, landscape position and geographic area.

The ecological community was nominated with the name 'Subtropical coastal floodplain eucalypt forest of northern New South Wales and Southern Queensland'.

In New South Wales the majority of the ecological community is known as the NSW state-listed 'Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion' threatened ecological community (TEC).

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 Subtropical eucalypt forest on the floodplains of eastern Australia.

The ecological community described in this conservation advice is the assemblage of plants, animals and other native organisms associated with eucalypt forests and woodlands, on the floodplains of the eastern watershed of the Great Dividing Range in the NSW North Coast and South Eastern Queensland bioregions. It is a floodplain forest community with a canopy dominated by eucalypts and other myrtaceous tree species.

This section describes the natural state (or range of natural states) of the ecological community as a reference for comparison of occurrences in varying states related to environmental gradients and varying levels of degradation. 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 Subtropical eucalypt forest on the floodplains of eastern Australia occurs in the New South Wales North Coast (NNC) and South Eastern Queensland (SEQ) IBRA bioregions (DoE 2013) and on Curtis Island in the Brigalow Belt North IBRA Bioregion (BBN). This encompasses an area from just north of Newcastle, New South Wales (around Raymond Terrace) in the south, to just north of Gladstone in Queensland.

The ecological community is found on floodplains, including the riparian zones of the parent river, alluvial flats, older floodplain terraces and periodically flooded depressions. It generally occurs below 50 metres above sea-level (ASL), although it can occur up to 250 metres ASL (NSW SC 2010).

The ecological community generally occurs on alluvial soils, with more limited occurrences on *in situ* soils within localised depressions, that may be at least occasionally saturated, water-logged or inundated. Alluvial soils are very diverse and usually reflect the properties of their parent material in the upper catchment (Wilson & Taylor 2012), but they may include *in-situ* subsoils, and colluvial deposits that overlay the alluvial floodplain. The soils are typically deep (greater than one metre), except in certain circumstances (i.e., particularly where floodplains and depressions grade into lithic landforms). They include silts, clay loams, clays and sandy loams, gravel and cobbles; and show little influence of saline ground water. The ecological community may occur on shallower soils on the margins of the floodplain and in the smaller narrow alluvial systems. The ecological community does not occur on soils that are primarily marine or aeolian sand, but may occur on such substrates after they are modified by fluvial activity.

More detailed information on soils and landforms is at Appendix D – Landforms and soils.

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.
- Should Curtis Island be included, or not? Why?
- Does the landscape position 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 structure of the ecological community varies from tall open forest to woodland, although partial clearing may have reduced the canopy to scattered trees in some areas. Elsewhere, there may be localised areas of denser closed forest and/or low forest, often associated with other disturbance (including flooding). It tends to be lower and less dense in the wider floodplains, whereas taller denser forests occur in the more confined floodplains.

The canopy is dominated by eucalypt and other myrtaceous trees (specifically *Eucalyptus*, *Angophora*, *Corymbia*, *Lophostemon* and *Syncarpia* species), often as a mixed canopy. The canopy may exceed 40 m in height, but can be considerably shorter, for example in regrowth stands, or where growth is inhibited (such as on waterlogged sites or in areas with lower rainfall). When intact, the canopy typically has between 40 to 60 per cent crown cover¹, with large trees often containing hollows; but crown cover may be as low as 20 per cent. Areas of higher crown cover also occur.

A mid layer, or sub-canopy, of small trees may be present with scattered to dense shrubs. For example, *Melaleuca*, *Leptospermum* and related genera may form dense thickets beneath eucalypt canopies, or in gaps between trees. The mid layer may be sparser in lower rainfall areas, or where partially cleared, grazed or frequently burnt. The ecological community often has climbers extending into the mid-storey and canopy.

The ecological community generally has a more diverse and abundant groundcover than ecological communities in locally adjoining slopes. Its groundcover typically includes grasses,

¹ Crown cover is measured as the area within the vertical projection of the periphery of the tree crowns, where the tree crowns are considered to be solid (as per National Committee on Soil and Terrain (2009)).

forbs, ferns, sedges and scramblers. The intact ecological community may have high litter cover and fallen logs.

The local expression of the ecological community is influenced by its location relative to the riparian areas of the floodplain, frequency of inundation by stream flows, local climate, latitude, and the contribution of biota from surrounding areas. Hence there is regional variation and intergradation of key species, although the structure and function remain similar throughout the extent.

The ecological community typically forms mosaics with other floodplain forest communities, lowland woodlands and treeless wetlands.

Consultation Questions on the Description of the assemblage

- 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.
- Is the description of crown cover accurate to represent this community across the entirety of its range? If not, what alternatives would you suggest?
- Is the minimum crown cover of 20% appropriate – e.g., for clumps of large relictual trees, with native vegetation at their bases, but with a majority exotic understorey)? If not, what alternative would you suggest?

1.2.3 Functionally important species within the ecological community

The dominant canopy species of *Eucalyptus*, *Angophora*, *Corymbia*, *Lophostemon* and *Syncarpia* are functionally important across the range of the ecological community. These species play a key role in maintaining the forest structure and environment and supporting its biodiversity.

The eucalypt canopy provides protection from strong winds and storms, while also intercepting sunlight and precipitation, leading to a relatively sparsely vegetated understory layer. It moderates and stabilises the temperature and humidity in and beneath it. The combination of environmental conditions at various heights creates different microclimates, which provide specialised niches for other plants, fungi, birds, insects, and other animals. The large trees maintain soil stability, influence water table levels and cycle large volumes of nutrients via mycorrhizae and extensive root systems. As well as microclimates, the forest canopy with its branches and arboreal connections creates structural diversity which is vital for the survival of many animals. For example, many tree-dwellers escape ground predators by staying and moving in the canopy (Trimble 2019).

The generation length of these canopy species is likely to be similar to other eucalypt species (e.g., 60 – 100+ years), and is at least 70 years (Fensham et al. 2020). Generation length of long-lived or key species believed to play a major role in sustaining the ecological community is used to define future timeframes in the assessment criteria; for example, by considering the mean age of the parents of the current cohort of seedlings (TSSC 2017). Hence, this age is used to define the generation time for the species in responding to this criterion, while for restoration, the maximum allowable time for five generations of these species (to threshold of 100 years), is used to define the 'near future' (TSSC 2017).

Faunal components of the ecological community have equally important ecological roles to the flora. These include nutrient cycling, dispersal and/or burial of seeds and fungal spores and pollination provided by mammals, birds and insects.

Consultation Questions on the functionally important species

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

1.2.4 Flora

This section describes the assemblage of native vascular plant species that characterises the ecological community throughout its range. More comprehensive species lists are in Appendix A - Species lists. However, these lists do not include all the species that make up the ecological community and many sites may have species that are not mentioned in this Conservation Advice. At any one time, above-ground individuals of some species may be absent, but the species may be represented below ground in the soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers. The ecological community also includes micro-organisms, fungi and cryptogamic plants; however, these are less well documented (NSW SC 2010).

The floristic composition of Subtropical eucalypt forest on the floodplains of eastern Australia is primarily determined by the frequency and duration of waterlogging and the texture, nutrient and moisture content of the soil; composition also varies with latitude (NSW SC 2010).

Characteristic species may be abundant or rare, and are only a subset of all the species in the ecological community. Not all characteristic species are present at every site. The number and identity of species at different sites also vary because of disturbance and historical land use and biogeography. Contextual effects of adjacent vegetation are also important (i.e., the local species pool is strongly influenced by the surrounding vegetation).

The species recorded at a site can also be affected by sampling scale, survey season and effort and expertise. At some sites characteristic native species are now locally extinct; and/or non-characteristic species have established themselves, or have become more abundant. In general, the number of species recorded is likely to increase with the size of the site.

1.2.4.1 CANOPY SPECIES

The composition of the tree canopy varies across the extent of the ecological community. It is characterised by the dominance of eucalypt and other myrtaceous trees. It may be dominated by a single tree species, or by a mix of several tree species, from five genera that characterise the ecological community. These five genera are *Eucalyptus*, *Angophora*, and *Corymbia*, *Lophostemon* and *Syncarpia*.

The following are typical examples of tree species that may dominate, or co-dominate the canopy in areas across the ecological community's range, or locally:

- *Corymbia intermedia* (Pink Bloodwood)
- *Eucalyptus bancroftii* (Bancroft's Red Gum), *E. moluccana* (Grey Box), *E. siderophloia* (Grey Ironbark), and *E. tereticornis* (Forest Red Gum, Red Ironbark)
- North of the Macleay floodplain *Lophostemon confertus* (Brush Box) and *L. suaveolens* (Swamp Box/Turpentine) may be dominant, or co-dominant with other eucalypts (NSW SC 2010; Qld Herbarium 2021), or form part of the subcanopy.

- In Queensland *Syncarpia glomulifera* (Turpentine) may dominate, or co-dominate; for example, with *Eucalyptus resinifera* (Red Mahogany) in some areas, and with *Corymbia intermedia* (Pink Bloodwood) in others.

A wide range of other canopy species (from the 5 genera) have been recorded, the most frequent of which are *Eucalyptus carnea* (Thick-leaved Mahogany), *E. crebra* (Narrow-leaved Ironbark), *E. fibrosa* (Red Ironbark), *E. microcorys* (Tallowwood), *E. pilularis* (Blackbutt), *E. propinqua* (Grey Gum), *E. resinifera* (Red Mahogany) and *E. seeana* (Narrow-leaved Red Gum) (Tozer et al. in review).

Other canopy tree species may be present. In some areas rainforest trees such as *Ficus* spp. (figs), *Cupaniopsis* spp (tuckeroos) and *Glochidion ferdinandi* (Cheese Tree) may be prominent (NSW SC 2010, Qld Herbarium 2021). Other non-eucalypt tree species may also be part of the canopy (e.g., *Allocasuarina littoralis* (Black Sheoak) and *Livistona australis* (Cabbage Palm)); but they mostly occur as an open sub-canopy, as described in Section 1.2.2.1. *Eucalyptus robusta* (Swamp Mahogany) may occur but is not dominant in this ecological community; it is more typically found in low-lying permanently waterlogged (swampier) parts of the floodplain.

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

1.2.4.2 UNDERSTOREY SPECIES – MID-LAYER

Non-eucalypt tree species may be part of the ecological community as well, mostly as an open midstorey or sub-canopy. These, include: *Allocasuarina littoralis* (Black Sheoak), *A. torulosa* (Forest Oak), *Alphitonia excelsa* (Red Ash), *Brachychiton populosa* (Kurrajong), *Callistemon* spp. (bottlebrushes), *Casuarina cunninghamiana* (River Oak, River Sheoak) and *C. glauca* (Swamp Oak, Swamp Sheoak), *Elaeocarpus reticulatus* (Blueberry Ash, Blue Olive-berry), *Glochidion ferdinandi* (Cheese Tree), *Lophostemon confertus* (Brush Box), *Lophostemon suaveolens* (Swamp Box) and *Pittosporum revolutum* (Hairy Pittosporum) (NSW SC 2010, Qld Herbarium 2021).

A range of paperbarks may occur in the sub-canopy and shrub-layer of this ecological community, such as *Melaleuca decora* (White Feather Honey Myrtle), *M. linariifolia* (Flax-leaved Paperbark, Snow-in-summer) *M. quinquenervia* (Broad-leaved Paperbark), *M. nodosa* (Prickly-leaved Paperbark) and *M. styphelioides* (Prickly-leaved Tea Tree/ Paperbark) (NSW SC 2010, Qld Herbarium 2021).

Other common mid-layer species (small trees and scattered shrubs) include: *Acacia concurrens* (Curracabah), *A. disparrima* (Southern Salwood), *A. leiocalyx* (Black Wattle), *A. maidenii* (Maiden's Wattle), *A. melanoxylon* (Blackwood), *Breynia oblongifolia* (Coffee Bush), *Androcalva* spp. (syn. *Commersonia* spp.), *Hibiscus* spp. (Native Hibiscus), *Myrsine variabilis* (Muttonwood) and *Notelaea longifolia* (Native Olive) (NSW SC 2010, Qld Herbarium 2021).

A more comprehensive list of mid-layer species likely to occur in the ecological community are in Appendix A - Species lists.

1.2.4.3 UNDERSTOREY SPECIES - CLIMBERS AND SCRAMBLERS

Veronica plebeia (Trailing Speedwell) is found mainly in the ground-layer, whereas *Desmodium varians* (Slender Trefoil), *Glycine clandestina* (Twining Glycine), *Parsonsia straminea* (Common Silkpod), *Smilax australis* (Native Sarsaparilla) and *Stephania japonica* (Snake Vine) may climb into the sub-canopy or mid-layer. Other commonly occurring species include *Clematis glycinoides* (Headache Vine), *Cissus hypoglauca* (Water Vine), *Eustrephus latifolius* (Wombat

Berry), *Geitonoplesium cymosum* (Scrambling Lily), *Gynochthodes jasminoides* (Morinda Vine), *Hibbertia scandens* (Climbing Guinea Flower), and *Rubus parvifolius* (Native Raspberry) (NSW SC 2010, Qld Herbarium 2021).

A more comprehensive list of climber and scrambler species likely to occur in the ecological community are in Appendix A - Species lists.

1.2.4.4 UNDERSTOREY SPECIES – GROUND-LAYER

Given this is a floodplain ecological community there are several understorey species adapted to the alluvial soils and its comparatively higher soil moisture, compared to surrounding slopes. These species are mostly perennial forbs, grasses, sedges, rushes, low shrubs and ferns, including: *Centella asiatica* (Pennywort), *Cheilanthes sieberi* (Forest Fern), *Commelina cyanea* (Scurvy-weed), *Dichondra repens* (Kidney Weed), *Dianella caerulea* (Blue Flax Lily), *Entolasia marginata* (Bordered Panic), *E. stricta* (Wiry Panic), *Gahnia* spp. (Saw-sedge), *Lobelia purpurascens* (Whiteroot), *Lomandra filiformis* (Wattle Mat-rush), *L. longifolia* (Spiny-headed Mat-rush), *L. multiflora* (Many-flowered Mat-rush), *Microlaena stipoides* (Weeping Grass), *Oplismenus aemulus* (Creeping Shade Grass), *O. hirtellus* (Basket Grass), *Paspalum distichum* (Water Couch), *Viola banksia* (Wild Violet) and *Viola hederacea* (Ivy-leaved/ Native Violet) (Good et al. 2017; Keith & Scott 2005; NSW Scientific Committee 2010, 2011). In some areas grasses that may dominate the groundcover include: *Themeda triandra* (Kangaroo Grass), *Imperata cylindrical* (Blady Grass), *Cymbopogon refractus* (Barbed Wire Grass) and *Heteropogon contortus* (Black Spear Grass) (NSW SC 2010; Qld Herbarium 2021).

A more comprehensive list of ground-layer species likely to occur in the ecological community are in Appendix A - Species lists.

1.2.4.5 DERIVED NATIVE GRASSLANDS

Areas lacking canopy cover and/or tree regrowth are not considered part of this ecological community on their own. However, where a treeless area represents a small gap in, or is on the edge of a larger patch of the woodland, or where the tree layer is sparse between treed areas across a short distance, they are part of the ecological community (see also section 2.2.1 – Identifying a patch and section 2.2.2– Breaks in a patch).

1.2.5 Fauna species

The ecological community includes a wide range of fauna species: in the canopy and sub-canopy; on the ground; in the soil and subsurface; and those dependent on wetlands. The ecological community's wide variety of habitat is important for food, nesting, roosting and/or hunting (Law et al. 2000). It includes migratory species, particularly birds (e.g., *Caligavis chrysops* (Yellow-faced Honeyeater), *Zosterops lateralis* (Silvereye)). Fauna species play important roles in the ecological community, including pollination, seed dispersal and soil turnover.

Species may be abundant or rare and the lists do not include all the species that make up the ecological community (i.e., many sites may have species that are not mentioned in this Conservation Advice). Not all species are present at every site; and some species may be only sporadically present. The ecological community also includes many ecologically important invertebrate fauna species that are less well documented (e.g., gall forming insects, including flies, wasps, bugs and thrips).

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

1.2.5.1 Canopy and sub-canopy fauna

The eucalypt canopy includes a range of fauna species that depend on hollows and other habitat values supplied by mature plants. For example, the tree hollows and crevices that form in mature trees are of particular importance to arboreal mammals, birds, frogs, reptiles and invertebrates, including bees and butterflies (Good et al. 2017, Healthy Land and Water 2016, SEQ Catchments 2016a). Certain tree species, such as *Eucalyptus tereticornis* (Forest Red Gum / Queensland Blue Gum), are preferred by a broad range of species including bats, arboreal mammals and some reptiles (Gibbons & Lindenmayer 2002). Many of the diagnostic eucalypt species are also important feed trees for *Phascolarctos cinereus* (Koala), including *Eucalyptus amplifolia*, *Eucalyptus tereticornis* and *Eucalyptus viminalis* (NSW DECC 2008; NSW OEH 2018d). Koalas generally favour habitat on soils with higher fertility and soil moisture such as the ecological community, particularly during times of high temperature and drought (Ellis et al. 1995).

Arboreal mammals play important roles in the ecological community, including pollination and seed dispersal for native plants (Turner 1983). They include *Pseudocheirus peregrinus* (Common Ringtail Possum), *Trichosurus vulpecula* (Common Brushtail Possum), *Acrobates pygmaeus* (Feathertail Glider), *Petaurus australis* (Yellow-bellied Glider), *Petaurus breviceps* (Sugar Glider) and *Petaurus norfolcensis* (Squirrel Glider), while nationally threatened species include *Petauroides volans* (Greater Glider) and Koala. The state listed *Cercartetus nanus* (Eastern Pygmy Possum) is an active climber in the canopy and subcanopy. It feeds on nectar and pollen, especially from banksias, eucalypts and bottlebrushes. It also feeds on insects and will eat soft fruits when flowers are not available (NSW OEH 2017x). *Phascogale tapoatafa* (Brush-tailed Phascogale) preys on smaller mammals, birds, lizards and insects, as well as feeding on nectar from flowering trees in the ecological community (NSW OEH 2018a).

Coastal lowland forests are important foraging resources for flying foxes, for example the nationally-listed *Pteropus poliocephalus* (Grey-headed Flying-fox) is part of the ecological community across its entire extent (Eby & Law 2008). In autumn and winter they congregate on coastal lowlands north of the Hunter Valley; whilst in summer they spread further south. Together with *Pteropus scapulatus* (Little Red Flying Fox) and *Pteropus alecto* (Black Flying Fox), they feed primarily on nectar and pollen of eucalypt blossoms and are responsible for much of their pollination (DAWE 2020a, was DoEE 2019 in consult). Fringing forests are important as roosting sites for flying foxes; whilst other species may live in adjacent habitats and move through the ecological community to access water (Healthy Land and Water 2017).

Microchiroptera (micro-bats) frequently forage across the fertile floodplains and riparian corridors of the ecological community. Megachiroptera (megabats) species of the ecological community include *Syconycteris australis* (Southern/Eastern/Queensland /Common Blossom Bat (Law 1994) and *Myotis macropus* (Southern Myotis), both listed as Vulnerable in NSW. The former requires a year-round supply of nectar and pollen which is gathered from a mosaic of coastal complex vegetation types (NSW OEH 2020b). The latter is Australia's only true fishing bat. It may roost in small groups of 10 to 15 close to water in hollow-bearing trees, or dense foliage. It forages over streams and pools, catching insects and small fish by raking its feet across the water surface (NSW OEH 2017a).

Understorey plants influence bird diversity. For example, the shrubs and twiners provide shelter, nesting substrates, foliage and include seasonal flowers which attract birds and insects (SEQ Catchments 2016a). The nationally and state-listed *Anthochaera phrygia* (Regent Honeyeater) and *Grantiella picta* (Painted Honey-eater) inhabit eucalypt forests with a reliable

nectar supply, including those with Rough-barked Apple. Other birds likely to be present include other honeyeaters, cuckoos, owls, doves, whistlers, fairywrens, scrubwrens and fantails. The ecological community also includes a range of cockatoos, lorikeets, rosellas and parrots such as the Critically Endangered *Lathamus discolor* (Swift Parrot) that forage on flowers and psyllid lerps. During periods of drought, the ecological community is a particularly important refuge habitat for the Swift Parrot (Saunders & Tzaros 2011).

The ecological community includes birds of prey such as: *Haliastur indus* (Brahminy Kite), *Haliastur sphenurus* (Whistling Kite), *Haliaeetus leucogaster* (White-bellied Sea-eagle) and *Pandion cristatus* (Osprey) (Law et al. 2000; NSW Committee 2010; NSW OEH 2018a). It also includes *Ninox strenua* (Powerful Owl), *Tyto tenebricosa* (Sooty Owl) and *Tyto novaehollandiae* (Masked Owl), which are listed as Vulnerable in New South Wales. They prefer the more densely wooded areas of the ecological community (e.g., in the upper floodplain and riparian corridors) and roost and nest in large tree hollows near foraging areas. The Masked Owl often hunts along the edges of forests, including roadsides. Birds of prey feed on a wide range of animals, including rodents, small dasyurids, possums, gliders, bandicoots, rabbits, bats, birds, reptiles, fish and insects.

Some flowering plants provide large amounts of nectar in the ecological community. This attracts many insects (e.g., butterflies), which lay their eggs on the various food plants for larvae and nymphs, including *Acacia* spp. (wattles), *Lomandra* spp., sedges like *Gahnia* spp. and *Carex* spp. and the vine *Hardenbergia violacea* (Purple Coral-pea). For example, *Trapezites symmokus* (Symmokus Skipper), which is found across the whole extent of the ecological community feeds on *Lomandra* spp., most commonly *Lomandra longifolia* (Spiny-headed Mat-rush) (Braby 2004).

1.2.5.2 GROUND DWELLING FAUNA

The ground-layer vegetation provides food and shelter for a wide range of ground-dwelling animals, including kangaroos, wallabies, wombats, birds, native rats and mice, reptiles and many invertebrates. Prior to European settlement, some areas of the ecological community also supported large birds such as Emus and Bustards, that are now locally extinct in southeast Qld (SEQ Catchments 2016b) and rare in NSW.

In the understorey, clumps of grasses, forbs, ferns and sedges provide cover for small to medium sized ground dwelling animals such as: *Perameles nasuta* (Long-nosed Bandicoot), *Isodon macrourus* (Northern Brown Bandicoot), the threatened *Isodon obesulus* (Southern Brown Bandicoot), and *Tachyglossus aculeatus* (Short-beaked Echidna). The diverse understorey also provides habitat for animals that forage or dwell in nearby rainforest (SEQ Catchments 2016a). Species such as the threatened *Pseudomys novaehollandiae* (New Holland Mouse) live in communal burrows and are found in habitats that are often high in floristic diversity, especially with leguminous perennials (Haering & Fox 1997; Kemper & Wilson 2008). *Pseudomys novaehollandiae* feeds primarily on seeds, although leaves, fungi and invertebrates are consumed, based on seasonal or floristic characteristics of individual sites in the ecological community; it is thought to play an important role in seed and fungal spore dispersal (Seebeck et al. 1996; Smith & Quin 1996).

Predators such as the threatened *Dasyurus maculatus* (Spotted-tailed Quoll) are adept at moving through the canopy, as well as at ground level, preying on possums, rabbits, insects, lizards, crayfish, birds, small mammals, frogs and fish, as well as consuming plant material (Jones et al. 2001). *Antechinus agilis* (Agile Antechinus) and *Antechinus stuartii* (Brown Antechinus) are also part of the ecological community, living in forested habitats with dense ground cover and low

fire frequency. These small carnivores prey on invertebrates; and mostly nest communally in tree-hollows.

Lizards such as *Cyclodomorphus gerrardii* (Pink-tongued Lizard) are a part of the ecological community, sheltering beneath leaf litter, in hollow logs, and in rock and tree crevices. Their slender bodies and limbs are adapted to moving in thick undergrowth. Although only partially arboreal, *Cyclodomorphus gerrardii* is a good climber and uses its semi- prehensile tail as a supporting aid to climb trees to feed when necessary (Lindenmayer et al. 2002; Shea 2004).

1.2.5.3 SOIL FAUNA

The grasses, herbs, ferns and deep-rooted trees of the ecological community play a prominent role in: intercepting, storing and recycling nutrients; protecting soil from erosion; reducing stream sediment loads during high intensity rainfall events; and regulating ground water (SEQ Catchments 2016). A broad range of invertebrates and fungi are associated with the decomposition cycles in moist, shaded conditions on the forest floor (SEQ Catchments 2016a).

Ground-dwelling and burrowing mammals, such as bandicoots, *Vombatus ursinus* (Common/ Bare-nosed Wombat) and Short-beaked Echidna, play many important roles by digging and raking through soil. These include: the dispersal of fungal species important for plant growth; soil aeration and water infiltration; and the breakdown of leaf litter (Fleming et al. 2014). The alluvial soil of the ecological community may be an important indicator of suitability of habitat for species such as the threatened New Holland Mouse, with deeper top-soils and softer substrates preferred for digging burrows (Wilson & Laidlaw 2003).

1.2.5.4 WATER DEPENDANT FAUNA

The ecological community plays an important role in maintaining river ecosystems and riverbank stability; and it provides essential connectivity between the slopes and rivers, as well as longitudinally along rivers. As an interface between terrestrial and aquatic habitats, the ecological community includes species considered to be water-dependent, such as *Intellagama lesueurii* (Eastern Water Dragon), *Hydromys chrysogaster* (Water Rat), *Ornithorhynchus anatinus* (Platypus), turtles and frogs. The Eastern Water Dragon basks on branches of the trees overhanging streams and dives into the water to escape predators. Waterbirds such as cormorants (*Phalacrocorax* spp.), egrets (*Ardea* spp. and *Egretta* spp.) kingfishers, *Ephippiorhynchus asiaticus* (Black-necked Stork) are also part of the ecological community.

Aquatic ecosystems (e.g., ephemeral ponds, creek lines and floodplains) support amphibians, particularly several species of southern frog (family Myobatrachidae) and tree frog (family Hylidae) (NSW SC 2010). These include: *Adelotus brevis* (Tusked Frog), *Limnodynastes peronii* (Brown Striped-frog) and *Limnodynastes tasmaniensis* (Spotted Grass-frog), and the threatened *Litoria aurea* (Green and Golden Bell Frog), *Litoria brevipalmata* (Green-thighed Frog) and *Mixophyes iteratus* (Giant Barred-frog) (Littlejohn et al. 1993; Cogger 2000; MRCCC 2005; Healthy Land and Water 2016; SEQ Catchments 2016a; NSW TSSC 2010). Characteristic reptiles of the ecological community that feed on these frogs and other water-dependent species in the ecological community include *Pseudechis porphyriacus* (Red-bellied Black Snake), *Varanus varius* (Tree Goanna, Lace Monitor), and *Chelodina longicollis* (Eastern Long-necked Turtle).

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, particularly across its range? Are there particular species that are more representative in particular regions? The focus should be on characteristic, functionally-significant &/or commonly occurring species. Please provide your reasons (and references if available).
- Is the list of eucalypt and other myrtaceous trees the most appropriate one, in terms of contributions to dominance of eucalypt in the canopy? Should any be added or removed?
- What other examples are there of 'characteristic' non-eucalypt canopy species (e.g., non-rainforest species)?
- Do you agree with the fauna information? If not, how can it be clarified?
- Are there particular species that are more representative in particular regions?
- 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?

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 ecological community intergrades with other vegetation types and ecological communities (see section 2.2.7). Key diagnostic characteristics are used to identify an area of native vegetation as being the Subtropical eucalypt forest on the floodplains of eastern Australia, 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 diagnostic characteristics 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 in the New South Wales North Coast (NNC) and South Eastern Queensland (SEQ) IBRA² bioregions and on Curtis Island in the Brigalow North Bioregion (BBN)

² Interim Biogeographic Regionalisation for Australia (Subregions - States and Territories) Version 7.

- typically occurs in the lower parts of catchments of the eastern watershed of the Great Dividing Range;
- occurs at elevations up to 250 metres above sea-level (ASL), most typically below 50 metres ASL;
- occurs on alluvial landforms, including river floodplains, riparian zones (e.g., along riverbanks, lake foreshores and creek lines), the floors of tributary gullies, floodplain pockets, alluvial flats, fans, terraces, and localised colluvial fans, as well as localised depressions amongst low rises, and associated sites where water can pond (refer to section 1.2.1 and Appendix D – Landforms and soils);
- occurs on alluvial soils³ of various textures including silts, clay loams, sandy loams, gravel and cobbles. Does not occur on soils that are primarily marine sands, or aeolian sands;
- occurs as a tall closed-forest, tall open-forest, closed forest, open forest, tall woodland, or woodland (Specht 1970). The canopy has a crown cover⁴ of at least 20 percent⁵; and
- has a canopy dominated⁶ by one or a combination of species of *Angophora*, *Corymbia*, *Eucalyptus*, *Lophostemon* or *Syncarpia* tree species, but NOT dominated by *Eucalyptus robusta* (swamp mahogany).
- other canopy tree species may be present. In some areas rainforest trees may be prominent.

Consultation Questions on the key diagnostic characteristics

- Do you agree that these statements will clearly identify when the ecological community is present (e.g., does it ‘typically occur in the lower parts of catchments’)?
- Are the key diagnostic characteristics sufficient to differentiate the ecological community from other ecological communities? If not, how should they be modified?
- Given the breadth of the ecological community across the landscape, is the key diagnostic characteristic for soils appropriate? If not, what alternative would you suggest?
- Is the 20% measure for minimum crown cover appropriate (appropriate – e.g., for clumps of large relictual trees, with native vegetation at their bases, but with a majority exotic understorey)? If not, what alternative would you suggest?

³ See Appendix D – Landforms and soils for more information on soils.

⁴ Crown cover is measured as the area within the vertical projection of the periphery of the tree crowns, where the tree crowns are considered to be solid (as per National Committee on Soil and Terrain (2009)).

⁵ Recent disturbance, such as fire, may remove the living canopy and cause a shift to a regenerative state. Under these circumstances, the loss is likely to be a temporary phenomenon, if natural regeneration is not disrupted. This temporary regenerative state is included as part of the ecological community when the other diagnostic features and condition thresholds are met, even when crown cover is temporarily less than 20 percent. However, there should also be evidence that the dominant eucalypt/eucalypt-like species typical of the ecological community will regenerate from seedlings, saplings, lignotubers or from epicormic regrowth.

⁶ This is where one or a combination of species from any of the five genera 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).

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 diagnostic characteristics, but it can include small-scale variations, gaps and disturbances. The smallest patch size that can be identified is 0.5 ha because the key diagnostic characteristics cannot reliably be identified for smaller areas. Where a larger area has been mapped or classified as a different vegetation type (e.g., by state vegetation mapping), localised areas of the ecological community, 0.5 ha or more in size, may be present within this larger area.

It is also important to consider whether a patch of the ecological continues beyond the boundary of a particular area surveyed, or site for a particular development, or change of use - in order to assess and consider the patch is a whole.

Note that NSW vegetation assessment tools/methodologies define a patch differently - as including all intact native vegetation, which may include one or more ecological communities that have a gap of less than 100 m from the next area of moderate to good condition native vegetation. The national Threatened Species Scientific Committee uses the term 'patch' to describe a discrete area of a single ecological community.

2.2.2 *Breaks in a patch*

When it comes to defining a patch of the ecological community, allowances are made for "breaks" of up to 30 metres between areas that meet the key diagnostic characteristics. These breaks may be because of watercourses or drainage lines, tracks, paths, roads, gaps made by exposed areas of soil, leaf litter or cryptogams, and areas of localised variation in vegetation that do not meet the key diagnostic characteristics. For example, a single patch could include two areas of the ecological community on different sides of a watercourse. Breaks like this do not significantly alter the overall functionality of the ecological community and they are part of the patch. Watercourses or drainage lines, gaps made by exposed areas of soil, leaf litter or cryptogams, and areas of localised variation in vegetation should be included in the calculation of the size of the patch and when determining the overall condition of the patch. Tracks, paths, roads or other artificial surfaces or buildings should be excluded from the calculation of patch size and condition.

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

2.2.3 *Variation within a patch*

Patches of the ecological community may contain areas that vary in structural or biological characteristics. For example, one part of a patch may have more rainforest species, whereas another part of the same patch may be dominated by more dry sclerophyll species; or one part of a patch may have been more recently burnt and therefore at a different stage of regeneration. Variation, in canopy cover, condition or composition of vegetation, across a patch is not evidence of multiple patches, as long as the patch as a whole meets the key diagnostic characteristics.

2.2.4 *Revegetation and regrowth*

Restored (including reconstructed) sites, or areas of regrowth, are part of the listed ecological community, as long as the patch meets the key diagnostic characteristics. Their inclusion reflects the ecological community's ability to persist (and even flourish) if threats are managed and ameliorated.

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). See also section 5.3 Principles and standards for conservation and section 5.4.2 Restore and Manage the ecological community.

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), the New South Wales Native Vegetation Interim Type Standard (Sivertsen 2009), and the Queensland Methodology For Surveying and Mapping Regional Ecosystems (Neldner 2020) provide guidance, along with relevant local guidelines.

The size, number and spatial distribution of plots or transects must be adequate to represent variation across the patch. Sampling should account for 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. Plots of 0.04 ha (e.g., quadrats of 20 x 20 m) would be suitable to establish condition (Tozer 2003; Tozer et al. 2010).

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

Whilst identifying the ecological community and its condition is possible at most times of the year, consideration must be given to the role that season, rainfall and disturbance history may play in a survey/assessment of condition. For example, plant surveys conducted during spring and early summer will more easily identify understorey species; and after a fire, one or more vegetation layers, or groups of species (e.g., obligate seeders), may not be evident for some time. Ideally, surveys should be held in more than one season to maximise the chance of detecting all species present, particularly threatened species. In years of low rainfall, assessors should recognise that many species may not be detected. In these situations, it is preferable that surveys are carried out over more than one year.

Timing of surveys should allow for a reasonable interval (e.g., 6–12 months) after a disturbance (natural or human-induced) to allow regrowth to become evident; as well as being 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 in the patch, and when the disturbance occurred.

Surveys should also note any areas that are either in a significantly higher or lower condition, gaps in canopy cover and the condition categories that would apply across different parts of the site respectively.

Fauna surveys should be conducted following best practice guidelines such as the Survey guidelines for Australia's threatened mammals (DSEWPC 2011) or equivalent.

2.2.6 Mapping and vegetation classifications

Several mapping and vegetation classification schemes are used in NSW and Qld. Although none directly map areas of the ecological community according to the key diagnostic characteristics, they can still provide useful information on the likely occurrence of the ecological community.

In NSW the ecological community is related to a large number of Plant Community Types (PCTs). In Queensland the ecological community corresponds to a number of eucalypt-dominated Regional Ecosystems (REs) occurring on floodplains. Appendix B - Relationship to other vegetation classification and mapping systems outlines the map units or classifications from several common mapping and classification systems that best relate to the ecological community.

The boundaries of coastal ecological communities may change over time due to the dynamic nature of these systems. This ecological community is often found in association with other vegetation types such as, littoral rainforest, swamp oak forests, or swamp sclerophyll forests in a 'mosaic' of coastal floodplain ecological communities.

The characteristic features that distinguish this ecological community from other floodplain ecological communities within its range are:

- its dominant canopy of eucalypts and eucalypt-like trees;
- the sub-dominance or relatively low abundance of *Casuarina* and *Melaleuca* species, along with the relatively low abundance of *Eucalyptus robusta* (Swamp Mahogany).

2.2.7 Other relevant listed ecological communities

2.2.7.1 STATE-LISTED ECOLOGICAL COMMUNITIES IN NEW SOUTH WALES

New South Wales protects threatened ecological communities by listing them under the *Biodiversity Conservation Act 2016*.

Much of the ecological community in New South Wales corresponds to the NSW-listed 'Sub-tropical Coastal Floodplain Forest of the NSW North Coast bioregion' and there is potential for some patches in the south to correspond to the 'River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions' (NSW Scientific Committee 2010; 2011) if they meet the key diagnostic characteristics.

The ecological community may also adjoin or intergrade with several other NSW-listed endangered ecological communities, which collectively cover the remaining native vegetation on the northern coastal floodplains of NSW. These include Lowland Rainforest on Floodplain in the NSW North Coast bioregion, Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions, Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions and Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (NSW TSSC 2010).

2.2.7.2 REGIONAL ECOSYSTEMS RECOGNISED AS THREATENED IN QUEENSLAND

Queensland does not have a legislative mechanism for listing ecological communities. However, Regional Ecosystems (REs) are assigned a status under the *Vegetation Management Act 1999*. Components of this ecological community are recognised as **Endangered** under this framework, including:

RE 12.3.3 - *Eucalyptus tereticornis* woodland on Quaternary alluvium

RE 12.3.3a - *Eucalyptus crebra*, *Corymbia tessellaris* woodland to open forest

RE 12.3.3d - *Eucalyptus moluccana* woodland

RE 12.3.10 - *Eucalyptus populnea* woodland on alluvial plains

RE 12.3.18 - *Melaleuca irbyana* (Swamp Tea-tree) low open forest on alluvial plains

RE 12.3.19 - *Eucalyptus moluccana* and/or *E. tereticornis* and *E. crebra* open forest to woodland.

RE 12.3.20 - *Melaleuca quinquenervia*, *Casuarina glauca* +/- *Eucalyptus tereticornis*, *E. siderophloia*, *M. styphelioides* open forest on low coastal alluvial plains

2.2.7.3 OTHER NATIONALLY-LISTED THREATENED ECOLOGICAL COMMUNITIES

Several other nationally-listed threatened ecological communities occur in, or close to, areas of the Subtropical eucalypt forest on the floodplains of eastern Australia.

As soil salinity increases the ecological community may intergrade with, and be replaced by, the Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland (Keith & Scott 2005). As soils become sandier and more waterlogged, the ecological community may intergrade with, and be replaced by, the Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland (e.g., forests with abundant *Melaleuca* spp. and/or *E. robusta* on sandy textured soils and poor drainage). The boundaries between all of these ecological communities are dynamic and may shift in response to changes in hydrological regimes, fire regimes or land management practices. Table 1 lists these ecological communities and their status at the time of listing.

Table 1: Nationally-listed threatened ecological communities that can intergrade or overlap with the Subtropical eucalypt forest on the floodplains of eastern Australia

Ecological community name	EPBC Status
<u>Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland</u>	Endangered
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Under assessment
<u>Lowland Rainforest of Subtropical Australia</u>	Critically Endangered
<u>Swamp Tea-tree (<i>Melaleuca irbyana</i>) Forest of South-east Queensland</u>	Critically Endangered
<u>Littoral Rainforest and Coastal Vine thickets of Eastern Australia</u>	Critically Endangered

Source: DAWE 2021b

Consultation Questions on the additional identification information

- How could we improve on the information provided to assist with identifying the ecological community?
- Is 0.5ha appropriate as a size threshold for the smallest patch size of the ecological community that can be reliably identified?
- Please comment on survey requirements, including post fire survey.
- Is the list of corresponding map units complete and accurate?
- The ecological community likely only corresponds to a small fraction of these map units. Do you have any information on the proportion of these map units that are likely to represent the ecological community?
- Have all relevant listed ecological communities been included?

2.3 Condition classes, categories and thresholds

Landuse 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, relatively natural 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 (MNES) 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 MNES, to which the referral, assessment, approval and compliance provisions of the EPBC Act apply. These include all patches in Classes A, B and C.

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

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

When assessing condition of a patch of the ecological community it is important to also consider the key diagnostic characteristics (section 2.1) and patch definition information (section 2.2).

The broadest area that meets the key diagnostic characteristics of the ecological community should be used in determining patch condition. Where condition falls below the minimum thresholds, the next largest area, or areas, that meet key diagnostic characteristics and minimum

condition thresholds should be specified and protected. This may result in multiple patches of the ecological community being identified within the overall area first considered. Areas of high, good or moderate condition may then be identified within patches if that is useful.

Recent disturbance by fire is likely to result in the ecological community presenting in a temporarily altered state that may include severely reduced canopy cover, simplified vegetation structure, resprouting trees and shrubs that have been partially or completely topkilled and may lack several obligate seeder species that must complete the primary juvenile phase following fire. This condition is likely to be temporary and if effects are severe consider postponing survey until a later date , or else projections should be made by inference from species life histories.

Table 2: Condition categories, classes and thresholds

Patch size thresholds → Biotic thresholds ↓		Large patch Patch size ≥2 ha	Small contiguous ⁷ patch ≥ 0.5 ha within a larger area of native vegetation ≥ 5 ha	Small patch Patch size ≥ 0.5 ha
Vegetation	Arboreal mammals			
HIGH CONDITION ≥ 80% of its total perennial understorey vegetation cover ¹ is comprised of native species AND Ground cover richness ² ≥ 10 native species per sample plot AND ≥ 20 large trees ³ per ha.		CLASS A1 Large patch with high quality understorey and many large trees	CLASS B1 Small patch with high quality understorey and many large trees	
GOOD CONDITION ≥ 50% of its total perennial understorey vegetation cover ¹ is comprised of native species AND Ground cover richness ² ≥ 6 native species per sample plot AND At least 10 large trees ³ per ha.	AND ≥5 species of arboreal mammals ⁴ detected ⁵ using the patch.	CLASS A2 Large patch with good quality understorey, large trees and evidence of arboreal mammals	CLASS B2 Small patch with good quality understorey, large trees and evidence of arboreal mammals	
	AND ⁸ <5 species of arboreal mammals ⁴ detected ⁵ using the patch.	CLASS B3 Large patch with good quality understorey and large trees	CLASS C1 Small patch with good quality understorey and large trees	
MODERATE CONDITION Ground cover richness ≥ 6 native species per sample plot ² AND At least 6 large trees ³ per ha.		CLASS C2 Large patch with moderate quality understorey and some large trees		Not protected
Notes: ¹ 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, shrubs and juvenile plants of canopy species, but does not include annual plants, cryptogams, plant litter or exposed soil. ² Ground cover richness includes combined species richness of native grasses, forbs, ferns and sedges per 0.04 ha (20 x 20 m sample plot). 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 across the patch as a whole, or for large patches, in plots of at least 0.1ha. ⁴ For the purposes of this calculation, evidence of any number of micro-bat species (Microchiroptera) found in the patch counts as one species of arboreal mammal. ⁵ Survey guidelines (DSEWPC 2011). ⁷ 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). ⁸ i.e., Arboreal mammals not surveyed, or threshold not met.				

Consultation Questions on the condition classes, categories and thresholds

- How can we improve on the proposed condition information?
- Is the proposed patch sizes appropriate?
- Are the proposed *measures* (large trees, groundcover species richness, weediness, arboreal mammals) appropriate to distinguish between patches of different condition?
- Are the proposed *thresholds* for these measures appropriate to distinguish the different condition classes?
- Are the proposed minimum condition thresholds appropriate?

2.4 Habitat critical to the survival of the ecological community

The habitat requirements for an ecological community include areas with the necessary physical, geological and climatic conditions, as well as the necessary biological conditions. These conditions are often provided by the ecological community itself, in this case the main vegetation structure. Thus the habitat for some species in the community can be provided by other species in the community. For example, the habitat for some species, such as fauna or understorey vegetation, can be provided by other species, particularly the canopy trees or other plants that provide the main vegetation structure.

The habitat or areas most critical to the survival of the ecological community are those patches that are in condition classes A and B (see Table 2). These represent those parts of the ecological community closer to the benchmark state of the ecological community. They are the patches that retain a higher species richness and a more intact structure (e.g., many large trees), and they typically have a higher chance of persisting over the long-term.

However, this does not mean that areas that meet the minimum condition thresholds (i.e., Class C in Table 2) are unimportant for the survival of the ecological community. Many of these patches occur in locations, or landscape positions, that are particularly important for biodiversity or function, and/or they may contain suites of species, or habitat features, that are important in a regional or local context (see section 2.5). Hence some of these areas are likely to also be critical to the survival of the ecological community. They also have the potential to recover, or be restored, to a higher condition.

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat at this time.

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 EC occur within any areas of Commonwealth Land? If so, which of those areas should be considered for the Critical Habitat Register under section 207A of the EPBC Act upon listing this EC?

2.5 Areas of high value - surrounding environment and landscape context

For natural resource management activities or actions that may have 'significant impacts' and require approval under the EPBC Act, it is important to consider the entire landscape context and environment surrounding patches of the ecological community. Patches of the ecological community do not occur in isolation. The surrounding vegetation and other landscape considerations will also influence how important a patch is to the survival of 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; it also adds to their viability. However, these are not the only factors to consider.

For example, in heavily cleared areas, some patches that meet the minimum condition thresholds occur in isolation. These patches need protection and could benefit from revegetation activities to link them with other patches. In other areas, patches that are connected 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 are connected to other native vegetation have a better chance of survival and restoration success, because they 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. They may be based on on-site observations, or on known past management history.

- Patches that meet or are closest to the better condition for this ecological community (classes A and B); particularly those which have been subject to low or no impacts (such as light grazing), and those which retain more hollow bearing trees.
- Patches with a low incidence of weeds, more 'mature habitat trees' (e.g., with more hollows) and a more diverse understorey, and/or those that support arboreal mammals.
- Patches with a larger area to boundary ratio – such patches are more resilient to edge effect disturbances such as weed invasion and human impacts.
- Patches in, 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 the 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). For example, tree canopy species are present in a range of sizes from saplings to large hollow-bearing trees.

- 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 that include 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 that do not experience grazing or show low-levels of disturbance caused by grazing by domestic livestock or feral herbivores.
- Patches with relatively low levels of weeds and feral animals or areas where these can be managed efficiently.

Additionally, areas such as buffer zones around patches (see information on buffer zones in Section 5.4.1.4), particularly adjoining native vegetation, and areas that meet the description of the ecological community but not the condition thresholds, can also be important to the survival of the ecological community. They should still be taken into consideration as part of the surrounding environment and landscape context.

Consultation Questions on the areas of high value

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

3 Cultural significance

3.1 Indigenous cultural values and uses associated with the ecological community

The Subtropical eucalypt forest on the floodplains of eastern Australia occurs on Country (the traditional lands) for several Indigenous / First Nations peoples including the: Biripi, Dainggatti, Gumbaynggirr, Bundjalung, Yuggera, Waka, Gubbi Gubbi, Badtjala, Gureng, Gangula and Bayali. 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 Indigenous Australians 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 Indigenous Australians 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.

Indigenous peoples have occupied the floodplains, coastal flats, creeks, rivers, estuaries and sea Country of eastern Australia for tens of thousands of years. The landscape provides a direct link to their traditional spiritual and material culture and has considerable cultural heritage values to Traditional Owners/custodians.

Indigenous Australians have an ongoing interest in continuing to use traditional land management practices to protect important areas and resources. The ecological community has many cultural values and important cultural land management practices required to keep it healthy — like cultural burning, camping and resource use. Places, cultural values and practices, ecological features, timing/seasons, and Indigenous language are all intrinsically linked to the ecological community and the broader Indigenous landscape. For example, the flowering times of certain plants (the shedding of tree bark, or other cyclical events) are used to indicate when to move from one camp to another.

Living and camping places are usually geographically close to resource collection places, as are teaching and work places. When natural resources are collected and processed, Elders pass on traditional ecological knowledge to the next generation, teaching them how to collect and prepare food, medicines or items of material culture (Donaldson 2010). Other important places with Indigenous heritage significance include places of conflict, travelling routes, historical Aboriginal Reservations, burial places and spiritual places.

Eucalypt trees of the ecological community have had a broad array of uses including as: gum for chewing, dying, and medicine; ash rubbed into the skin for soothing young mothers; where bees, honey and wax can be found; hollow logs for fish-traps, hard timber for weapons and utensils; bark for shelter, canoes, embalming, and containers. Some species contained water; others were used to create smoke for sending signals. Some species indicated an unsuitable camp-site, and others indicated the likelihood of finding koalas and possum as game (Fensham 2021). Further details are in Appendix C – Indigenous Australians and cultural values associated with the ecological community.

The understorey and ground cover plants also provide food and shelter for food animals. Climbers and scramblers, like native sarsaparilla were used to relieve pain, arthritis and coughs and to make a tonic that purifies the blood and manage diabetes. The shoots of Scrambling Lily, another vine, were eaten. Other important plants that are part of the ecological community include ferns, Myrtle and Kurrajong.

The creeks and rivers found in the ecological community also support other culturally important animals like turtles, eels and fish, frogs, lizards, as well as Black Duck and other water birds. Kangaroos or wallabies could be trapped in the forests and eggs gathered from the nests of birds (Arrawarra Sharing Culture Project 2014; Australian Museum Consulting 2015; English 2002; Mathew 1910; Maynard 2014; Smith 2011; Wesson 2009). Some animals of the ecological community have spiritual significance as totems and symbols of Dreaming.

Sources include: NSW NPWS (2014); Moore (2019); Donaldson (2010).

Consultation Questions on the cultural significance

For Traditional Custodians:

- Do you have any information you are willing to share about the cultural significance of the ecological community, forests in the area generally or the country that supports the ecological community?
- Do you know any people or organisations we could contact in the NSW Northern Rivers or South East Queensland who may have information they are willing to share?
- Do you know of any books, articles or online resources about the relevant Indigenous Peoples relationships with forests or the landscape you think would be sources of appropriate information?

4 Threats

The Subtropical floodplain eucalypt forest has primarily been impacted by: clearing and the selective harvesting of the dominant canopy species; altered fire and hydrological regimes; livestock grazing; weeds; invasive fauna (pests); climate change; disease, pathogens and dieback (e.g., Bell Miner associated dieback (BMAD)); and human disturbance.

Most of the remaining patches of the ecological community occur on productive agricultural land, and/or in coastal areas, where continuing population growth and urban development is expected. Historically, clearing was primarily for timber and agriculture, and actions such as culling of native fauna were undertaken largely to support agricultural productivity. Clearing is continuing for agriculture, residential and industrial development and for fire protection (e.g., along property boundaries and roads (State of NSW 2021)). The nature of some areas of the ecological community has changed structurally because of clearing, followed by regrowth that is likely to be subject to altered fire and hydrological regimes and livestock grazing and trampling. Disturbance from increased urbanisation and recreational activity is also a problem.

Additional potential threats include the impact of the decline in pollinator species, particularly long-range pollinators such as flying-foxes.

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 **Error! Reference source not found.** Although presented as a list, in reality these threats often interact cumulatively.

Table 3: Summary of threats facing the ecological community

Threat factor	Threat Status*	Threat impacts
Clearing	<i>Timing:</i> Ongoing <i>Severity:</i> Extreme <i>Scope:</i> Whole	Eastern floodplains were severely cleared and modified, primarily for agricultural development, following non-indigenous settlement. Large areas of forested floodplains are now occupied by exotic pastures grazed by cattle, or occupied by market gardens, turf and other cropping enterprises. Overall, more than 70 percent of native vegetation on the coastal floodplains in New South Wales has been destroyed since non-Indigenous settlement (Keith 2004; Keith & Scott 2005; Good et al. 2017). As the ecological community occurs on the most productive parts of the floodplain landscapes, it is likely that an even greater portion of this ecological community has been cleared. Early clearing for agriculture also included tree-felling for timber. Outside of reserves (which contain an estimated 10 percent of the area of the ecological community), land clearing is an ongoing threat, with coastal development continuing across much of its range. Recent clearing typically happens at local scales, but amounts to a large overall impact. Clearing for agriculture continues today as rural enterprises and hobby farms have expanded into the upper reaches of floodplains. Major cities, rural centres and coastal towns continue to expand, with the construction of new housing estates, industrial development and recreational facilities displacing alluvial forests and other adjacent native vegetation.

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Threat factor	Threat Status*	Threat impacts
Fragmentation legacies	<i>Timing:</i> Ongoing <i>Severity:</i> Major <i>Scope:</i> Whole	Native vegetation on eastern floodplains is often degraded and has a fragmented distribution. Few remaining patches are large enough on their own to provide sufficient species and genetic diversity to ensure the ecological community's long-term survival. This is especially so for some of the most representative habitat of the ecological community (e.g., the broad areas that flood less often on larger floodplains between the riparian zone and hills). In contrast, many of the largest and most intact remnants are on the margins of the large floodplains, or occur as long linear remnants in the riparian zones; or in localised depressions within other types of forest ecosystems. The historic loss of patches of the ecological community, plus the decreased size of remaining patches, lead to a greater vulnerability to threats and to the negative impacts of edge effects. When patches are isolated, in modified landscapes, with a higher incidence of introduced plants and feral animals, they are more susceptible to further degradation and are less amenable to successful recovery actions. Habitat value declines if the remnants become too small and isolated to support a diversity of flora and fauna. Increased separation of patches is likely to limit regeneration and colonisation opportunities and so reduce genetic diversity within patches. This is because many understorey plants have restricted seed dispersal or seed longevity, or rely on overbank flows for dispersal; while many fauna (e.g., ground-dwelling reptiles and birds with small ranges) have limited ability to move between sites if they are too distant and/or separated by large expanses of unfavourable habitat. Where this ecological community persists as long, narrow patches along rivers and waterways, the edge effects can be even greater. Small or linear patches have a large edge to area ratio which is likely to allow the introduction of weeds and incursions by feral animals, and alter microclimates, making the ecological community more vulnerable to damage during droughts, floods or other extremes.
Livestock grazing	<i>Timing:</i> Ongoing <i>Severity:</i> Minor <i>Scope:</i> Minority	The ecological community suffers from overgrazing, trampling, weed invasion and other soil disturbance by domestic livestock, which are known to have a strong negative influence on riparian and floodplain vegetation (Good et al. 2017). Domestic livestock are known to preferentially browse grasses, followed by forbs, and will also browse woody shrubs and trees when resources become scarce, such as during drought (Pah 2019). Grazing pressure and impacts are exacerbated by the provision of more available water sources (bores, tanks and troughs), with grazing by domestic stock more likely to occur near to watering points. This leads to concentrated trampling of vegetation and soil and the selective removal of vegetation because livestock preferentially browse the more palatable species (Lunt 2005). Heavy grazing can lead to reduced plant diversity with the most grazing sensitive grasses and forbs disappearing earliest in a sequence of decline; it also disturbs the soil, which often prevents seeds from successfully germinating (Cole et al. 2004). The ecological community is susceptible to degradation by overgrazing and stock accessing waterways, causing vegetation loss (grazing and trampling), soil compaction (hard hoofed stock), riverbank erosion/collapse, disturbing sediments and increasing nutrient levels.

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Threat factor	Threat Status*	Threat impacts
Weeds	<i>Timing:</i> Ongoing <i>Severity:</i> Major <i>Scope:</i> Whole	Invasion by non-native plants, including transformer weed species, is a major threat to this ecological community (Keith & Scott 2005; Tozer et al. 2010; NSW OEH 2020a). Transformer weeds are highly invasive taxa with the potential to seriously alter the structure and function of the ecological communities they invade, thereby 'transforming' them into a different system. In this ecological community they particularly include camphor laurel (<i>Cinnamomum camphora</i>), groundsel bush (<i>Baccharis halimifolia</i>), exotic vines and scramblers (such as lantana, cats-claw creeper (<i>Dolichandra unguis-cati</i>) and Madeira vine (<i>Anredera cordifolia</i>)), and exotic perennial grasses (such as cocksfoot (<i>Dactylis glomerata</i>), paspalum and fountain grass (<i>Cenchrus setaceus</i>)). Studies in wet sclerophyll forests near the NSW coast demonstrated that heavy invasion by lantana is accompanied by a loss of species richness and composition, and was apparent across different vegetation lifeforms – herbs, vines, shrubs and trees (Gooden et al. 2009a, b). Impacts were greater for juvenile than adult forms, indicating that lantana limits the natural recruitment of native species (Gooden et al. 2009a). There also appeared to be an impact threshold whereby native species richness declined markedly when the cover of lantana increased above 75 percent (Gooden 2009b). The high levels of fertility and moisture make the ecological community prone to invasion by a number of environmental weeds that have a capacity to alter nutrient cycling, species composition, structure, habitat values and fire regimes in the ecological community (Good et al. 2017). Impacts include a reduction in native plant species richness and a lower abundance of certain bird feeding guilds (Cousens et al., 2013). Floodplain ecological communities are also susceptible to weeds following natural disturbance such as flooding. Weed seeds can be transported by water, wind, birds and other animals. Once established, weeds can change nutrient cycling, species composition, vegetation structure, habitat values, soil chemistry, mycorrhizae and fire regimes in the ecological community (NSW Scientific Committee 2010; Good et al. 2017). Many weeds have the potential to invade patches that are close to urban settlements. Invasion is often the result of physical disturbance; dumping of landfill/rubbish and garden refuse; naturalised garden plants which have escaped cultivation; construction of roads and other utilities, polluted runoff from urban and agricultural areas and grazing by domestic livestock. Physical disturbance reduces the ability of native plants to compete with invading species, while also directly providing bare soil and resource to allow non-native species to establish. Highly invasive coastal weeds have a range of detrimental impacts on native flora and fauna, for instance reduction in native plant species richness and lower abundance of certain bird feeding guilds. The invasion of weed species will continue under future climate change, where different suites of invaders may become problematic (Duursma et al. 2013; Roger et al. 2015).
Invasive fauna	<i>Timing:</i> Ongoing <i>Severity:</i> Major <i>Scope:</i> Majority	The ecological community is subject to a range of negative impacts from invasive animals. These include: predation, habitat destruction through trampling and soil disturbance, competition and disease transmission by feral pigs; predation, disease transmission and spread of invasive plant species by dogs, foxes, cats, and other feral (or domestic) predators; grazing and trampling pressures from rabbits, unmanaged goats, deer and other feral herbivores, which can leave the ecological community open to erosion and weed invasion (Davis et al. 2008; Davis et al. 2016); adverse competitive, or lethal impacts to faunal elements, such as from cane toads, feral honeybees, over-abundant noisy miners and other aggressive birds and insects; and Bell Miner associated dieback (BMAD), is also present through forests on public and private lands throughout the range of this ecological community (Silver & Carnegie 2017).

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Threat factor	Threat Status*	Threat impacts
Diseases and pathogens	<i>Timing:</i> ongoing <i>Severity:</i> Minor <i>Scope:</i> Majority	A number of diseases and pathogens can affect the eucalypt canopy of the ecological community, including dieback resulting from <i>Armillaria</i> root rot caused by <i>Armillaria</i> spp. (honey fungus). Infection by myrtle rust (<i>Austropuccinia psidii</i>) is also a threat to trees and shrubs in the Myrtaceae family in the ecological community, including some common midstorey species (Makinson 2018; Makinson et al 2020). While there are unlikely to be major impacts, rust infection has impacted localised areas and susceptible species, particularly those adjacent to lowland/littoral rainforest. Dieback caused by <i>Phytophthora cinnamomi</i> is a potential threat to the ecological community. This plant pathogen can spread easily, causing disease, death and potential extinction in susceptible plants, and loss of habitat for animals. It appears to be widespread in coastal forests (Arentz 1974; Blowes 1980; Gerrettson-Cornell 1986; McDougall & Summerell 2003). The ecological community includes a wide range of amphibians that are at high risk from Chytridiomycosis caused by chytrid fungus (<i>Batrachochytrium dendrobatidis</i>) (DoEE 2016a). Psittacine beak and feather disease (Psittacine Circoviral Disease) is a threat to bird species in the ecological community (DoEE 2016b).
Hydrological changes	<i>Timing:</i> Ongoing <i>Severity:</i> Extreme <i>Scope:</i> Majority	The ecological community is detrimentally impacted by changes to hydrology, including from dam construction, flood mitigation and drainage works, water extraction and river regulation. In addition, water has been diverted for crop irrigation and to fill farm dams (Keith & Scott 2005, Qld DES 2016). The impacts are not only in the immediate area they also occur for significant distances downstream. Alteration of the natural flow regimes of rivers, streams and wetlands is recognised as a major factor contributing to loss of biological diversity and ecological function in aquatic ecosystems and their associated floodplains (NSW Scientific Committee 2002). Hydrological changes created through levee and weir construction, artificial drainage and irrigation, can also trigger oxidisation in acid sulfate soils (NSW OEH 2020a). This has the potential for severe negative impacts on the vegetation and fauna of the ecological community, as well as water quality. These impacts include changes in species composition, declines in population and shifts in food resources after natural flooding patterns are impacted by the diversion of water. Declining food resources include a lower abundance of vegetation and fewer invertebrates on floodplains that inundate less frequently after their natural flow regimes are disrupted. Urbanisation of the landscapes that adjoin the ecological community may also have significant hydrological effects. The 'hardening' of surfaces through activities such as road building and urban development surrounding the ecological community results in increased runoff (and less infiltration and water retention). This changes stream flow patterns, causing erosion and the runoff often penetrates adjacent bushland. It can carry high nutrient and sediment loads, which encourage weed invasion (NSW DEC 2005; NSW DECCW 2010a).

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Threat factor	Threat Status*	Threat impacts
Climate change	Timing: Ongoing Severity: Major Scope: Whole	Major impacts of climate change are likely to be played out through interactions with other threatening processes, including habitat loss and degradation, invasion of exotic species and changes to hydrological and fire regimes (Auld & Keith 2009; Dunlop & Brown 2008). A generally warming and drying climate in southern and eastern Australia is likely to significantly reduce run-off to coastal rivers and streams within the range of the ecological community (DCC 2009). Climate change is likely to intensify drought events (Dai 2012; Mitchell et al. 2016), which may exacerbate mortality in eucalypt populations. Some functionally important fauna species of the ecological community, such as Little Red Flying fox and Grey-headed Flying fox, can suffer heat stress, with reported deaths when temperatures exceed 42°C (reference needed). Latitudinal 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 coastal development, the availability of suitable soil types, or competition with other vegetation communities (Paice & Chambers 2016). Groundwater salinity is considered a potential influence of regrowth dynamics for the ecological community. This can be affected by both altered hydrology and potentially sea water incursion as result of rising sea-levels (Keith & Scott 2005).
Inappropriate fire regimes (including fires which cause a decline in the biota)	Timing: Ongoing Severity: Major Scope: Unknown, likely Majority	Fire regimes have changed throughout the extent of the ecological community in association with the growth of agriculture and urban development. Fire may be used to promote regrowth (green pick) for livestock and for hazard reduction management, both of which can increase fire frequency. The amount of fallen timber and other plant litter can be diminished during such burns. Arson can also be an issue, particularly on urban fringes. Alternately, fire management, altered land practices, fragmentation and other vegetation changes can decrease fire frequency. In some areas, high intensity or too frequent fires may slow or prevent regeneration of some species in the ecological community and lead to lower species richness. Sustained high frequency fire will lead to a loss of eucalypts and other plant species, a reduction in vegetation structure and a corresponding loss of animal species in the ecological community (NSW OEH 2017b). Severe fires and the resulting habitat changes are likely to detrimentally impact on resident fauna such as koalas, bandicoots, gliders and potoroos (Tozer et al. 2010; NSW OEH 2017b). Even in areas where vegetation recovers quickly, the loss of animal species detrimentally impacts on the short-term recovery and long-term health of the ecological community, as animals provide essential functions such as soil turnover and seed dispersal. Fires' frequency, intensity and size are expected to increase under climate change as temperatures rise, rainfall variability increases, droughts become more severe and ecosystem dynamics alter, resulting in changed biomass fuel loads and types. The projected hotter, drier, windier conditions associated with climate change would extend the period of fuel drying and increase rates of fire spread (Harrison & Kelley 2017). In addition, climate change will broaden the seasonal window of fire occurrence, particularly from human ignitions. Mega-fires, such as those experienced in the 2019-2020 fire season, can burn a significant proportion of an ecological community and the surrounding vegetation in a single event, which compounds these detrimental impacts. Almost 15 percent of the ecological community was burnt in 2019-20, based on the Australian Google Earth Engine Burnt Area Map (DAWE 2020e).

Threat factor	Threat Status*	Threat impacts
Urban heat effects	<i>Timing:</i> Ongoing <i>Severity:</i> Unknown <i>Scope:</i> Minority	Urbanisation can also result in an 'urban heat island effect' whereby heat is absorbed then radiated by urban structures, such as houses and paved, concreted and asphalted areas, leading to elevated temperatures. With increased temperatures and less soil moisture, the small remnant occurrences of the ecological community in built landscapes are not sufficient to cool the surrounding environment. The altered local micro-climate may, in turn, adversely impact patches of the ecological community in and adjacent to urban developments. This process operates in addition to any temperature rise due to global climate change.
Vegetation and firewood removal	<i>Timing:</i> Ongoing <i>Severity:</i> Minor <i>Scope:</i> Minority	In rural-residential areas, patches of the ecological community are often mown, slashed or scrubbed for bushfire fuel reduction, grazing and perceived aesthetics. These activities can deplete the soil seed bank (James 1994) and contribute to the spread of weeds. Firewood collection and the removal of woody debris also damage the ecological community. They are likely to interact with the effects of drought, fire and overgrazing by further contributing to disturbance and exacerbating impacts. For example coarse woody debris influences leaf litter moisture content and soil conditions, moderating the effects of drought on soil moisture (Goldin & Hutchinson 2014) and on fire behaviour. Further, interactions between selective timber removal and livestock grazing may alter bird assemblages, e.g., increasing the abundance of aggressive birds such as the noisy miner (<i>Manorina melanocephala</i>) (Eyre et al. 2009). Trampling, loss of habitat for fauna and interruption to other natural processes such as decomposition are also an issue. The majority of this community EC occurs on private land or other tenure where firewood harvesting potentially occurs.
Disturbance from urbanisation and recreational activity	<i>Timing:</i> Ongoing <i>Severity:</i> Major <i>Scope:</i> Minority	The threat of recreational activity includes detrimental impacts from a range of activities where people access areas of the ecological community. Visitor disturbance results in soil compaction and disturbance, erosion from foot, cycle, trail bike and four-wheel drive tracks, fishing and boat ramp access points, the introduction of pests and the creation of new planned and unplanned tracks. Increased visitation to adjacent watercourses results in increased demand for and use of visitor facilities, such as walking tracks, viewing platforms, toilet blocks and picnic areas. Other negative impacts in such areas include the dumping of cars, rubbish and garden waste, which can cause weed infestation. There are also a number of cumulatively detrimental impacts from urbanisation and recreational activity, such as vehicle strikes on species such as koalas, predation or disturbance by domestic animals, rubbish dumping and bush rock removal.
*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 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 Scope – the threat is affecting the whole (>90%), a majority (>50%), a minority (<50%), a negligible amount, or unknown amount of the ecological community		

4.1.1 Key threatening processes

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

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

- Land clearance

- Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants
- Novel biota and their impact on biodiversity
- Predation, habitat degradation, competition and disease transmission by feral pigs
- Predation by feral cats
- Predation by European red fox
- Competition and land degradation by rabbits
- Competition and land degradation by unmanaged goats
- Aggressive exclusion of birds from potential woodland and forest habitat by over-abundant noisy miners (*Manorina melanocephala*)
- Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species
- Infection of amphibians with chytrid fungus resulting in chytridiomycosis
- Dieback caused by the root-rot fungus (*Phytophthora cinnamomi*)

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.

5 Conservation of the ecological community

5.1 Primary conservation objective

To mitigate the risk of extinction of the Subtropical eucalypt forest on the floodplains of eastern Australia, and to help recover its biodiversity and function. To do this by protecting it from significant impacts as a Matter of National Environmental Significance under national environmental law, and by guiding implementation of management and recovery. To do this in ways that are consistent with the recommended priority conservation and research actions set out in this advice.

5.2 Existing protection and management plans

5.2.1 Existing protections

5.2.1.1 EXISTING PROTECTIONS AS OTHER MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

An estimated 1.5 percent of the ecological community occurs in world heritage areas (Gondwana rainforest of Australia and Great Barrier Reef). An estimated 0.2 percent of the ecological community occurs in Ramsar areas (Great Sandy Strait, Moreton Bay and Myall Lakes) (DAWE 2021).

5.2.1.2 EXISTING PROTECTION IN RESERVES

Despite a number of reserves containing the ecological community, its position in the landscape means only a relatively small area of the ecological community has been included in formal conservation reserves, typically on localised, sheltered river-flats between hills, rather than the large open floodplains that comprised the majority of its original extent.

It is estimated that around 10 percent of the remaining ecological community occurs in conservation reserves; this represents three percent of the estimated original extent of the ecological community (DAWE, 2021). These reserves include Banyabba, Bulburin, Bundjalung, Bungawalbin, Burrum Coast, Curtis Island, Deepwater, Eurimbula, Fortis Creek, Great Sandy, Kewilpa, Karuah, Limeburners Creek, Lockyer, Maria, Myall Lakes, Stotts Island, Ukerebagh, Wongi and Yuraygir (NSW TSSC 2010; DAWE 2021 [Qld Herbarium 2021](#)).

5.2.2 Existing management plans

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

A number of existing plans relate to management and/or recovery of the ecological community, or its component species. Please refer to the relevant agency's website for any updated versions or new information that has been published.

5.2.2.1 STATE MANAGEMENT PLANS

Plans prepared for the management and/or recovery of the ecological community (or its component vegetation units and state-listed equivalent communities).

A Saving Our Species Strategy for the NSW state-listed threatened ecological community that aligns with the Subtropical eucalypt forest on the floodplains of eastern Australia ecological community was developed by the NSW Department of Planning, Industry and Environment. Please refer to the relevant agency's website for any updated versions or new information that has been published.

- NSW OEH (Undated). Saving Our Species - Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion. Accessed 21/9/21.
<https://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10944>

The Queensland Regional Ecosystem Description Database (REDD) (Qld Herbarium 2021) has fire guidelines for each regional ecosystem (Qld RE), at
<https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/descriptions/download>

5.2.2.2 RECOVERY, THREAT ABATEMENT AND WILDLIFE CONSERVATION PLANS

- NSW DECCW (2008a). Threat abatement plan for predation by the European red fox. Commonwealth of Australia.

www.environment.gov.au/biodiversity/threatened/publications/tap/predation-european-red-fox

- DEWHA (2008b). Threat abatement plan for competition and land degradation by unmanaged goats, Commonwealth of Australia.
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- DoE (2015a). Threat abatement plan for predation by feral cats. Commonwealth of Australia. www.environment.gov.au/biodiversity/threatened/publications/tap/threat-abatement-plan-feral-cats
- DSEWPC (2011). Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads. Commonwealth of Australia, Canberra.
www.environment.gov.au/biodiversity/threatened/publications/tap/threat-abatement-plan-biological-effects-including-lethal-toxic-ingestion-caused-cane-toads
- DoEE (2018). Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi* – 2018 Commonwealth of Australia, Canberra.
www.environment.gov.au/biodiversity/threatened/publications/threat-abatement-plan-disease-natural-ecosystems-caused-phytophthora-cinnamomi-2018
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<https://www.environment.gov.au/biodiversity/threatened/threat-abatement-advice/beak-feather-disease>
- DoEE (2016c). Threat abatement plan for competition and land degradation by rabbits. Commonwealth of Australia.
www.environment.gov.au/biodiversity/threatened/publications/tap/competition-and-land-degradation-rabbits-2016
- DoEE (2017). Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*). Commonwealth of Australia.
www.environment.gov.au/biodiversity/threatened/publications/tap/feral-pig-2017
- Australian Pork Limited (2021). The National Feral Pig Action Plan 2021 – 2031.
<https://feralpigs.com.au/the-plan/#ActionPlan>
- Silver, MJ and Carnegie AJ (2017). An independent review of bell miner associated dieback. Final report prepared for the Project Steering Committee: systematic review of

bell miner associated dieback.

<https://www.environment.nsw.gov.au/resources/vegetation/bell-miner-associated-dieback-independent-review.pdf>

- NSW DECC (2008). Recovery plan for the koala (*Phascolarctos cinereus*). <https://www.environment.nsw.gov.au/research-and-publications/publications-search/recovery-plan-for-the-koala-phascolarctos-cinereus>
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5.2.2.3 PLANS RELATING TO CULTURAL HERITAGE MANAGEMENT AND/OR INDIGENOUS PROTECTED AREAS (IPAS)

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Consultation Questions on existing protections and management plans

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

5.3 Principles and standards for conservation

To undertake priority actions to meet the conservation objective, the overarching principle is that it is preferable to maintain existing areas of the ecological community that are relatively intact and of high condition. There are good, practical reasons to do so. It is typically more cost-

effective to retain an intact remnant than to allow degradation and then attempt to restore it or another area. The more disturbed and modified a patch of the ecological community, the greater the recovery effort that is required. Also, intact remnants are likely to retain a fuller suite of native plant and animal species, and ecological functions. Certain species may not be easy to recover in practice, if lost from a site.

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

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

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

Standards Reference Group SERA (2021) – Appendix 2.

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

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

5.4 Priority conservation and research actions

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

- planning, management and restoration of the ecological community by landholders, NRM and community groups Traditional Owners/Custodians and other land managers (including local and/or state governments);
- 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 5.2.2.

More specific guidance regarding restoration of the ecological community, or information that is regionally specific, may become available. Restoration ecology is continually developing. So, it is important to reflect on the experience of others involved in restoring the ecological community, or other eucalypt or floodplain communities, as well as adapting restoration projects as site-level experience accumulates.

To achieve cost-effective investments in conservation management it is important to consider the likely interaction of the various management actions being undertaken at any one site, because these may be synergistic or antagonistic. There are also likely to be interactions between sites. Additionally, when allocating management resources it is important to consider what is the minimum investment required for success and the follow-up required to secure long-term recovery (e.g., for how many years should weed management be repeated).

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.

- Protecting the ecological community should be ensured 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 minimised as part of broader strategic planning or large projects (e.g., including 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 been greatly reduced in its extent.

- Protect and conserve remaining areas of the ecological community.
- Retain other native vegetation remnants, near patches of the ecological community, where they are important for connectivity and diversity of habitat, or act as buffer zones between the ecological community and threats or development zones.

- Protect patches identified as of regional importance by including them in formal conservation reserves. Consider other remnants for less formal conservation tenures, preferably ones that aim for long-term protection. 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 (e.g., wildlife corridors and migration routes).
- Identify Travelling Stock Reserves where the ecological community occurs and work with Local Land Services to manage these areas for conservation purposes.
- Where regeneration is occurring, support the regeneration to maturity (e.g., provide fencing to minimise damage risk).
- Protect mature and over-mature trees and stags⁷, particularly with hollows. Large and old trees typically have numerous hollows or fissures that provide shelter and support a diversity of animals, particularly insects and their predators.

5.4.1.2 *PLAN STRATEGICALLY TO MINIMISE FURTHER CLEARING*

- Remnants Patches of the ecological community should be properly protected during the early stages of zoning and development planning decisions, including strategic planning documents at state, regional and local levels.
- Liaise with local councils and State authorities to ensure that the ecological community, buffer areas and linkages that provide connectivity between patches and/or other vegetation communities, are identified and protected.”
- Liaise with local councils and State authorities to ensure that cumulative impacts on the ecological community are reduced as part of broader strategic planning or large projects (e.g., road works, developments).

5.4.1.3 *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 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 condition 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.
- High and good condition areas (Table 2) should not be offset. Where impacts are unavoidable to moderate condition patches, offsets should be used as a last resort to compensate for the adverse impacts of the action deemed unavoidable. The outcomes of

⁷ A standing, dead or dying tree, often missing a top, or most of the smaller branches.

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 good and high condition patches (classes A and B in Table 2) of the ecological community, rather than offset them (particularly with lower condition 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 condition patches of the ecological community to achieve high 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 (such as powerlines or telecommunications infrastructure) in or immediately adjacent to patches of the community that will encourage fire-hazard reduction activities, or preclude any future ecological burns in the ecological community.
 - 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 (e.g., tree 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.

5.4.1.4 APPLY BUFFER ZONES

- Protect and apply appropriate buffers, particularly of other native vegetation, around patches of the ecological community to minimise impacts arising off-site. A buffer zone is a contiguous area adjacent to a patch that is important for protecting the integrity of the ecological community. The risk of indirect damage to an ecological community is usually greater where actions occur close to a patch. One purpose of the buffer zone is to minimise this risk by absorbing and reducing impacts on the ecological community. They

also guide 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.

- A buffer zone of at least 50–60 m (beyond the canopy of the outermost trees in the patch) helps protect the patch from many potential adverse impacts (Smith & Smith 2010). This distance accounts for likely influences on the root zone. A larger buffer zone (e.g., 100 m) should be applied, where practical, to protect patches of high conservation value, or where indirect impacts are more extensive. Judgement should be exercised to determine an appropriate buffer distance, depending on circumstances and how a patch may be detrimentally impacted.
- Implement a water sensitive design that benefits the ecological community, such as planting of buffer zones to trap nutrients and the design and installation of detention basins that have an ecological value so that hydrology is improved. Encourage Councils and other land managers to plan holistically when installing water infrastructure.

5.4.1.5 *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.
- Encourage landholders/managers to engage in weed identification and intervention, and to implement prevention measures using current best management practices. Encourage landholders/managers to identify weed threats early by monitoring invasion pathways.
- Engage with Local Government and Local Land Services to minimise impacts from weed spraying activities when managing roadsides in or adjacent to the ecological community.
- Use an integrated weed management approach to control transformer weeds species. Where appropriate use a staged approach and use methods that reduce off-target damage. Control of weeds should include all problematic species. Schedule regular follow up work to maintain effective weed management.
- Prevent planting of known or potentially invasive species in gardens, developments and landscaping near the ecological community; particularly of known transformer weeds, or bird-dispersed species. For example, avoid planting highly invasive rainforest species in or around patches where rainforest species are uncommon or absent in the understorey.
- Avoid the sale of known invasive species in areas where the ecological community occurs.
- Prevent dumping of garden waste into bushland, especially in or near patches of the ecological community.
- 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 2015c?).
- 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; exotic species seeds (e.g., from cattle fodder, or from other areas), can be spread in their manure and by adhering to their coats. Provide advice and support to landholders/managers to assist with this.
- 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. Restoration actions should be based on the best available knowledge and scientific research to maximise positive biodiversity outcomes.

- Engage and liaise with landholders/managers, NRM and community groups, Traditional Owners/Custodians and governments to support, undertake and promote programs that ameliorate threats such as grazing 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.
- 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.
- Control introduced pest animals through coordinated landscape-scale control programs. For example, work with relevant authorities to suppress rabbit, pig, deer, goat, cat and fox numbers (and red imported fire ants and yellow crazy ants), in line with regional pest management strategies.

- Implement best practice measures to control, prevent and restore Bell Miner associated dieback. Follow recommendations in Silver & Carnegie (2017).

5.4.2.2 *MANAGE TRAMPLING, BROWSING AND GRAZING*

- Strategically timed reductions in grazing pressure are essential to ensure periodic recruitment and renewal of the tree layer. Grazing in the ecological community should cease during episodes of seedling establishment. Fencing may be required for exclusion of stock and native herbivores, until seedlings are at least 2 m high. Protection of individual seedlings by installing herbivore guards may be the most appropriate means for managing tree recruitment.
- The ecological community naturally has a variety of understorey structural and floristic characteristics. In some cases, occasional grazing may be used to reduce exotic grass cover and manage shrub regeneration — encouraging native grass and herb growth. It may be used to help manage some weeds, such as African olive. However, effects must be closely monitored and grazing carefully managed in accordance with recommendations for biodiversity conservation, because grazing is more typically associated with a loss of biodiversity in grassy ecosystems (Dorrough et al. 2004).
- Ensure that the timing of grazing enables the regeneration of native plant species. Allow moderate to high intensity grazing for a short period of time (usually in early spring) and wherever possible avoid grazing during peak native plant flowering and seeding times for many species (late spring and summer).
- Promote native pastures as grazing best management practice.
- Integrate appropriate grazing management regimes with fire management requirements.
- Construct wildlife friendly fences to exclude overgrazing and that incorporate a buffer to protect patches and allow for recruitment and enhanced connectivity.
- Remove (access to) non-essential sources of water and manage remaining watering points to reduce total grazing pressure on the ecological community, for example, with appropriate fencing.
- Firewood cutting and other uses which may be acceptable in dry forests are not appropriate in this ecological community.

5.4.2.3 *MANAGE OTHER ACTIVITY AND ACCESS CAUSING DEGRADATION*

- 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.
- Limit or prevent access of vehicles to patches of the ecological community (e.g., install bollards, gates, and/or fencing at strategic locations and/or use deterrent signage).

5.4.2.4 *MANAGE APPROPRIATE FIRE REGIMES*

Fires (including planned burns) 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 and facilitate control of exotic species; avoid impacts from suppression and mop-up operations, and; avoid increased impacts of other threats such as drought, prolonged heavy grazing or predation by feral predators. Isolated faunal populations and threatened plants are particularly vulnerable to local extinction following intense fires combined with other threats.

- Manage fire appropriately, including actions to protect individual hollow-bearing trees, in patches of the ecological community.
- Implement appropriate fire management regimes for the ecological community and for the surrounding landscapes. Use both indigenous knowledge and scientific research results.
- Where hazard reduction burns, or prescribed fires, are undertaken near 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 patches of the ecological community that would benefit from reinstating appropriate fire frequency to prevent further declines because of either too low, or too high, fire frequency.
 - For areas affected by too low fire frequency, identify opportunities for applying appropriate ecological burns, including with traditional knowledge and practices.
 - For areas 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 antecedent fire history, life histories of species within the community, forecasts of drought, post-fire management plans for herbivores and predators, patch size, habitat features (e.g., protect hollow-bearing trees and large logs), vegetation structure and the surrounding landscape (including property protection) to sustain biological diversity, maintain refuges for fauna (during and after fire) and increase habitat variability.
 - Ensure that an invasive species risk assessment and evidence-based management program is planned and budgeted-for ahead of proposed burning to ensure adequate protection of post-fire regeneration from invasive species.
 - Use available ecological information to avoid detrimental fire impacts on key and susceptible species in the ecological community. For instance, do not burn areas in or 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 in, or adjacent to, the ecological community when soil moisture is low, or dry conditions are predicted for the coming season. Otherwise, already stressed flora and fauna will struggle to

recover 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 threats in an appropriate timescale (e.g., immediately: put in place erosion control measures; limit access by feral predators and grazers; and control weeds as they first appear, with follow up treatments as necessary, until native vegetation has regenerated). Ensure monitoring results are considered when planning and implementing future fire regimes. For further information on monitoring priorities see section 5.4.4.3.

5.4.2.5 *UNDERTAKE RESTORATION*

There are opportunities for private landholders, Government agencies, bush regenerators and community groups, Traditional custodians and others to work together to strategically maintain and where possible improve the extent and condition of ecological community. The overall aim of any restoration actions is to develop ecosystem resilience through restoration of representative flora and fauna diversity, natural structural elements, and function of the ecological community over the long term, while avoiding deleterious management interventions that alter restoration trajectory.

Across the range of the ecological community consider opportunities to facilitate natural regeneration to increase its area and improve ecological function. While the ecological qualities of regenerated, and particularly of planted areas may not match those of intact remnants, these areas can still contribute to functioning landscapes that in turn aid the persistence of higher condition patches of the ecological community. Ensure that more intensive management approaches, such as planting do not preclude opportunities for natural regeneration. As part of restoration activities, also manage other threats such as grazing, fire, and invasive animals as outlined above. Directly involve or seek advice and guidance from suitably qualified and experienced bush regenerators and Traditional custodians when planning and carrying out restoration works – from seed collection and propagation to invasive species management, re-planting and other restoration activities.

- Undertake restoration, including facilitating regeneration and revegetation, of poorer and moderate and good condition patches to restore them to high condition. This includes the 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).
 - Identify which areas are best revegetated with seedlings or seed, as residual chemicals and nutrients in the soil of agricultural areas can suppress germination of native species for many years (up to five years in some agricultural areas).
 - Restoration should aim to establish species from the full suite of life-history successional characteristics (e.g., pioneer species, through to mid-late successional species) and create resilient soil and understorey conditions, to promote natural regeneration and recovery from disturbance (e.g., storms).

- Support natural regeneration before planning and implementing replanting programs (e.g., using fenced areas, weed and pest control, and fire). Replant areas where natural regeneration has not been successful.
- Work with landholders/managers 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.
- Identify sites prone to sea-level rise impacts and use as a genetic source (seed collection) for retreat sites at higher locations. Identify higher sites as re-establishment sites and work with land managers to establish these.
- 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 account of 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, 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; but take account of access required (e.g., by elderly Indigenous traditional custodians to cultural sites).
- Where appropriate habitat is available, and predators and competitors can be sufficiently controlled, re-introduction of some fauna species, including those supporting important ecological functions may be possible.
 - Consider the size of the gene pool and interactions with naturally occurring populations when introducing fauna.
 - Where key ecological services formerly provided by fauna are known to be limited or missing, consider any opportunities to replicate these.
- 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.

- Support and enhance existing programs for carbon mitigation across the entire range of the ecological community to inform restoration.
- Implement effective adaptive management regimes using information from available research and management guidelines, for example, see the National Standards for the Practice of Ecological Restoration in Australia (Standards Reference Group SERA, 2017), relevant research or advice from local authorities.

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, schools, volunteers, Indigenous communities and other community members.

5.4.3.1 *RAISE AWARENESS*

This may be done through the distribution of relevant publications, erecting interpretive signs at strategic locations, school programs and establishing a demonstration site for the ecological community.

- Communicate with and educate landholders/managers, relevant agencies, groups and the public about the ecological community. Emphasise: its value; its significance and its key threats (such as continued clearing, altered hydrology, other human disturbance, and pests and weeds); the importance of its protection and restoration; and appropriate management actions.
- Encourage the activities of, and seek support from, local restoration groups, State-based conservation organisations as well as national groups.
- With permission, include culturally appropriate information on traditional knowledge and values in education and awareness programs, publications and signage.
- Encourage landholders/managers to talk with local NRM organisations and other knowledgeable groups to promote cooperation to protect and restore patches of the ecological community
- 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).

5.4.3.2 *INFORM LANDHOLDERS/MANAGERS 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. GATHER AND 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 about the ecological community. Identify and support culturally appropriate mechanisms to share this knowledge to protect and restore the ecological community.
- Install signage to discourage damaging activities such as the removal of dead timber, dumping garden waste and other rubbish, creating informal paths and tracks, and the use of off-road vehicles in patches of the ecological community.
- Install significant vegetation markers along roads to designate areas of the ecological community to protect and prevent inappropriate road side maintenance from occurring.
- Promote knowledge about local weeds and what garden plants to avoid planting. Recommend local native species for revegetation and landscaping or safe alternative garden plants. Discourage nurseries and DIY stores from selling weed species.

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.
- Engage with sympathetic landholders and utilise peer-to peer learning with other landholders (NSW OEH Undated).
- 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 protects remnants, with due regard to principles for long-term conservation;
 - land owners and developers, to minimise threats associated with land conversion and development;
 - local councils and state authorities, to ensure infrastructure or development works involving substrate or vegetation disturbance do not adversely impact the ecological community - this includes avoiding the introduction or spread of weeds.

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, management and protection. Relevant and well-targeted research and other information gathering activities are important in informing the protection and management of the ecological community.

- Develop an improved understanding of Traditional Ecological Knowledge; and identify and support culturally appropriate mechanisms to share this knowledge to protect and restore the ecological community.
- Investigate the responses of key plants and animals to alternative fire regimes. Consider the effects on reproduction and identify limits of survival.
- Investigate potential impacts of climate change on the current distribution and future habitat suitability of important species within the ecological community.
- Investigate the impact of climate change on flowering phenology and plant/animal interactions (i.e., pollination networks).

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.
- Identify and map the fire interval status of the ecological community and surrounding fire-dependent and/or fire sensitive vegetation.
- Comprehensively map and monitor the extent and condition of the ecological community across its range:
 - support targeted field surveys and interpretation of other data, such as aerial photographs and satellite images; more accurately document current extent, condition, threats, function, presence, and use by regionally significant or threatened species; ground-truth to fill data and knowledge gaps, including knowledge of the different 'states' and recovery from different disturbances.
 - support and enhance existing programs to model the pre-1750 extent across the entire range of the ecological community to inform restoration; and
 - identify the most intact, high conservation value remnants and gain a better understanding of variation across the ecological community;
 - identify and map at high accuracy and spatial resolution the fire history/interval status 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*

- Investigate key ecological interactions, such as the role of fauna in pollination, seed dispersal and nutrient cycling.
- Conduct research into the role of fire in this ecological community, including understanding the:
 - current fire frequency status in each management area, by comparing time since fire across the ecological community;
 - ecological consequences of fire-exclusion, including identifying critical thresholds in the process of canopy closure, ground-layer displacement and rainforest invasion;

- role of low intensity fires in maintaining an open vegetation structure and in the ongoing recruitment of open-forest species; and
 - development of rainforest-invaded stands, in order to improve understanding of their rate and trajectory of development, to evaluate departure from fire-maintained reference states.
- Improve understanding of habitat requirements of resident and transient fauna.
 - Conduct research into appropriate and integrated methods to manage pests and weeds that affect the ecological community.
 - Assess the vulnerability of the ecological community to climate change and investigate ways to improve resilience through other threat abatement and management actions.
 - Improve understanding of how fire regimes affect life history processes and population dynamics of component flora and fauna, including indirect effects through interactions with threats posed by periodic droughts, invasive species and other threats.
 - Use improved knowledge of fire ecology to investigate the efficacy of alternative fire management strategies for conservation of the community on different land tenures and land uses.
 - Conduct research leading to the development of effective landscape-scale restoration techniques for the ecological community, incorporating Traditional Ecological Knowledge.
 - 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 incursions by new weeds and pest animals.
 - Monitor for signs of decline, in terms of known problems e.g., dieback due to pathogens and pests, and new incursions, e.g., myrtle rust, phytophthora.
 - Monitor changes in the condition, composition, structure and function of the ecological community, including response to all types of management actions and use this information to increase understanding of the ecological community and inform recommendations for future management.

Consultation Questions on the priority actions

- Is this list of proposed priority actions to conserve this ecological community complete and appropriate?
- Is there any evidence to inform fire management that would maintain the ecological community?

6 Listing assessment

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

6.1 Reason for assessment

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

6.2 Eligibility for listing

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

6.2.1 Criterion 1 – decline in geographic distribution

Eligible under Criterion 1 for listing as **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:

The Subtropical eucalypt floodplain forest has been extensively cleared and modified since European settlement. It has been estimated that at least 70 per cent of native vegetation on the coastal floodplains of NSW has been destroyed since European settlement (Keith 2004; Keith & Scott 2005; Good et al. 2017). Along with lowland/littoral rainforests and swamp oak floodplain forest, this ecological community appears to have been more heavily depleted than the other floodplain assemblages (Keith & Scott 2005). Large areas of floodplain, that formerly supported this ecological community, are now occupied by exotic pastures grazed by cattle, market gardens, other cropping enterprises (e.g., sorghum, corn, poplars, etc.) and, further north, by canefields and tea-tree plantations.

In recent years, clearing rates have been highest in southern Queensland and northern New South Wales (Bradshaw 2012 in Good et al. 2017). In the Tweed lowlands, Pressey and Griffith (1992) estimated that in 1985, less than 3 percent of the original floodplain wetlands and forests remained. Similar estimates are likely to apply in other parts of the NSW North Coast bioregion (Goodrick 1970, Pressey 1989a, 1989b, NPWS 1999 in NSW Determination). Qld Herbarium

(2021) notes that areas of the ecological community have been cleared for grazing, agriculture and pine plantations, and that habitat has been fragmented by land uses such as horticulture and rural residential. Less than nine per cent of the *Eucalyptus tereticornis* woodland on Quaternary alluvium (Qld RE 12.3.3) remains in south eastern Queensland (SEQ Catchments 2016).

An analysis of NSW Plant Community Types (PCTs) and Queensland Regional Ecosystems (REs) representative of the ecological community⁸ provided an estimate of the current extent of the ecological community as being up to 265,000 ha; with an estimated 73 percent reduction from its original extent (of up to 979,000 ha, prior to European settlement) (DAWE 2021, based on NSW DPIE 2021, NSW DPIE 2020, Qld Herbarium 2021). These estimates do not take the minimum condition thresholds into account, so it is likely that the current extent of the ecological community is less than 27 percent of its estimated original extent.

This represents a **severe** decline in geographic distribution. The Committee therefore considers that the ecological community has met the relevant elements of Criterion 1 to make it eligible for listing as Endangered.

6.2.2 Criterion 2 – limited geographic distribution coupled with demonstrable threat

Ineligible under Criterion 2

	Category		
	Critically Endangered	Endangered	Vulnerable
Its geographic distribution is:	very restricted	restricted	limited
<i>Extent of Occurrence (EoO)</i>	<100 km ²	< 1,000 km ²	< 10,000 km ²
<i>Area of Occupancy (AoO)</i>	<10 km ²	< 100 km ²	< 1,000 km ²
<i>Average patch size</i>	<0.1 km ²	< 1 km ²	
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	the near future	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

⁸ DAWE (2021), based on NSW DPIE 2021, NSW DPIE 2020, Qld Herbarium 2021). Using areas of 55 (potential) matched PCTs that occur in 'NSW Coastal Floodplain Forests' (CFF) in the NNC & SEQ IBRA bioregions and areas of 17 matched QLD RE's (see Appendix B - Relationship to other vegetation classification and mapping systems* for details on selected map units). Not all areas identified as these state vegetation units will meet the definition for the ecological community.

* NSW PCTs: 3060, **3067**, 3087, 3088, **3102**, 3139, 3142, 3160, 3162, 3171, 3174, 3241, 3242, 3249, 3251, 3322, 3323, **3420**, 3421, **3428**, 3431, 3434, **3435**, **3436**, 3548, 3551, 3553, 3557, 3561, 3563, 3564, 3567, 3568, 3569, **3574**, 3582, 3796, 3898, **3984**, 3991, **4002**, **4003**, 4005, **4020**, **4021**, **4032**, **4034**, **4036**, 4039, **4042**, 4043, **4045**, **4046**, 4077 and 4087; and Qld REs: 12.3.2, 12.3.2a, 12.3.3, 12.3.3a, 12.3.3d, 12.3.4a, 12.3.7, 12.3.9, 12.3.10, 12.3.11, 12.3.11a, 12.3.11b, 12.3.12, 12.3.14a, 12.3.15, 12.3.18 and 12.3.19 (PCTs in **Bold** are those in Appendix B, Table 7).

Evidence:*Extent of occurrence*

The ecological community occurs from just north of Newcastle NSW (around Raymond Terrace) in the south, to just north of Gladstone Qld. Its estimated extent of occurrence (EoO) is 18,400,000 ha / 184,000 km² (DAWE 2021). This is not considered to indicate a **limited** geographic distribution by this measure.

Area of occupancy

The estimated total area of occupancy of the ecological community is 265,000 ha / 2,650 km² (DAWE 2021). This is not considered to indicate a **limited** geographic distribution by this measure.

Patch sizes

Patch size thresholds are highly sensitive to mapping scale. In the absence of guidance as to a valid scale of mapping for this threshold, it has not been assessed.

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 dominant canopy species of *Eucalyptus*, *Angophora*, and *Corymbia*, *Lophostemon* and *Syncarpia* (eucalypt and eucalypt-like species) are functionally important across the range of the ecological community (see Section 1.2.3).

The loss of large trees with hollows reduces other parts of the ecological community such as arboreal mammals, insectivorous bats and other species that rely on tree hollows.

None of the key eucalypt or eucalypt-like species of the ecological community are listed⁹ as threatened under the EPBC Act. However, an assessment of 822 Australian eucalypt species against IUCN Red List criteria by Fensham et al. (2020) concluded that two canopy species in the

⁹ At the time of this advice.

ecological community (*Eucalyptus longifolia* and *E. moluccana*) qualified as threatened (in the Vulnerable category).

Faunal components of the ecological community, such as digging and arboreal mammals, birds and insects are important for nutrient cycling, dispersal of fungi, seed dispersal and/or burial, water infiltration, and pollination. Several threatened fauna species occur in the ecological community, but only a few are identified as of particular functional significance across its range. Birds and arboreal mammals such as flying foxes feed on the nectar and pollen of native blossoms, spreading seeds and pollinating native plants. The Grey-headed Flying-fox (*Pteropus poliocephalus*) is listed as Vulnerable (following an estimated 30 percent decline in abundance over a decade); it has also suffered more recent large declines due to heat stress (TSSC 2001; NSW OEH 2019). As a key pollinator of the ecological community (SCEE 2017), this decline may impair the regeneration of key vegetation species in the ecological community. Even where vegetation is regenerating, regrowth trees lack the hollows found in older trees limiting faunal habitat, ecological complexity and functionality.

Other species that have likely suffered significant declines, are likely to be locally important to the functioning and health of the ecological community in different areas, but are not necessarily important across the full range of the ecological community. This is because different species fulfil these ecological functions in different areas. For example, foraging by various bandicoot species and wombats is important in maintaining the health of the ecological community. They dig in the leaf litter and soil to find insects (bandicoots), fungi, plant root nodules and bulbs (mixing and aerating the soil and litter, and recycling nutrients). They also eat fruit, seeds and other plant material on the ground (acting as a dispersal agent and further recycling nutrients).

Overall, there has been significant loss of components of the ecological community. However, data to support an analysis against this criterion (and its indicative thresholds), for decline in a particular functionally important species is 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:

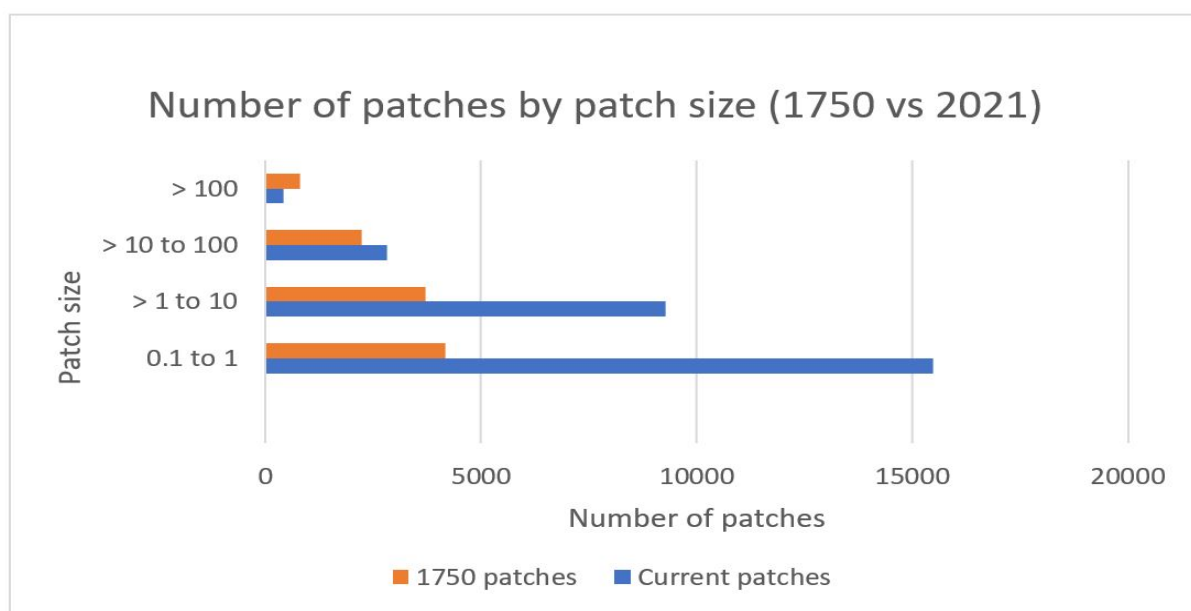
The ecological community has undergone severe changes in structure and function as a result of the threats outlined in Section 4. The ecological community has experienced a reduction in integrity across most of its extent primarily because of:

- Changes to hydrological regimes;
- Fragmentation and edge effects;
- Weed invasion and invasive fauna;
- Loss of native fauna; and
- Altered fire regimes.

Fragmentation and edge effects

Small remnants of this ecological community are often vegetation that is left in a cleared landscape; for example, as small strips along rivers and creeks which were less suitable for development. The large open floodplains that comprised the majority of the original habitat have been largely cleared, with more patches left on localised, sheltered river flats between hills (Keith 2004). This has resulted in generally smaller and narrower patches, with an increased distance between patches and the isolation of some patches in a matrix of modified land use.

The ecological community was naturally patchy pre-1750, because of its position in a mosaic of floodplain ecological communities. The estimated pre-1750 median patch size is 2.15 ha, almost 3 times its current value (DAWE 2021). However, patches have been further fragmented by clearing and degradation. Figure 1 shows that the number of large patches of the ecological community (greater than 100 ha) has halved since 1750 and that the number of very small patches has nearly quadrupled.



Source: DAWE 2021 based on mapping by DPIE 2021 and Qld Herbarium 2021.

The current distribution of the ecological community is severely fragmented, with an average edge density of 3,300 m/ha. The new edges are largely the result of land clearing, and they typically adjoin agricultural or urban areas. An estimated 50 percent of the edges of the ecological community are adjacent to areas that are non-native (NSW) or non-remnant (Qld)

vegetation (DAWE 2021). The majority (over 70 percent) of the ecological community now occurs within 50 m of the edge of a patch and as such is subject to significant to edge effects¹⁰ (DAWE 2021).

Weed invasion and invasive fauna

Weeds are frequently cited as a key threat based on observations from vegetation mapping, surveys and studies; very few examples of the ecological community in New South Wales remain unaffected by weeds (NSW TSSC 2010). The principal weed species affecting the ecological community include: moth plant (*Araujia sericiflora*), bridal creeper (*Asparagus asparagoides*), climbing asparagus fern (*A. plumosus*), carpet grasses (*Axonopus* spp.), groundsel bush (*Baccharis halimifolia*), cobbler's peg (*Bidens pilosa*), camphor laurel (*Cinnamomum camphora*), fleabanes (*Conyza* spp.), catsear (*Hypochaeris radicata*), morning glories (*Ipomoea* spp.), small-leaved privet *Lantana camara*, *Ligustrum sinense*), large-leaved privet (*L. lucidum*), Japanese honeysuckle (*Lonicera japonica*), African olive (*Olea europaea* subsp. *cuspidata*), paspalum (*Paspalum dilatatum*), kikuyu (*Pennisetum clandestinum*), blackberry (*Rubus fruticosus*), fireweed (*Senecio madagascariensis*), slender pigeon grass (*Setaria parviflora*), Paddy's lucerne (*Sida rhombifolia*), wild tobacco bush (*Solanum mauritianum*), black-berry nightshade (*S. nigrum*), wandering trad (*Tradescantia fluminensis*) and purpletop (*Verbena bonariensis*) (Keith and Scott 2005 in NSW TSSC 2010). In Queensland there at least 18 weed species that typically invade components of the ecological (Qld Herbarium 2021). Three of these weeds are widespread, notably *Lantana camara*, asparagus ferns (*Asparagus* spp.) and corky passionfruit (*Passiflora suberosa*). Asparagus ferns and passionfruit include vine species that may climb into the middle and upper canopy layers to smother trees and shrubs and are often referred to as transformer species (Simberloff & Rejmánek 2011; Gallagher et al 2015).

Loss of native fauna

Faunal components of the ecological community, such as digging mammals and arboreal mammals, birds and insects are important for nutrient cycling, dispersal and/or burial of seeds and fungal spores, water infiltration, and pollination. The loss of these animals negatively impacts the functioning of the ecological community and reduces its ability to recover from the adverse impacts of other threats.

Most threatened and near threatened Australian land mammal species are continuing to decline, including those of the ecological community (Woinarski et al. 2015). The Grey-headed Flying-fox, for example, underwent an estimated 30 percent decline in abundance over a decade; and it suffered more recent large declines due to heat stress and fire (TSSC 2001; NSW OEH 2019). As a key pollinator of the ecological community (SCEE 2017), its decline is likely to impair the regeneration of key vegetation species.

Inappropriate fire regimes, grazing by stock and invasive herbivores, invasion by weeds, and hydrological alteration have resulted in the loss of groundcover and understorey structure and flora species. The loss of the native groundcover and understorey negatively impacts ground-dwelling fauna that play key roles in the ecological community. Fallen timber is also important as habitat for ground-dwelling fauna (as well as for carbon turnover) and has been selectively

¹⁰ An edge width of 50 m was chosen for the analysis as a mid-range estimate for demonstrated edge effects in forests (various studies indicate edge effects on different forest species or functions from 10 m to 500 m into patches e.g., Ewers & Didham (2007), Berry (2001), Laurence et al. (2002) and Pocock & Lawrence (2005)).

removed for firewood, particularly close to urban centres. All these threats reduce the habitat value and exacerbate the direct loss of fauna from the ecological community.

Insects are functionally critical to the ecological community, in a wide variety of roles. Recent studies have demonstrated a large worldwide decline, with over 40 percent of insect species declining; and a third being endangered globally. This further compromises the ecological community through cascade effects through the food chain. The analysis also indicated that the loss in biomass was in the order of 2.5 percent annually which can detrimentally impact many birds, reptiles, amphibians and fish that feed on insects (Sanchez Bayo & Wyckhuys 2019). Compounding this, Marsh et al. (2021) found that 44 percent (more than 14,000) of the invertebrate species, for which they were able to compile data, were likely to have lost habitat during Australia's 2019-20 bushfires, including in the Subtropical eucalypt forest on the floodplains of eastern Australia.

Changes to hydrological regimes

South eastern Queensland is the most densely populated area of Queensland. Water storages are predominantly managed for urban use around Brisbane and the Gold Coast, whilst irrigated agriculture is the major water user in rural areas. Water resources are highly developed, with 22 major storages and a combined capacity of over 2.5 million ML (BOM 2019). Some areas have been leveed to expand agricultural production which can reduce connectivity with the floodplain and result in concentrated channel flow during high flows.

Many of the larger floodplains containing the ecological community, in both New South Wales and Queensland, have undergone major transformation as a result of systematic hydrological engineering for the development of agricultural land, especially in the early 20th century. As a result, the natural hydrological connectivity for the many parts of the ecological community has been impaired. Construction of drain networks and tidal gates channelised much of the floodplain sheet flow, lowered the water tables, reduced salinity and oxidised surface soils. Where native vegetation, including the ecological community, remains on the floodplain, hydrological transformation has resulted in major shifts in biogeochemical processes and ecosystem-scale impacts (Capon et al. 2016).

In coastal New South Wales, large areas of coastal floodplain habitat were directly drained by constructing artificial channels (e.g., Pressey 1989a, Boulton & Brock 1999); and river flows were significantly altered by weirs, levees, floodgates and dams (Pressey & Griffith 1992). By the early 1990s there were co-ordinated drainage systems on the major floodplains, while additional areas that were not directly drained may have been altered hydrologically by changed patterns of flooding and drainage following flood mitigation works (Pressey and Griffith 1992; Keith & Scott 2005). On the north coast of NSW, expansion of *Melaleuca quinquenervia* and *Casuarina glauca* has been attributed to artificial drainage and shortening of the hydroperiod¹¹ (Johnston et al. 2003). These changes appear to be closely associated with enhanced acidity, altered ionic ratios, increased dissolved organic carbon and sulfide oxidation in the soil profile (Johnston et al. 2003; NSW TSSC 2010).

¹¹ The period in which a soil area is waterlogged

Much of the coastal water diversions serve the large urban centres on the coastal plains (e.g., the Sunshine Coast and Brisbane-Gold Coast). In NSW the distribution of weirs appears to be concentrated on the far north coast, where significant occurrences of the ecological community are.

As well as the construction of large dams, more widespread cumulative impacts, that are not necessarily directly monitored or measured, affect broader hydrological changes across the landscape. For instance, the collective impacts of numerous smaller structures (such as town and farm dams, weirs, irrigation channels, drainage works, and buildings). Almost all coastal rivers in New South Wales are affected by reduced flows caused by extraction for livestock and domestic supplies. Water extraction diminishes flows, especially during dry times and reduces the frequency of small- and medium-sized flood events (Pressey & Middleton 1982), which adversely impacts floodplain vegetation.

Constructing road and rail networks throughout the extent of the ecological community, particularly raised roadways, can also substantially affect drainage and hydrological connectivity on the floodplain.

Altered fire regimes

Fire regimes have been changed throughout the extent of the ecological community, in association with the growth of agriculture and urban development. Fire is used to promote regrowth (green pick) and to maintain higher levels of species richness of native pasture species for livestock grazing; and for hazard reduction management. These practices can increase fire frequency. The amount of fallen timber and other plant litter can be diminished during such burns; this negatively impacts the fauna that use them for shelter and their other habitat values. Arson is also an issue, particularly on urban fringes.

In some areas, more high intensity or frequent fires may slow or prevent the regeneration and recovery of parts of the ecological community and lead to lower species richness. Sustained high frequency fire will lead to a loss of plant species, a reduction in vegetation structure and a corresponding loss of animal species in the ecological community (NSW OEH 2017b). The resulting habitat changes are also likely to detrimentally impact fauna such as bandicoots, gliders and potoroos (Tozer et al. 2010; NSW OEH 2017b). Even in areas where vegetation recovers quickly, the loss of animal species impedes the recovery, long term health and resilience of the ecological community.

Conversely, other areas of the ecological community may have been impacted by a lack of fire, resulting from fire suppression activities and a reduction in Indigenous burning. Some sources suggest that parts of the ecological community may have experienced increased fire intervals since 1750 (A Baker 2019, pers comm). The evidence from fire history data showed that, prior to the 2019/20 bush fires, between 73 and 99 percent of the ecological community was underburnt in south eastern Queensland and northern New South Wales, relative to the Queensland regional ecosystem fire interval guidelines (A Baker 2019, pers comm).

A persistent low frequency of fire can disrupt integrity of eucalypt forests in a number of ways (Close *et al.* 2009). These include transition to a denser mid-storey, including the encroachment of more mesic and fire-intolerant shrub species. A denser mid-storey affects regeneration of the existing eucalypt canopy through competition for light, water and nutrient resources. There is evidence of such changes in northern stands of the ecological community, at least. About 90 percent of the ecological community in the Byron Shire has seen an encroachment of rainforest species, to the extent that rainforest saplings are now prominent in the understorey (A Baker 2019, pers comm). About half the sites of the ecological community between the Richmond and Clarence Rivers

have a dense mid layer of small trees and shrubs, often rainforest species, and a reduced ground layer as a consequence of fire exclusion. Invasion by mesic plant species is facilitated by the proximity of the ecological community to patches of rainforest and wet sclerophyll forest. About 90 percent of patches of the ecological community on the NSW far north coast are within 1.5 kilometres of a mapped patch of rainforest.

In addition to structural change in vegetation, the characteristic fire-tolerant ground flora of the ecological community are unlikely to recover from long-term fire suppression. More than 90 percent of such plants either don't develop a substantial soil seed bank, or don't have long-distance dispersal mechanisms, or lack both (A Baker 2019, pers comm). Consequently, important elements of the characteristic graminoid and forb ground flora are constrained in their recovery capacity or face potential local extinction.

Conclusion

The combination of these threat impacts has impacted the structure, species assemblage and ecological function across the range of the ecological community. The long lag time to recover vegetation structure, with adequate representation of mature trees and evidence of recruitment, lengthens the timeframe of recovery. The intractability of other problems, such as the regional loss of many fauna species, and the nature of existing land use in the ecological community's extent further reduces the potential for recovery.

This represents a **severe** reduction in integrity across most of its geographic distribution, as indicated by a **severe** degradation of the community and of its habitat, and a **severe** 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)

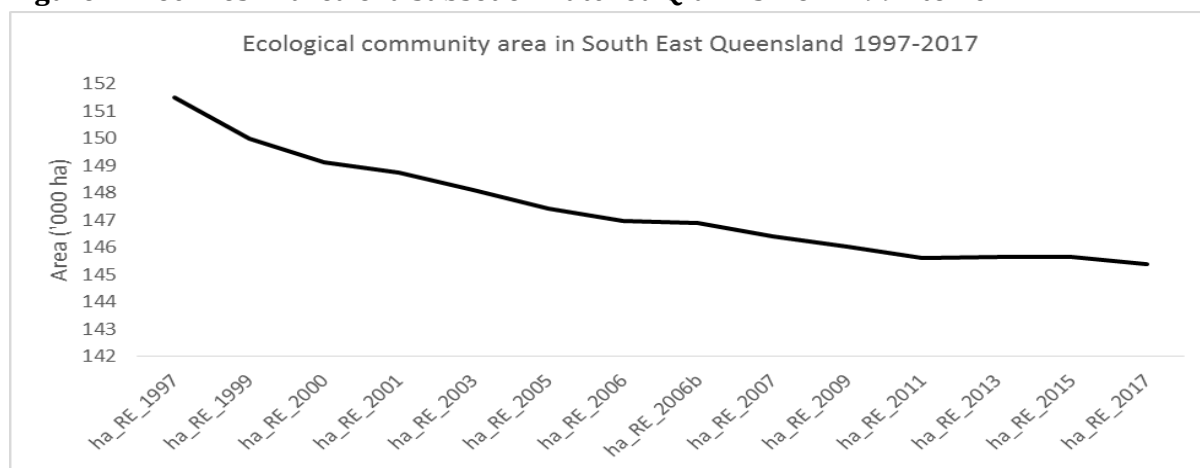
Evidence:

Historically the primary change affecting the ecological community has been clearing for agriculture and grazing. More recently it has been for urbanisation and coastal development. Data from the Australian Bureau of Statistics show that, at the national scale, since 1991, population growth was

fastest near the coast. This trend was even stronger for 2011–2014, indicating that coastal population growth, and the environmental pressures it brings, is accelerating (Clark & Johnston 2016). As a consequence of this growth in population, housing, jobs, agribusiness and related infrastructure such as roads and airports are expected to increase substantially over the next 20 years.

Recent rates of decline in extent, for the ecological community in New South Wales are not available. In south eastern Queensland, the estimated rate of removal of the ecological community over recent years was approximately 0.2 percent per year. From 1997 to 2017 there was a four percent decline in the extent of a selection of matched regional ecosystems in south east Qld, with an estimated 6,100 ha transformed to pasture, crops, settlement, mining, infrastructure or forestry (Figure 2).

Figure 2: Declines in area of a subset of matched Qld REs from 1997 to 2017



Source: Qld DES (2018) - Data is for Qld REs 12.2.2, 12.2.3, 12.3.7, 12.3.11, 12.3.18 and 12.3.19.

With additional decline and degradation due to weed invasion, overgrazing, trampling and other soil disturbance by domestic livestock and feral animals including pigs, changes to hydrology from flood mitigation and drainage works, inappropriate fire regimes, removal of dead wood and rubbish dumping and climate change it is highly likely that there will be substantial detrimental change in the geographic distribution and substantial degradation across most of its geographic distribution of the ecological community.

Although there has been, and continues to be, detrimental change to the ecological community as a result of continuing urbanisation and coastal development, data are insufficient to determine rates of loss in the recent past, or to predict them for the immediate future, across the range of the ecological community.

The Committee considers that there is insufficient information to determine the eligibility of the ecological community for listing in any category under Criterion 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?
- In particular, can you provide any studies or specific information on the degree to which the threatening processes outlined in criterion 4 are impacting the ecological community?

Appendix A - Species lists

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

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

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

Scientific names for vascular plants are nationally accepted names as per the Australian Plant Census (Council of Heads of Australasian Herbaria 2020) and New South Wales Flora Online (Royal Botanic Gardens and Domain Trust 2020), as at the time of writing. Scientific names for fauna are nationally accepted names as per the Atlas of Living Australia (CSIRO 2020), as at the time of writing.

A1 Flora

Due to the large latitudinal range of this community, some species will only be relevant in certain parts of the coast. For some species, the approximate extent of the species are noted as either: typically over the entire extent of the ecological community (A), or hot temperate and subtropical typically north of Sydney (S). Where the species is limited in extent the IBRA code is indicated (e.g., example SYB is Sydney Basin). (**) Indicates species that are generally indicative of wetter locations in the landscape (e.g., on the floodplain). Species without a tick in any of the five columns, to indicate why they are included in this table, were suggested as additions by experts during the assessment process.

Table 4: Characteristic, frequently occurring or threatened flora of the ecological community

Scientific name	Common name	Listing status March 2019	NSW SCFF TEC	NSW PCTs	Qld REs
Canopy and emergent trees					
<i>Allocasuarina littoralis</i>	Black Sheoak			✓	✓
<i>Allocasuarina torulosa</i>	Forest Sheoak, Rose Sheoak		✓	✓	✓
<i>Angophora costata</i> (A)	Smooth-Barked Apple			✓	
<i>Angophora floribunda</i> (A)	Rough-barked Apple			✓	✓
<i>Angophora paludosa</i> (S)	(an Apple)		✓	✓	

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Scientific name	Common name	Listing status March 2019	NSW SCFF TEC	NSW PCTs	Qld REs
<i>Angophora subvelutina</i> (A)	Broad-leaved Apple		✓	✓	✓
<i>Angophora woodsiana</i> (S)	Smudgee		✓	✓	✓
<i>Brachychiton populneus</i> (A)	Kurrajong		✓	✓	✓
<i>Callitris columellaris</i> (S)	a native Cypress Pine		✓	✓	
<i>Casuarina cunninghamiana</i> (A)	River Oak, River Sheoak		✓	✓	✓
<i>Casuarina glauca</i> (A)	Swamp Oak, Swamp Sheoak		✓	✓	✓
<i>Clerodendrum tomentosum</i>	?			✓	✓
<i>Corymbia citriodora</i>	Lemon (-scented) Gum, Blue Spotted Gum				✓
<i>Corymbia gummifera</i> (A)	Red Bloodwood			✓	
<i>Corymbia henryi</i> (S)	Large-leaved Spotted Gum			✓	
<i>Corymbia intermedia</i> (S)	Pink Bloodwood		✓	✓	✓
<i>Corymbia maculata</i> (A)	Spotted Gum			✓	
<i>Corymbia tessellaris</i> (S)	Moreton Bay Ash, Carbeen			✓	✓
<i>Corymbia torelliana</i>	Cadaghi, Cadaga			✓	✓
<i>Corymbia trachyphloia</i> Syn <i>E. trachyphloia</i>	Brown Bloodwood			✓	✓
<i>Cryptocarya obovata</i>				✓	✓
<i>Cryptocarya triplinervis</i>	?			✓	✓
<i>Cupaniopsis anacardioides</i>	?			✓	✓
<i>Cupaniopsis parvifolia</i>	?			✓	✓
<i>Denhamia bilocularis</i>	?			✓	✓
<i>Drypetes deplanchei</i> (Supersedes <i>Drypetes australasica</i> (S))	Yellow Tulipwood		✓	✓	✓
<i>Elaeocarpus obovatus</i>	Hard Quandong, Blueberry Ash,			✓	✓
<i>Endiandra sieberi</i>	?			✓	✓
<i>Eucalyptus acmenoides</i> (S)	White Mahogany		✓	✓	✓
<i>Eucalyptus amplifolia</i> (A)	Cabbage Gum		✓	✓	
<i>Eucalyptus bancroftii</i> (S)	Bancroft's Red Gum, Orange Gum			✓	✓
<i>Eucalyptus carnea</i>	Thick-leaved mahogany			✓	✓
<i>Eucalyptus fibrosa</i>	(Broad-leaved) Red Ironbark			✓	✓
<i>Eucalyptus crebra</i> (S)	Narrow-leaved Ironbark			✓	✓
<i>Eucalyptus grandis</i> (S)	Flooded Gum, Rose Gum			✓	✓
<i>Eucalyptus latisinensis</i>	White Mahogany				
<i>Eucalyptus longifolia</i>	Woollybutt			✓	
<i>Eucalyptus melanoleuca</i>	Yarraman ironbark			-	✓
<i>Eucalyptus melliodora</i>	Yellow Box				
<i>Eucalyptus melanophloia</i>	Silver-leaved Ironbark			✓	✓
<i>Eucalyptus microcorys</i> (S)	Tallowwood			✓	✓

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Scientific name	Common name	Listing status March 2019	NSW SCFF TEC	NSW PCTs	Qld REs
<i>Eucalyptus moluccana</i> (S)	Grey Box, Gum-topped Box		✓	✓	✓
<i>Eucalyptus nobilis</i>	Ribbon Gum, Giant White Gum				
<i>Angophora paludosa</i>	(an Apple)		✓		
<i>Eucalyptus pilularis</i> (A)	Blackbutt			✓	?
<i>Eucalyptus populnea</i>	Poplar/ Bimble Box				
<i>Eucalyptus propinqua</i> (S)	Grey Gum		✓	✓	✓
<i>Eucalyptus portuensis</i>	White Mahogany				
<i>Eucalyptus racemosa</i> (S) – Supersedes <i>Eucalyptus signata</i>	Scribbly Gum			✓	✓
<i>Eucalyptus resinifera</i> (S)	Red Mahogany		✓	✓	✓
<i>Eucalyptus robusta</i> (A)	Swamp Mahogany / Messmate		✓	✓	✓
<i>Eucalyptus seeana</i> (S)	Narrow-leaved Red Gum		✓	✓	✓
<i>Eucalyptus siderophloia</i> (S)	(Queensland / Northern) Grey Ironbark		✓	✓	✓
<i>Eucalyptus tereticornis</i> (A)	Forest Red Gum, Queensland Blue Gum, Red Irongum		✓	✓	✓
<i>Eucalyptus tindaliae</i>	Tindal's stringybark			✓	✓
<i>Eucalyptus umbra</i>	Broad-Leaved White Mahogany			✓	✓
<i>Euroschinus falcatus</i>	?			✓	✓
<i>Ficus macrophylla</i> (S)	Moreton Bay Fig		✓		
<i>Ficus obliqua</i> (A)	Small-leaved Fig		✓	✓	
<i>Ficus superba</i> (A)	Deciduous Fig		✓	✓	
<i>Flindersia australis</i>	?			✓	✓
<i>Glochidion ferdinandi</i> (A, not Vic)	Cheese Tree		✓	✓	✓
<i>Glochidion sumatranum</i>	?			✓	✓
<i>Grevillea robusta</i>	?			✓	✓
<i>Hibiscus tiliaceus</i>	?			✓	✓
<i>Jagera pseudorhus</i>	Foambark			✓	✓
<i>Lophostemon confertus</i> (S)	Red/ Scrub/ Brush/ Brisbane/ Queensland (Brush) Box, Vinegar Tree			✓	✓
<i>Lophostemon suaveolens</i> (S)	Swamp Box/ Mahogany/ Turpentine		✓	✓	✓
<i>Mallotus philippensis</i> (S)	Red Kamala		✓		?
<i>Scolopia braunii</i>				✓	✓
<i>Symplocos stawellii</i>				✓	✓
<i>Syncarpia glomulifera</i> (A)	Turpentine, Yanderra			✓	
<i>Toona ciliata</i>				✓	✓
<i>Trochocarpa laurina</i>				✓	✓
<i>Waterhousea floribunda</i>				✓	✓

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Scientific name	Common name	Listing status March 2019	NSW SCFF TEC	NSW PCTs	Qld REs
Sub-canopy and mid-layer (highly variable)					
<i>Acacia aulacocarpa</i>	?			✓	0
<i>Acacia blakei</i>	?			✓	✓
<i>Acacia concurrens</i> (S)	Curracabah		✓	✓	✓
<i>Acacia disparrima</i> (S)			✓	0	✓
<i>Acacia falcata</i>	?			✓	✓
<i>Acacia fimbriata</i> (A)	Fringed Wattle, Brisbane Wattle			✓	✓
<i>Acacia flavescens</i>	?			0	✓
<i>Acacia floribunda</i> (A)	White Sally Wattle, Gassomer Wattle			✓	0
<i>Acacia glaucocarpa</i>	?			0	✓
<i>Acacia irrorata</i> (A)	Green Wattle			✓	✓
<i>Acacia leiocalyx</i> (S)				✓	✓
<i>Acacia longifolia</i> (A)	Sydney Golden Wattle			✓	
<i>Acacia maidenii</i>				✓	✓
<i>Acacia melanoxylon</i> (A)	Blackwood, Black Wattle, Mudgerabah			✓	✓
<i>Acacia salicina</i>	?			0	✓
<i>Acronychia imperforata</i>	?			✓	✓
<i>Acronychia oblongifolia</i>	?			✓	✓
<i>Alchornea ilicifolia</i>	?			✓	✓
<i>Alphitonia excelsa</i>	Red Ash		✓	✓	✓
<i>Alstonia constricta</i>	Quinine Bush, Bitterbark			✓	✓
<i>Androcalva fraseri</i>	Brush Kurrajong		✓	?	0
<i>Aphananthe philippinensis</i>				✓	✓
<i>Austromyrtus dulcis</i>				✓	✓
<i>Backhousia myrtifolia</i> (A, not in Vic)	Grey Myrtle, Ironwood			✓	✓
<i>Banksia integrifolia</i>	Coast Banksia			✓	✓
<i>Billardiera scandens</i> (A)	Appleberry, Snotberry			✓	
<i>Breynia oblongifolia</i> (A)	Breynia, Coffee Bush		✓	✓	✓
<i>Bursaria spinosa</i> (A)	Sweet Bursaria Blackthorn (Kurwan -D'harawal)			✓	?
<i>Callistemon salignus</i>	White Bottlebrush		✓	✓	✓
<i>Callistemon viminalis</i> (syn. <i>Melaleuca viminalis</i>)	Weeping Bottlebrush		✓	✓	✓
<i>Capparis arborea</i>	?			✓	✓
<i>Chorizema parviflorum</i>	?			✓	✓
<i>Commersonia bartramia</i>	Brown Kurrajong		✓	✓	✓
<i>Commersonia fraseri</i>	Brush Kurrajong		✓	✓	
<i>Cordyline congesta</i>	Tooth-leaved Palm Lily		✓		

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Scientific name	Common name	Listing status March 2019	NSW SCFF TEC	NSW PCTs	Qld REs
<i>Cupaniopsis anacardioides</i>	Tuckaroo		✓		
<i>Cupaniopsis parvifolia</i>	Small-leaved Tuckaroo		✓		
<i>Daviesia ulicifolia</i>	?			✓	0
<i>Daviesia umbellulata</i>	?			✓	✓
<i>Dodonaea triquetra</i>	Large-leaf Hop-bush			✓	✓
<i>Elaeocarpus reticulatus</i> (A)	Blueberry Ash, Blue Oliveberry		✓	✓	✓
<i>Epacris microphylla</i>	?			✓	✓
<i>Eremophila debilis</i>	?			✓	✓
<i>Excoecaria agallocha</i>	?			✓	✓
<i>Exocarpos cupressiformis</i>	?			✓	✓
<i>Ficus coronata</i>	?			✓	✓
<i>Grevillea robusta</i>	(Southern (?)) Silky Oak				✓
<i>Hakea florulenta</i>	?			✓	✓
<i>Hibbertia aspera</i>	?			✓	
<i>Hibbertia vestita</i>	?			✓	✓
<i>Hibiscus diversifolius</i>	Swamp Hibiscus		✓		0
<i>Hibiscus tiliaceus</i>	Cottonwood Hibiscus		✓		0
<i>Hovea acutifolia</i>	a native Pea		✓	✓	✓
<i>Jacksonia scoparia</i>	?			✓	✓
<i>Leptospermum polygalifolium</i>	Tantoon			✓	✓
<i>Leucopogon juniperinus</i>	?			✓	
<i>Leucopogon lanceolatus</i>	?			✓	
<i>Livistona australis</i> (A)	Cabbage Palm			✓	
<i>Livistona decora</i>	Weeping Cabbage/ Ribbon (Fan) Palm			✓	
<i>Lomatia silaifolia</i>	?			✓	✓
<i>Macadamia integrifolia</i>	Queensland Nut	EPBC/ NSW/ Qld V			
<i>Macadamia tetraphylla</i>	Rough Shelled Bush Nut	EPBC/ NSW/ Qld V			
<i>Melaleuca alternifolia</i> ** (S)	Tea-tree (a Paperbark)		✓	✓	0
<i>Melaleuca bracteata</i>	Black Tea-tree, River Ti-tree,				✓
<i>Melaleuca decora</i> ** (S)	White Feather Honey Myrtle		✓	✓	
<i>Melaleuca irbyana</i> **	Swamp Tea-tree; Scale-leaved Paperbark, Irbyana	NSW/Qld E		✓	✓
<i>Melaleuca linariifolia</i> ** (A)	Flax-leaved Paperbark, Snow-in- summer			✓	✓
<i>Melaleuca nodosa</i>	A paperbark		✓	✓	✓
<i>Melaleuca quinquenervia</i> ** (S)	(Broad-leaved) Paperbark/Tea- tree		✓	✓	✓
<i>Melaleuca sieberi</i>				✓	✓

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Scientific name	Common name	Listing status March 2019	NSW SCFF TEC	NSW PCTs	Qld REs
<i>Melaleuca styphelioides</i> ** (A)	Prickly-leaved Paperbark		✓	✓	✓
<i>Melaleuca thymifolia</i>	?			✓	✓
<i>Melia azedarach</i>	White Cedar, Chinaberry Tree			✓	✓
<i>Myrsine howittiana</i> ** (A)	Brush Muttonwood			✓	✓
<i>Myrsine variabilis</i>	?			✓	✓
<i>Notelaea longifolia</i> ** (A)	Native Olive		✓	✓	✓
<i>Notelaea ovata</i>				✓	✓
<i>Notelaea venosa</i> (A)	Mock Olive			✓	0
<i>Persoonia media</i>	?			✓	✓
<i>Persoonia stradbrogensis</i>	a geebung		✓	✓	✓
<i>Phyllanthus gunnii</i>	Scrubby Spurge			✓	✓
<i>Phyllanthus hirtellus</i>	?			✓	
<i>Pimelea linifolia</i>	Rice Flower		✓	✓	✓
<i>Pittosporum revolutum</i> (A)	Hairy Pittosporum		✓	✓	✓
<i>Pittosporum undulatum</i> (A)	Sweet Pittosporum			✓	0
<i>Prostanthera incisa</i> (A)	Cut-leaved Mint-bush			✓	
<i>Syzygium smithii</i> (Syn <i>Acmena smithii</i>)** (A)	Lilly Pilly		✓	✓	✓
<i>Wikstroemia indica</i>	Bootlace Bush		✓		
Climbers, epiphytes and scramblers					
<i>Cissus hypoglauca</i> (A)	Water Vine		✓	✓	
<i>Desmodium rhytidophyllum</i>			✓		✓
<i>Desmodium varians</i> (A)	Slender Tick-trefoil		✓	✓	
<i>Eustrephus latifolius</i> (A)	Wombat Berry		✓	✓	✓
<i>Geitonoplesium cymosum</i> (A)	Scrambling Lily		✓	✓	✓
<i>Glycine clandestina</i> (A)	Twining Glycine		✓	✓	✓
<i>Glycine tabacina</i>	a scrambler			✓	✓
<i>Gynochthodes jasminoides</i> (syn. <i>Morinda jasminoides</i>) (A)	Morinda Vine		✓	✓	
<i>Hardenbergia violacea</i>	False Sarsparilla		✓	✓	✓
<i>Hibbertia scandens</i> (A)	Climbing Guinea Flower		✓	✓	✓
<i>Kennedia rubicunda</i>	Red Kennedy Pea		✓	✓	
<i>Maclura cochinchinensis</i>	Cockspur Thorn		✓		✓
<i>Parsonsia straminea</i> (A)	Common Silkpod		✓	✓	✓
<i>Rubus parvifolius</i> (A)	Native Raspberry, Small-leaved Bramble			✓	
<i>Smilax australis</i> (A)	Native Sarsparilla, Lawyer vine, Wait-a-while		✓	✓	
<i>Smilax glycyphylla</i>	Sweet Sarsparilla		✓		
<i>Stephania japonica</i> var. <i>discolor</i> (A)	Snake Vine		✓	✓	
<i>Veronica plebeia</i> (A)	Trailing /Creeping Speedwell			✓	

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Scientific name	Common name	Listing status March 2019	NSW SCFF TEC	NSW PCTs	Qld REs
Understorey (Grasses)					
<i>Alloterospis semialata</i>	Cockatoo Grass				✓
<i>Aristida vagans</i>	Three-awn Speargrass		✓		✓
<i>Austrostipa ramosissima</i>	Stout Bamboo-grass			✓	✓
<i>Bothriochloa bladhii</i>	Forest Blue-grass, Burnett River Blue-grass				✓
<i>Bothriochloa decipiens</i>	Pitted Blue-grass, Red/Redleg Grass				✓
<i>Capillipedium spicigerum</i>	Scented-top Grass				✓
<i>Cymbopogon refractus</i> (A)	Barbed-wire Grass		✓	✓	✓
<i>Dichanthium sericeum</i>	Queensland Blue-grass				✓
<i>Dichelachne micrantha</i> (A)	Shorthair Plume Grass		✓	✓	
<i>Digitaria parviflora</i> (A)	Small-flowered Finger Grass		✓	✓	✓
<i>Eremochloa bimaculata</i>	Poverty Grass				✓
<i>Heteropogon contortus</i>	Black Spear Grass				✓
<i>Imperata cylindrica</i> (A)	Blady Grass		✓	✓	✓
<i>Microlaena stipoides</i> (A)	Weeping Grass		✓	✓	✓
<i>Oplismenus hirtellus</i> (A) (Syn O. imbecillis)	Basket Grass, Creeping Shade Grass		✓	✓	
<i>Ottochloa gracillima</i>	-			✓	✓
<i>Panicum effusum</i>	Hairy Panic				✓
<i>Panicum simile</i> (A)	Two-colour Panic		✓	✓	
<i>Paspalidium distans</i> (A)	-			✓	✓
<i>Paspalum distichum</i> **	Water Couch				
<i>Paspalum scrobiculatum</i>	-				✓
<i>Sporobolus creber</i>	Slender Rat's-tail Grass				✓
<i>Themeda triandra</i> (A) (syn. <i>T. australis</i>)	Kangaroo Grass		✓	✓	✓
Understorey (Forbs) - GRAMINOIDES					
<i>Brunoniella australis</i>	Blue Trumpet		✓	✓	✓
<i>Centella asiatica</i> ** (A)	Pennywort		✓	✓	
<i>Commelina cyanea</i> (A, not in Vic)	Scurvey-weed, Wandering Jew		✓	✓	
<i>Cymbidium suave</i>	Snake Orchid		✓	✓	
<i>Dianella caerulea</i> (A)	Blue Flax Lily, Paroo Lily		✓ -	✓	✓
<i>Dianella longifolia</i>	a Flax Lily		✓	✓	
<i>Dichondra repens</i> (A)	Kidney Weed, Yilibili (D'harawal)		✓	✓	✓
<i>Einadia hastata</i> (A)	Berry Saltbush, Saloop			✓	
<i>Lagenophora stipitata</i>	Common Bottle-daisy		✓	✓	
<i>Laxmannia gracilis</i> (A)			✓		
<i>Lomandra filiformis</i> (A)	Wattle Mat-rush		✓	✓	

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Scientific name	Common name	Listing status March 2019	NSW SCFF TEC	NSW PCTs	Qld REs
<i>Lomandra longifolia</i> (A)	Spiny-headed Mat-rush		✓	✓	✓
<i>Lomandra multiflora</i> subsp. <i>multiflora</i> (A)	Many-flowered Mat-rush		✓	✓	
<i>Murdannia graminea</i>	Grass Lily			✓	✓
<i>Philydrum lanuginosum</i> (A)	Woolly Waterlily, Frog's Mouth			✓	
<i>Phyllanthus hirtellus</i>				✓	
<i>Phyllanthus virgatus</i>			✓	✓	
<i>Poranthera microphylla</i>	Small Poranthera			✓	
<i>Lobelia purpurascens</i> ** (A) (syn. <i>Pratia purpurascens</i>)	Whiteroot		✓	✓	
<i>Sigesbeckia orientalis</i>	Indian Weed		✓		
<i>Tricoryne elatior</i>			✓		
<i>Viola hederacea</i> ** (A)	Ivy-leaved Violet		✓	✓	
Understorey (Ferns)					
<i>Cheilanthes sieberi</i> subsp. <i>Sieberi</i> (A)	Poison Rock Fern		✓	✓	
<i>Pteridium esculentum</i> (A)	Bracken Fern		✓	✓	✓
Understorey (Sedges/rushes) - GRAMANOIDS					
<i>Baumea articulata</i> ** (A)	Jointed Twigrush			✓	
<i>Baumea rubiginosa</i> ** (A)	Soft Twigrush			✓	
<i>Carex appressa</i> **	Tall Sedge				
<i>Chorizandra cymbaria</i> ** (A)	Heron Bristle Sedge			✓	
<i>Cyperus enervis</i>			✓		
<i>Fimbristylis dichotoma</i> (A) **	Common Fringe-sedge			✓	✓
<i>Gahnia aspera</i> (E)	Rough Saw-sedge		✓	✓	
<i>Gahnia clarkei</i> ** (A)	Tall Saw-sedge		✓	✓	
<i>Gahnia melanocarpa</i> ** (A)	Black-fruit Saw-sedge			✓	
<i>Juncus</i> spp. **				✓	
<i>Lepidosperma laterale</i> (A)	Variable Saw-sedge			✓	
Understorey (Other) – e.g., small shrubs					
<i>Plectranthus parviflorus</i> (A)	Cockspur Flower			✓	

Sources: DAWE 2021. EPBC status refers to species listed under the EPBC Act at the time this document was prepared; State status refers to species listed under the State Act at the time this document was prepared.

A2 Fauna

Table 5: Fauna recorded in the ecological community*

Scientific name	Common name	EPBC Act.	NSW Act	Qld Act.
Mammals				
<i>Acrobates pygmaeus</i>	Feathertail Glider			
<i>Aepyprymnus rufescens</i>	Rufous Bettong		V	
<i>Antechinus agilis</i>	Agile Antechinus			

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Scientific name	Common name	EPBC Act.	NSW Act	Qld Act.
<i>Antechinus flavipes</i>	Yellow-footed Antechinus			
<i>Antechinus stuartii</i>	Brown Antechinus			
<i>Cercartetus nanus</i>	Eastern Pygmy Possum		V	
<i>Chalinolobus nigrogriseus</i>	Hoary Wattled Bat		V	
<i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll	E	V	
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle		V	
<i>Hydromys chrysogaster</i>	Water Rat			
<i>Isodon macrourus</i>	Northern Brown Bandicoot			
<i>Isodon obesulus</i>	Southern Brown Bandicoot	E	E	
<i>Macropus giganteus</i>	Eastern Grey Kangaroo			
<i>Micronomus norfolkensis</i>	Eastern Free-tail Bat		V	
<i>Miniopterus australis</i>	Little Bentwing Bat		V	
<i>Miniopterus orianae oceanensis</i>	Eastern Bentwing Bat		V	
<i>Myotis macropus</i>	Large-footed Myotis, Southern Myotis		V	
<i>Notamacropus dorsalis</i>	Black-striped Wallaby		E	
<i>Notamacropus parma</i>	Parma Wallaby		V	
<i>Notamacropus rufogriseus</i>	Red-necked Wallaby			
<i>Nyctophilus bifax</i>	Eastern Long-eared Bat		V	
<i>Ornithorhynchus anatinus</i>	Platypus			NT
<i>Ozimops lumsdenae</i> (syn. <i>Mormopterus lumsdenae</i>)	Northern Free-tailed Bat		V	
<i>Perameles nasuta</i>	Long-nosed Bandicoot			
<i>Petauroides volans</i>	Greater Glider	V	V?	V
<i>Petaurus australis</i>	Yellow bellied Glider		V	
<i>Petaurus breviceps</i>	Sugar Glider			
<i>Petaurus norfolcensis</i>	Squirrel Glider		V	
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale		V	
<i>Phascolarctos cinereus</i>	Koala	V	V	V
<i>Phoniscus papuensis</i>	Golden-tipped Bat		V	
<i>Planigale maculata</i>	Common Planigale		V	
<i>Potorous tridactylus</i>	Long-nosed Potoroo	V	V	V
<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum			
<i>Pseudomys novaehollandiae</i>	New Holland Mouse/Pookila	V		V
<i>Pteropus alecto</i>	Black Flying Fox			
<i>Pteropus poliocephalus</i>	Grey-headed Flying Fox	V	V	
<i>Pteropus scapulatus</i>	Little Red Flying Fox			
<i>Rattus lutreolus</i>	Swamp Rat			
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail Bat		V	
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat		V	
<i>Sminthopsis leucopus</i>	White-footed Dunnart		V	V
<i>Syconycteris australis</i>	Eastern Blossom-bat		V	
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna			NT
<i>Trichosurus caninus</i>	Mountain Brushtail Possum, Short-eared Possum, Bobuck			

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Scientific name	Common name	EPBC Act.	NSW Act	Qld Act.
<i>Trichosurus cunninghami</i>	Mountain Brushtail Possum, Southern Bobuck			
<i>Trichosurus vulpecula</i>	Common Brushtail Possum			
<i>Vombatus ursinus</i>	Common Wombat			
<i>Xeromys myoides</i>	Water Mouse, False Water Rat, Yirrkoo	V		V
Birds				
<i>Accipiter novaehollandiae</i>	Grey Goshawk			
<i>Amaurornis moluccana</i>	Pale-Vented Bush-hen		V	
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	E
<i>Ardea ibis</i>	Cattle Egret			
<i>Ardea modesta</i>	Eastern Great Egret			
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo		V	
<i>Calyptrorhynchus funereus</i>	Yellow-tailed Black-cockatoo			
<i>Calyptrorhynchus lathamii</i>	Glossy Black-cockatoo		V	V
<i>Carterornis leucotis</i>	White-Eared Monarch		V	
<i>Ceyx azureus</i>	Azure Kingfisher			
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper		V	
<i>Coracina lineata</i>	Barred Cuckoo-shrike		V	
<i>Coturnix ypsilophora</i>	Brown Quail			
<i>Daphoenositta chrysoptera</i>	Varied Sittella		V	
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E	E	E
<i>Dicaeum hirundinaceum</i>	Mistletoebird			
<i>Dromaius novaehollandiae</i>	Emu			
<i>Egretta garzetta</i>	Little Egret			
<i>Egretta novaehollandiae</i>	White-faced Heron			
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork		E	
<i>Erythrotriorchis radiatus</i>	Red Goshawk	V	CE	E
<i>Gymnorhina tibicen</i>	Australian Magpie			
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle		V	
<i>Haliastur indus</i>	Brahminy Kite			
<i>Haliastur sphenurus</i>	Whistling Kite			
<i>Hieraaetus morphnoides</i>	Little Eagle		V	
<i>Ixobrychus flavicollis</i>	Black Bittern		V	
<i>Lathamus discolor</i>	Swift Parrot	CE	E	E
<i>Leucosarcia melanoleuca</i>	Wonga Pigeon			
<i>Lophoictinia isura</i>	Square-tailed Kite		V	
<i>Malurus cyaneus</i>	Superb Fairy Wren			
<i>Malurus lamberti</i>	Variegated Fairy Wren			
<i>Malurus melanocephalus</i>	Red-backed Fairy Wren			
<i>Manorina melanocephala</i>	Noisy Miner			
<i>Manorina melanophrys</i>	Bell Miner			
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater		V	
<i>Merops ornatus</i>	Rainbow Bee-eater			

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Scientific name	Common name	EPBC Act.	NSW Act	Qld Act.
<i>Neochmia temporalis</i>	Red Browed Finch / Firetail			
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	CE	CE	
<i>Neophema pulchella</i>	Turquoise Parrot		V	
<i>Nettapus coromandelianus</i>	Cotton Pygmy Goose		E	
<i>Ninox connivens</i>	Barking Owl		V	
<i>Ninox strenua</i>	Powerful Owl		V	V
<i>Numenius madagascariensis</i>	Eastern Curlew	CE, M		E
<i>Nycticorax caledonicus</i>	Nankeen Night Heron			
<i>Oxyura australis</i>	Blue-billed Duck		V	
<i>Pachycephala rufiventris</i>	Rufous Whistler			
<i>Pandion cristatus</i> (syn. <i>P. haliaetus</i>)	Eastern Osprey	M	V	
<i>Parvipsitta pusilla</i>	Little Lorikeet		V	
<i>Petroica boodang</i>	Scarlet Robin		V	
<i>Petroica phoenicea</i>	Flame Robin		V	
<i>Pezoporus wallicus</i>	Eastern Ground Parrot		V	V
<i>Phalacrocorax spp.</i>	Cormorants			
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler		V	
<i>Ptilinopus superbus</i>	Superb Fruit-dove		V	
<i>Rhipidura albiscapa</i>	Grey Fantail			
<i>Rostratula australis</i>	Australian Painted Snipe	E	E	V
<i>Stagonopleura guttata</i>	Diamond Firetail		V	
<i>Stictonetta naevosa</i>	Freckled Duck		V	
<i>Stipiturus malachurus</i>	Southern Emu-wren			V
<i>Threskiornis spinicollis</i>	Straw-necked Ibis	M		
<i>Todiramphus chloris</i>	Collared Kingfisher		V	
<i>Todiramphus sanctus</i>	Sacred Kingfisher			
<i>Trichoglossus chlorolepidotus</i>	Scaley-breasted Lorikeets			
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet			
<i>Tringa nebularia</i>	Common Greenshank	M		
<i>Tringa stagnatilis</i>	Marsh Sandpiper	M		
<i>Turnix maculosus</i>	Red-backed Button-quail		V	
<i>Tyto longimembris</i>	Eastern Grass Owl		V	
<i>Tyto novaehollandiae</i>	Masked Owl		V	
<i>Tyto tenebricosa</i>	Sooty Owl		V	
<i>Xenus cinereus</i>	Terek Sandpiper	M	V	LC
Reptiles				
<i>Amphibolurus muricatus</i>	Jacky Lizard			
<i>Bellatorias major</i>	Land Mullet			
<i>Boiga irregularis</i>	Brown Tree Snake			
<i>Chelodina longicollis</i>	Eastern Long-necked Turtle			
<i>Cyclodomorphus gerrardii</i>	Pink-tongued Lizard			
<i>Cyclodomorphus michaeli</i>	Mainland She-oak Skink			
<i>Egernia mcpheei</i>	Eastern Crevice Skink			

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Scientific name	Common name	EPBC Act.	NSW Act	Qld Act.
<i>Elseya albagula</i>	White-throated Snapping Turtle	CE		E
<i>Elusor macrurus</i>	Mary River Turtle	E		E
<i>Emydura macquarii</i>	Murray River Turtle			
<i>Hemiaspis signata</i>	Black-bellied Swamp Snake			
<i>Hoplocephalus bitorquatus</i>	Pale-headed Snake		V	
<i>Intellagama lesueurii</i>	Eastern Water Dragon			
<i>Pseudechis porphyriacus</i>	Red-bellied Black Snake			
<i>Pseudonaja textilis</i>	Eastern Brown Snake			
<i>Tiliqua nigrolutea</i>	Blotched Blue Tongue Lizard			
<i>Tropidechis carinatus</i>	Rough-scaled Snake			
<i>Varanus rosenbergi</i>	Rosenberg's Goanna		V	
<i>Wollumbinia georgesi</i>	Bellinger River Snapping Turtle	CE	CE	
Amphibians				
<i>Crinia tinnula</i>	Tinkling Frog, Wallum Froglet		V	V
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	
<i>Lechriodus fletcheri</i>	Fletcher's Frog			
<i>Limnodynastes dumerilii</i>	Eastern Banjo Frog (Pobblebonk)			
<i>Limnodynastes peronii</i>	Brown-striped Frog			
<i>Limnodynastes tasmaniensis</i>	Spotted Grass-frog			
<i>Litoria aurea</i>	Green and Golden Bell Frog	V	E	
<i>Litoria brevipalmata</i>	Green-thighed Frog		V	
<i>Litoria caerulea</i>	Green Tree Frog			
<i>Litoria chloris</i>	Red-eyed Tree Frog			
<i>Litoria citropa</i>	Blue Mountains Tree Frog			
<i>Litoria dentata</i>	Bleating Tree Frog			
<i>Litoria ewingii</i>	Brown Tree Frog			
<i>Litoria fallax</i>	Dwarf Green Tree Frog			
<i>Litoria freycineti</i>	Freycinet's Tree Frog, Wallum Rocket Frog			V
<i>Litoria jervisiensis</i>	Jervis Bay Tree Frog			
<i>Litoria latopalmata</i>	Broad-palmed Frog			
<i>Litoria revelata</i>	Revealed Tree Frog			
<i>Mixophyes iteratus</i>	Giant Barred Frog	E	E	E
<i>Platypsectrum ornatum</i>	Ornate Burrowing Frog			
Invertebrates				
<i>Argynnis hyperbius inconstans</i>	Laced Fritillary	CE	E	E
<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail		E	
<i>Ocybadistes knightorum</i>	Black Grass-dart, Knight's Dart		E	
<i>Petalura gigantea</i>	Giant Dragonfly		E	
<i>Petalura litorea</i>	Coastal Petaltail		E	

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Scientific name	Common name	EPBC Act.	NSW Act	Qld Act.
<i>Thersites mitchellae</i>	Mitchell's Rainforest Snail	CE	E	
<i>Trapezites symmokus</i>	Splendid Ochre			
<i>Australothele nambucca</i>	Large Curtain Web Spider			
<i>Delias aganippe</i>	Spotted Jezebel			
<i>Hypochrysops delicia</i>	Moonlight Jewel			
<i>Megadolomedes australianus</i>	Giant Water Spider			
<i>Nephila spp.</i>	Golden Orb Weaving Spider			
<i>Psychonotis caelius taygetus</i>	Small Green-banded Blue			
<i>Spodoptera picta</i>	Lily Caterpillar			
<i>Tetragonula carbonaria</i>	Stingless Native Bees			
<i>Tisiphone abeona</i>	Varied Sword Grass Brown			
*Note this Table is to be updated to remove erroneous species that occur further south than the range of the ecological community prior to consultation				

Sources: EPBC status refers to species listed under the EPBC Act at the time this document was prepared <https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>; State status refers to species listed under the State Act at the time this document was prepared.

Consultation Questions on the species lists

- Are the lists of flora and fauna accurate? If not, what species should be added or removed? Please provide any additional, or updated information (preferably referenced & published, or attributable) that will help us complete this list and any comments, or corrections.

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 diagnostic characteristics and minimum condition thresholds. Conversely, areas mapped or described as other units may sometimes meet the key diagnostic characteristics 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 definitively determine if any patch is part of the ecological community.

New South Wales vegetation classifications

New South Wales (NSW) has a comprehensive state-wide vegetation classification system that identifies Plant Community Types (NSW PCTs). The NSW PCT classification is designed to be the state standard for community-level vegetation mapping. Each NSW PCT has a description of its relationship and degree-of-fit to NSW state-listed threatened ecological communities, where applicable. The NSW PCT classification was recently updated for the east coast area. Examples of NSW PCTs that are likely to correspond (wholly, or in part) to the national Subtropical eucalypt forest on the floodplains of eastern Australia ecological community are outlined in Table 6.

Table 6: Examples of current New South Wales Plant Community Types that are likely to correspond (wholly, or in part) to the Subtropical eucalypt forest on the floodplains of eastern Australia (i.e., where key diagnostics are met).

NSW PCT ID	NSW PCT Name	SCFF	Strength of association*
3067	Far North Floodplain Wet Layered Forest	Yes	Moderate
3102	Northern Lowland Swamp Turpentine Wet Forest	Rainforest	Moderate
3420	Clarence Lowland Ironbark-Spotted Gum Grassy Forest	not in Tozer et al. (in review)	High
3425†	Far North Hinterland Swamp Turpentine-Apple Forest	Yes	Moderate
3428	Northern Lowland Red Gum-Swamp Turpentine Grassy Forest	Yes	High
3435	Hunter Coast Lowland Flats Damp Forest	RFEF+	Moderate
3436*	Hunter Coast Sandy Creekflat Low Paperbark Scrub	SCFF & RFEF	Moderate
3574	Northern Lowland Sandstones Dry Open Forest	Sometimes	Moderate
3984	Clarence Lowland Paperbark Sedge Swamp Woodland	Yes	High
4002	Northern Lowland Orange Gum Dry Swamp Forest	Yes	High

NSW PCT ID	NSW PCT Name	SCFF	Strength of association*
4003	Northern Lowland Swamp Turpentine-Mahogany Forest	Part	High
4020*	Coastal Creekflat Layered Grass-Sedge Swamp Forest	SSF	Moderate
4021*	Coastal Creekline Dry Shrubby Swamp Forest	SSF	Moderate
4032	Far North Floodplain Red Gum Sedge Forest	Yes	High
4033†	Far North Hinterland Flats Mesic Apple Forest	Yes	High
4034	Far North Swamp Oak-Tuckeroo Swamp Fringe Forest	SCFF - Rainforest	Moderate
4036*	Hunter Coast Lake Flats Apple Forest	RFEF+	High
4042*	Lower North Riverflat Eucalypt-Paperbark Forest	RFEF	High
4045	Northern Lowland Swamp Turpentine-Paperbark Forest	Yes	High
4046	Northern Lowland Swamp Turpentine-Red Gum Forest	Yes	High
Notes: SCFF/RFEF = the two relevant NSW listed threatened ecological communities (TECs) in Tozer et al (in review) – the Subtropical Coastal Floodplain Forest and River-Flat Eucalypt forest TECs respectively. RFEF+ = the NSW RFEF TEC (from Sydney to the north); SSF = the NSW Swamp Sclerophyll Forest TEC. Strength of association* is an estimation of the strength of association between the map unit and the Subtropical eucalypt floodplain forest ecological community. Grey highlighting indicates that the NSW PCT is not matched to the SCFF Tec in Tozer et al. (in review). A yellow highlighted * indicates the NSW PCT is matched to the RFEF Tec in Tozer et al. (in review). † = Not used for initial assessment of statistics for the listing criteria assessment.			

Source: NSW DPIE (2021); Tozer et al (in review).

Historically, several other NSW mapping or classification schemes were used that relate, to a greater or lesser degree, to the national ecological community. NSW SC (2010) lists units from several vegetation surveys and mapping studies that may include components of the NSW state-listed ecological community (whilst noting that there may be additional or unmapped occurrences beyond these surveyed areas). For example NSW SC (2010) says that on the Tweed lowlands, this community includes *Eucalyptus tereticornis*-*E. intermedia*-*Lophostemon suaveolens* tall to very tall open forest' (F5) of Pressey and Griffith (1992) and parts of the 'Floodplain Wetland Complex' (FL) dominated by *eucalypts* or *Lophostemon suaveolens* (Pressey and Griffith 1992); and the NSW state-listed ecological community is within the 'Coastal Floodplain Wetlands' vegetation class of Keith (2002, 2004).

Table 7 outlines the PCTs in use before the 2021 NSW PCT revisions, that were identified as known to be associated with the NSW state-listed 'Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion' (NSW OEH 2018). They are likely to include patches of the ecological community.

Table 7: Previous New South Wales vegetation types (as at 2019/20) that may include patches of the ecological community

Vegetation formations	Vegetation classes	Vegetation types	Classification
Dry sclerophyll forests (shrub/grass sub-formation)	Clarence Dry Sclerophyll Forests	Grey Box - Grey Ironbark grassy open forest of the Clarence Valley lowlands of the NSW North Coast Bioregion	PCT 852 (OEH 2018b); & FE 21 (NSW NPWS 1999).
		Orange Gum (<i>Eucalyptus bancroftii</i>) open forest of the NSW North Coast Bioregion	PCT 1062 (OEH 2018b); & NRAC Floristic Group 83 (NRAC 1995).

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Vegetation formations	Vegetation classes	Vegetation types	Classification
		Red Ironbark open forest of the coastal lowlands of the NSW North Coast Bioregion	PCT 1091 (OEH 2018b); & FE 71 (in part) (NPWS 1999).
		Yellow Box - Grey Box grassy open forest in the Glenugie area of the NSW North Coast Bioregion	PCT 1333 (OEH 2018b).
	Hunter-Macleay Dry Sclerophyll Forests	Grey Ironbark - Broad-leaved Mahogany - Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast	?
Forested wetlands	Coastal Floodplain Wetlands	Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter	?
		Forest Red Gum grassy open forest on floodplains of the lower Hunter	PCT 1598 (OEH 2018b); & MU080 (Siverstsen et al. 2011).
	Coastal Swamp Forests	Swamp Box swamp forest of the coastal lowlands of the NSW North Coast Bioregion	PCT 1227 (OEH 2018b).
Grassy woodlands	Coastal Valley Grassy Woodlands	Cabbage Gum - Broad-leaved Apple open forest of the eastern escarpment, NSW North Coast Bioregion and South Eastern Queensland Bioregion	PCT 761 (OEH 2018b); & FE46 (NSW NPWS 1999).
		Cabbage Gum open forest or woodland on flats of the North Coast	PCT 762 (OEH 2018b).
		Cabbage Gum open forest or woodland on flats of the NSW North Coast Bioregion and New England Tableland Bioregion	PCT 763 (OEH 2018b); & FE 46 (NSW NPWS 1999).
		Forest Red Gum - Swamp Box of the Clarence Valley lowlands of the NSW North Coast Bioregion	PCT 837 (OEH 2018b); & FE 73 (NPWS 1999)
		Grey Box - Forest Red Gum - Grey Ironbark open forest of the hinterland ranges of the North Coast	?
		Narrow-leaved Red Gum woodlands of the lowlands of the North Coast	PCT 971 (OEH 2018b); & NRAC Floristic Group 19 (NRAC 1995)
Wet sclerophyll forests (grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	Red Mahogany open forest of the coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion	?
Wet sclerophyll forests (shrubby sub-formation)	North Coast Wet Sclerophyll Forests	Blackbutt - Pink Bloodwood shrubby open forest of the coastal lowlands of the NSW North Coast Bioregion	?

Source: NSW OEH (2020a). Further details on previously associated NSW Vegetation formations, classes and types is available via the Regional distribution and habitat section of the NSW TEC Profile for state-listed ecological community.

Queensland vegetation classifications

Queensland has a comprehensive state-wide vegetation classification system using Regional Ecosystem (Qld REs) designations. Regional ecosystems are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. They were derived from a broad range of information sources including land system, vegetation and geology mapping and reports. The Regional Ecosystem Description Database (REDD) supersedes the regional ecosystem descriptions in Sattler and Williams (1999); and it also includes additional regional ecosystems and vegetation communities recognised since 1999.

South Eastern Queensland bioregion REs that are likely to correspond (wholly, or in part) to the Subtropical eucalypt forest on the floodplains of eastern Australia are outlined in Table 8.

Table 8: Queensland Regional Ecosystems (RE) that are associated with the Subtropical eucalypt forest on the floodplains of eastern Australia (i.e., where key diagnostics are met)

Qld RE	Qld RE Short Description (+ extra descriptive elements if relevant)	Match#	Strength of association ^{\$}	Status*
<u>12.3.2</u>	<i>E. grandis</i> (Flooded Gum) +/- <i>E. microcorys</i> (Tallowwood), <i>Lophostemon confertus</i> (Brush Box) tall open forest with vine forest understorey (wet sclerophyll) on alluvial plains	Ryan & Tozer	Strong	OC
12.3.2a	Open forest of <i>E. resinifera</i> (Red Mahogany) and <i>Syncarpia glomulifera</i> subsp. <i>glomulifera</i> (Turpentine) with a wet heath understorey	No, but it is a sub-type	Moderate	(OC)
<u>12.3.3</u>	<i>E. tereticornis</i> (Queensland Blue Gum) woodland on Quaternary alluvium	Ryan & Tozer	Strong	EN
12.3.3a	<i>E. crebra</i> (Narrow-leaved Ironbark), <i>C. tessellaris</i> (Moreton Bay ash) woodland to open forest	Ryan	Moderate	(EN)
<u>12.3.3d</u>	<i>E. moluccana</i> (Grey Box) woodland	Ryan & Tozer	High	(EN)
<u>12.3.4a</u>	<i>E. bancroftii</i> (Orange Gum) open woodland, often with <i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark) ⁰⁰	Tozer	Moderate	(OC)
<u>12.3.7</u>	<i>E. tereticornis</i> (Queensland Blue Gum) and <i>Casuarina cunninghamiana</i> (River Oak) Narrow fringing woodland	Ryan	Moderate	LC
<u>12.3.9</u>	<i>Eucalyptus nobilis</i> (Ribbon Gum) open forest on alluvial plains (at headwaters of streams, usually forming a narrow fringing community.)	Neither ^c	Low	OC
<u>12.3.10</u>	<i>Eucalyptus populnea</i> (Ribbon Gum) /- <i>E. tereticornis</i> (Queensland Blue Gum) grassy woodland/tall woodland on alluvial plains	Neither ^c	Moderate	EN
<u>12.3.11</u>	<i>E. tereticornis</i> (Queensland Blue Gum) +/- <i>E. siderophloia</i> (Grey Ironbark), <i>C. intermedia</i> (Pink Bloodwood) open forest on alluvial plains, usually near coast	Ryan & Tozer	High	OC
12.3.11a	Open forest of <i>E. tereticornis</i> (Queensland Blue Gum) and/or <i>E. siderophloia</i> (Grey Ironbark), <i>Lophostemon confertus</i> (Brush Box) with vine forest understorey	Ryan	High	(OC)
12.3.11b	<i>E. tereticornis</i> (Queensland Blue Gum) and/or <i>E. racemosa</i> subsp. <i>racemosa</i> (Scribbly Gum) +/- <i>E. siderophloia</i> (Grey Ironbark), <i>Lophostemon suaveolens</i> (Swamp Box), <i>E. seeana</i> (Narrow-leaved Red Gum), <i>E. fibrosa</i> subsp. <i>fibrosa</i> (Red Ironbark), <i>E. propinqua</i> (Grey Gum) and <i>A. leiocarpa</i> (Rusty Gum) open forest	Ryan	High	(OC)
<u>12.3.12</u>	<i>E. latisinensis</i> (White Mahogany) or <i>E. exserta</i> (Queensland peppermint), <i>Melaleuca viridiflora</i> var. <i>viridiflora</i> (Broad-leaved Paperbark) woodland on alluvial plains	Neither ^c	Moderate	LC
<u>12.3.14a</u>	<i>E. racemosa</i> subsp. <i>racemosa</i> (Scribbly Gum) woodland to open forest.	Neither ^c	Low	(OC)
<u>12.3.15</u>	<i>C. intermedia</i> (Pink Bloodwood), <i>Syncarpia glomulifera</i> (Turpentine) open forest on granite outwash +/- <i>E. portuensis</i> (Broad-leaved Stringybark), <i>C. trachyphloia</i> (Brown/White Bloodwood), <i>Lophostemon suaveolens</i> (Swamp Box).	Neither ^c	Low	LC
<u>12.3.18</u> was 12.3.3c	⁰² <i>Melaleuca irbyana</i> (Swamp Tea-tree) low open forest on alluvial plains. Emergent <i>E. moluccana</i> , <i>E. crebra</i> , <i>E. tereticornis</i> or <i>C. citriodora</i> subsp. <i>variegata</i> may be present	Tozer	Moderate (some overlap)	E
<u>12.3.19</u> was 12.3.3b	<i>E. moluccana</i> (Grey Box) and/or <i>E. tereticornis</i> (Queensland Blue Gum) and <i>E. crebra</i> (Narrow-leaved Ironbark) open forest to woodland	Ryan & Tozer	High	E

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<u>12.3.20</u> *	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark), <i>Casuarina glauca</i> (Swamp Oak) +/- <i>Eucalyptus tereticornis</i> (Queensland Blue Gum), <i>E. siderophloia</i> (Grey Ironbark), <i>M. styphelioides</i> (Prickly-leaved Tea Tree) open forest on low coastal alluvial plains ⁰⁰	Neither ^c	Low (some overlap)	E
Notes: Eucalypt Genus abbreviations (A. = <i>Angophora</i>, C.= <i>Corymbia</i>; and E. = <i>Eucalyptus</i>). NSW common names include: <i>E. tereticornis</i> (Forest Red Gum). M = <i>Melaleuca</i> Match # = Matched to the NSW SCFF TEC in Tozer et al (in review) or by Ryan (pers comms). St* = Qld Biodiversity status (LC = Least Concern, OC = Of Concern, E=Endangered). Strength of association^s is an estimation of the strength of association between the map unit and the Subtropical eucalypt forest ecological community. ⁰⁰ Will overlap with the EPBC listed Coastal Swamp Sclerophyll Forest of NSW & SE Qld; e.g., where <i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark) dominates. ⁰¹If west of the Great Dividing Range, this RE corresponds to the EPBC Listed Poplar Box Woodland. ⁰²Already EPBC Listed Swamp Tea-tree Forest of South East Qld. ^c However, this Qld RE can have a canopy dominated by a eucalypt species (e.g., above a <i>Melaleuca</i> subcanopy) Grey highlighting indicates that the NSW PCT is not matched to the NSW listed SCFF Tec threatened ecological community (TEC) in Tozer et al. (in review). A green highlighted * indicates the NSW PCT is matched to the NSW state listed Swamp Sclerophyll Forest (SSF) TEC in Tozer et al. (in review).				

Source: Qld Herbarium (2021), SPRAT (2021).

Consultation Questions on map units

- Does the list of current and superseded map units and classifications include all those that may be related to the ecological community?

Appendix C – Indigenous Australians and cultural values associated with the ecological community

C1 Indigenous Australians associated with the ecological community

Location (Queensland)	Registered Aboriginal Party
Fraser Island.	Butchulla Native Title Aboriginal Corporation
Cherbourg Aboriginal Shire Council, Gympie Regional Council, North Burnett Regional Council, South Burnett Regional Council.	Wakka People
Mulgumpin (Moreton Island), Peel Island (Teerk Roo Ra), Minjerribah (Stradbroke Island), the Southern Moreton Bay Islands and the mainland coast (Belmont, Chandler, Tingalpa, Wynnum and Redlands).	Quandamooka Yoolooburrabee Aboriginal Corporation
Brisbane City Council, Bundaberg Regional Council, Fraser Coast Regional Council, Gympie Regional Council, Moreton Bay Regional Council, Noosa Shire Council, North Burnett Regional Council, Somerset Regional Council, Sunshine Coast Regional Council.	Kabi First Nation Traditional Owners Native Title Claim Group
Brisbane City Council, Ipswich City Council, Lockyer Valley Regional Council, Logan City Council, Scenic Rim Regional Council, Somerset Regional Council, Southern Downs Regional Council, Toowoomba Regional Council.	Yuggera Ugarapul People
Brisbane City Council, Ipswich City Council, Lockyer Valley Regional Council, Logan City Council, Scenic Rim Regional Council, Somerset Regional Council,	Jinibara People Aboriginal Corporation
Brisbane City Council, Gold Coast City Council, Logan City Council, Redland City Council, Scenic Rim Regional Council.	Danggan Balun (Five Rivers) People
Brisbane City Council.	Jagera Daran Pty Ltd, Turrbal Association Inc
Gold Coast City Council, Logan City Council, Scenic Rim Regional Council.	Gold Coast Native Title Claim Group
<u>Southern Downs.</u>	Githabul Nation Aboriginal Corporation
Location (New South Wales)	
Lake Macquarie LGA.	Awabakal LALC
Richmond Valley Council.	Bandjalang People
Lake Macquarie City Council.	Bahtabah LALC
Areas surrounding Lake Macquarie.	Biraban LALC
Central Coast Council.	Darkinjung LALC
Mid-Coast Council	Forster Local Aboriginal Land Council
Clarence Valley Council.	Gumbaynggirr People
<u>Tenterfield and Kyogle Local Government.</u>	Githabul Nation Aboriginal Corporation
Tweed Shire Council.	Tweed Byron LALC
Byron Shire Council, Gold Coast City Council, Tweed Shire Council.	Tweed River Bundjalung People

Source: NNTT (2021)

C2 Indigenous names and uses for eucalypt tree species in the ecological community

The eucalypts from the ecological community have been named and used by Indigenous people for thousands of years.

The explorer Ludwig Leichhardt travelled with Indigenous people in south-east Queensland during 1843–44. Leichhardt's record of indigenous taxonomy in Yagara, Wakka, Kabi, and other languages has been related to the current taxonomy of the eucalypts in the ecological community (Fensham 2021). Most could be associated across cultures and verifies the intimate understanding of Indigenous peoples with tree species that are difficult to distinguish in the field.

Table 9: Summary of indigenous names for eucalypt species from south-east Queensland, according to Ludwig Leichhardt's aboriginal informants

Species	Language group (Informants/guides)				
	Wakka (Charly)	Duungidjau Wakka (Paddy)	Kabi (Nikki)	Yagara (Pinky, Jacky, plus convict Baker and missionary Eipper)	Wakka, or uncertain (Gumerigo)
<i>Angophora leiocarpa</i>	mangagaborri, mingagabarre, mingagaborri	bugginagauri			
<i>Angophora subvelutina</i>	bulburri	nuckurr	buppo	ngukkur	nickkurr, nukkur
<i>Angophora woodsiana</i>				dandorro	
<i>Corymbia citriodora</i>	manarm	manarm	manarm	gurrar	benjoe
<i>Corymbia gummifera/ Corymbia intermedia</i>	bunnair	bunner	bunnah		bun
<i>Corymbia henryi</i>	damban, tamban, dambamm, dambam	dambam	dambam	urgorka, uurka, dambam	
<i>Corymbia tessellaris</i>	gurran, wanga	gudden	kurrandarr, kidambar	gnarran	
<i>Corymbia trachyphloia</i>	gala	gaga	gallai		
Mahogany eucalypts (<i>Eucalyptus acmenoides/ E. carnea/ E. helidonica/ E. latisinensis/ E. psammitica</i>)	dibilpalam	jimbiom	dibilpalam	turra	

Species	Language group (Informants/guides)				
	Wakka (Charly)	Duungidjawa Wakka (Paddy)	Kabi (Nikki)	Yagara (Pinky, Jacky, plus convict Baker and missionary Eipper)	Wakka, or uncertain (Gumerigo)
<i>Eucalyptus crebra</i> / <i>E. fibrosa</i> / <i>E. siderophloia</i>	durro	tandurr	malling	kanei perah, jandurro	
<i>Eucalyptus grandis</i>	buddul	gnamborro	dullarr	hanbru-call	
<i>Eucalyptus major</i> / <i>E. propinqua</i>	dambirri	tambir	dambir	dambirr	
<i>Eucalyptus melanophloia</i>	bullah, bull-la	kakkarr	kannaibalam, tunninbin		
<i>Eucalyptus microcorys</i>	dil	jimbiom	dil		
<i>Eucalyptus moluccana</i>	mundelli, mingall	boargan	mingall	mundeli, mundelli, gnarran	bea
<i>Eucalyptus pilularis</i>	binaroan		doai		bundinbil, binargan
<i>Eucalyptus racemosa</i>	manderoljam	manderra	killambarr	gerur, gorr, gargar karger, kangar, gargar	
<i>Eucalyptus resinifera</i>	gnauarr	gnar	dalla-la		
<i>Eucalyptus robusta</i>	dadangba	dadangaba	dannangen		
<i>Eucalyptus seeana</i>	binnamdall	binnamda	binnamda		
<i>Eucalyptus tereticornis</i>	mangorri	manburrir	yarra-ra	mongra, manborri, mongorr	
<i>Eucalyptus tindaliae</i>	boa	boa	biggin		mundile
<i>Lophostemon confertus</i>	tabilpillah, tangpalam	tangimbam	uirrauah		
<i>Lophostemon suaveolens</i>	gnarrabill, ngarabill	guannarr	burrabi, kurrabi	bolorta, bulluritju, bullorta	mgarra
<i>Syncarpia glomulifera</i>	burrawam, burrawom	biuam	burrumbam		
Note “/” symbol indicates “Or”					

Source: Fensham (2021). The language group of the informants assigned according to Jefferies (2013).

Leichhardt's record together with that of Gairabau, a Dungidau man from south-east Queensland also verifies a broad array of uses for eucalypts Fensham (2021). The indigenous people who acted as Leichhardt's guides had a precise understanding of the eucalypt species and also their uses. The ethnobotany recorded by Leichhardt is greatly enhanced by Gairabau, an Aboriginal man with a thorough knowledge of the language and culture of his people. The language group of the informants assigned according to Jefferies (2013).

Table 10: Uses of eucalypts recorded by Leichhardt, Gaiarbau and others from south-east Queensland

Eucalypt genus/species	Indigenous use
<i>Angophora</i>	Growths contain water. Burns smoky, good for sending signals. A camp was never made where apple trees grew because: 1) they always lean over and interfere with the pitching of humpies and the general arrangement of the camp; and 2) the wood of these trees makes a lot of smoke when it is burnt, and this might blow across the camp. Possums fat when apple is in flower.
<i>Angophora woodsiana</i>	Swollen growths contain water which can be accessed after opening a fissure evident on the outside of the swelling.
<i>Angophora subvelutina</i>	Medicine. Tapping swelling can yield water, which is mixed with sap and not pleasant but will alleviate thirst.
<i>Corymbia citriodora</i>	Wood for clubs.
<i>Corymbia citriodora</i> / <i>C. henryi</i>	Gum used to treat tooth-ache. Burns without smoke.
<i>Corymbia. gummifera</i> / <i>C. intermedia</i>	Bees' nest, bought down by Nikki. The honey watery, tasting like the liquid in the flowers of <i>Doryanthes excelsa</i> . Gum used as a red dye for staining possum rugs.
<i>Corymbia tessellaris</i>	Burns without smoke.
<i>Eucalyptus acmenoides</i> / <i>E. carnea</i> / <i>E. helidonica</i>	For making little canoes.
Mahogany eucalypts: <i>Eucalyptus acmenoides</i> / <i>E. carnea</i> / <i>E. helidonica</i> / <i>E. latisinensis</i> / <i>E. psammitica</i>	[Bark] used for canoes.
<i>Eucalyptus crebra</i> / <i>E. fibrosa</i> / <i>E. siderophloia</i>	[Swellings] provide water, more drinkable than <i>Angophora</i> . Burns without smoke. Tough wood. Wood for making waddies, nullah nullahs (gnirimm), spears (called pi-lar). Treatment of wounds with hot fire from ironbark. Poultice of powdered ironbark [ashes?] applied to a woman's breasts to purify milk. Powdered [burnt?] bark of ironbark trees rubbed on windows for cleansing after funeral ceremony. Powdered bark after being burnt makes a very permanent black paint; used for colouring newborn babies; and for colouring/ cleansing mothers after returning to their camp after childbirth.
<i>Eucalyptus crebra</i> / <i>E. fibrosa</i> / <i>E. siderophloia</i>	[Swellings] provide water, more drinkable than <i>Angophora</i> . Tough wood. Wood for making nullah nullahs (gnirimm). Could also be used to make honey buckets but was less preferred because the gum tainted the honey.
<i>Eucalyptus melanophloia</i>	Hollow logs (silver-leaved ironbark preferred because its centre decays quickly) could be used as a fish trap to catch jewfish, eels and turtles.
<i>Eucalyptus moluccana</i> / <i>E. microcorys</i> / <i>E. tindaliae</i> / <i>Syncarpia glomulifera</i>	Bark for huts (e.g., covering).

Eucalypt genus/species	Indigenous use
<i>Eucalyptus pilularis</i>	Bark used for huts. Buckets made from bark, sewn together and sealed with beeswax to hold honey.
<i>Eucalyptus tereticornis</i>	The sap under the bark provided a sweet fluid. Bark for covering hut (in this case European).
Yellow jacket [<i>Eucalyptus tereticornis</i> ?]	Gum when soaked in water with its own bark makes a very lasting yellow stain.
<i>Eucalyptus seeana</i>	Bees' nest found in binnamdall, containing little or no honey, but a mealy substance which tasted like gingerbread. When soft the substance is quite sour. Bee larvae in the lower part of the hive.
common turpentine (<i>Lophostemon confertus</i> ?)	Medicine, recipe provided incorporating gum to reduce swelling. Spears made from young saplings.
<i>Lophostemon suaveolens</i>	[Bark] preferred for making canoes.
Gum tree	Burls on gum trees used to make drinking vessels. Sap sweet for chewing.
Stringy bark	Buckets made from bark, sewn together and sealed with beeswax to hold honey. Sap sweet for chewing. Used for wrapping a corpse.
Sugar gum	When these trees shed their bark the barnji [bunya] nuts are ripe.
White gum	When these trees shed their bark the barnji [bunya] nuts are ripe. Provides clues for finding hives. A hole, big enough for two fingers and a thumb, is made by chopping into the bottom of the hive. Gympie bark (<i>Dendrocnide</i> spp.) was used as a sponge, to catch drops and then a piece of this bark was tied on the end of a stick which was poked into the hive and deposited in a bucket made of stringybark or blackbutt. The honey was shared with Gympie bark sticks.

Source: Adapted from Fensham (2021), who cited: Anonymous (c. 1845); Petrie (1904); Auroousseau (1968); Winterbotham & Mackenzie (1957); Darragh & Fensham (2013). Square brackets are Fensham's insertions.

Consultation Questions for First Nations peoples and cultural values associated with the ecological community (also see questions in Section 3)

- Is the information in this section appropriate to the ecological community, and/or is additional information required? Please provide additional wording and/or (referenced & published) information, or any questions you may have.

Appendix D – Landforms and soils

Further information is included here (and in Table 11) to help identify floodplains and alluvial soils for the purposes of identifying the ecological community.

Although floodplains may be occasionally, or more often, saturated, water-logged or inundated, the definition of floodplains is NOT limited to areas of any particular flood frequency. Rather, for the purposes of defining the ecological community, the floodplain is defined by the presence of alluvial landforms.

The ecological community occurs on alluvial landforms related to coastal river floodplains and associated sites where transient water accumulates, including floodplains, river-banks, riparian zones, lake foreshores, creek lines (including the floors of tributary gullies), floodplain pockets, depressions, alluvial flats, fans, terraces, and localised colluvial fans.

Compared to the surrounding landscape, the terrain of the floodplains is remarkably flat, and slopes rarely exceed 5° from horizontal, except on localized terraces and river-banks. However there may be local variation associated with river channels, local depressions, natural levees and river terraces (Keith & Scott 2005).

The edge of the floodplain (and the edge of the alluvial soils) is typically indicated by the break in slope between the river-flat (i.e., the net depositional zone) and the steeper foot slopes (i.e., the net erosional zone) of the adjoining higher land. Changes in slope within the depositional zone (i.e., because of localised terraces and river-banks), are not indicative of the edge of the floodplain. However, as terrain slope decreases, it can be more difficult to locate the edge of the floodplain.

The edge of the floodplain may also be indicated by changes in the vegetation. Vegetation on alluvial deposits is typically more diverse than vegetation in the surrounding landscape — with a denser tree canopy and ground-layer, due to greater water availability as the groundwater in alluvial systems is typically contained in unconfined aquifers within the rooting depth of the vegetation. The greater diversity and abundance of groundcover vegetation (as compared to adjacent slopes) may be visible, particularly of species associated with moister environments, including grasses, forbs, sedges and ferns.

The ecological community occurs on alluvial soils of a variety of textures, including (but not limited to) silts, clay loams and sandy loams, gravel and cobbles. Alluvial soils are very diverse, including examples from many of the major soil groups of the Australian Soil Classification (Isbell 2016) and usually reflect the properties of their parent material in the upper catchment. They may include in-situ subsoils, and colluvial fans where they overlay the alluvial floodplain.

The ecological community is typically found on deep (greater than one metre) alluvial soils but may be found on shallower soils on the margins of the floodplain and in the smaller narrow alluvial systems and floodplain pockets.

Where the alluvial soils are shallower, or occur as a veneer of alluvial soil over soils derived from other geomorphological processes, it should be considered an alluvial soil for the purposes of identifying the ecological community (if the majority of the root zone is confined to the part of the soil horizon dominated by alluvial processes).

The ecological community does not occur on soils that are primarily marine sands or aeolian sands.

Table 11: Landform glossary

Term	Definition
Alluvium/alluvia (alluvial deposits)	Sediment transported and deposited by channelled or overbank stream flow (Speight & Isbell 2009).
Alluvial systems or landforms	Alluvial systems include landform patterns such as alluvial fan, alluvial plain, anastomotic plain, bar plain, covered plain, delta, flood plain, meander plain, playa plain, stagnant alluvial plain, and terrace. Each landform pattern contains one or more landform elements including back plain, bank (stream bank), bar (stream bar), channel bench, drainage depression, fan, flood-out, lagoon, lake, levee, lunette, ox-bow, playa, prior stream, scroll, stream bed, stream channel, swamp, terrace flat, terrace plain, and valley flat. In all these landforms, there may be frequent active erosion and aggradation by channel and overbank stream flow, or the landforms may be a relict (residual) from these processes (Speight 2009).
Alluvial terrace (fill terrace, terrace)	Typically a relatively flat (planar), valley marginal feature that is perched above the contemporary channel and/or floodplain. These abandoned floodplains are no longer active. They are generally separated from the contemporary floodplain by a steep slope called a terrace riser. Terraces can be paired or unpaired and are often found as a flight of terraces. (Fryirs & Brierley 2013; River Styles 2020).
Colluvium (colluvial deposits)	Unconsolidated material at the base of a slope, due mainly to gravity, which includes sheet wash as a result of diffuse overland sheet erosion and deposition (Speight & Isbell 2009).
Colluvial fan	When an alluvial fan is built by debris flow, then it is referred to as a debris cone or colluvial fan.
Floodplain (alluvial flat, river-flat; includes alluvial terraces)	Floodplains are areas of sediment accumulation made up of alluvial materials between or adjacent to (active or abandoned) stream/river/channel banks and the valley margin. They are typically tabular and elongated parallel to active channels. However, they may be highly variable, ranging from featureless, flat-topped landforms, to inclined landforms (typically tilted away from the channel), to irregularly reworked (scoured) landforms (River Styles 2020). Floodplains are often poorly drained, acting as a stilling basin in which fine-grained suspended sediments settle out from over-bank flows. Older, elevated floodplain deposits along valley margins are referred to as alluvial terraces (Fryirs & Brierley 2013).
Floodplain pockets	In the middle to upper catchment of a river system floodplains typically occur as isolated pockets; and as discontinuous, alternating pockets in the sediment transfer zone downstream. Floodplain pockets tend to alternate as the river switches from one side of the valley to the other, creating planform-controlled floodplain pockets. As slope decreases even further (into the lower catchment), and the valley widens further, floodplain pockets become more frequent, eventually becoming continuous along both banks (adapted from Fryirs & Brierley 2013).

Fluvial sediments	Sediments deposited by the main channels of stream flow. This definition includes outwash and landforms that are characteristically produced by flooding conditions (i.e., point bars, floodplains, and terraces).
Nick point	A nick point (or knick point) is part of a river or channel where there is a sharp change in channel slope, such as a waterfall or lake.
Quaternary alluvial systems	Alluvial systems that formed during the last 2.5 million years.
River-flat	A river-flat is a planar landform element that is neither a crest nor a depression and is level or very gently inclined (< 3 percent tangent approximately). Some flats and slopes may have the same inclination (1–3 percent). The slope line on a River-flat often runs parallel to the course line in a nearby open depression (such as a stream channel or river). The slope line of a slope seldom does, instead it makes an angle with the course line (Speight 2009).

Consultation Questions on Landforms and soils

- Is the information in this section appropriate to the ecological community, and/or is additional information required? Please provide additional wording and/or (referenced & published) information, or any questions you may have.

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(Still to be edited and updated)

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Consultation draft	<i>Draft Conservation advice for the Subtropical eucalypt forest on the floodplains of eastern Australia</i>	10/12/2021