Draft Conservation Advice for the

Brogo Wet Vine Forest of the South East Corner Bioregion

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

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

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



An example of the Brogo Wet Vine Forest at Brogo Reserve © Nikki Ward

The Brogo Wet Vine Forest occurs within country (the traditional lands) of the Yuin Nation. We acknowledge their culture and continuing link to the ecological community and the country it inhabits.

Proposed Conservation Status

The Brogo Wet Vine Forest of the South East Corner Bioregion 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).

**CONTENTS**

[1 Ecological community name and description 3](#_Toc90292150)

[1.1 Name 3](#_Toc90292151)

[1.2 Description of the ecological community and the area it inhabits 3](#_Toc90292152)

[2 Identifying areas of the ecological community 7](#_Toc90292153)

[2.1 Key diagnostic characteristics 8](#_Toc90292154)

[2.2 Additional information to assist in identifying the ecological community 9](#_Toc90292155)

[2.3 Condition classes, categories and thresholds 12](#_Toc90292156)

[2.4 Habitat critical to the survival of the ecological community 13](#_Toc90292157)

[2.5 Areas of high value – surrounding environment and landscape context 14](#_Toc90292158)

[3 Cultural significance 16](#_Toc90292159)

[4 Threats 16](#_Toc90292160)

[4.1 Threat table 17](#_Toc90292161)

[5 Conservation of the ecological community 20](#_Toc90292162)

[5.1 Primary conservation objective 20](#_Toc90292163)

[5.2 Existing protection management plans 20](#_Toc90292164)

[5.3 Principles and standards for conservation 21](#_Toc90292165)

[5.4 Priority conservation and research actions 22](#_Toc90292166)

[6 Listing assessment 33](#_Toc90292167)

[6.1 Reason for assessment 33](#_Toc90292168)

[6.2 Eligibility for listing 33](#_Toc90292169)

[Appendix A - Species lists 40](#_Toc90292170)

[Appendix B - Relationship to other vegetation classification and mapping systems 54](#_Toc90292171)

[References 60](#_Toc90292172)

# Ecological community name and description

## Name

The name of this ecological community is the Brogo Wet Vine Forest of the South East Corner Bioregion, hereafter referred to as “Brogo Wet Vine Forest”. The name refers to the geographic area of Brogo in the South East Corner Bioregion within New South Wales, and the unique floristic and structural characteristics of the community. Brogo Wet Vine Forest contains many species associated with mesic forests and vines are typically found in the understorey.

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.

## 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 Brogo Wet Vine Forest.

The ecological community described in this conservation advice is a type of temperate eucalypt forest best represented in the Brogo area of the South East Corner Bioregion (NSW). It is a sclerophyll forest with a canopy dominated by eucalypts with an occasional substratum of rainforest trees, with an open, shrubby mid-storey and diverse groundcover of forbs, grasses and ferns. A diversity of vines and climbers in the ground layer and mid-storey are a key characteristic of this community. Patches of dry rainforest with fig-dominated canopies are commonly found within or adjacent to Brogo Wet Vine Forest on rocky outcrops.

This section describes the range of natural states of the ecological community. More information to assist in identifying patches of the ecological community is provided in section 2. Because of past loss or degradation, not all current patches of the ecological community are in a completely natural state. Section 2.3 provides information to identify which patches retain sufficient conservation values to be considered a Matter of National Environmental Significance.

### Location and physical environment

Brogo Wet Vine Forest occurs in New South Wales within the South East Corner Bioregion between the Moruya River in the north and Nadgee River in the south, although most of the community is found between the Towamba and Tuross Rivers.

The community typically occurs on steep, often rocky slopes with a northerly aspect (Miles, 2021b). Sometimes the community may also occur on relatively flat terrain and infrequently in gullies. The community typically occurs on granite-derived soils, rarely on other volcanic or sedimentary soils. These are primarily Kurosols, Kandosols and Dermosols, with a small proportion in the north of its range occurring on other soils such as Vertosols and Tenesols (DPIE, 2021). The community is found at elevations up to 500 m above sea level (ASL), but the majority occurs between elevations of 200 m to 290 m ASL. The majority of the community occurs in areas with mean annual rainfall of 900 mm to 1050 mm, although it can be found in drier areas (e.g. down to approximately 820 mm) and wetter areas closer to the coast (e.g. up to 1290 mm).

Consultation Questions on the location and physical environment

* Do you agree with the proposed location, physical environment and boundaries for the ecological community? If not please provide your reasons and provide any supporting evidence.
* Does the altitude range, slope profile and described soils accurately capture the full range where this ecological community can be found?

### Description of the assemblage

#### Vegetation structure

Brogo Wet Vine Forest typically reaches 15 to 25 metres tall with sparse to moderate canopy cover consisting or *Eucalyptus* or *Angophora* species. Mature trees often form multiple hollows which provide habitat for fauna. Vines and twiners are found in both the shrub and ground layers. A sparse to moderate subcanopy of smaller trees up to 10 m tall is usually present. There is often an open mid-storey of shrubs up to 3 m tall and the species-rich ground layer is typically moderate to dense and comprised of grasses, ferns, small forbs and larger, emergent forbs. Vegetation structure will vary across the extent of the ecological community, particularly following fire or grazing by livestock and with landscape features such as rocky outcrops.

#### Flora

##### Canopy species

The canopy is characterised by the usual dominance of *Eucalyptus tereticornis* or sometimes *Angophora floribunda.* Varying proportions of these species are expected to be present at most sites, in association with less frequently occurring *Eucalyptus* species such as *E. bosistoana*, *E. globoidea and E. maidenii* (see Appendix A - Species lists). Rainforest species such as *Ficus rubiginosa* are not a dominant component of the canopy. Where rainforest species are the dominant component of the canopy layer, this is not considered to be part of the ecological community (See Appendix B - Relationship to other vegetation classification and mapping systems).

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

##### Understorey species – subcanopy and mid layer

The understorey shrubs and small trees are linked to the ground cover by a variety of vine species including *Celatrus australis*, *Geitonoplesium cymosum*, *Clematis glycinoides*, *Eustrephus latifolius*, *Marsdenia rostrata* and *Stephania japonica.* Small trees may include *Acacia implexa, Acacia mearnsii, Brachychiton populneus, Ficus rubiginosa and Pittosporum undulatum.* A diverse shrub layer typically includes *Cassinia trinerva, Breynia oblongifolia* and *Melicytus dentatus.* Infrequent but very characteristic species are *Abutilon oxycarpum* and *Deeringia amaranthoides*.

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

##### Understorey species – Ground Layer

The ground cover consists of various grasses (*Microlaena stipoides, Echinopogon ovatus* and *Oplismenus imbecillis*), herbs (*Desmodium brachypodum,* *Dichondra repens* and *Sigesbeckia orientalis*) and ferns (*Cheilanthes sieberi* and *Pellaea falcata*).

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

#### Fauna

Fauna play key roles in decomposition, nutrient cycling, pollination, seed dispersal and pest control (Gorosábel et al., 2020). Fauna are dependent on the habitat and resources provided by the plant components of the community and other features such as rocky outcrops. Brogo Wet Vine Forest grows in association with grassy woodlands and dry rainforest, containing elements of both, and thus provides habitat for a wide range of mammals, birds, reptiles, amphibians and invertebrates.

Eucalypts provide perching, hunting and nesting sites for birds of prey such as *Ninox strenua* (Powerful Owl) and *Accipiter fasciatus* (Brown Goshawk) and provide habitat for arboreal marsupials such as *Petauroides volans* (Greater Glider) and *Petaurus breviceps* (Sugar Glider). Insectivorous microbats, such as *Nyctophilus geoffroyi* (Lesser Long-eared Bat) and *Vespadelus regulus* (Southern Forest Bat) may be found roosting in tree hollows. Eucalypt flowers also provide food for nectar-feeding fauna such as the threatened *Pteropus poliocephalus* (Grey-headed Flying Fox) and a diverse array of avian honeyeaters. Bark-gleaners such as *Daphoenositta chrysoptera* (Varied Sittella) and *Cormobates leucophaea* (White-throated Treecreeper) may be seen spiralling up or down eucalypt stems.

Smaller trees and shrubs provide further structural complexity and resources. Rainforest species like *Ficus rubiginosa* provide food for fruit-eating birds such as *Lopholaimus antarcticus* (Topknot Pigeon), *Columba leucomela* (White-headed Pigeon) and *Scythrops novaehollandiae* (Channel-billed Cuckoo). The understorey vegetation provides habitat and feeding grounds for small passerines including *Acanthiza spp.* (Thornbills), *Petroica spp.* and *Eopsaltria spp.* (Robins) and *Sericornis spp* (Scrubwrens). *Jalmenus evagoras* (Imperial Hairstreak butterfly) extracts sap from *Acacia* species, some of which is provided to ants that provide protection from predators in exchange. Colonies of *Manorina melanophrys* (Bell Miner) may be found in areas where the understorey is dense, feeding on small insects in the eucalypt canopy.

Native rodents(e.g. *Rattus fuscipes*, *R. lutreolus*) and *Antechinus spp.* (Antechinus) search for food under the protection of long unburnt ground cover. They may be preyed upon by elapid snakes such as *Pseudonaja textilis* (Eastern Brown Snake). Brogo Wet Vine Forest likely supports a diversity of skinks, agamids and amphibians, especially near streams. The leaf litter and soil support a rich diversity of invertebrates, and fungi that are sought out by *Perameles nasuta* (Long-Nosed Bandicoot). Macropods and monotremes are common, while *Phascolarctos cinereus* (Koala) and *Dasyurus maculatus* (Spotted-Tail or Tiger Quoll) are occasionally found within Brogo Wet Vine Forest.

For a period of time following fire, a number of species may be absent due to shortage of resources and/or mortality. For example, nectar and fruit feeding birds and mammals may not return to a site until resprouting plants have completed their secondary juvenile phase and become reproductively active. Species that rely on the resources produced by non-resprouting plants may likewise be rare or absent until such plants reach maturity.

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

Consultation Questions on the species assemblage

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

### Functionally important species within the ecological community

Consultation Questions on the functionally important species

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

### Relevant biology and ecology

#### Fire ecology

Species and vegetation types vary in their capacity to survive fire, with species associated with rainforest fringes or mixed forest understories likely to be more susceptible to canopy damage or mortality (Trouvé et al., 2021). Brogo Wet Vine Forest contains several fire sensitive species that may not persist under a frequent fire regime or may fail to recolonise after extensive, severe fire. Further, the presence of species in this community that are typically associated with moist, sheltered sites indicates an infrequent regime of fire in this community.

Brogo Wet Vine Forest is a geographically restricted ecological community that supports the presence of rainforest associated flora. Some rainforest associated flora are sensitive to fire and may not be present in recently or frequently burnt sites. The moderately sheltered physical environment may promote a fire regime that allows for the dry elements of the floristic composition to coexist with rainforest associated species. Brogo Wet Vine Forest may transition into Lowland Grassy Woodland in adjacent exposed sites that experience more frequent and severe fire. By contrast, the community may transition into Dry Rainforest in more sheltered sites that experience less frequent and severe fire. In this way, Brogo Wet Vine Forest can be considered part of an ecological transition from recently disturbed eucalypt woodland to long undisturbed rainforest. Although landscape features, such as rocky outcrops found within Brogo Wet Vine Forest, may influence the fire regime (e.g., discourage the spread of fires, Miles, 2021b) and play an important role in the occurrence of some rainforest-associated species, independent of fire regime (Floyd, 2009).

Variability in vegetation structure is likely to be observed in fire-affected sites for a number of years post-fire, including completely top-killed or partially killed shrubs and trees that may be regenerating, resulting in variable canopy and understorey cover. Where fire has been less severe, eucalypt tree canopies may be unaffected, while some non-eucalypts may incur higher relative damage (Trouvé et al., 2021). Consideration should be given to disturbance-driven variability of vegetation cover as legacies may persist for one or more decades following disturbance (Collins, Hunter, et al., 2021; Haslem et al., 2016; Karna et al., 2019). The effects of fire regimes and interactions with regional climatic conditions, topoclimatic conditions and edaphic conditions on vegetation composition and structure, will have implications for faunal species composition and population dynamics via effects on resource availability, habitat suitability and predator-prey interactions (DAWE, 2021a).

Many plant species known to occur within Brogo Wet Vine Forest are capable of resprouting following fire (see Appendix A - Species lists). However, resprouting success depends on the level of damage sustained during fire (or accumulated over multiple fires), which is influenced by fire severity, fire frequency and plant characteristics such as stem diameter and bark thickness/bark type (Denham et al., 2016; Nolan, Rahmani, et al., 2020). Severe drought preceding or following fire may result in resource depletion that damages tree canopies and exacerbates the effects of fire (Enright et al., 2015; Matusick et al., 2013).

Brogo Wet Vine Forest contains understorey species that are not known to resprout following fire, including *Abutilon oxycarpum, Cassinia longfolia, Cassinia trinerva, Leucopogon juniperinus, Myoporum bateae, Ozothamnus diosmifolus* (see Appendix A for details). In addition, a high proportion of species are known to resprout from the base-only or from roots or rhizomes, including *Acacia falciformis, Acacia implexa, Clematis glycinoides, Melicytus dentata, Indigofera australis, Eustrephus latifolius, Geitonoplesium cymosum* and *Stephania japonica* (see Appendix A). There are also several species where resprouting status is unknown (see Appendix A). The structure of Brogo Wet Vine Forest therefore varies with time since fire1.2.2.1, as the structural complexity and vertical height of the lower layers increases with time and juvenile plants transition to maturity, culminating in the structural form described in section 1.2.2.1.

Vegetation types that contain mesic, fire-sensitive species are likely at higher risk of local extirpations of species than other vegetation types (Clarke et al., 2009; Fairman et al., 2016). Some understorey components may be unable to persist through frequently recurring fires if low postfire survival is not compensated by recruitment of seedlings. Eucalypt forests, such as Brogo Wet Vine Forest, that contain fire-sensitive elements in their subcanopy and understorey at risk of extirpation via their processes (Clarke et al., 2009; Fairman et al., 2016).

Consultation Questions on the relevant biology and ecology

* Are there any other 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.

# 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.

Brogo Wet Vine Forest intergrades with other vegetation types and ecological communities, particularly grassy woodlands in flatter, low-lying areas or lower slopes (see Appendix B - Relationship to other vegetation classification and mapping systems). Key diagnostic characteristics are used to identify an area of native vegetation as being Brogo Wet Vine Forest, and define the features that distinguish it from other communities, noting that additional information to assist with identification is provided in the other sections of this document, particularly the description (section 1.2) and Appendix A - Species lists.

## Key diagnostic characteristics

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

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

The ecological community is defined as areas matching the description in section 1.2 that meet the following key diagnostic characteristics:

* Occurs in New South Wales within the South East Corner Bioregion[[1]](#footnote-2).
* Occurs typically on granitic parent material or Ordovician mudstone parent material. The typical relevant Australian Soil Classification (DPIE, 2021) is Kurosols, Kandosols or Dermosols[[2]](#footnote-3).
* Has a canopy[[3]](#footnote-4) dominated by *Eucalyptus* species and sometimes *Angophora floribunda.* At least one of the following species must be present: *Eucalyptus tereticornis, Eucalyptus bosistoana, Eucalyptus globoidea, Eucalyptus maidenii, Angophora floribunda.*
* Has an understorey[[4]](#footnote-5) of small trees, soft-leaved shrubs and vines/climbers, often containing species associated with rainforests or rainforest margins such as *Ficus rubiginosa, Alectryon subcinereus* and *Pittosporum undulatum.* Other small trees such as *Brachychiton populneus*, *Acacia implexa* and *Acacia mearnsii* may also be present.During post-fire regenerative phases, these trees may be evident only as dead remains, seedlings or juveniles.
* Has a moderately-dense to open, species-rich ground layer[[5]](#footnote-6) with cover greater than 25% (can be less for some time after a fire, drought or other major disturbance, or approaching 100% following wetter than average periods), comprising a mix of grasses and ferns with vines and creepers extending into the above strata, except in patches where deep leaf litter suppresses ground layer development.

Consultation Questions on the key diagnostic characteristics

* Do you agree that these statements will clearly identify when the ecological community is present?
* Are the key diagnostic characteristics sufficient to differentiate the ecological community from other ecological communities? If not, how should they be modified?
* Is the presence of *F. rubiginosa* or *A. subcinereus* AND a eucalypt dominated canopy sufficient to distinguish from Lowland Grassy Woodland and Dry Rainforest?
* Are some of the grasses that are found in Lowland Grassy Woodland (such as *T. triandra*) absent in Brogo Wet Vine Forest?

## 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.

### Identifying a patch

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

### Breaks in a patch

When it comes to defining a patch of the ecological community allowances are made for “breaks” up to 30 metres between areas that meet the key diagnostics. Such breaks may be the result of watercourses or drainage lines, fence lines, tracks, paths, roads, powerline easements or other gaps presenting as areas of water, rocks, exposed soil, leaf litter or cryptogams, and areas of localised variation in vegetation that do not meet the key diagnostics. For example, a single patch could include two areas of the ecological community that meet the key diagnostics, but which are separated by a narrow strip of riparian vegetation lining a watercourse. Such breaks do not significantly alter the overall functionality of the ecological community and form a part of the patch. Watercourses or drainage lines, gaps made by exposed areas of soil or leaf litter, and areas of localised variation in vegetation should be included in the calculation of the size of the patch and be taken into account when determining the overall condition of the patch. Tracks, paths, roads or other artificial surfaces should be excluded from the calculation of patch size and condition. Where there is a break in the ecological community of 30 metres or more (e.g. due to permanent artificial structures, wide roads or other barriers, water bodies or other types of vegetation) then the gap indicates that separate patches are present.

### Variation within a patch

Patches of the ecological community may contain areas that vary in structural or biological characteristics. For example, the sparse nature of the small tree and shrub layer means that some diagnostic species may not always be present in parts of a patch. Species that are sensitive to disturbance (such as fire sensitive species) may also be absent for a time after disturbance. Variation in vegetation across a patch should not be considered to be evidence of multiple patches, so long as it meets the key diagnostics.

### Revegetation and regrowth

Revegetated or replanted sites or areas of regrowth are not excluded from the listed ecological community so long as the patch meets the key diagnostic characteristics.

Where ecological restoration is planned, the aim should be for recovery of as many key biodiversity and ecosystem attributes as practical for a particular site, so that the ecological community is on a trajectory to recovery and is self-sustaining. This should be based on identifying appropriate reference site(s) for the ecological community following the *National Standards for the Practice of Ecological Restoration in Australia* (Standards Reference Group SERA 2021) (also see 5.4.2 RESTORE and MANAGE the ecological community).

### 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) and New South Wales BioNet Vegetation Classification User Manual (NSW Office of Environment and Heritage 2017) may provide guidance.

The size, number and spatial distribution of plots or transects must be adequate to represent variation across the patch. Sampling should address likely variation in species composition and significant variation in the vegetation (including areas of different condition), landscape qualities and management history (where known) across the patch. Recording the search effort (identifying the number of person hours spent per plot/transect and across the entire patch; along with the surveyor’s level of expertise and limitations at the time of survey) is useful for future reference.

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

### Consideration of fire effects on community appearance

The fire history of a site should be given consideration during assessment, as Brogo Wet Vine Forest may appear simplified and potentially similar to adjacent vegetation types such as Lowland Grassy Woodland where fires have occurred at short intervals.

Where there is difficulty in distinguishing recently or frequently burnt Brogo Wet Vine Forest from Lowland Grassy Woodland the following points should also be considered:

* Presence of *Ficus rubignosa,* or its burnt remains, indicates that the community is likely to be Brogo Wet Vine Forest, as this species is typically absent from Lowland Grassy Woodland (Tozer et al. 2010).
* Rocky areas and outcrops found within patches of Brogo Wet Vine Forest likely disrupt fire activity and provide refugia for fire-sensitive species. Such species should therefore be comparatively more abundant than within Lowland Grassy Woodland (Miles, 2021a).
* While there is crossover of these two communities on steep granitic slopes, Brogo Wet Vine Forest is less likely to occur on flatter lower-lying terrain, where Lowland Grassy Woodland is predominant (Tozer et al. 2010; NSW Scientific Committee 2011);
* On average, Lowland Grassy Woodland is likely to have a higher proportion of ground cover vegetation than Brogo Wet Vine Forest, e.g. 40 to 90% versus 25 to 75% (Tozer et al. 2011). However, following wetter than average periods there may be little difference as cover may approach 100%.

### Mapping and vegetation classifications

There are a number of mapping and vegetation classification schemes used in NSW. Although none directly map areas of the ecological community according to the key diagnostics, they can still provide useful information on the likely occurrence of the ecological community. Appendix B - Relationship to other vegetation classification and mapping systems outlines the map units or classifications from a number of common mapping and classification systems that best relate to the ecological community.

### Other listed ecological communities

The ecological community includes the New South Wales listed “Brogo Wet Vine Forest in the South East Corner Bioregion”.

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

* Araluen Scarp Grassy Forest (currently under assessment) – also listed in NSW as the Araluen Scarp Grassy Forest in the South East Corner Bioregion. This community occurs further north and does not overlap with the known distribution of Brogo Wet Vine Forest.
* Lowland Grassy Woodland in the South East Corner Bioregion (critically endangered) – also listed in NSW. Lowland Grassy Woodland occurs in the flatter valley floors and does not contain the rainforest elements that are characteristic of Brogo Wet Vine Forest.
* River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (critically endangered) – Includes the River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions listed in NSW. This community is restricted to alluvial flats, edges of waterways and floodplain margins mostly less than 50 metres ASL.
* Dry Rainforest of the South East Forests in the South East Corner Bioregion - listed in NSW (endangered). Dry Rainforest often intergrade with Brogo Wet Vine Forest but is distinguished by the dominance of *Ficus rubiginosa* rather than eucalypts in the canopy.

Consultation Questions on the additional identification information

* How could we improve on the information provided to assist with identifying the ecological community?
* Is 0.1ha appropriate as a size threshold for the smallest patch size of the ecological community that can be identified?
* Please comment on survey requirements, including post fire survey.
* Is the list of corresponding map units complete and accurate?
* The closest matched Plant Community Type (PCT) is 3108, but there is very little overlap between this PCT and other mapping (e.g. SCIVI) of Brogo Wet Vine Forest. Can you provide any information that would help resolve this difference?
* Have all relevant listed ecological communities been included?

## Condition classes, categories and thresholds

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

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

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

* the key diagnostic characteristics (section 2.1) AND
* at least the minimum condition thresholds (Table 1).

Table 1 outlines the different condition classes that apply to the ecological community. The minimum condition thresholds are designed to identify those patches that retain sufficient conservation values to be considered a matter of national environmental significance, to which the referral, assessment, approval and compliance provisions of the EPBC Act apply. These include all patches in Classes A, B C and D.

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

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

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

Recent disturbance by fire is likely to result in the ecological community presenting in a temporarily altered state that may include severely reduced canopy cover, simplified vegetation structure, resprouting trees and shrubs that have been partially or completely 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.

Table 1. Condition categories, classes and thresholds

| **Patch size threshold →**  **Biotic threshold ↓** | **Large patch**  ≥ 1 ha | **Small contiguous patch**3  ≥ 0.1 ha within an area of native vegetation ≥ 2 ha | **Small patch**  ≥ 0.1 ha |
| --- | --- | --- | --- |
| **High condition** Total of ≥ 16 native understorey/ground layer1 species per plot2  **AND**  Total of ≥ 80% understorey/ground layer1 plant cover per plot2 is native species | **CLASS A1**  Large or contiguous patch in high condition | | **CLASS B1**  Small patch in high condition |
| **Good condition**  Total of ≥ 10 native understorey/ground layer1 species per plot2  **AND**  Total of ≥ 50% understorey/ground layer1 plant cover per plot2 is native species | **CLASS B2**  Large of contiguous patch in good condition | | **CLASS C1**  Small patch in good condition |
| **Moderate condition**  Total of < 8 native understorey/ground layer1 species per plot2  **AND**  > 30% total understorey/ground layer1 plant cover per plot2 is native species | **CLASS C2**  Large of contiguous patch in moderate condition | | **Not protected** |
| 1Understorey/ground layer is inclusive of all flora below canopy layer, including both the juvenile forms of canopy species and fire-/drought-affected canopy trees that are resprouting.  2The minimum acceptable plot size is 0.04 ha.  3Patches that are connected to other patches of native vegetation, or are within 30 m of other native vegetation. | | | |

Consultation Questions on the condition classes, categories and thresholds

* How can we improve on the proposed condition information?
* Are the proposed *measures* (understorey species richness, weediness, animal trails, and fire/drought/BMAD impacts) appropriate to distinguish between patches of different condition?
* Are the proposed *thresholds* for these measures appropriate to distinguish the different condition classes?

## Habitat critical to the survival of the ecological community

The habitat or areas most critical to the survival of the ecological community are those patches that are in the best condition (i.e. Classes A and B in Table 1). These represent those parts of the ecological community closest to the benchmark state of the ecological community; they are the patches that retain the highest diversity and most intact structure and ecological function, and have the highest chance of persisting in the long-term.

However, other patches in lower condition classes (i.e. Class C in Table 1) can also be critical to the survival of the ecological community if occur in locations or landscape positions that are particularly important for biodiversity or function and/or may contain suites of species or habitat features that are important in a regional or local context (see Section 2.5).

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 of this EC?

## Areas of high value – surrounding environment and landscape context

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

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

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

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

* Patches that meet, or are closest to, the high quality (Class A) condition for this ecological community. These may be based on on-site observations or known past management history.
* Patches with a larger area to boundary ratio – such patches are more resilient to edge effect disturbances such as weed invasion and human impacts.
* Patches that occur in areas where the ecological community has been most heavily cleared and degraded such as lower slopes or low-lying flatter areas, particularly if they contain large, mature trees.
* Patches within or near to a larger native vegetation remnant and that contribute to a mosaic of vegetation types present at a site. Areas of mosaic native vegetation provide a wider range of habitats that benefit flora and fauna diversity. Other patches are important as linkages among remnants, acting as ‘stepping stones’ of native remnants in the landscape. Connectivity includes actual or potential connectivity to restoration works (e.g. native plantings).
* Patches that occur adjacent to other vegetation types that contain rainforest/mesic forest elements. Dispersal of rainforest/mesic species into Brogo Wet Vine Forest may be an important ecological process, especially following major or short-interval disturbances where more sensitive species may have been depleted.
* Patches that are at the natural edge of its range, particularly where there is genetic distinction, or absence of some threats. These may include unique variants of the ecological community, e.g. with a unique flora and/or fauna composition, or a patch that contains flora or fauna that have largely declined across the broader ecological community or region.
* Patches that show evidence of recruitment of key diagnostic native plant species or the presence of a range of age cohorts (including through successful assisted regeneration or management of sites).
* Patches with good faunal habitat as indicated by diversity of landscape, diversity of plant species and vegetation structure, diversity of age class, presence of movement corridors, mature trees (particularly those with hollows), logs, watercourses, etc.
* Patches containing nationally or state-listed threatened species.
* Patches with high species richness, as shown by the variety of native understorey plant species, or high number of native fauna species (vertebrates and/or invertebrates).
* Patches with relatively low levels of weeds and feral animals or areas where these can be managed efficiently.
* Patches that do not experience grazing or show low-levels of disturbance caused by grazing by domestic livestock or feral herbivores.
* Patches that do not contain evidence of sustained eucalypt canopy dieback.

Consultation Questions on the areas of high value

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

# Cultural significance

The Brogo Wet Vine Forest occurs within country (the traditional lands) of the Yuin Nation. 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 peoples that live in the vicinity and care for Country. This section describes some examples of this significance but is not intended to be comprehensive or applicable to, or speak for, all Indigenous people. Such knowledge may be only held by Indigenous groups and individuals who are the custodians of this knowledge.

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

The Yuin people maintain a strong community presence and cultural identity to this day and are engaged in maintaining traditional knowledge and active management of traditional lands, which contains patches of Brogo Wet Vine Forest (NSW NPWS, 2014).

Current evidence of the widespread use of the Bega and far south coast region by the people of the Yuin people dates back at least 20,000 years (NSW NPWS, 2006, 2011b), but may be much longer. The coast, mountains and tablelands are physically, culturally and spiritually linked via pathways, culturally important places, dreaming trails and varied environments, and this interconnected continuum of life, places and history is significant to the Yuin people (NSW NPWS, 2011b). There are numerous significant traditional pathways across the landscape that includes the ecological community, which were historically used for trade east-west/north-south trade, gathering materials and food, and cultural and social reasons (Blay, 2005).

Several plants may be found within Brogo Wet Vine Forest that are utilised as food sources or for materials by First Nations communities, including but not limited to *Geitonoplesium cymosum* (eaten; rope-making)*, Lomandra longifolia* (food; basket weaving; animal traps)*, Plantago debilis* (medicine)*, Ficus rubiginosa* (food)*, Einadia* spp*.* (food, dye, paint) (Caton & Hardwick, 2016).

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 region who may have information they are willing to share?
* Do you know of any books, articles or online resources about Yuin Peoples relationships with forests or the landscape you think would be sources of appropriate information?

# Threats

Brogo Wet Vine Forest has been primarily impacted by clearing for agriculture and rural development, overgrazing by feral herbivores and domestic livestock, as well as altered disturbance regimes and associated invasion of exotic flora. The community is likely to be under pressure from climate change and associated further changes to disturbance regimes.

## Threat table

Table 2 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 0. Although presented as a list, in reality these threats often interact, rather than act independently.

Table 2: Summary of threats facing the ecological community

| **Threat** | **Threat Status\*** | **Threat impacts** |
| --- | --- | --- |
| **Inappropriate fire regimes (including fires which cause decline in biota)** | Timing: ongoing  Severity: extreme / major  Scope: whole | Inappropriate fire regimes or changes to fire frequency are known threats facing Brogo Wet Vine Forest (NSW Scientific Committee, 2011). Inappropriate fire regimes may threaten the persistence of the mesic, rainforest-associated flora that characterise the community (NSW Scientific Committee, 2011). It is likely that consecutive short intervals fires have the capacity to fundamentally alter the community composition and vegetation structure of temperate eucalypt forests such as Brogo Wet Vine Forest, in particular, loss or decline of understorey elements (DAWE, 2021a; Fairman et al., 2016; Keith, 1996; Kenny et al., 2004; Nolan, Collins, et al., 2021; NSW NPWS, 2011a). Other climate-change related changes to fire regimes may increase pressures on biodiversity, such as expansion of the fire season (e.g. potential for fires earlier and later than normal), changes to the dominant fire type (e.g. a shift from low severity understorey fires toward higher severity crown fires) and changes to the spatial patterns of fire in the landscape (DAWE, 2021a). For example, the highly spatially restricted nature of the ecological community also places it at risk of being entirely burnt within a single fire event. Mega-fires, such as those experienced in the 2019-2020 fire season, can burn a significant proportion of the ecological community (an estimated 45% of the ecological community was within the extent of the 2019-20 bushfires (DAWE 2020) and the surrounding vegetation in a single event, which compounds these detrimental impacts. Fires also have effects on biotic interactions, such as herbivore-plant interactions (e.g. altering resource availability), predator-prey interactions (e.g. facilitating easier access for feral predators to native fauna) and abiotic interactions, such as combined drought and fire, which may have compounding effects on rates of plant mortality and regenerative capacity (DAWE, 2021a). |
| **Climate change and severe weather** | Timing: ongoing  Severity: extreme / major  Scope: whole | Increases in drought severity and the number of severe fire weather days are predicted for southeastern NSW within coming decades (DECCW, 2010; OEH, 2014). Severe drought can cause mass canopy dieback in eucalypt forests and may decrease the capacity for forests to regenerate following fire (Blackman et al., 2019; Choat et al., 2018; Nolan, Gauthey, et al., 2021). Severe drought may also increase the likelihood of large and severe wildfires (Andrade et al., 2019; Nolan, Boer, et al., 2020). Drought may interact with overgrazing to exacerbate negative effects on this community, e.g. reduced availability of palatable ground layer vegetation during drought is likely to lead to increased browsing of woody shrubs and trees, potentially inhibiting plant recruitment (Pahl, 2019; Tasker & Bradstock, 2006).  Current and future drought episodes are occurring within the context of rising global temperatures, with predictions that drought and heatwave severity will increase for southeastern Australia (Kirono et al., 2020). Some models predict that the frequency of severe drought will also increase in this region (Herold et al., 2021). Specifically, the South East and Tablelands Region of NSW is predicted to experience higher severity drought in future, along with a 10–50% increase in the number of severe fire weather days (DECCW, 2010; OEH, 2014). For this region, OEH (2014) also predicts that:   * Maximum temperatures are predicted increase by 0.5–1°C within the next 20 years and by 1.8–2.5°C within 40–60 years; * Minimum temperatures are predicted to increase by 0.4–0.7°C within the next 20 years and by 1.4–2.3°C within the next 40–60 years; * The number of days >35°C will increase and the number of nights <2°C will decrease; * Rainfall will decrease in spring and winter, while rainfall will increase in summer and autumn. |
| **Clearing for agricultural activities and rural dwellings** | *Timing*: mostly past / some ongoing  *Severity*: extreme  *Scope*: majority | European settlement and subsequent land clearing for agriculture on the NSW south coast and hinterland began as early as the late 1820s (Keith & Bedward, 1999).  Land clearing for agricultural activities such as dairy farms and small holdings, and subdivisions resulting in land clearing for houses and fence lines are known threats currently facing some areas of Brogo Wet Vine Forest (Miles, 2006, 2021b; NSW Scientific Committee, 2011; Quartermain & Lambert, 2020). Clearing for fire protection may also be relevant in these areas. |
| **Invasive plant species** | Timing: ongoing  Severity: major  Scope: majority | Invasive plant species are a known issue within Brogo Wet Vine Forest (Miles, 2006; NSW Scientific Committee, 2011; Quartermain & Lambert, 2020). Weed invasion, and its interaction with overgrazing and erosion is likely to be resulting in habitat degradation and reducing the ecological function of Brogo Wet Vine Forest (e.g. Miles 2006).  Known invasive species within the greater Bega region that may be impacting Brogo Wet Vine Forest include (but are not limited to): *Eragrostis curvula, Hypericum perforatum, Lantana spp., Nassella trichotoma, Rubus* spp*.* (BVSC, 2016), *Echium plantagineum, Cirsium vulgare* (NSW NPWS, 2006), *Ailanthus altissima, Ligustrum spp.* (NSW NPWS, 2011b), *Opuntia* spp., *Bidens pilosa*, *Tagetes minuta*, *Verbena* spp., *Verbascum* spp. and *Senecio madagascariensis* (Miles, 2021b). |
| **Overgrazing and trampling by feral herbivores and domestic livestock** | Timing: ongoing  Severity: major / minor  Scope: majority | Overgrazing by feral animals including deer, goats and rabbits, and heavy grazing by domestic livestock are known threats currently facing Brogo Wet Vine Forest (Miles, 2006; NSW Scientific Committee, 2011; Quartermain & Lambert, 2020). Pigs (*Sus scrofa*) are also known to occur within reserves that contain Brogo Wet Vine Forest (NSW NPWS, 2006, 2011b).  Issues likely to be associated with overgrazing and trampling by feral herbivores and domestic livestock in this community include loss of key plant species, reduced community structure, erosion, weed invasion, changes to soil nutrients and negative impacts on the habitat of threatened native fauna.  Within the Eurobodalla Shire Council LGA, overgrazing and trampling by feral herbivores and domestic livestock has resulted in a lack of tree regeneration, loss of small tree or shrub layer, weed invasion or reduced ground layer diversity and erosion (Miles, 2006).  Overgrazing and trampling from overabundant native fauna has been described as a potential threat to Brogo Wet Vine Forest, but evidence of the severity or extent of impacts is not available nor are impacts on the community clearly understood. |
| **Invasive predators** | Timing: ongoing  Severity: minor  Scope: unknown | Feral predator species known to occur within National Park estate that contains patches of Brogo Wet Vine Forest include: Cat (*Felis catus*) and European red fox (*Vulpes vulpes*) (NSW NPWS, 2006, 2011b). |
| **Disease** | Timing: future  Severity: unknown  Scope: unknown | Infection by myrtle rust (*Austropuccinia psidii*) is also potentially a threat to trees and shrubs in the Myrtaceae family in the ecological community, including some of the characteristic and structurally significant canopy and understorey species (Makinson, 2018).  Chytrid fungus is also a potential threat to the various frogs of the ecological community. |
| **Dieback** | Timing: future  Severity: unknown  Scope: unknown | Dieback of the dominant eucalypt species, which is often associated with overabundant psyllids, linked to Bell Miner (*Manorina melanophys*) colonies (Bell Miner Associated Dieback; BMAD) has been described as a potential threat to Brogo Wet Vine Forest (Quartermain & Lambert, 2020). There is concern that loss of habitat associated with the 2019-2020 bushfires may lead to BMAD spreading further into Brogo Wet Vine Forest (Quartermain & Lambert, 2020).  BMAD is listed as a key threatening process in NSW and is a known issue in the South East Corner Bioregion (DPIE, 2008). |
| \****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 | | |

### 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:

* Loss of plant species and erosion caused by overgrazing by feral animals and domestic livestock.
* Competition and land degradation by unmanaged goats
* 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
* Land clearance
* Novel biota and their impact on biodiversity

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.

# Conservation of the ecological community

## Primary conservation objective

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

## Existing protection management plans

### Existing protections

Brogo Wet Vine Forest in the South East Corner Bioregion is listed as an endangered ecological community in NSW, under the *NSW Biodiversity Conservation Act 2016.*

Patches of the community are known to exist within NPWS reserves, NSW State Forest reserves and Bush Heritage Australia reserves, which have varying levels of regulation, active management and public access, and include South East Forest National Park, Wadbilliga National Park, Biamanga National Park, Brogo Reserve, Bodalla State Forest and Mumbulla State Forest.

Around 26% of the community currently lies within land reserved for nature conservation.

### 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.

* Bush Heritage Australia. (2021). *Brogo*. Bush Heritage Australia. Retrieved 29/09/21 from <https://www.bushheritage.org.au/places-we-protect/new-south-wales/brogo>
* Miles, J. (2006). *Recognition and Management of Endangered Ecological Communities in the South East Corner of N.S.W*. S. R. C. M. Authority.
* NSW NPWS. (2006). *South East Forest National Park and Egan Peaks Nature Reserve Plan of Management*. <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Parks-reserves-and-protected-areas/Parks-plans-of-management/south-east-forests-national-park-egan-peaks-reserve-plan-of-management-060645.pdf>
* NSW NPWS. (2011). *Far South Coast Escarpment Parks Plan of Management*. <https://www.environment.nsw.gov.au/resources/planmanagement/final/20110159FarSthCoastFinal.pdf>
* NSW NPWS. (2014). *Plan of Management Yuin Bangguri (Mountain) Parks*. <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Parks-reserves-and-protected-areas/Parks-plans-of-management/yuin-bangguri-mountain-parks-plan-of-management-150003.pdf>

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?

## Principles and standards for conservation

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

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

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

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

Standards Reference Group SERA (2021) – Appendix 2.

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

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

## 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 state agencies, landholders, Traditional custodians, NRM and community groups and other land managers;
* conditions of approval for relevant controlled actions under national environment law (the EPBC Act); and
* prioritising activities in applications for Australian Government funding programs.

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

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

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

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

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

### PROTECT the ecological community

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

* The ecological community should be properly taken into account during the early stages of zoning and development planning decisions, including strategic planning documents at state, regional and local levels, to protect it from clearing and degradation..
* 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. including fire management, road works, developments).
* Environmental assessments should address impacts that extend beyond the immediate footprint of developments, including the needs for asset protection works that involve removal, modification or burning of the Ecological Community.
* Undertake activities to mitigate future climate change and therefore reduce the impacts on this ecological community.

#### Conserve remaining patches

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

* Protect and conserve remaining areas of the ecological community.
* Retain other native vegetation remnants, near patches of the ecological community, where they are important for connectivity, diversity of habitat and act as buffer zones between the ecological community and threats or development zones.
* Protect patches identified as of regional importance in formal conservation reserves. Consider other remnants for less formal conservation tenures, preferably ones that aim for protection over the long-term. This includes investigating formal conservation arrangements, management agreements and covenants to protect patches on private land. This is particularly important for larger patches or areas that link to other patches of native vegetation.
* Where regeneration is occurring, provide measures that will support the regeneration to maturity (e.g. provide fencing to minimise damage risk) and provide for recognition of the alternate states of the community post-disturbance.
* Protect mature and over-mature trees and stags, particularly with hollows. Large and old trees typically have numerous hollows or fissures that provide shelter and support a diversity of animals, particularly insects and their predators.

#### Manage actions to minimise impacts

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

* Plan projects to avoid the need to offset, by avoiding significant impacts to the ecological community.
* In circumstances where impacts cannot be totally avoided and due diligence has been demonstrated, approvals should be predicated on impact minimisation by:
  + retaining and avoiding damage to high quality patches, which should be managed to retain their high quality state;
  + commitments to ongoing mitigation of residual impacts; and
  + protecting important habitat features, such as large mature trees or stags with hollows as these take many decades to develop, cannot be quickly replaced including by nest boxes or other artificial structures which mimic but do not replace habitat.
* Where impacts are unavoidable, offsets should be used as a last resort to compensate for the adverse impacts of the action deemed unavoidable. The outcomes of offsetting activities are generally highly uncertain. Any proposals considering offsets for this ecological community should:
  + minimise the need to offset the ecological community by designing development around the ecological community and applying buffers;
  + retain medium and higher quality patches of the ecological community, rather than offset them (particularly avoiding the use of lower quality offset sites);
  + manage and protect offset areas in perpetuity in areas dedicated for conservation purposes - avoid risks that reduce may their size, condition and ecological function in the future;
  + select offset sites as close as possible to the impact site, to allow for local and regional variation in the ecological community;
  + increase the area and improve ecological function of existing patches, for example by enhancing landscape connectivity, habitat diversity and condition;
  + 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 which should be used to avoid the re-use of offset sites for multiple projects; and
  + monitor offset areas and the outcomes they deliver over the long-term, to manage them adaptively and improve understanding of the best ways to manage offsets to delivery biodiversity benefits.
* Minimise the risk of indirect impacts to the ecological community from actions outside but near to patches of the ecological community, for example avoid building fire-sensitive infrastructure in or immediately adjacent to patches of the community that will encourage fire-hazard reduction activities.
* Prior to removal of any trees or use of heavy machinery that may also damage the understorey, ensure comprehensive flora and fauna surveys have identified threatened or locally important species on site and their potential shelter and nesting sites (for example hollows, burrows, rocks and tree crevices, as well as visible nests). Damage to these should be avoided altogether, but if approved for removal, care should be taken to appropriately relocate or otherwise protect fauna, and avoid undertaking the works during important times, such as during breeding seasons.

#### Apply buffer zones

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

#### Prevent the introduction and spread of exotic species

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

### RESTORE and MANAGE the ecological community

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

* Liaise with landholders and undertake and promote programs that halt threats such as land clearing, grazing, inappropriate fire regimes, weed invasion, Bell Miner-Associated Dieback or human disturbance.
* Identify and prioritise other specific threats and undertake appropriate on-ground site management strategies where required.
* Undertake restoration which meets national standards to increase condition above thresholds for protection.

#### 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.

#### Manage trampling, browsing and grazing

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

#### Manage activities and access

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

#### Manage appropriate fire regimes

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

#### Undertake restoration

* Undertake restoration, including bush regeneration and revegetation, of poorer and medium quality patches to restore them to high quality, including restoration of patches that don’t currently meet the minimum condition thresholds for protection to a condition that does (see Table 1).
  + 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 1 and SERA (2021) for guidance on implementing appropriate standards). This is particularly the case for sites that are being restored or reconstructed from highly altered states (see also Section 2.2.4).
  + Work with landholders to restore and reconnect patches of the ecological community and other adjacent or nearby native vegetation (including buffer areas)
  + Maintain stags, logs, and mature and old-growth trees with hollows as they provide important habitat for fauna.
  + If necessary, supplement, (but do not replace) habitat as part of restoration projects by placing hollow logs, large rocks or other habitat features (such as artificial hollows or various sized nest boxes) in or near to, the ecological community. This may be particularly important after disturbance such as a severe fire event.
  + Use local native species in restoration/revegetation projects for the ecological community and restore understorey vegetation to a structure and diversity appropriate to the site.
  + In general, use locally collected seeds, where available, to revegetate native plant species. However, choosing sources of seed closer to the margins of their range may increase resilience to climate change. Take into account key plant species’ growing seasons to successfully achieve seed set.
  + Ensure commitment to maintenance after planting, such as the care of newly planted vegetation by watering, mulching, weeding and use/removal of tree guards.
  + Consider the landscape context and other relevant species and communities when planning restoration works. For example, ensure adjacent ecological communities and threatened and migratory species are not adversely impacted by tree planting or other restoration activities for the ecological community.
  + Close and rehabilitate unnecessary roads and tracks and otherwise control access to restored patches.

### COMMUNICATE, engage with and support

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

#### Raise awareness

* Communicate with landholders/managers, relevant agencies and the public to emphasise the value of the ecological community, the key threats, its significance, and appropriate management. Encourage landholders to talk with local NRM organisations and other knowledgeable groups.
* Undertake effective community engagement and education to highlight the importance of minimising disturbance during recreational activities such as walking and bicycle riding and of minimising pollution, littering and damage to habitat via informative and explicit signage.
* Inform landholders about incentives, such as conservation agreements, stewardship projects, funding and government NRM programs etc. that may apply to help look after sites on private lands.

#### 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.
* Install signage to discourage damaging activities such as the removal of dead timber, bush rock removal, dumping garden waste and other rubbish, creating informal paths and tracks, and the use of off-road vehicles in patches of the ecological community. Signage should include a section that describes the damaging effects of these activities and the relevant associated penalties for engaging in these activities.
* 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.

#### Coordinate efforts

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

### RESEARCH and monitoring

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

#### Mapping

* Collate existing vegetation mapping information and associated data for this ecological community and identify gaps in knowledge.
* Comprehensively map the extent and condition of the ecological community across its range:
  + Support field survey and interpretation of other data such as aerial photographs and satellite images to more accurately map the current extent, condition, threats, function, presence and use by regionally significant or threatened species.
  + Support and enhance existing programs to model the pre-1750 extent across the entire range of the ecological community to inform restoration.
  + Identify the most intact, high conservation value remnants and gain a better understanding of variation across the ecological community.
  + Continue to track spatially the fire interval status of the ecological community and surrounding fire-dependent and/or fire sensitive vegetation;
  + Collate existing information on populations of fauna characteristic of the ecological community across its range.

#### Options for management

* Investigate key ecological interactions, such as the role of fauna in pollination, seed dispersal and nutrient cycling.
* Research into appropriate and integrated methods to manage pests and weeds that affect the ecological community.
* Assess the vulnerability of the ecological community to climate change and investigate ways to improve resilience through other threat abatement and management actions.
* Improve understanding of fire survival and reproductive responses, and relevant traits of plant and animal species to predict community responses to alternative fire regimes.
* Assess the appropriateness and efficacy of fire management regimes and fire management infrastructure (e.g. fire trails) that exist for patches of the ecological community.
* Assess the appropriateness and efficacy of fire management regimes that employed by landholders that hold/own/lease property that contains patches of the ecological community.
* Conduct research leading to the development of effective landscape-scale restoration techniques for the ecological community. Investigate the interaction between disturbance types, such as fire and invasion by weeds and feral animals, to determine how an integrated approach to threat management can be implemented.
* Investigate the most cost-effective options for restoring landscape function, including re-vegetation or assisted regeneration of priority areas, potentially buffering, connecting and protecting existing remnants.

#### Monitoring

* It is important that any monitoring is planned before management commences and considers what data are required to address research questions. Monitoring must also be resourced for management activities, especially for those using a novel approach, and applied during and following the management action.
  + Monitor for signs of decline, in terms of known problems e.g. Bell Miner-Associated Dieback, and new incursions, e.g. myrtle rust.
  + 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? Do you have an opinion about appropriate fire-regimes that would maintain both the understorey and canopy layer?
* The Committee and Department would appreciate any additional information or advice to improve this section, including an indication of what are the highest priorities and why.

# Listing assessment

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

## Reason for assessment

This assessment follows prioritisation of a nomination from the public in response to the impacts of the 2019-2020 bushfires.

## Eligibility for listing

This assessment uses the criteria set out in the [EPBC Regulations](https://www.legislation.gov.au/Details/F2020C00778) and TSSC [Guidelines for Nominating and Assessing Threatened Ecological Communities](http://www.environment.gov.au/system/files/pages/d72dfd1a-f0d8-4699-8d43-5d95bbb02428/files/guidelines-ecological-communities.pdf), as in force at the time of the assessment.

### Criterion 1 – decline in geographic distribution

Eligible under Criterion 1 for listing as **Vulnerable.**

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

Source: TSSC 2017

**Evidence:**

Estimates of the decline in extent since 1750 of Brogo Wet Vine Forest have included 42% (Keith & Bedward, 1999), 45 to 50% (Tozer et al. 2010) and approximately half (NSW Scientific Committee, 2011).

Largely, clearing has likely been associated with historical conversion to agricultural land, but analysis of recent (1991–2015) woody vegetation change data (DEE, 2017) suggests that up to 8% of Brogo Wet Vine Forest may have been recently cleared for either agriculture or rural development, although this could also indicate that these areas have not recovered from drought/fire/BMAD during the period 1991–2015.

Additionally, many remaining patches have experienced degradation, due to the multitude of interacting factors that are detailed in Section 4. Therefore, some proportion of the remaining Brogo wet vine forest is likely to no longer meet the key diagnostics and condition thresholds in Table 1.

On balance, taking into account historic estimates, recent losses, and that the condition of the remaining patches of Brogo wet vine forest have been severely degraded such that many patches may no longer meet the key diagnostics and condition thresholds for the ecological community, the geographic distribution of the ecological community is likely to have declined by more than 50% since 1750.

This represents a **substantial** decline in geographic distribution. Following preliminary assessment, the Committee therefore considers that the ecological community is likely to meet the relevant elements of Criterion 1 to make it eligible for listing as **Vulnerable**.

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Its geographic distribution is:** | | **very restricted** | **restricted** | **limited** |
| *Extent of occurrence (EOO)* | | *< 100 km2*  *= <10,000 ha* | *<1,000 km2*  *= <100,000 ha* | ***<10,000 km2***  ***= <1,000,000 ha*** |
| *Area of occupancy (AOO)* | | *< 10 km2*  *= <1,000 ha* | ***<100 km2***  ***= <10,000 ha*** | *<1,000 km2*  *= <100,000 ha* |
| *Average patch size* | | ***< 0.1 km2***  ***= <10 ha*** | *< 1 km2*  *= <100 ha* | *-* |
| AND the nature of its distribution makes it likely that the action of a threatening process could cause it to be lost in: | | | | |
| the immediate future | *10 years or 3 generations*  *(up to a maximum of 60 years)* | Critically  endangered | Endangered | Vulnerable |
| **the near future** | ***20 years or 5 generations***  ***(up to a maximum of 100 years)*** | **Endangered** | **Endangered** | **Vulnerable** |
| the medium term future | *50 years or 10 generations*  *(up to a maximum of 100 years)* | Vulnerable | Vulnerable | Vulnerable |

Source: TSSC 2017

**Evidence:**

The geographic distribution for this ecological community has been calculated from the NSW SCIVI: Southeast NSW Native Vegetation Classification and Mapping (NSW DPIE, version 14; Tozer et al. 2010) units that most closely match the description of the ecological community, being the map units representing the NSW-listed EEC.

The estimated Extent of Occupancy (EoO) for the ecological community is 408,616 ha or 4086 km2. This represents a **limited** geographic distribution. The estimated Area of Occupancy (AoO) for the ecological community is 5294 ha or 53 km2. This represents a **restricted** geographic distribution. The median patch size for patches is 2.12 ha or 0.02 km2. This represents a **very restricted** geographic distribution. Around 92% of the ecological community exists as patches smaller than 10 ha in size.

The ecological community’s highly patchy distribution makes management initiatives and actions difficult to coordinate across its range and increases the ecological community’s susceptibility to immediate threats such as clearing or degradation through inappropriate management. The small patch size of the community also makes it vulnerable to edge effects such as weed invasion, changes to microclimate, changes to species richness and abundance and changes to vegetation structure (Laurance et al., 2002). Only around 26% of the community currently lies within land reserved for nature conservation. Further loss of patches may reduce connectivity and therefore the ability of some species to disperse between patches (Fischer & Lindenmayer, 2007; Opdam & Wascher, 2004). Intensified disturbance regimes, such as those being experienced within southeastern Australia (Boer et al., 2020; Collins, Bradstock, et al., 2021), will likely compound the risks that many small patches face, making them less likely to persist in the landscape.

Severe drought has the potential to cause mass tree mortality and destabilise temperate forest ecosystems (see **Error! Reference source not found.**). Severe drought is also a known driver of large and severe wildfires (Andrade et al., 2019; Nolan, Boer, et al., 2020). Severe drought episodes are likely to interact with fire regimes that cause biodiversity decline in a number of ways detrimental to fauna and flora (see **Error! Reference source not found.**). Intensified fire regimes, such as those being experienced within south-eastern Australia (Boer et al., 2020; Collins, Bradstock, et al., 2021), will likely compound the risks that many small patches face, making them less likely to persist in the landscape. The ability of the species that represent the community to persist and disperse between patches will likely become more difficult if conditions become less suitable for them in future (Fischer & Lindenmayer, 2007; Opdam & Wascher, 2004).

Large-scale wildfires occurring at short intervals have the capacity to fundamentally change the ecology of Brogo Wet Vine Forest, e.g. via extirpation of fire-sensitive mesic elements, to the point where patches of the community may no longer meet the description in 1.2 or the key diagnostics in 2.1. Dramatic shifts in fire regimes that may be conducive to this scenario are recognised to be occurring globally and are linked to anthropogenic climate change (Bowman et al., 2020; Kirchmeier‐Young et al., 2019).

The fire history of Brogo wet vine forest suggests that an increase in fire frequency could be detrimental to the persistence of the ecological community. Considering the period from 1988 to 2021, the maximum size of areas affected by contiguous high severity fire in the region containing the ecological community can be up to approximately 149,000 ha, averaging around 38,000 ha, while the median size of fires overall is approximately 7400 ha (Collins, Bradstock, et al., 2021). Thus, the median fire size within this region exceeds the Area of Occupancy for Brogo Wet Vine Forest (5294 ha), and vastly exceed the average patch size for the community (2.12 ha). Further, predicted increases in drought severity and frequency across southeastern Australia (Herold et al., 2021; Kirono et al., 2020) are likely to lead to increased occurrence of large and severe wildfires in this region (Andrade et al., 2019; Nolan, Boer, et al., 2020). A 10–50% increase in the number of severe fire weather days is predicted for the South East and Tablelands region specifically within the next 60 years (DECCW, 2010; OEH, 2014).

In the last 20 years, around 43% of the ecological community has burned once and 18% burned twice (Table 3). Around 45 per cent of the TEC burnt during the 2019–2020 fire season, with over half of this burning at high or very high fire severity (Table 3).

Table 3. Fire frequency and fire severity statistics for Brogo Wet Vine Forest. Spatial extent of vegetation was Shoalhaven EEC data (DPIE, 2013).

|  |  |  |
| --- | --- | --- |
| **Fire frequency 1950 – 2021** | | |
| **Number of fires** | **Area (ha)** | **Percentage of total** |
| 0 | 525 | 10 |
| 1 | 1896 | 36 |
| 2 | 1616 | 30 |
| 3 | 644 | 12 |
| 4 | 484 | 9 |
| 5 | 113 | 2 |
| 6 | 19 | <1 |
| **Number of fires since 2000** | | |
| 0 | 2037 | 38 |
| 1 | 2270 | 43 |
| 2 | 962 | 18 |
| 3 | 33 | 1 |
| **Fire severity 2019 – 2020 season** | | |
| **Severity class** | **Area (ha)** | **Percentage of total** |
| Not burnt in 2019/20 | 2948 | 56 |
| 1 (no data) | 108 | 2 |
| 2 (unburnt) | 142 | 3 |
| 3 (low to moderate) | 662 | 12 |
| 4 (high) | 793 | 15 |
| 5 (very high) | 646 | 12 |

Sources: NPWS (2021), AUS GEEBAM (2020)

Additionally, around 3% of TEC lies within commercial production forests, with some of these patches included within the harvest area of Forestry Corporation harvest plans (Forestry Corporation, 2015).

Bell Miner-Associated Dieback has been described as a potential threat to the community integrity of Brogo Wet Vine Forest. Bell Miner-Associated Dieback is a syndrome of canopy defoliation associated with overabundant psyllids and has been linked to complex relationships between colonies of the Bell Miner (*Manorina melanophys*), densities of other bird species and disturbance processes (Hall et al., 2015; Kemmerer et al., 2008). Such outbreaks can result in significant loss of canopy over wide geographic areas (Hall et al., 2015; Haywood & Stone, 2011), potentially interacting with other threats such as drought and fire to exacerbate ecosystem degradation.

The cumulative impact of these threatening processes has the potential to cause the loss of the ecological community within 100 years (5 generations of the dominant canopy species)**.**

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

### Criterion 3 – decline of functionally important species

There is 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 |
| *Estimated decline over the last 10 years or three generations, whichever is longer* | *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 |
| *timeframe* | *the immediate future (10 years or 3 generations up to a maximum of 60 years)* | *the near future (20 years or 5 generations up to a maximum of 100 years)* | *the medium-term future (50 years or 10 generations up to a maximum of 100 years)* |

Source: TSSC 2017

**Evidence:**

The ecological relationships between member species of this community are important for maintaining its ecological function, but specific data related to the decline of individual key species or their functional importance within this ecological community are not available.

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

### 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 |
| *such that restoration is unlikely (even with positive human intervention) within* | *the immediate future (10 years or 3 generations up to a maximum of 60 years)* | *the near future (****20 years*** *or 5 generations up to a maximum of 100 years)* | *the medium-term future (50 years or 10 generations up to a maximum of 100 years)* |

Source: TSSC 2017

**Evidence:**

Complex and detrimental interactions involving past land clearing, overgrazing, feral animal impacts, drought and fire impacts (see Criterion 2 – limited geographic distribution coupled with demonstrable threat), and weed invasion has occurred within Brogo Wet Vine Forest, causing severe reductions in integrity and degradation of ecological functions across most of its range. 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 domestic and feral animals and invasive plants.

**Domestic and feral animals**

Currently around 70% of the remaining ecological community may be subject to grazing by domestic livestock. Feral goats, deer and domestic livestock are known to preferentially browse grasses, followed by forbs will also browse woody shrubs and trees when resources become scare, e.g. during drought (Davis et al., 2008; Pahl, 2019). Rabbits can reduce vegetation cover, reduced or prevent plant recruitment, increase soil erosion and have been implicated in the extinction of native fauna (DSEWPC, 2011; Eldridge et al., 2006; Hobbs, 2001). Overgrazing in this community is likely to result in simplification of understorey vegetation (e.g. reduced plant species abundance and diversity), long term impacts on recruitment of canopy species, removal of shrubs, changes to species dominance, changes in nutrient concentrations, damage to soils and increased erosion (Tasker & Bradstock, 2006; Yates et al., 2000). Presence of introduced herbivores can also negatively impact fauna, e.g. via trampling effects and changes to critical habitat (Denmead et al., 2015; Hansen et al., 2019). Interactions between severe fires and heavy rainfall, i.e., post-fire erosion of bare soils (Tulau et al., 2018), may further exacerbate degradation by overgrazing. Such changes may reduce the effectiveness of future restoration projects (Sims et al., 2019). Livestock are also efficient vectors of transmission for introduced plants species and noxious weeds throughout landscapes, and facilitate the transport of weeds beyond edges and into forest interiors (Castillo-Flores & Calvo-Irabién, 2003; Hogan & Phillips, 2011).

In the NSW south coast and tablelands region, the distribution of feral deer was either patchy or absent in 2009, but had become almost continuous by 2020 (DPI, 2021a). Feral goat distribution has been largely stable and patchy in this region between 2009 to 2016, with mostly low abundance in the Bega Valley region (DPI, 2021b). Feral pig distribution has been mostly stable in this region between 2009 to 2016, being either absent or present at low to medium densities across the majority of areas containing Brogo Wet Vine Forest (DPI, 2021c). Foxes are present in all areas containing Brogo Wet Vine Forest (DPI, 2021d). Rabbit distribution has remained largely stable in this region between 2009 to 2016, with continuous low-density coverage across the areas containing Brogo Wet Vine Forest (DPI, 2021e).

**Invasive plants**

Invasive plants are a known issue within the community (see Threat table for species list). Invasive species have the capacity to transform ecosystems and inhibit ecological function (Vilà et al., 2011). Invasion of natural ecosystems by introduced plants species is most likely to occur on edges where land conversion has taken place (Vilà & Ibáñez, 2011).

**Conclusion**

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

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

### 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 |
| *an observed, estimated, inferred or suspected detrimental change over the immediate past, or projected for the immediate future (10 years or 3 generations, up to a maximum of 60 years), of at least:* | *80%* | *50%* | *30%* |

Source: TSSC 2017

**Evidence:**

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

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

### 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 |
| *timeframes* | *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:**

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?
* Please provide any additional data or evidence to support the assessment against the criteria?

# Appendix A - Species lists

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

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

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

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

1. Flora

Table 4: Flora that are known to occur within the ecological community.

| **Scientific name** | **Common name/s** | **Fire response**1 | **EPBC status2** | **State status3** | **Source** |
| --- | --- | --- | --- | --- | --- |
| **Canopy tree species** | | | | | |
| *Angophora floribunda* | Rough-barked Apple | R | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Eucalyptus baueriana* | Blue Box | R | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Eucalyptus bosistoana* | Coast Grey Box | R | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Eucalyptus globoidea* | White Stringybark | R | Not listed | Not listed | Tozer et al. (2010) |
| *Eucalyptus maidenii* | Maiden’s Blue Gum | R | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Eucalyptus tereticornis* | Forest Red Gum | R | Not listed | Not listed | NSW Scientific Committee (2011) |
| **Understorey trees and shrubs** | | | | | |
| *Acacia implexa* | Hickory Wattle | R; B only | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Abutilon oxycarpum* | Flannel Weed | OS | Not listed | Not listed | Miles (2006) |
| *Acacia falciformis* | Broad-leaved Hickory | R; B only | Not listed | Not listed | Miles (2006) |
| *Acacia maidenii* | Maiden’s Wattle | R | Not listed | Not listed | Miles (2006) |
| *Acacia mearnsii* | Black Wattle | R; seedlings > 1 yr | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Alectryon subcinereus* | Native Quince | U | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Brachychiton populneus* | Kurrajong | R | Not listed | Not listed | NSW Scientific Committee (2011), Tozer (2010) |
| *Breynia oblongifolia* | Coffee Bush | R | Not listed | Not listed | Tozer et al. (2010) |
| *Bursaria spinosa* | Blackthorn | R | Not listed | Not listed | Tozer et al. (2010) |
| *Cassinia longifolia* | Dogwood | OS; seedlings > 1 yr | Not listed | Not lsted | Miles (2006) |
| *Cassinia trinerva* | Three-veined Cassinia | OS | Not listed | Not listed | Tozer et al. (2010) |
| *Deeringia amaranthoides* | Deeringia | U | Not listed | Not listed | Miles (2006) |
| *Exocarpos cupressiformis* | Native Cherry | R | Not listed | Not listed | Miles (2006) |
| *Ficus rubiginosa* | Port Jackson Fig | R | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Indigofera australis* | Austral Indigo | R; B only; seedlings < 1 yr | Not listed | Not listed | Tozer et al. (2010) |
| *Leucopogon juniperinus* | Prickly Beard Heath | OS | Not listed | Not listed | Miles (2006) |
| *Melicytus dentata* | Tree Violet | R; B only | Not listed | Not listed | Tozer et al. (2010) |
| *Myoporum bateae* |  | U | Not listed | Not listed | Miles (2006) |
| *Myrsine howittiana* | Muttonwood | U | Not listed | Not listed | Miles (2006) |
| *Notelaea venosa* | Veined Mock Olive | R | Not listed | Not listed | Miles (2006) |
| *Ozothamnus diosmifolius* | Tickbush | OS | Not listed | Not listed | Miles (2006) |
| *Pimelea axiflora ssp axiflora* | Bootlace Bush | U | Not listed | Not listed | Miles (2006) |
| *Pittosporum revolutum* | Large-fruited Pittosporum | R | Not listed | Not listed | Miles (2006) |
| *Pittosporum undulatum* | Sweet Pittosporum | R | Not listed | Not listed | NSW Scientific Committee (2011) |
| **Ferns** | | | | | |
| *Asplenium flabellifolium* | Necklace Fern |  | Not listed | Not listed | Tozer et al. (2010) |
| *Cheilanthes distans* | Bristly Cloak Fern |  | Not listed | Not listed | Miles (2006) |
| *Cheilanthes sieberi* | Poison Rock Fern |  | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Doodia aspera* | Prickly Rasp Fern |  | Not listed | Not listed | Miles (2006) |
| *Pellaea falcata* | Sickle Fern |  | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Pteridium esculentum* | Bracken Fern |  | Not listed | Not listed | Miles (2006) |
| *Pteris tremula* | Tender Brake |  | Not listed | Not listed | Miles (2006) |
| *Pyrrosia rupestris* | Rock Felt Fern |  | Not listed | Not listed | Miles (2006) |
| **Herb and orchid and sedge/graminoid species** | | | | | |
| *Ajuga australis* | Austral Bugle |  | Not listed | Not listed | Miles (2006) |
| *Arthopodium milleflorum* | Pale Vanilla Lily |  | Not listed | Not listed | Miles (2006) |
| *Dysphania carinatum* | Green Crumbweed |  | Not listed | Not listed | Miles (2006) |
| *Dysphania pumilio* | Small Crumbweed |  | Not listed | Not listed | Miles (2006) |
| *Commelina cyanea* | Scurvy Weed |  | Not listed | Not listed | Miles (2006) |
| *Cymbonotus spp.* | Bear’s Ear |  | Not listed | Not lsted | Miles (2006) |
| *Carex appressa* | Tall Sedge |  | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Carex breviculmis* | Short-stem Sedge |  | Not listed | Not listed | Tozer et al. (2010) |
| *Carex inversa* | Knob Sedge |  | Not listed | Not listed | Tozer et al. (2010) |
| *Carex longebrachiata* | Drooping Sedge |  | Not listed | Not listed | Tozer et al. (2010) |
| *Cyperus gracilis* |  |  |  |  | Miles (2006) |
| *Cyperus laevis* |  |  |  |  | Miles (2006) |
| *Cyperus trinervis* |  |  | Not listed | Not listed | Miles (2006) |
| *Cynoglossum australe* | Australian Hound's-tongue |  | Not listed | Not listed | Tozer et al. (2010) |
| *Daucus glochidiatus* | Australian Carrot |  | Not listed | Not listed | Tozer et al. (2010) |
| *Dendrobium speciosum* | Rock orchid |  | Not listed | Not listed | Miles (2006) |
| *Desmodium brachypodum* | Large Tick-trefoil |  | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Desmodium gunii* | Slender Tick-trefoil |  | Not listed | Not listed | Miles (2006) |
| *Desmodium varians* | Slender Tick-trefoil |  | Not listed | Not listed | Tozer et al. (2010) |
| *Dichondra repens* | Kidney Weed |  | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Einadia hastata* | Berry Saltbush |  | Not listed | Not listed | Tozer et al. (2010) |
| *Einada nutans* | Climbing Saltbush |  | Not listed | Not listed | Miles (2006) |
| *Einada trigonos* | Fishweed |  | Not listed | Not listed | Miles (2006) |
| *Euchiton japonicus* | NA |  | Not listed | Not listed | Tozer et al. (2010) |
| *Galium leiocarpum* | Bedstraw |  | Not listed | Not listed | Miles (2006) |
| *Geranium solanderi var. solanderi* | Austral Crane's-bill |  | Not listed | Not listed | Tozer et al. (2010) |
| *Gahnia aspera* | Red-fruited Saw-sedge |  | Not listed | Not listed | Miles (2006) |
| *Hackelia latifolia* | Forest Hound’s Tongue |  | Not listed | Not listed | Tozer et al. (2010) |
| *Hydrocotyle laxiflora* | Stinking Pennywort |  | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Hypericum gramineum* | Native St John’s Wort |  | Not listed | Not listed | Miles (2006) |
| *Mentha diemenica* | Native Mint |  | Not listed | Not listed | Miles (2006) |
| *Opercularia aspera* | Stinkweed |  | Not listed | Not listed | Miles (2006) |
| *Lepidosperma laterale* | Variable Sword Sedge |  | Not listed | Not listed | Tozer et al. (2010) |
| *Lomandra longifolia* | Mat Rush |  | Not listed | Not listed | Tozer et al. (2010) |
| *Oxalis perennans* | Grassland Wood-sorrel |  | Not listed | Not listed | Tozer et al. (2010) |
| *Parietaria debilis* | Native Pellitory |  | Not listed | Not listed | Miles (2006) |
| *Plantago debilis* | Shade Plantain |  | Not listed | Not listed | Tozer et al. (2010) |
| *Plectranthus graveolens* |  |  | Not listed | Not listed | Miles (2006) |
| *Plectranthus parviflorus* | Cockspur Flower |  | Not listed | Not listed | Tozer et al. (2010) |
| *Lobelia purpurascens* | Whiteroot |  | Not listed | Not listed | Miles (2006) |
| *Rumex brownii* | Swamp Dock |  | Not listed | Not listed | Tozer et al. (2010) |
| *Scleria mackaviensis* |  |  | Not listed | Not listed | Miles (2006) |
| *Senecio bipinnatisectus* |  |  | Not listed | Not listed | Miles (2006) |
| *Senecio linearfolius* | Fireweed Groundsel |  | Not listed | Not listed | Miles (2006) |
| *Sigesbeckia orientalis subsp. orientalis* |  |  | Not listed | Not listed | Tozer et al. (2010) |
| *Solanum prinophyllum* | Forest Nightshade |  | Not listed | Not listed | Miles (2006) |
| *Solanum pungetium* | Eastern Nightshade |  | Not listed | Not listed | Tozer et al. (2010) |
| *Stellaria flaccida* | Forest Starwort |  | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Urtica incisa* | Stinging Nettle |  | Not listed | Not listed | Tozer et al. (2010) |
| *Veronica calycina* | Hairy Speedwell |  | Not listed | Not listed | Miles (2006) |
| *Veronica plebeia* | Common Speedwell |  | Not listed | Not listed | Miles (2006) |
| *Wahlenbergia gracilis* | Sprawling Bluebell |  | Not listed | Not listed | Tozer et al. (2010) |
| *Xerochrysum bracteatum* | Golden Everlasting |  | Not listed | Not listed | Tozer et al. (2010) |
| **Scramblers, climbers, vines, epiphytes** | | | | | |
| *Celastrus australis* | Staff Climber | U | Not listed | Not listed | Tozer et al. (2010) |
| *Clematis glycinoides* | Headache Vine | R; B only | Not listed | Not listed | DPIE (2011) |
| *Eustrephus latifolius* | Wombat Berry | R; B only | Not listed | Not listed | Tozer et al. (2010) |
| *Geitonoplesium cymosum* | Scrambling Lily | R; B only | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Glycine clandestina* | Twining Glycine | R | Not listed | Not listed | NSW Scientific Committee (2011) |
| *Glycine tabacina* | Variable Glycine | R | Not listed | Not listed | Tozer et al. (2010) |
| *Marsdenia rostrata* | Milk Vine | R | Not listed | Not listed | Tozer et al. (2010) |
| *Gynochthodes jasminoides* | Sweet Morinda | U | Not listed | Not listed | Tozer et al. (2010) |
| *Pandorea pandorana* | Wonga Wonga Vine | R | Not listed | Not listed | Tozer et al. (2010) |
| *Rubus parvifolius* | Native Raspberry | R | Not listed | Not listed | Tozer et al. (2010) |
| *Sarcopetalum harveyanum* | Pearl Vine | R | Not listed | Not listed | Tozer et al. (2010) |
| *Smilax australis* | Wait-a-while | Unknown; possibly OS | Not listed | Not listed | Miles (2006) |
| *Sicyos australis* | Star Cucumber |  | Not listed | Not listed | Tozer et al. (2010) |
| *Stephania japonica* var. *discolor* | Snake Vine | R; B only | Not listed | Not listed | Tozer et al. (2010) |
| *Tylophora barbata* | Bearded Tylophora | R | Not listed | Not listed | Miles (2006) |
| **Grasses** | | | | | |
| *Rytidosperma pilosum* | Velvet Wallaby Grass |  | Not listed | Not listed | Tozer et al. (2010) |
| *Austrostipa ramosissima* |  |  | Not listed | Not listed | Miles (2006) |
| *Cenchrus caliculatus* | Hillside Burrgrass |  | Not listed | Not listed | Tozer et al. (2010) |
| *Cymbopogon refractus* | Barbed Wire Grass |  | Not listed | Not listed | Miles (2006) |
| *Digitaria ramularis* |  |  | Not listed | Not listed | Miles (2006) |
| *Echinopogon ovatus* | Forest Hedgehog Grass |  | Not listed | Not listed | Tozer et al. (2010) |
| *Anthosachne scabra* | Common Wheat Grass |  | Not listed | Not listed | Tozer et al. (2010) |
| *Entolasia stricta* | Wiry Panic |  | Not lsted | Not listed | Miles (2006) |
| *Entolasia leptostachya* | Paddock Lovegrass |  | Not listed | Not listed | Miles (2006) |
| *Imperata cylindrica* | Blady Grass |  | Not listed | Not listed | Tozer et al. (2010) |
| *Microlaena stipoides* | Weeping Grass |  | Not listed | Not listed | Tozer et al. (2010) |
| *Rytidosperma longifolium* | Long-leaved Wallaby Grass |  | Not listed | Not listed | Tozer et al. (2010) |
| *Oplismenus imbecillis* | Creeping Beard Grass |  | Not listed | Not listed | Tozer et al. (2010) |
| *Panicum effusum* | Hairy Panic |  | Not listed | Not listed | Miles (2006) |
| *Poa labillardierei var. labillardierei* | Common Tussock-grass |  | Not listed | Not listed | Tozer et al. (2010) |
| *Sporobolus elongatus* | Slender Rat’s Tail Grass |  | Not listed | Not lsted | Miles (2006) |
| 1 For woody species, the likely fire response is given as: R = resprouter, St = stem resprouter only, B = basal resprouter only, OS = non-respouter, U = resprouter-type unknown. Species of conservation concern are indicated with \*. Species marked with † are predicted to occur within the ecological community but may not have been observed. Sources for fire responses: (Benson & McDougall, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001; Miles, 2021b; Nicolle, 2006).  2 Species listed under the EPBC Act at the time this document was prepared. Source: <https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>  3 Species listed under the State Act at the time this document was prepared. Source: <https://www.environment.nsw.gov.au/threatenedspeciesapp/> | | | | | |

Sources: (Clarke et al., 2009; DAWE, 2021b; Miles, 2006; NSW Scientific Committee, 2011; Tozer et al., 2010).

1. Fauna

Table 5: Fauna likely or known to occur in the ecological community. Species of conservation concern are indicated with \*.

| **Scientific name** | **Common name/s** | **EPBC status1** | **State status2** | **Source** |
| --- | --- | --- | --- | --- |
| **Mammals** | | | | |
| *Acrobates pygmaeus* | Feathertail Glider | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Antechinus agilis* | Agile Antechinus | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Antechinus mimetes* | Dusky Antechinus | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Antechinus stuartii* | Brown Antechinus | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Canis lupus* | Dingo | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Chalinolobus morio* | Chocolate Wattled Bat | not listed | not listed | DPIE survey (ALA, 2021b) |
| *\*Dasyurus maculatus* | Bindjulang; Spot-tailed Quoll | Endangered | Vulnerable | DPIE survey (ALA, 2021b) |
| *Macropus giganteus* | Eastern Grey Kangaroo | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Notamacropus rufogriseus* | Red-necked Wallaby | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Nyctophilus geoffroyi* | Lesser Long-eared Bat | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Ozimops planiceps* | Little Mastiff-bat | not listed | not listed | Other survey (ALA, 2021b) |
| *Perameles nasuta* | Long-nosed Bandicoot | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Petaurus breviceps* | Sugar Glider | not listed | not listed | DPIE survey (ALA, 2021b) |
| *\*Phascolarctos cinereus* | Koala | Vulnerable | Vulnerable | WYLIE (DAWE, 2021) |
| *Pseudocheirus peregrinus* | Common Ringtail Possum | not listed | not listed | DPIE survey (ALA, 2021b) |
| *\*Pteropus poliocephalus* | Grey-headed Flying-fox | Vulnerable | Vulnerable | WYLIE (DAWE, 2021) |
| *Rattus fuscipes* | Bush Rat | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Rattus lutreolus* | Swamp Rat | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Rhinolophus megaphyllus* | Eastern Horseshoe-bat | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Tachyglossus aculeatus* | Short-beaked Echidna | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Trichosurus vulpecula* | Common Brushtail Possum | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Vespadelus darlingtoni* | Large Forest Bat | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Vespadelus regulus* | Southern Forest Bat | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Vespadelus vulturnus* | Little Forest Bat | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Vombatus ursinus* | Common Wombat | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Wallabia bicolor* | Swamp Wallaby | not listed | not listed | DPIE survey (ALA, 2021b) |
| **Birds** | | | | |
| *Acanthiza chrysorrhoa* | Yellow-rumped Thornbill | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Acanthiza lineata* | Striated Thornbill | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Acanthiza nana* | Yellow Thornbill | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Acanthiza pusilla* | Brown Thornbill | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Acanthiza reguloides* | Buff-rumped Thornbill | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Acanthorhynchus tenuirostris* | Eastern Spinebill | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Accipiter cirrocephalus* | Collared Sparrowhawk | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Accipiter fasciatus* | Brown Goshawk | Marine | not listed | DPIE survey (ALA, 2021b) |
| *Accipiter novaehollandiae* | Grey Goshawk | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Aegotheles cristatus* | Australian Owlet-nightjar | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Alisterus scapularis* | Australian King-parrot | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Anthochaera carunculata* | Red wattlebird | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Anthochaera chrysoptera* | Little Wattlebird | not listed | not listed | DPIE survey (ALA, 2021b) |
| *\*Anthochaera phrygia* | Regent Honeyeater | Critically Endangered | Critically Endangered | WYLIE (DAWE, 2021) |
| *Apus pacificus* | Fork-tailed swift | Marine; Migratory | not listed | DPIE survey (ALA, 2021b) |
| *Aquila audax* | Wedge-tailed Eagle | not listed | not listed | DPIE survey (ALA, 2021b) |
| *\*Artamus cyanopterus* | Dusky Woodswallow | not listed | Vulnerable | DPIE survey (ALA, 2021b) |
| *Artamus superciliosus* | White-browed woodswallow | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Cacatua galerita* | Sulphur-crested Cockatoo | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Cacomantis flabelliformis* | Fan-tailed Cuckoo | Marine | not listed | DPIE survey (ALA, 2021b) |
| *Cacomantis pallidus* | Pallid Cuckoo | Marine | not listed | Unknown |
| *Cacomantis variolosus* | Brush Cuckoo | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Caligavis chrysops* | Yellow-faced Honeyeater | not listed | not listed | DPIE survey (ALA, 2021b) |
| *\*Callocephalon fimbriatum* | Gang-gang Cockatoo | not listed | Vulnerable | DPIE survey (ALA, 2021b) |
| *Calyptorhynchus funereus* | Yellow-tailed Black-cockatoo | not listed | not listed | Other survey (ALA, 2021b) |
| *Chalcites basalis* | Horsfield's Bronze-cuckoo | Marine | not listed | DPIE survey (ALA, 2021b) |
| *Chalcites lucidus* | Shining Bronze-cuckoo | Marine | not listed | DPIE survey (ALA, 2021b) |
| *Chenonetta jubata* | Maned Duck | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Cinclosoma punctatum* | Spotted Quail-thrush | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Colluricincla harmonica* | Grey Shrike-thrush | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Columba leucomela* | White-headed Pigeon | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Coracina novaehollandiae* | Black-faced cuckoo-shrike | Marine | not listed | DPIE survey (ALA, 2021b) |
| *Coracina papuensis* | White-bellied Cuckoo-shrike | Marine | not listed | DPIE survey (ALA, 2021b) |
| *Coracina tenuirostris* | Cicadabird | Marine | not listed | Unknown |
| *Corcorax melanorhamphos* | White-winged Chough | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Cormobates leucophaea* | White-throated Treecreeper | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Corvus coronoides* | Australian Raven | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Corvus mellori* | Little Raven | Marine | not listed | DPIE survey (ALA, 2021b) |
| *Coturnix pectoralis* | Grey Quail | Marine | not listed | DPIE survey (ALA, 2021b) |
| *Cracticus torquatus* | Grey Butcherbird | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Dacelo novaeguineae* | Laughing Kookaburra | not listed | not listed | DPIE survey (ALA, 2021b) |
| *\*Daphoenositta chrysoptera* | Varied Sittella | not listed | Vulnerable | DPIE survey (ALA, 2021b) |
| *Dicaeum hirundinaceum* | Mistletoebird | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Eolophus roseicapilla* | Galah | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Eopsaltria australis* | Eastern Yellow Robin | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Eudynamys orientalis* | Pacific Koel | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Eurostopodus mystacalis* | White-throated Nightjar | Marine | not listed | DPIE survey (ALA, 2021b) |
| *Eurystomus orientalis* | Dollarbird | Marine | not listed | DPIE survey (ALA, 2021b) |
| *Falco berigora* | Brown Falcon | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Falco cenchroides* | Nankeen Kestrel | Marine | not listed | DPIE survey (ALA, 2021b) |
| *Falco longipennis* | Australian Hobby | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Falco peregrinus* | Peregrine Falcon | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Falcunculus frontatus* | Eastern Shrike-tit | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Geopelia striata* | Peaceful Dove | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Gerygone mouki* | Brown Gerygone | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Gerygone olivacea* | White-throated Gerygone | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Glossopsitta concinna* | Musk Lorikeet | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Grallina cyanoleuca* | Magpie-lark | Marine | not listed | DPIE survey (ALA, 2021b) |
| *Gymnorhina tibicen* | Australian Magpie | not listed | not listed | DPIE survey (ALA, 2021b) |
| *\*Haliaeetus leucogaster* | White-bellied Sea-eagle | Marine | Vulnerable | DPIE survey (ALA, 2021b) |
| *Haliastur sphenurus* | Whistling Kite | Marine | not listed | DPIE survey (ALA, 2021b) |
| *\*Hieraaetus morphnoides* | Little Eagle | not listed | Vulnerable | DPIE survey (ALA, 2021b) |
| *\*Hirundapus caudacutus* | White-throated Needletail | Vulnerable | not listed | WYLIE (DAWE, 2021) |
| *Hirundo neoxena* | Welcome Swallow | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Lalage sueurii* | White-winged Triller | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Leucosarcia melanoleuca* | Wonga Pigeon | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Lichenostomus melanops* | Yellow-tufted Honeyeater | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Lopholaimus antarcticus* | Topknot Pigeon | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Macropygia phasianella* | Brown Cuckoo-dove | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Malurus cyaneus* | Superb Fairy-wren | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Malurus lamberti* | Variegated Fairy-wren | not listed | not listed | Other survey (ALA, 2021b) |
| *Manorina melanocephala* | Noisy Miner | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Manorina melanophrys* | Bell Miner | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Meliphaga lewinii* | Lewin's Honeyeater | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Melithreptus brevirostris* | Brown-headed Honeyeater | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Melithreptus lunatus* | White-naped Honeyeater | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Menura novaehollandiae* | Superb Lyrebird | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Microeca fascinans* | Jacky Winter | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Monarcha melanopsis* | Black-faced Monarch | Marine; Migratory | not listed | DPIE survey (ALA, 2021b) |
| *Myiagra inquieta* | Restless Flycatcher | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Myiagra rubecula* | Leaden Flycatcher | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Myzomela sanguinolenta* | Scarlet Honeyeater | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Neochmia temporalis* | Red-browed Finch | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Nesoptilotis leucotis* | White-eared Honeyeater | not listed | not listed | DPIE survey (ALA, 2021b) |
| *\*Ninox connivens* | Barking Owl | not listed | Vulnerable | DPIE survey (ALA, 2021b) |
| *Ninox novaeseelandiae* | Southern Boobook | Marine | not listed | DPIE survey (ALA, 2021b) |
| *\*Ninox strenua* | Powerful Owl | not listed | Vulnerable | DPIE survey (ALA, 2021b) |
| *Oriolus sagittatus* | Olive-backed Oriole | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Pachycephala pectoralis* | Golden Whistler | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Pachycephala rufiventris* | Rufous Whistler | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Pardalotus punctatus* | Spotted Pardalote | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Pardalotus striatus* | Striated Pardalote | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Petrochelidon nigricans* | Tree Martin | Marine | not listed | DPIE survey (ALA, 2021b) |
| *\*Petroica boodang* | Scarlet Robin | not listed | Vulnerable | DPIE survey (ALA, 2021b) |
| *\*Petroica phoenicea* | Flame Robin | Marine | Vulnerable | DPIE survey (ALA, 2021b) |
| *Petroica rosea* | Rose Robin | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Phaps chalcoptera* | Common Bronzewing | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Philemon corniculatus* | Noisy Friarbird | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Phylidonyris novaehollandiae* | New Holland Honeyeater | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Phylidonyris pyrrhoptera* | Crescent Honeyeater | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Platycercus elegans* | Crimson Rosella | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Platycercus eximius* | Eastern Rosella | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Podargus strigoides* | Tawny Frogmouth | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Psophodes olivaceus* | Eastern Whipbird | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Ptilonorhynchus violaceus* | Satin Bowerbird | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Rhipidura albiscapa* | Grey Fantail | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Rhipidura leucophrys* | Willie Wagtail | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Rhipidura rufifrons* | Rufous Fantail | Marine; Migratory | not listed | DPIE survey (ALA, 2021b) |
| *Scythrops novaehollandiae* | Channel-billed Cuckoo | Marine | not listed | DPIE survey (ALA, 2021b) |
| *Sericornis frontalis* | White-browed Scrubwren | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Sericornis magnirostra* | Large-billed Scrubwren | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Stagonopleura guttata* | Diamond Firetail | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Strepera graculina* | Pied Currawong | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Strepera versicolor* | Grey Currawong | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Todiramphus sanctus* | Sacred Kingfisher | Marine | not listed | DPIE survey (ALA, 2021b) |
| *Trichoglossus haematodus* | Rainbow Lorikeet | not listed | not listed | DPIE survey (ALA, 2021b) |
| *\*Tyto novaehollandiae* | Masked Owl | not listed | Vulnerable | DPIE survey (ALA, 2021b) |
| *\*Tyto tenebricosa* | Sooty Owl | not listed | Vulnerable | DPIE survey (ALA, 2021b) |
| *Vanellus miles* | Masked Lapwing | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Zoothera lunulata* | Bassian Thrush | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Zosterops lateralis* | Silvereye | Marine | not listed | DPIE survey (ALA, 2021b) |
| **Reptiles** | | | | |
| *Acanthophis antarcticus* | Common Death Adder | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Amphibolurus muricatus* | Jacky Lizard | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Chelodina longicollis* | Eastern snake-necked turtle | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Concinnia tenuis* | Barred-sided Skink | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Cryptophis nigrescens* | Eastern Small-eyed Snake | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Drysdalia coronoides* | White-lipped Snake | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Egernia saxatilis* | Black Rock Skink | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Eulamprus heatwolei* | Yellow-bellied Water-skink | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Eulamprus quoyii* | Eastern Water-skink | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Lampropholis delicata* | Dark-flecked Garden Sunskink | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Lampropholis guichenoti* | Pale-flecked Garden Sunskink | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Pseudechis porphyriacus* | Red-bellied Black Snake | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Pseudonaja textilis* | Eastern Brown Snake | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Saproscincus mustelinus* | Weasel Skink | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Tiliqua scincoides* | Eastern Blue-tongue | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Varanus varius* | Lace Monitor | not listed | not listed | DPIE survey (ALA, 2021b) |
| **Amphibians** | | | | |
| *Crinia signifera* | Common Froglet | not listed | not listed | DPIE survey (ALA, 2021b) |
| *\*Heleioporus australiacus* | Giant Burrowing Frog | Vulnerable | Vulnerable | WYLIE (DAWE, 2021) |
| *Limnodynastes peronii* | Brown-striped Frog | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Litoria citropa* | Blue Mountains Tree Frog | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Litoria quiritatus* | Screaming Tree Frog | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Litoria ewingii* | Brown Tree Frog | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Litoria lesueuri* | Lesueur's Frog | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Litoria peronii* | Peron's Tree Frog | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Litoria nudidigitus* | Southern Green Stream Frog | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Litoria verreauxii* | Verreaux's Frog | not listed | not listed | DPIE survey (ALA, 2021b) |
| *Uperoleia laevigata* | Smooth Toadlet | not listed | not listed | DPIE survey (ALA, 2021b) |
| **Fish** | | | | |
| *Anguilla australis* | shortfin eel | not listed | not listed | Citizen science (ALA, 2021b) |
| *Gobiomorphus coxii* | Cox Gudgeon | not listed | not listed | Other survey (ALA, 2021b) |
| *Retropinna semoni* | Smelt | not listed | not listed | Other survey (ALA, 2021b) |
| **Invertebrates** | | | | |
| *Acrida conica* | Giant Green Slant-face | not listed | not listed | Citizen science (ALA, 2021b) |
| *Adversaeschna brevistyla* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Agathodesmus carorum* | NA | not listed | not listed | Other survey (ALA, 2021b) |
| *Aglaosoma variegata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Amata nigriceps* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Amenia imperialis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Amphirhoe sloanei* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Anachloris subochraria* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Anax papuensis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Anoplognathus chloropyrus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Anoplognathus viriditarsis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Anthela excellens* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Aphaenogaster longiceps* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Apis mellifera* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Araneus brisbanae* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Argiope keyserlingi* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Aridaeus thoracicus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Aulacophora hilaris* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Austracantha minax* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Austroaeschna pulchra* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Austroagrion watsoni* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Austroargiolestes icteromelas* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Austrogomphus guerini* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Austrogomphus ochraceus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Austrolestes cingulatus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Austrolestes leda* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Austrolestes psyche* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Austroscolia soror* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Badumna insignis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Belenois java* | Caper White | not listed | not listed | Citizen science (ALA, 2021b) |
| *Bermius brachycerus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Blepharotes coriarius* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Blepharotes splendidissimus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Boreoides subulatus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Calomela curtisi* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Calomela pallida* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Camponotus consobrinus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Camponotus innexus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Camponotus suffusus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Cercophonius squama* | NA | not listed | not listed | Other survey (ALA, 2021b) |
| *Charaxes sempronius* | Tailed Emperor | not listed | not listed | Citizen science (ALA, 2021b) |
| *Chauliognathus imperialis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Chauliognathus lugubris* | Plague Soldier Beetle | not listed | not listed | Citizen science (ALA, 2021b) |
| *Chauliognathus tricolor* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Chelepteryx chalepteryx* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Chlorobapta frontalis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Chlorocoma dichloraria* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Chondropyga dorsalis* | Cowboy Beetle | not listed | not listed | Citizen science (ALA, 2021b) |
| *Choristhemis flavoterminata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Chrysodeixis argentifera* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Chrysolopus spectabilis* | Diamond Weevil | not listed | not listed | Citizen science (ALA, 2021b) |
| *Coccinella transversalis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Coelophora inaequalis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Comocrus behri* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Cordulephya pygmaea* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Cormocephalus esulcatus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Cormocephalus westwoodi* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Coryphistes ruricola* | Bark-mimicking Grasshopper | not listed | not listed | Citizen science (ALA, 2021b) |
| *Creophilus erythrocephalus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Cryptachaea gigantipes* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Cryptoptila australana* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Ctenomorpha marginipennis* | Margined-winged Stick-insect | not listed | not listed | Citizen science (ALA, 2021b) |
| *Cyclochila australasiae* | Masked Devil | not listed | not listed | Citizen science (ALA, 2021b) |
| *Dasygaster padockina* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Dasypodia selenophora* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Delena cancerides* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Delias nigrina* | Black Jezebel | not listed | not listed | Citizen science (ALA, 2021b) |
| *Diamma bicolor* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Diatenes aglossoides* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Dicladosomella georgii* | NA | not listed | not listed | Other survey (ALA, 2021b) |
| *Dicladosomella perplexa* | NA | not listed | not listed | Other survey (ALA, 2021b) |
| *Dicranosterna immaculata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Didymuria violescens* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Diphlebia lestoides* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Diphlebia nymphoides* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Diplacodes bipunctata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Diplacodes haematodes* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Diplacodes melanopsis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Dispar compacta* | Barred Skipper | not listed | not listed | Citizen science (ALA, 2021b) |
| *Dissomorphia australiaria* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Dolichoderus doriae* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Doratifera quadriguttata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Endoxyla encalypti* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Epicoma contristis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Epidesmia chilonaria* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Epidesmia tricolor* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Eriophora transmarina* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Eupoecila australasiae* | Fiddler Beetle | not listed | not listed | Citizen science (ALA, 2021b) |
| *Eurymela distincta* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Eurymeloides punctata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Eusynthemis virgula* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Exaireta spinigera* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Fodina ostorius* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Gastrimargus musicus* | Yellow-winged Locust | not listed | not listed | Citizen science (ALA, 2021b) |
| *Gastrophora henricaria* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Geitoneura acantha* | Ringed Xenica | not listed | not listed | Citizen science (ALA, 2021b) |
| *Glyphipterix chrysoplanetis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Gminatus australis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Goniaea australasiae* | Gumleaf Grasshopper | not listed | not listed | Citizen science (ALA, 2021b) |
| *Harmonia conformis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Helicoverpa punctigera* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Helpis minitabunda* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Hemicordulia australiae* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Hemicordulia tau* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Hemigomphus gouldii* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Hesperilla ornata* | Spotted Sedge-skipper | not listed | not listed | Citizen science (ALA, 2021b) |
| *Hestiochora furcata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Heteronympha banksii* | Banks' Brown | not listed | not listed | Citizen science (ALA, 2021b) |
| *Heteronympha merope* | Common Brown | not listed | not listed | Citizen science (ALA, 2021b) |
| *Heteronympha mirifica* | Wonder Brown | not listed | not listed | Citizen science (ALA, 2021b) |
| *Heteronympha paradelpha* | Spotted Brown | not listed | not listed | Citizen science (ALA, 2021b) |
| *Hippodamia variegata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Hippotion scrofa* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Hoplatessara froggatti* | NA | not listed | not listed | Other survey (ALA, 2021b) |
| *Hypocysta metirius* | Brown Ringlet | not listed | not listed | Citizen science (ALA, 2021b) |
| *Idiodes apicata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Illeis galbula* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Ischnura heterosticta* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Isidorella hainesii* | NA | not listed | not listed | Other survey (ALA, 2021b) |
| *Jalmenus evagoras* | Imperial Hairstreak | not listed | not listed | Citizen science (ALA, 2021b) |
| *Junonia villida* | Meadow Argus | not listed | not listed | Citizen science (ALA, 2021b) |
| *Laccotrephes tristis* | Toe-Biter | not listed | not listed | Citizen science (ALA, 2021b) |
| *Lamprima aurata* | Golden Stag Beetle | not listed | not listed | Citizen science (ALA, 2021b) |
| *Lasioglossum callomelittinum* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Lasioglossum hiltacum* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Laxta friedmani* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Lema daturaphila* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Leptomyrmex erythrocephalus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Leptotarsus clavatus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Lipotriches australica* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Lophyrotoma analis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Maechidius tibialis* | NA | not listed | not listed | Other survey (ALA, 2021b) |
| *Megachile maculariformis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Melangyna viridiceps* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Melanococcus albizziae* | Wattle Mealybug | not listed | not listed | Citizen science (ALA, 2021b) |
| *Melanodes anthracitaria* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Metriolagria affinis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Micraspis frenata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Musgraveia sulciventris* | Bronze Orange Bug | not listed | not listed | Citizen science (ALA, 2021b) |
| *Myrmecia forficata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Myrmecia piliventris* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Myrmecia pilosula* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Myrmecia simillima* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Myrmecia tarsata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Neoaratus hercules* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Neola semiaurata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Neorrhina punctatum* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Nyctemera amicus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Nysius vinitor* | Rutherglen Bug | not listed | not listed | Citizen science (ALA, 2021b) |
| *Nyssus albopunctatus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Nyssus coloripes* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Ocybadistes flavovittatus* | Narrow-brand Grass-dart | not listed | not listed | Citizen science (ALA, 2021b) |
| *Ocybadistes walkeri* | Green Grass-dart | not listed | not listed | Citizen science (ALA, 2021b) |
| *Oechalia schellenbergii* | Predatory Shield Bug | not listed | not listed | Citizen science (ALA, 2021b) |
| *Ommatius coeraebus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Omyta centrolineata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Oncopeltus sordidus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Onthophagus leanus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Orthetrum caledonicum* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Orthetrum villosovittatum* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Orthodera ministralis* | Green Mantid | not listed | not listed | Citizen science (ALA, 2021b) |
| *Oxycanus dirempta* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Panesthia australis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Papilio aegeus* | Orchard Butterfly | not listed | not listed | Citizen science (ALA, 2021b) |
| *Papilio anactus* | Dingy Swallowtail | not listed | not listed | Citizen science (ALA, 2021b) |
| *Paralucia pyrodiscus* | Dull Copper | not listed | not listed | Citizen science (ALA, 2021b) |
| *Paraoxypilus tasmaniensis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Paropsis atomaria* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Paropsisterna liturata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Pasma tasmanica* | Tasmanica Skipper | not listed | not listed | Citizen science (ALA, 2021b) |
| *Pempsamacra tillides* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Perga affinis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Perperus lateralis* | Whitestriped Weevil | not listed | not listed | Citizen science (ALA, 2021b) |
| *Philobota protecta* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Pholodes sinistraria* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Phonognatha graeffei* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Phyllotocus navicularis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Phyllotocus ruficollis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Pieris rapae* | Cabbage White Butterfly | not listed | not listed | Citizen science (ALA, 2021b) |
| *Plebs eburnus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Podalonia tydei* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Poecilometis strigatus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Poecilopachys australasia* | Two-spined Spider | not listed | not listed | Citizen science (ALA, 2021b) |
| *Polistes humilis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Polyrhachis ammon* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Polyrhachis femorata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Porrostoma rhipidium* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Pterygophorus cinctus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Repsimus manicatus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Rhadinosticta simplex* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Rhytidoponera metallica* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Rhytiphora nodosa* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Ropalidia plebeiana* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Runcinia acuminata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Scaptia testacea* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Sceliphron formosum* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Scolia verticalis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Scolypopa australis* | Passionvine Hopper | not listed | not listed | Citizen science (ALA, 2021b) |
| *Scopula rubraria* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Simosyrphus grandicornis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Somethus biramus* | NA | not listed | not listed | Other survey (ALA, 2021b) |
| *Spilosoma curvata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Stenoderus suturalis* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Stephanopis altifrons* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Stephanopis barbipes* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Storenosoma hoggi* | NA | not listed | not listed | Other survey (ALA, 2021b) |
| *Synlestes weyersii* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Talaurinus kirbii* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Taxeotis perlinearia* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Tenagogerris euphrosyne* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Tepperia sterculiae* | Kurrajong Seed Weevil | not listed | not listed | Citizen science (ALA, 2021b) |
| *Thalaina clara* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Thyreus nitidulus* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Toxidia doubledayi* | Doubleday's Skipper | not listed | not listed | Citizen science (ALA, 2021b) |
| *Toxidia parvula* | Parvula Skipper | not listed | not listed | Citizen science (ALA, 2021b) |
| *Toxidia rietmanni* | White-brand Grass-skipper | not listed | not listed | Citizen science (ALA, 2021b) |
| *Tramea loewii* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Trapezites symmomus* | Splendid Ochre | not listed | not listed | Citizen science (ALA, 2021b) |
| *Triclista guttata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Trigonidium sjostedti* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Utetheisa pulchelloides* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Vanessa itea* | Yellow Admiral | not listed | not listed | Citizen science (ALA, 2021b) |
| *Vanessa kershawi* | Australian Painted Lady | not listed | not listed | Citizen science (ALA, 2021b) |
| *Vespula germanica* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Visiana brujata* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Xanthagrion erythroneurum* | NA | not listed | not listed | Citizen science (ALA, 2021b) |
| *Ypthima arctous* | Dusky Knight | not listed | not listed | Citizen science (ALA, 2021b) |
| *Zizina otis* | Grass Blue | not listed | not listed | Citizen science (ALA, 2021b) |
| Species listed under the EPBC Act at the time this document was prepared. Source: <https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>  2 Species listed under the State Act at the time this document was prepared. Source:  <https://www.environment.nsw.gov.au/threatenedspeciesapp/> | | | | |

Sources: (ALA, 2021b; DAWE, 2021b).

Consultation Questions on the species lists

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

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

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

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

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

Table 6: Key features of vegetation types/mapping units that correspond or are considered equivalent to Brogo Wet Vine Forest.

| **Classification system** | **Name** | **Key distinguishing features** |
| --- | --- | --- |
| NSW SCIVI | Brogo Wet Vine Forest | * Eucalypt forest with a canopy usually dominated by *E. tereticornis* and soft-leaved shrubs and climbers in the understorey * A canopy sub-stratum of rainforest trees such as *Ficus rubiginosa* and *Pittosporum undulatum* may be present * Climbers likely to be present throughout the lower layers * Restricted to steep granitic or mudstone substrates below 400 m elevation * Rainforest elements may be absent where fire or grazing impacts are frequent or severe * NSW TEC listing includes *Angophora floribunda* as a co-dominant canopy tree species * NSW TEC listing suggest the grass *Cenchrus caliculatus* is typically associated with this community and not others within the Bega region * Considered equivalent to the TEC |
| NSW TEC | Brogo Wet Vine Forest in the South East Corner Bioregion |
| Shoalhaven EEC | Brogo Wet Vine Forest |
| NSW SVTM | 3108: South Coast Scarp Wet Vine Forest | * Structurally similar to the TEC * Canopy typically contains *E. bosistoana*, and a wide range of other eucalypts may be present, such as *E. maidenii E. tereticornis, E. muelleriana* and sometimes *E. smithii* * Considered equivalent to the TEC |

Sources: NSW SVTM: NSW Plant Community Type (DPIE, 2020), NSW TEC: NSW Threatened Ecological Community mapping, NSW SCIVI: Southeast NSW Native Vegetation Classification and Mapping (NSW DPIE, version 14).

Table 7: Key features distinguishing Brogo Wet Vine Forest from other vegetation types/mapping units that may be adjacent to the ecological community.

| **Classification system** | **Name** | **Key distinguishing features** |
| --- | --- | --- |
| **Woodlands and grassy forests** | | |
| NSW SVTM | 3332: Southeast Lowland Grassy Woodland | * Typically occurs below 500 m elevation * Does not contain species associated with rainforest flora. * Has substantial grass cover (e.g. 40 to 90%) |
| NSW TEC | Lowland Grassy Woodland in the South East Corner Bioregion |
| EPBC | Lowland Grassy Woodland in the South East Corner Bioregion |
| NSW SCIVI | e20: Southeast Lowland Grassy Woodland |
| NSW SVTM | 4052: South Coast Low Hills Red Gum Grassy Forest | * Tall, grassy open forest to woodland dominated by *E. tereticornis,* found on lows hills and slopes * Does not have a canopy substratum of rainforest trees such as *Ficus spp.* and *Brachychiton spp.* * Ground layer typically contains grasses, forbs and small climbers |
| NSW SVTM | 3325: South Coast Valley Flats Ribbon Gum Forest | * Tall forest that occurs on creek flats only * Canopy dominated by *E. viminalis, E. melliodora*, with *Acacia melanoxylon* sometimes present * Numerous Acacia species in the mid-storey, including *A. implexa, A. mearnsii* |
| NSW SVTM | 3331: Southeast Gorge Dry Forest | * Tall forest or woodland occurring at lower elevations on slopes within gorges. * Canopy dominated by *A. floribunda* and stringybark eucalypts * Contains a mid-storey of *Allocasuarina littoralis*, *Persoonia linearis* and *Acacia mearnsii* * Typically contains a sclerophyllous shrub layers and patchy grasses * DSF eW5 is restricted to gorges within Wadbilliga National Park |
| NSW SCIVI | DSF eW5: Wadbilliga Gorge Dry Forest |
| **Wet sclerophyll forests** | | |
| NSW SVTM | 3181: Bega Wet Shrub Forest | * Occurs in drainage lines and moist lower slopes. * *Eucalyptus elata* is typically the dominant canopy species * Has a prominent layer of shrubs * Typically occurs on south-facing slopes |
| NSW SCIVI | Bega Wet Shrub Forest |
| NSW SCIVI | WSF e12: Mountain Wet Fern Forest | * Usually over 32 m canopy height * Groundcover is dominated by ferns * Multi-layered mid-storey containing tree ferns (e.g. *Cyathea australis*) * Dominant *Eucalyptus* species are *E. cypellocarpa* and *E. fastigata* * Generally occurs at sheltered sites at higher elevations * Plant Community Type (PCT) 3190 may not contain tree ferns and *E. muelleriana* may also be present in the canopy. Generally occurs < 750 m elevation * WSF e13 generally occurs below 800 m elevation * WSF e14 generally occurs in steep gullies below 500 m elevation on metasedimentary substrates |
| NSW SCIVI | WSF e13: Southeast Hinterland Wet Fern Forest |
| NSW SCIVI | WSF e14: Southeast Hinterland Wet Shrub Forest |
| NSW SVTM | 3219: Southeast Mountain Wet Fern Forest |
| NSW SVTM | 3190: South Coast Hinterland Monkey Gum Wet Fern Forest |
| NSW SVTM | 3193: South Coast Stringybark-Monkey Gum Wet Forest | * Tall wet open forest occurring on sedimentary substrate at elevations < 450 m * Canopy typically dominated by *E. cypellocarpa* or *E. muelleriana* |
| NSW SCIVI | WSF e34: Southeast Coastal Gully Shrub Forest | * Wet open forest occurring in steep gullies below 200 m elevation on metasedimentary substrates * Canopy species are highly variable * Contains a canopy sub-stratum of rainforest species * Contains a mesophyllous shrub layer * Ground layer typically contains a diversity of grass species and climbers |
| NSW SVTM | 3185: Far South Riverflat Wet Forest | * Tall wet open forest with canopy dominated by *E. cypellocarpa* and *E. elata* * Restricted to sheltered lower slopes and flat areas along major waterways and creeks * Contains a layer of small trees and shrubs of medium density * Ground layer is dominated by ferns |
| NSW SVTM | 3310: Gulaga Silvertop Ash Moist Forest | * Tall wet open forest restricted to north-facing slopes of Mount Dromedary * Occurs between 300-750 m elevation * Canopy typically dominated by *E. sieberi*; *E. cypellocarpa* occurs occasionally * Ground layer dominated by *Pteridium esculentum* |
| NSW SCIVI | WSF p103: South Coast Hinterland Wet Forest | * Canopy dominated by eucalypts over 30 m tall * Dense sub-canopy stratum of small trees * Tree ferns are present * Dense groundcover dominated by ferns * Many climbing plants strewn throughout understorey shrubs |
| NSW SVTM | 3189: South Coast Gully Shrub Forest | * Tall wet open forest with a sparse small tree layer, sparse shrub layer and ground layer comprised of ferns, climbers, grasses and forbs * A range of eucalypts and *A. floribunda* may be present in the canopy * *E. tereticornis* is generally not present * In addition to *Acacia mearnsii, Acacia falciformis* and *Allocasuarina littoralis* may be present in the small tree layer * Is not restricted to northwest to northeast facing slopes * Occurs on sheltered slopes and in steep gullies |
| NSW SVTM | 3273: South Coast Lowland Shrub-Grass Forest | * Tall wet open forest found in coastal areas * Lacks canopy sub-stratum of rainforest trees * Typically contains dense ground cover of grasses, ferns, graminoids and ferns * Typically found on sedimentary substrates |
| NSW SVTM | 3192: South Coast Riverflat Ribbon Gum Forest | * Tall wet open forest occurring on alluvial flats near major waterways and below 400 m elevation * Canopy typically contains *E. viminalis* and *E. elata* |
| NSW SVTM | 3301: Southeast Tableland Ranges Snow Gum Sheltered Forest | * Grassy open forest restricted to tablelands and higher elevations > 750 m * Canopy dominated by *E. pauciflora, E. dalrympleana* or *E. viminalis* * Acacia melanoxylon may be present as a small tree |
| **Rainforests** | | |
| NSW SCIVI | RF e1: Southeast Dry Rainforest | * Canopy typically closed * Low, dense canopy dominated by *Ficus rubiginosa*, with *Pittosporum undulatum*, *Brachychiton populneus* and emergent eucalypts occurring occasionally * Occurs on north-facing slopes * Patch-size usually small, less than 10 ha |
| NSW TEC | Dry Rainforest of the South East Forests in the South East Corner Bioregion |
| NSW SVTM | 3106: South Coast Grey Myrtle Dry Rainforest | * Tall, dense rainforest occurring along waterways in gullies * Canopy dominated by *Backhousia myrtifolia* * Occasional emergent eucalypts and *Casuarina cunninghamiana* |
| NSW SCIVI | RF p40: Temperate Dry Rainforest | * Canopy is closed * Canopy dominated by non-eucalypt species such as *Backhousia myrtifolia*, *Syzigium smithii*, *Pittosporum undulatum*   Typically grows in gullies on shale-derived soils |
| NSW SCIVI | RF e6e7: Southeast Warm Temperate Rainforest | * Only found in steep, sheltered gullies * Dense canopy dominated by *Syzigium smithii*, *Pittosporum undulatum, Doryphora sassafras, Ceratopetalum apetalum* with sub-stratum of tree ferns * Contains lianas and epiphytic species * May contain large emergent eucalypts * PCT 3045 occurs at low elevations in higher rainfall areas, tree ferns may be absent * PCT 3036 has higher canopy diversity, palms may be present and is not restricted to gullies. Tree ferns may be absent |
| NSW SVTM | 3046: Southeast Warm Temperate Rainforest |
| NSW SVTM | 3045: South Coast Temperate Gully Rainforest |
| NSW SVTM | 3036: South Coast Warm Temperate-Subtropical Rainforest |
| **Dry sclerophyll forests** | | |
| NSW SVTM | 3659: South Coast Hinterland Silvertop Ash Forest | * Tall, dry open forest with sclerophyllous shrubs and sparse grasses and ferns * Canopy typically dominated by *E. sieberi* and stringybark eucalypts |
| NSW SCIVI | DSF e35: Southeast Escarpment Dry Grass Forest | * Tall open forest occurring on granite-derived slopes below 700 m elevation * Canopy is typically dominated by *E. bosistoana, E. maidenii* and *E. globoidea* * A small tree layer usually contains *Acacia spp*. * Typically contains and open shrub layer a groundcover of grasses and forbs * Rainforest elements may be lacking, but will depend on fire history |
| NSW SVTM | 3662: South Coast Lowland Blackbutt Forest | * Tall, shrubby dry forest with canopy dominated by *Corymbia gummifera* and *E. pilularis* * Understorey typically contains shrubs associated with DSF, e.g. *Banksia spp.* * Limited to coastal strip |
| NSW SVTM | 3664: Southeast Foothills Woollybutt Dry Shrub Forest | * Tall, dry open forest occurring on sandstone at lower elevations * Canopy typically dominated by *E. longifolia* and Stringybark eucalypts * DSF e32A occurs on a wider range of sedimentary substrates |
| NSW SCIVI | DSF e32A: Deua-Brogo Foothills Dry Shrub Forest |
| NSW SVTM | 3660: South Coast Hinterland Yellow Stringybark Forest | * Tall, dry and shrubby sclerophyll forest found on exposed slopes, ranges and foothills * Canopy typically dominated by *E. muelleriana, E. sieberi* and *A. floribunda* * Very sparse shrub layer, *Persoonia linearis* and *Acacia falciformis* usually present * Occurs on quartz-rich sediments, granites |
| NSW SVTM | 3656: South Coast Foothills Dry Shrub Forest | * Tall, dry open sclerophyll forest with sparse shrub layer and sparse groundcover of grasses * Canopy is typically dominated by stringybark eucalypts, along with *E. sieberi* * *Allocasuarina littoralis* and *Acacia falciformis* are typically present in the mid-storey * Occurs on exposed ridges and upper slopes * DSF e48 may not contain *A. falciformis* * DSF e49 may contains climbers and twiners in the understorey and occurs primarily on metasedimentary substrates |
| NSW SCIVI | DSF e48: Mumbulla Dry Shrub Forest |
| NSW SCIVI | DSF e49: Southeast Coastal Dry Shrub Forest |
| NSW SVTM | 3452: Southeast Hinterland Dry Grassy Forest | * Tall grassy dry forest occurring on exposed slopes * Canopy dominated by *E. globoidea* and *E. maidenii* * Lacks a sub-stratum of rainforest trees * PCT 3453 may also contain box eucalypts such as *E. bosistoana, E. baueriana* and *E. polyanthemos* |
| NSW SVTM | 3453: Southeast Scarp Maidens Gum Forest |
| **Other vegetation types** | | |
| NSW SVTM | 4061: Bega-Towamba Riparian Scrub | * Very tall shrubland dominated by Leptospermum spp. and Acacia spp. * Occasional emergent eucalypts may be present * Restricted to waterway margins on alluvial soils |
| NSW SCIVI | FoW e60: Southeast Floodplain Wetlands | * Herbaceous wetland occurring on floodplains that frequently contains standing water * *E. ovata* and *Melaleuca spp.* may be present |
| NSW SCIVI | FoW p30: South Coast River Flat Forest | * Occurs on alluvial flat areas along the margins of floodplains and waterways * Tree canopy typically over 20 m high * TEC community typically has a dense groundcover of Lomandra longifolia * Overlap of species with Brogo Wet Vine Forest, but landscape position should distinguish |
| TEC | River Flat Eucalypt Forest on Coastal Floodplains |
| EPBC | River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions |
| NSW SVTM | 3188: South Coast Riverflat Peppermint Forest |

Sources: NSW SVTM: NSW Plant Community Type (DPIE, 2020), NSW TEC: NSW Threatened Ecological Community mapping, EPBC: communities listed under the EPBC Act 1999, NSW SCIVI: Southeast NSW Native Vegetation Classification and Mapping (NSW DPIE, version 14).

Consultation Questions on map units

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

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Version history table

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1. Interim Biogeographical Regionalisation of Australia Version 7 (DoE 2012) [↑](#footnote-ref-2)
2. A small proportion of the community occurs on other soil classifications such as Vertesols, Tenesols or Rudosols. Therefore, if all other diagnostics are met, but the soil classification is not Kurosols, Kandosols, Dermosols, the community may still be present. [↑](#footnote-ref-3)
3. Recent disturbance, such as fire, may remove the living canopy and cause a shift to a regenerative state. Under these circumstances, the loss is likely to be a temporary phenomenon, if natural regeneration is not disrupted. This temporary regenerative state is included as part of the ecological community when the other key diagnostic characteristics are met. In these cases, there should be evidence that the canopy species will regenerate from seedlings, saplings, lignotubers or from epicormic regrowth. See section 1.2.2.2 for more information. [↑](#footnote-ref-4)
4. Understorey refers to the vegetation strata below the canopy layer but does not include the ground layer (e.g. grasses, forbs, etc.). Note that climbers may be found across multiple strata. [↑](#footnote-ref-5)
5. Where ground cover is consistently higher than approximately 60% and canopy tree cover is consistently lower than approximately 15%, cross-checking with descriptions for Lowland Grassy Woodland is required. See 1.2.2.2 and Appendix B - Relationship to other vegetation classification and mapping systems for details. [↑](#footnote-ref-6)