

NSW Threatened Species Scientific Committee

Conservation Assessment of the ecological community 'Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions'

NSW Threatened Species Scientific Committee 2026

Name: Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions

Distribution: New South Wales endemic

Related EPBC Act ecological community: Illawarra and south coast lowland forest and woodland ecological community

Current EPBC Act Status: Critically Endangered (Date effective 16 September 2016)

Current NSW BC Act Status: Endangered (Gazettal date 14 October 2011)

Proposed listing on NSW BC Act: Endangered

Summary of Conservation Assessment

Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions was found to be eligible for listing as Endangered under Criteria A3 and B1a(i,iii)bc.

The main reasons for this ecological community being eligible for listing as Endangered under this criterion are: (1) it has undergone a large historical reduction in geographic distribution since 1750; and (2) it has a highly restricted geographic distribution and there are threatening processes that are likely to cause continuing decline in geographic distribution and biotic interactions in the near future.

Background

'Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion' ecological community was first listed as Endangered in NSW under a Final Determination in December 1999 (NSW Scientific Committee 1999). A subsequent minor amendment (NSW Scientific Committee 2011) corrected minor errors or omissions, specifically to rectify omission of the reference, Thackway and Cresswell (1995), which documents the version of the Interim Biogeographic Regions of Australia that was used to define the particular area occupied by that ecological community.

The (1999) NSW Scientific Committee Final Determination was based primarily on the work of Mills (1997), and at the time the distribution of the community was understood to be confined to the Sydney Basin Bioregion with confirmed records in the Wollongong City, Shellharbour City and Kiama Municipality local government areas (LGA). Since the original listing in 1999, significant amounts of new field survey data and other information have been collected from a larger region enabling a more detailed analysis of the distribution of this ecological community (e.g., Gellie 2005; Tindall *et al.* 2004; Tozer *et al.* 2010). Recently, a revised classification of plant community types across eastern NSW (DPE 2022a) has been undertaken, which prompted this review of current knowledge of the species assemblage, distribution, habitat and status of this ecological community. This review found that Tozer *et al.* (2010), CTSSC (2016) and DPE (2022a) all report that the community has a wider

NSW Threatened Species Scientific Committee

distribution extending further south than was previously understood. A revised name aligned with the current Commonwealth listing (CTSSC 2016) is therefore appropriate for the ecological community – ‘Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions’. As a further indicator of threat status, ‘Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion’ was identified as threatened by serious and irreversible impacts (SAIL) under the Biodiversity Offsets Scheme fulfilling the requirements under three of the four principles set out in clause 6.7 of the *Biodiversity Conservation Regulation 2017* (BC Regulation) (<https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/clear-and-develop-land/serious-irreversible-impacts#list-of-threatened-entities>).

Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions includes the ‘Illawarra and south coast lowland forest and woodland’ ecological community which is listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Description

The ecological community encompasses all constituent organisms, including plants, animals, fungi and other microbes. Threatened flora and fauna that are currently considered likely to occur in the ecological community are listed in Appendix 4. Over 400 species of native plants have been recorded, with most species diversity recorded in the ground layer (Table 1; Appendix 2). Variation in plant species composition and vegetation structure appears to be related to topographic position, edaphic properties and moisture (DPE 2022a).

Vegetation structure and plant species composition

Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions is a tall (12–20 m) to very tall (20–35 m) sclerophyll woodland to open forest (in the sense of McDonald *et al.* 1990), generally with a sparse mid-stratum (*i.e.*: mid-stratum crowns clearly separated, see McDonald *et al.* 1990) and a diverse grassy ground layer. Grasslands that are predominantly comprised of native species, derived from the clearing of trees and shrubs within the ecological community, are considered part of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions. Plant species commonly found within the assemblage are listed in Table 1 and Appendix 2. Vegetation types, from various sources, that are wholly or partly included within the EPBC Act-listed community “Illawarra and south coast lowland forest and woodland” are listed in Appendix 3.

In a relatively undisturbed state, the most frequently encountered species in the tree canopy include *Eucalyptus tereticornis* (forest red gum), often in association with *E. eugenioides* (thin-leaved stringybark), *E. globoidea* (white stringybark) and/or *Angophora floribunda* (rough-barked apple), and less commonly with *E. bosistoana* (coast grey box). On periodically damp soils with clay-loam texture, the tree canopy may include *E. longifolia* (woollybutt) as a dominant or co-dominant, often with a small tree layer of *Melaleuca* spp. present.

NSW Threatened Species Scientific Committee

In the mid-stratum, the most frequently encountered species include *Acacia mearnsii*, *A. maidenii* and *A. implexa*, *Allocasuarina littoralis*, *Exocarpos cupressiformis*, and *Pittosporum undulatum*. Dense patches of *Melaleuca decora* and occasionally *M. styphelioides* may be present on periodically damp soils.

Long-unburnt areas of the community can include scattered individuals of shrub and small tree species that are associated with dry rainforests, such as *Streblus brunonianus*, *Myrsine variabilis*, *Maclura cochinchinensis*, *Clerodendrum tomentosum*, *Notelaea venosa*, *Melia azedarach* and *Notelaea longifolia*.

The groundlayer in relatively undisturbed examples of the community typically has a grassy appearance and has the highest species richness relative to other strata (Appendix 2). The most frequently recorded species in the groundlayer include grasses (*Microlaena stipoides*, *Eragrostis leptostachya*, *Themeda triandra*, *Echinopogon ovatus*, *Poa labillardierei* var. *labillardierei*, *Cymbopogon refractus*, *Imperata cylindrica*, *Echinopogon caespitosus*, *Oplismenus imbecillis*, *Oplismenus aemulus*, *Entolasia marginata*, *Entolasia stricta*), tall strap-leaved forbs (*Lomandra longifolia*, *Dianella longifolia*), sedges (*Carex longibrachiata*, *Lepidosperma laterale*), twiners and scramblers (*Glycine clandestina*, *Grona varians*, *Geitonoplesium cymosum*, *Glycine tabacina*, *Pandorea pandorana* subsp. *pandorana*, *Veronica plebeia*, *Eustrephus latifolius*, *Parsonsia straminea*, *Rubus parvifolius*, *Hibbertia scandens*), small ferns (*Cheilanthes sieberi* subsp. *sieberi*, *Pellaea falcata*) and other forbs (*Dichondra repens*, *Lobelia purpurascens*, *Commelina cyanea*, *Oxalis perennans*, *Centella asiatica*, *Sigesbeckia orientalis* subsp. *orientalis*).

Fauna species recorded in the community

Fauna recorded in Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions include bird species, with *Gymnorhina tibicen* (Australian magpie), *Grallina cyanoleuca* (magpie-lark), *Cacatua (Cacatua) galerita* (sulphur-crested cockatoo) and *Corvus coronoides* (Australian raven) the most frequently recorded among nearly 600 sightings (ALA 2025). Mammal species recorded in the community include, but are not limited to *Pteropus poliocephalus* (grey-headed flying-fox), *Macropus giganteus* (eastern grey kangaroo), *Pseudocheirus peregrinus* (common ringtail possum), and *Trichosurus vulpecula* (common brushtail possum). Species of frogs recorded in the community include, but are not limited to *Crinia signifera* (common froglet), *Limnodynastes peronii* (striped marsh frog), *Litoria peronii* (Peron's tree frog), and *L. fallax* (eastern dwarf tree frog). Reptiles recorded in the community include, but are not limited to *Tiliqua scincoides* (eastern blue-tongue), *Pseudechis porphyriacus* (red-bellied black snake), *Cacophis squamulosus* (golden-crowned snake), *Intellagama lesueurii* (eastern water dragon). The list of commonly detected species in the community should not be considered diagnostic features of the community. A list of threatened fauna that have been recorded in areas of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions mapped by Tozer *et al.* (2010) can be found in Appendix 4.

NSW Threatened Species Scientific Committee

Table 1. Plant species recorded in Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions. Trees and shrubs listed here are those found in more than 10% of floristic plots attributable to this ecological community; groundlayer species are those found in more than 20% of plots. (N/Int) denotes native and naturalised occurrences within the community. Source: DPE (2022a).

<i>Acacia implexa</i>	<i>Acacia longifolia</i>
<i>Acacia maidenii</i>	<i>Acacia mearnsii</i>
<i>Allocasuarina littoralis</i>	<i>Angophora floribunda</i>
<i>Breynia oblongifolia</i>	<i>Bursaria spinosa</i>
<i>Carex longebrachiata</i>	<i>Centella asiatica</i> (N/Int)
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	<i>Clerodendrum tomentosum</i>
<i>Commelina cyanea</i>	<i>Cymbopogon refractus</i>
<i>Cynodon dactylon</i>	<i>Dianella longifolia</i>
<i>Dichondra repens</i>	<i>Diospyros australis</i>
<i>Dodonaea viscosa</i>	<i>Echinopogon caespitosus</i>
<i>Echinopogon ovatus</i>	<i>Entolasia marginata</i>
<i>Entolasia stricta</i>	<i>Eragrostis leptostachya</i>
<i>Eucalyptus bosistoana</i>	<i>Eucalyptus eugenioides</i>
<i>Eucalyptus globoidea</i>	<i>Eucalyptus longifolia</i>
<i>Eucalyptus tereticornis</i>	<i>Eustrephus latifolius</i>
<i>Exocarpos cupressiformis</i>	<i>Geitonoplesium cymosum</i>
<i>Geranium solanderi</i>	<i>Glycine clandestina</i>
<i>Glycine tabacina</i>	<i>Grona varians</i>
<i>Hibbertia scandens</i>	<i>Imperata cylindrica</i>
<i>Indigofera australis</i>	<i>Lagenophora stipitata</i>
<i>Lepidosperma laterale</i>	<i>Leucopogon juniperinus</i>
<i>Lobelia purpurascens</i>	<i>Lomandra longifolia</i>
<i>Marsdenia rostrata</i>	<i>Melaleuca decora</i>
<i>Melaleuca styphelioides</i>	<i>Melia azedarach</i>
<i>Melicytus dentatus</i>	<i>Microlaena stipoides</i>
<i>Myrsine variabilis</i>	<i>Notelaea longifolia</i>
<i>Notelaea venosa</i>	<i>Oplismenus aemulus</i>
<i>Oplismenus imbecillis</i>	<i>Oxalis perennans</i>
<i>Ozothamnus diosmifolius</i>	<i>Pandorea pandorana</i>
<i>Parsonsia straminea</i>	<i>Pittosporum multiflorum</i>

NSW Threatened Species Scientific Committee

Pittosporum revolutum

Pittosporum undulatum

Plectranthus parviflorus

Poa labillardierei

Rubus parvifolius

Rytidosperma racemosum

Solanum prinophyllum

Streblus brunonianus

Themeda triandra

Veronica plebeia

Abiotic Environment

The distribution of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions generally spans an elevation range from near sea-level up to c. 200 m above sea level on coastal lowland hills, valley slopes and alluvial flats (DPE 2022a), typically within c. 30 km of the coastline (CTSSC 2016). Mean annual rainfall across the distribution of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions is within the approximate range 900–1,300 mm (DPE 2022a), with a general decrease from north to south and local variation due to rain shadows influenced by topography and distance from coast. Average annual temperatures are mild (c. 15–16°C) and vary little across the community's near-coastal distribution, with just a slight decrease from north to south across the range (DPE 2022a).

Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions typically occurs on undulating to near-level coastal lowland landforms. Soils on undulating landforms where the community occurs are generally well drained, while on near-level areas may include accumulated clay and be subject to higher moisture retention (but rarely waterlogging or flooding). Current records of the community are on soils of moderate to high fertility or on soils downslope from these (Colquhoun *et al.* 2021).

Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions may be juxtaposed with other communities depending on substrate, landform and aspect, e.g.: wet sclerophyll and rainforest communities in areas of steep and sheltered landforms; riparian forest along major drainage lines, and floodplain forests on active alluvial flats prone to inundation.

Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions can occur at sites that are outside the range of these abiotic descriptors, provided the assemblage of species is present and is within the Sydney Basin and South East Corner bioregions. Abiotic descriptors provide supporting information only, and the community can only be identified with certainty by the assemblage of species occupying a particular area (Preston and Adam 2004).

Distribution

Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions is patchily

NSW Threatened Species Scientific Committee

distributed from the northern Illawarra to coastal districts north of Narooma, and localised occurrences may extend further south. The community is currently known from the Sydney Basin Bioregion (Illawarra and Jervis subregions) and South East Corner Bioregion (Bateman subregion) Interim Biogeographic Regionalisation for Australia (IBRA) (Commonwealth DCCEEW 2024). The Ecological Community is currently known from the Wollongong City, Shellharbour City, Kiama, Shoalhaven City, and Eurobodalla LGAs but may also occur in other LGAs within the Sydney Basin and South East Corner Bioregions.

Related woodlands to the south and west of this distribution, primarily in the South East Coastal Ranges IBRA subregion, receive lower mean annual rainfall (generally less than 900 mm) and have different assemblages of species, including those attributable to the Lowland Grassy Woodland of the South East Corner Bioregion Endangered Ecological Community).

Historically, the community was most extensive in the Illawarra (including Kangaroo Valley and lower Shoalhaven), Milton and Moruya areas, with smaller occurrences recorded elsewhere. In the far south of its range, the natural range appears to be increasingly limited to a narrow coastal fringe. Another threatened ecological community, Lowland Grassy Woodland in the South East Corner Bioregion, occupies hinterland valleys inland and south of occurrences of this ecological community. Some examples may exhibit characteristics that are intermediate between these two communities. Intermediate examples are included within the ecological community that exhibits the most similarity in properties. In general, examples within the South East Coastal Ranges IBRA subregion (Commonwealth DCCEEW 2024) align with Lowland Grassy Woodland in the South East Corner Bioregion.

Threats

Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions is threatened by clearing and fragmentation, livestock grazing and pasture management, anthropogenic climate change, adverse fire regimes, weed invasion, and feral animals. The impacts from these threats may occur independently from each other or interact (Figure 1). This assessment was based on indicators of clearing and fragmentation (mapped extent of remaining native vegetation) and degradation by weed invasion (% of total flora composed of introduced species). The latter represents outcomes of interactions between multiple threats identified in Figure 1.

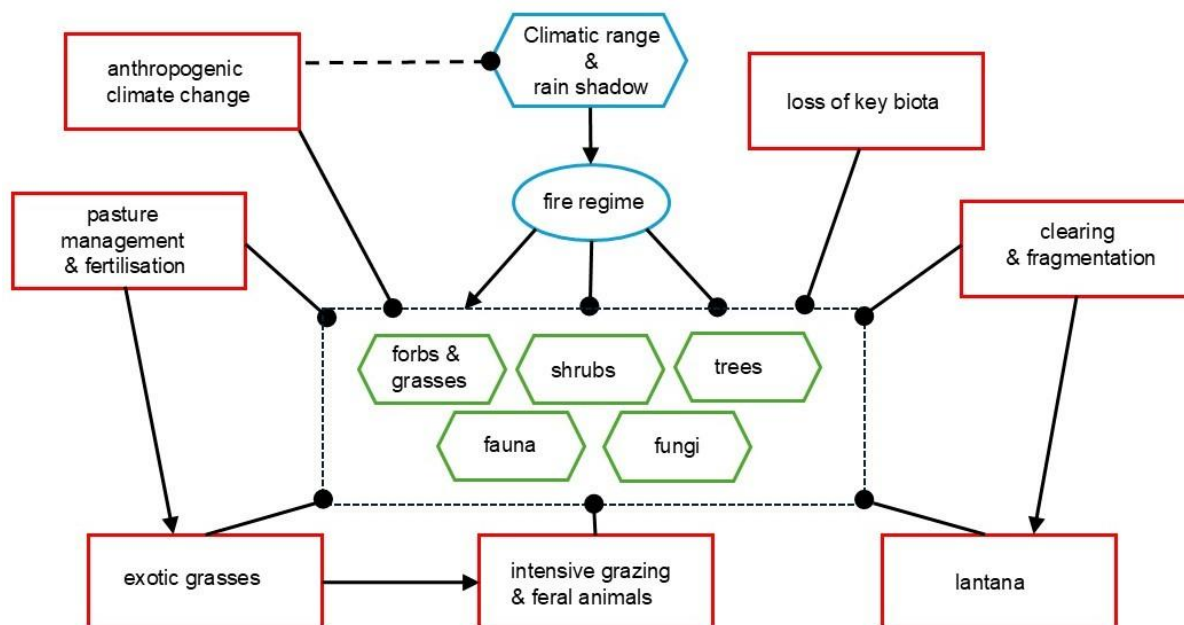


Figure 1. Conceptual model depicting key ecosystem components and drivers of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions and the threats leading to ecosystem collapse. Characteristic biota is represented by green hexagons contained within the dashed box, elements of the abiotic environment by a blue hexagon, abiotic processes by a blue oval, and threats by red rectangles. Pointed arrowheads represent a positive effect; rounded arrowheads represent a negative effect. Dotted arrow lines indicate uncertainty in the outcome or effect.

Clearing and fragmentation

Clearing of native vegetation in the Illawarra region began in the early 1800s following land grants given by colonial Governors (e.g., see McCaffrey 1922). By the 1920s, extensive areas of the relatively fertile soils of the Illawarra and south coast had been cleared for dairy farming, as it became economically profitable to clear and convert this “wet frontier” (Frost 1994, cited by Wilkinson 1999).

Tozer *et al.* (2010) estimated that 10–24% of the total pre-European extent of the community remains extant, with a best estimate of 18.5% remaining. To update those estimates for this Conservation Assessment, additional clearing of the community detected in the NSW Statewide Landcover and Tree Study (SLATS) program (DPE 2022b) for the period 2017–2021 were compared to mapping by Tozer *et al.* (2010). Over this 4-year period, approximately 31 hectares of clearing (c. 0.4% of the estimated pre-European distribution) was detected by SLATS in vegetation types GW p3 and GW p34 modelled by Tozer *et al.* (2010) and included here within Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions.

Fine-scale mapping of woody vegetation in the Sydney Basin Bioregion (SEEnv 2024) revealed the largest patch of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions remaining within that bioregion to be 44.5 ha in extent, with four patches >40 ha, and 198 patches >2 ha ($n = 807$; SEEnv 2024). Approximately 80% of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney

NSW Threatened Species Scientific Committee

Basin and South East Corner Bioregions was mapped in the Sydney Basin Bioregion in patches >2 ha in size.

The Commonwealth Conservation Advice (CTSSC 2016, p. 21) concluded that vegetation clearing has been the “primary source of damage” to ‘Illawarra and south coast lowland forest and woodland ecological community’. The economic drivers for clearing have varied over time, with clearing for agriculture and timber harvesting dominant in the 19th and early 20th centuries. More recently, however, the Commonwealth Conservation Advice (CTSSC 2016) found that the ‘Illawarra and south coast lowland forest and woodland’ community has “undergone a severe decline... in its geographic extent” estimated to be between 76% to 90% of its original extent, based on modelling by Tozer *et al.* (2010), and concluded that “It is likely that since the information used in Tozer *et al.* (2010) was collected, there have been further losses.” As noted above, some of these further losses can be estimated from recent Statewide Landcover and Tree Study data (2017–2021).

Clearing continues to be a significant threat in the broader landscapes of the five local government areas in which Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions has been recorded, with more than 1,000 ha of native vegetation cleared for agricultural land uses and more than 2,100 ha cleared for urban and transport infrastructure during 2015–2020 (based on NSW Statewide Landcover and Tree Study data, DPE2022b). Remnant vegetation patches adjacent to urban development are subject to ongoing degradation from disturbances including establishment and use of unauthorised motorbike and bicycle trails, dumping of rubbish and garden waste and other refuse, and firewood collection (CTSSC 2016).

‘Clearing of native vegetation’ is a Key Threatening Process under the *Biodiversity Conservation Act 2016*. ‘Land clearance’ is a Key Threatening Process under the *Environmental Protection and Biodiversity Conservation Act 1999*.

Livestock grazing and pasture management

Many surviving areas of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions occur as isolated remnants within a matrix of cleared lands subject to livestock grazing and pasture management. Dairy and beef farming have dominated land use throughout the ecological community’s distribution for much of the last century. Management practices for this land use aim to establish dense perennial pastures dominated by introduced species (*e.g.*, *Dactylis glomerata*, *Cenchrus clandestinus* and *Lolium perenne*) maintained by fertiliser inputs, ploughing, sowing, and livestock grazing (*e.g.*, Fulkerson *et al.* 2010). Elevated levels of nitrogen and other soil nutrients are associated with invasion of introduced weed species (*e.g.*, Adair and Groves 1998; Prober *et al.* 2004). The Commonwealth TSSC (CTSSC 2016) noted that “Many of the low-lying areas along the NSW coast have been grazed since the 19th century, with activities such as tree removal, sowing of and invasion by introduced pastures, and ‘underscrubbing’ of vegetation also associated (Lunney and Leary 1988; Mills and Jakeman 1995).”

Grazing by domestic livestock can alter ecosystem structure and suppress tree and shrub recruitment (Lunt *et al.* 2007), and lead to a reduction in understorey species

NSW Threatened Species Scientific Committee

diversity and richness due to the suppression or loss of native species that are both relatively palatable and intolerant of grazing (Eldridge *et al.* 2016).

The majority of plant species diversity in Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions is found in the groundlayer stratum (Table 2). On lands managed for grazing, patches of remnant vegetation may be retained for stock shade and shelter and are commonly subject to ongoing degradation and destruction of the native groundlayer with only the tree layer largely persisting. Release from livestock grazing may be associated with invasion of introduced plants that exploit open space and altered soil structure and chemistry. Thus, causes of degradation include trampling of vegetation by livestock, invasion by introduced plants, changes to nutrient status and structure of soils, soil disturbance including erosion and compaction by livestock, selective grazing of palatable native groundlayer species, and suppression of tree and shrub regeneration. These effects are most likely to occur in unfenced remnants of the ecological community adjacent to, or within livestock paddocks. The Commonwealth TSSC (2016, p. 21) noted that other activities in remnants may include “small scale removal of trees (including large habitat trees in farm paddocks and urban areas), as well as removal of dead trees and timber for fencing and for firewood.”

Most information on the level of degradation of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions pertains to remnants in the northern part of the distribution of the ecological community (e.g.: NPWS 2002; SEEnv 2024). Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions includes two map units defined in a vegetation survey of Wollongong LGA (MU23 Coastal Grassy Redgum Forest and MU24 Lowland Woollybutt-Melaleuca Forest). These were among the most disturbed vegetation communities in the LGA. Only 2% and 9% of extant areas of these map units respectively showed ‘light’ disturbance, while indicators of ‘moderate’ and ‘heavy’ disturbance were observable across 54% and 50% of their respective extant distributions (NPWS 2002). Additionally, 44% and 41% of the estimated extant distribution of MU23 and MU24, respectively, consisted of only “scattered trees above an open or absent understorey in a mosaic of cleared and remnant vegetation” at the time of that survey (NPWS 2002).

Only a very small proportion of remaining areas of MU23 and MU24 (4.2% and 4.5% respectively) was on public reserve tenure (NPWS 2002). Livestock are not permitted on reserves (yet reserves are still plausibly vulnerable to weed invasion as a legacy of historical grazing and other disturbance), but the remainder of extant areas of these types are likely to be on private lands with a history of disturbance from grazing and weed invasion. Analysis of land use zonings in 2002 indicated that some 33% and 54% of the extant area of the two Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions vegetation types were zoned for rural and intensive usage (NPWS 2002 Appendix F p.242).

Invasion of disturbed areas by *Lantana camara* is especially likely when active livestock grazing is abandoned without follow up weed management, a scenario that is common on the expanding peri-urban fringe.

NSW Threatened Species Scientific Committee

Effects of anthropogenic climate change

The climate is projected to change across the distribution of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions, however the impacts are predicted to differ across that distribution and at different locations depending on local climatic conditions. Temperatures are projected to increase by 0.6–2.4°C by 2070 across the entire distribution of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions (<https://www.climatechange.environment.nsw.gov.au/projections-map>). Temperature increases are projected to be more moderate at the northern extent of the distribution in the Illawarra (0.6–1.9°C), compared with the southern extent (0.7–2.4°C).

Changes in rainfall for the region are less certain, with models projecting scenarios in which both the Illawarra and southern extent have a reduction in rainfall of 9% or become wetter by up to 30% by 2070 (<https://www.climatechange.environment.nsw.gov.au/projections-map>). While spring rainfall is projected to decrease, there is uncertainty around whether this will be offset by projected increases in autumn rainfall. Although rainfall projections are uncertain, the area in which Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions occurs is likely to experience an increasing water deficit due to increases in temperature and evapotranspiration associated with climate warming.

The Commonwealth TSSC (2016, p.22) concluded that “In the long term, climate change is likely to change the character of the community by altering resource availability and the competitive relationships between species. Higher atmospheric carbon dioxide levels are known to favour woody species, including woody weeds such as *Lantana camara* and *Olea europaea* subsp. *cuspidata* (African olive), whilst being less favourable to non-woody species. Likely changes include increases in temperatures, changes to the seasonality and intensity of rainfall, with unknown compounding effects on other disturbances such as fire.”

‘Anthropogenic Climate Change’ is a Key Threatening Process under the *Biodiversity Conservation Act 2016*. ‘Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases’ is a Key Threatening Process under the *Environmental Protection and Biodiversity Conservation Act 1999*.

Adverse fire regimes

Isolated remnants of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions in rural and urban landscapes may experience reduced fire frequency, due to reduced ‘fire connectivity’ in these landscapes (DAWE 2022) and the active prevention and suppression of fire. In the long absence of fire some remnants may experience increased abundance of less flammable native plants (e.g., *Pittosporum undulatum* and *Streblus brunonianus*) which can alter vegetation structure and composition and influence subsequent fire behaviour when remnants eventually do burn. Conversely, some remnant vegetation in peri-urban landscapes “may be exposed to increased frequency of human ignitions, depending on adjacent land use, social systems and human activity” (DAWE 2022), with regular arson in some localities. High frequency fire is recognised as a threat to the ecological community (Tozer *et al.* 2010), for

NSW Threatened Species Scientific Committee

example in the Illawarra and Moruya areas. Fire may facilitate invasion and spread of introduced plant species in the absence of post-fire weed control, including some that can further increase fire risk and intensity, such as the introduced *Lantana camara* (Berry *et al.* 2011).

Climate change is predicted to increase the number of severe fire days across the range of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions, with 1–2 more days per year by 2070 (<https://www.climatechange.environment.nsw.gov.au/projections-map>).

‘High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition’ is a Key Threatening Process under the *Biodiversity Conservation Act 2016*. ‘Fire regimes that cause declines in biodiversity’ is a Key Threatening Process under the *Environmental Protection and Biodiversity Conservation Act 1999*.

Weed invasion

Many processes that degrade remnant patches of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions, including grazing, soil disturbance and nutrient enrichment from fertiliser use, also facilitate invasion by introduced plant species. Weed invasion by introduced perennial grasses such as *Paspalum dilatatum* and *Cenchrus clandestinus* as well as the woody *Lantana camara* impact upon the highly diverse native groundlayer by competing for light and suppressing regeneration and recruitment of trees and shrubs (Table 2).

Invasion by *Lantana camara* can lead to reduced richness of native fern, herb, vine and tree species, altering species composition and disrupting community structure by limiting tree recruitment through competition and allelopathic effects on seedling plants (Gooden *et al.* 2008).

Vegetation surveys of more intact remnants indicate a substantial presence of introduced plant species (Table 2), which is likely to be considerably greater in more degraded remnants. Of nine NSW TECs with grassy groundlayer surveyed by Rayment *et al.* (2022), “Illawarra Lowland Grassy Woodland” had the greatest introduced species richness and occurrence of introduced perennial grasses (18 species). More than half of the sites surveyed were invaded by *Paspalum dilatatum*, *Sporobolus africanus*, *Cenchrus clandestinus*, *Chloris gayana*, *Setaria parviflora* and *Axonopus fissifolius*. The high levels of invasive grasses in this community were likely to be exacerbated by urban and peri-urban development isolating very small fragments of woodland (Rayment *et al.* 2022).

The Commonwealth TSSC (2016) found that “Agricultural weeds and garden escapees are contributing to a significant weed load, causing competition for light, space, water, and nutrients. One of the most problematic species is common lantana (*Lantana camara*)...”. In disturbed sites, *Lantana camara* can form dense thickets that compete with native groundlayer and shrub species; it has allelopathic effects on germination and seedling growth of native plants (Gentle and Duggin 1997), and long-term persistence of lantana thickets can alter the structure and composition of the plant community. During fine-scale mapping, patches found to be particularly prone to

NSW Threatened Species Scientific Committee

dense weed infestations (mostly lantana), were in more moist and high fertility locations (SEEnv 2024).

The most widespread and serious weed of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions remnants is *Lantana camara*. NPWS (2002, p.126) noted that their map unit Coastal Grassy Red Gum Forest (a component of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions) is “highly susceptible to chronic weed infestation particularly by *Lantana camara*.” Aerial photograph interpretation (API) across Wollongong LGA by that study found that 65.4% and 63.9% of the extant area of the two vegetation types included within Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions had observable high disturbance intensity (NPWS 2002, p.39) defined as dense weed infestations dominating the understorey or canopy (NPWS 2002), and the most common visible disturbance feature was weed infestation. These figures were considered “likely to underestimate the total weed presence given that many weed infestations are not observable from Aerial Photograph Interpretation at the map scale” (NPWS 2002, p.39). The general pattern revealed by this mapping was that remaining vegetation remnants in lowland landscapes in Wollongong LGA are dominated by highly disturbed remnants, characterised by scattered trees and introduced weeds (NPWS 2002). Similarly in the lowland Dunmore – Shellharbour Hills area of Shellharbour and Kiama LGAs, DECCW (2011) reported that remnants of the vegetation types that represent Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions are “largely dominated by a lantana understorey”.

Recent fine-scale mapping in the Sydney Basin corroborates inferences of high levels of degradation and weed invasion from the earlier studies. Plant communities included within Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions were estimated to be moderately to highly disturbed in 87% of extant patches, with low diversity in the understorey due to invasion by introduced plants in the groundlayer and *Lantana camara* (SEEnv 2024). Only 1.6% of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions in the Sydney Basin was in very high condition (<1% weed cover). These data, in combination with earlier mapping (NPWS 2022) indicate that those areas of the ecological community in the Sydney Basin (*i.e.* the majority of the distribution) which have survived past clearing are subject to widespread and ongoing degradation by introduced plants in the groundlayer and *Lantana camara*.

Another significant weed species in Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions is *Cenchrus clandestinus*, which is a widespread and dominant component of dairy pastures across the Illawarra and South Coast. This species competes strongly with native groundlayer species, and may inhibit germination and growth of native groundlayer, shrubs and trees (CTSSC 2010; Rayment *et al.* 2022).

An invasive woody species that represents an emerging threat for northern areas of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions is *Olea europaea*

NSW Threatened Species Scientific Committee

subsp. *cuspidata* (African olive), which has the potential to become widespread in the Illawarra and is known to cause major structural change to native vegetation communities if not controlled (Cuneo and Leishman 2015; DECCW 2011).

As discussed above, climate change is also predicted to exacerbate the threat of invasive weeds including African olive and lantana, with changed climatic conditions favouring introduced weed species over constituent TEC species (CTSSC 2016).

'Invasion of native plant communities by exotic perennial grasses', 'Invasion, establishment and spread of Lantana (*Lantana camara*)', and 'Invasion of Native Plant Communities by African olive (*Olea europaea* subsp. *cuspidata*)' are each a Key Threatening Process under the *Biodiversity Conservation Act 2016*. 'Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants' is a Key Threatening Process under the *Environmental Protection and Biodiversity Conservation Act 1999*.

Feral animals

Feral animals can have multiple impacts across the whole ecological community. The Commonwealth TSSC (2016) found that "Feral animal species present and likely to affect the ecological community by predation and competition to native fauna" include *Felis catus* (domestic and feral cats), *Vulpes vulpes* (foxes), introduced *Rattus* spp. (rats), *Mus musculus* (house mice) and *Apis mellifera* (European honeybees). *Capra hircus* (goats) and *Sus scrofa* (pigs) may also degrade the ecological community in some areas (Department of Climate Change and Water 2011). Goats compete with native fauna for food, water and shelter, and browse on native plants causing damage to ecological communities (Squires 1980; Henzell 1993; Parkes *et al.* 1996). Feral pig wallowing and rooting causes direct disturbance to habitats (Hone 2002) and predation of plants.

Disturbance of habitats by feral pigs may also facilitate the invasion and spread of weeds and thus affect the composition of ecological communities (DEH 2003). Feral pigs are active predators of native birds and reptiles (including their eggs), frogs and soil invertebrates such as earthworms as well as the underground storage organs of plants and the fruiting bodies of fungi (Richards *et al.* 1993).

Several species of deer are also established and may be increasing their range (Davis *et al.* 2016). Records of deer in the Illawarra are greatest in forested parts of the escarpment but include scattered records from the undulating coastal lowlands (DPE 2023). The presence of rusa deer (*Cervus timorensis*) specifically within Illawarra lowland grassy woodland remnants has recently been confirmed by Spitznagel-Reeves (2021), with observations suggesting the potential for deer to inhibit plant regeneration through trampling and browsing. Feral deer populations are known to have multiple negative impacts on native biodiversity through browsing, trampling and wallowing (Davis *et al.* 2016; Hampton and Davis 2020).

'Herbivory and environmental degradation caused by feral deer', 'Predation by feral cats', 'Predation by the European red fox (*Vulpes vulpes*)', 'Competition from feral honeybees', 'Competition and habitat degradation by feral goats (*Capra hircus*)', and 'Predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*)' are each a Key Threatening Process under the *Biodiversity Conservation Act 2016*.

NSW Threatened Species Scientific Committee

'Competition and land degradation by unmanaged goats', 'Predation by European red fox', 'Predation by feral cats', 'Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs' are each a Key Threatening Process under the *Environmental Protection and Biodiversity Conservation Act 1999*.

Ecological degradation

The condition of remaining occurrences of the ecological community ranges from relatively intact to highly degraded. Some remnants of the ecological community may consist of a degraded or partially degraded overstorey, understorey or both, but may still support important floral and faunal elements of the assemblage of species.

Number of threat-defined locations

Local planning and land zoning are determined by local governments in the context of state planning policies. Local environmental plans provide a framework that guides planning decisions and development controls. The most serious plausible threat to Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions is land clearing and vegetation fragmentation and then subsequent degradation of remnants due to climate change, adverse fire regimes, weeds and feral animals. Five LGAs (Wollongong, Shell Harbour, Kiama, Shoalhaven, and Eurobodalla) are known to contain Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions, and Bega LGA is also possible. Tozer *et al.* (2012) estimated 270 ha of the community to occur within conservation reserves. Given that Wollongong LGA is primarily urban, and that the other LGAs are primarily rural, there could be three groupings including the conservation reserves, each with different drivers of decline. Therefore, the ecological community is estimated to occur at 3–6 threat-defined locations as per the IUCN (2024) definition.

Assessment against IUCN Red List of Ecosystems criteria

For this assessment it is considered that the survey of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions has been adequate and there is sufficient scientific evidence to support the listing outcome. The IUCN Red List protocol uses thresholds of ecosystem collapse defined as a reference point for ecosystem-specific indicators in order to assess the status of an ecological community. IUCN (2024) defines ecosystem collapse as “a transformation of identity, a loss of key defining biotic or abiotic features, and a replacement by a different ecosystem type or anthropogenic environments”.

Criterion A Reduction in Geographic Distribution

An ecosystem may be listed under criterion A if it meets the thresholds for any of four subcriteria (A1, A2a, A2b or A3), quantified as a reduction in geographic distribution over the following time frames:

Criterion A. Reduction in geographic distribution over ANY of the following time periods:				
	A1. the past 50 years	A2a. the next 50 years	A2b. any 50 year period including the past, present and future	A3. since 1750
CR	≥ 80%	≥ 80%	≥ 80%	≥ 90%
EN	≥ 50%	≥ 50%	≥ 50%	≥ 70%
VU	≥ 30%	≥ 30%	≥ 30%	≥ 50%

Assessment Outcome: Endangered under Criterion A3, Criteria A1 and A2 are assessed as Data Deficient.

Justification: Under this criterion, the ecological community is interpreted to have collapsed when its mapped extent declines to zero.

The Commonwealth TSSC (2016) concluded that c. 81% (plausible bounds 76%–90%) of the estimated pre-1750 extent of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions has been cleared based primarily on evidence reported by Tozer *et al.* (2010). Annual woody vegetation change detection data for 2017–2021 (DPE 2022b) suggests further low levels of clearing (c. 31 ha or a further c. 0.4% of the pre-European extent) of the community, particularly in southern parts of its range. Similar rates of decline are likely to have occurred prior to 2017 and after the analysis by Tozer *et al.* (2010) and since 2021 (DPE 2022b). Although the upper plausible bound of estimated clearing may just exceed 90% of its historical geographic distribution, the bounded estimate of decline lies almost entirely within the thresholds that delimit the Endangered category (70–90% of pre-European extent) representing a large reduction in geographic distribution over the historical time frame.

Regional-scale mapping of native vegetation (SVTM, DCCEEW 2020), assuming that three PCTs align with the Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions described here, appears to overestimate both its pre-1750 and current extent, with a smaller estimate of reduction (70%), but nevertheless also supports Endangered status. There is insufficient information to assess change in the distribution of the

NSW Threatened Species Scientific Committee

ecological community in the past 50 years (subcriterion A1) or in future decades (subcriterion A2).

Criterion B Geographic range

An ecosystem may be listed under criterion B if it meets the thresholds for any of three subcriteria (B1, B2 and B3), which indicate restricted geographic distribution as follows:

Criterion B. Restricted geographic distribution indicated by ANY OF B1, B2 or B3:	
CR	<p>B1. Extent of a minimum convex polygon enclosing all occurrences (extent of occurrence, EOO) is no larger than:</p> <p>2,000 km²</p> <p>AND at least one of the following (a-c):</p> <p>(a) An observed or inferred continuing decline in ANY OF:</p> <ul style="list-style-type: none"> i. a measure of spatial extent appropriate to the ecosystem; OR ii. a measure of environmental quality appropriate to characteristic biota of the ecosystem; OR iii. a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecosystem. <p>(b) Observed or inferred threatening processes that are likely to cause continuing declines in geographic distribution, environmental quality or biotic interactions within the next 20 years.</p> <p>(c) Ecosystem exists at <u>1 location</u></p>
EN	<p>(a) An observed or inferred continuing decline in ANY OF:</p> <ul style="list-style-type: none"> i. a measure of spatial extent appropriate to the ecosystem; OR ii. a measure of environmental quality appropriate to characteristic biota of the ecosystem; OR iii. a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecosystem. <p>(b) Observed or inferred threatening processes that are likely to cause continuing declines in geographic distribution, environmental quality or biotic interactions within the next 20 years.</p> <p>(c) Ecosystem exists at <u>≤ 5 locations</u></p>
VU	<p>(a) An observed or inferred continuing decline in ANY OF:</p> <ul style="list-style-type: none"> i. a measure of spatial extent appropriate to the ecosystem; OR ii. a measure of environmental quality appropriate to characteristic biota of the ecosystem; OR iii. a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecosystem <p>(b) Observed or inferred threatening processes that are likely to cause continuing declines in geographic distribution, environmental quality or biotic interactions within the next 20 years.</p> <p>(c) Ecosystem exists at <u>≤ 10 locations</u></p>

NSW Threatened Species Scientific Committee

B2. The number of 10 × 10 km grid cells occupied (area of occupancy, AOO) is no more than:	
CR	2
<p>AND at least one of the following (a-c):</p> <p>(a) An observed or inferred continuing decline in ANY OF:</p> <ul style="list-style-type: none"> i. a measure of spatial extent appropriate to the ecosystem; OR ii. a measure of environmental quality appropriate to characteristic biota of the ecosystem; OR iii. a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecosystem. <p>(b) Observed or inferred threatening processes that are likely to cause continuing declines in geographic distribution, environmental quality or biotic interactions within the next 20 years.</p> <p>(c) Ecosystem exists at <u>1 location</u></p>	
EN	20
<p>AND at least one of the following (a-c):</p> <p>(a) An observed or inferred continuing decline in ANY OF:</p> <ul style="list-style-type: none"> i. a measure of spatial extent appropriate to the ecosystem; OR ii. a measure of environmental quality appropriate to characteristic biota of the ecosystem; OR iii. a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecosystem. <p>(b) Observed or inferred threatening processes that are likely to cause continuing declines in geographic distribution, environmental quality or biotic interactions within the next 20 years.</p> <p>(c) Ecosystem exists at <u>≤ 5 locations</u></p>	
VU	50
<p>AND at least one of the following (a-c):</p> <p>(a) An observed or inferred continuing decline in ANY OF:</p> <ul style="list-style-type: none"> i. a measure of spatial extent appropriate to the ecosystem; OR ii. a measure of environmental quality appropriate to characteristic biota of the ecosystem; OR iii. a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecosystem <p>(b) Observed or inferred threatening processes that are likely to cause continuing declines in geographic distribution, environmental quality or biotic interactions within the next 20 years.</p> <p>(c) Ecosystem exists at <u>≤ 10 locations</u></p>	

B3. The number of locations is:	
VU	Very small (generally fewer than 5) AND prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and thus capable of Collapse or becoming Critically Endangered within a very short time period (B3 can only lead to a listing as VU).

Assessment Outcome: Endangered under Criterion B1a(i,ii)bc; Vulnerable under Criterion B2a(i,iii)bc and Criterion B3.

Justification: The geographic distribution of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions is moderately to highly restricted. Mapping of the community (Tozer 2010) shows the extent of occurrence (EOO) to be 4,095 km² based on a minimum convex polygon enclosing known occurrences of the community, the method of assessment recommended by IUCN (2024). The area of occupancy (AOO) was estimated to be 28 grid cells (10 x 10 km), by counting the number of cells occupied, excluding those that account cumulatively for less than 1% of the total mapped extant area of the ecological community, as recommended for assessing AOO by IUCN (2024). This AOO meets the threshold for the category of Vulnerable under Criterion B2(b).

The Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions community is subject to observed and inferred threatening processes that are likely to cause continuing declines in geographic distribution and biotic interactions within the next 20

NSW Threatened Species Scientific Committee

years. Although at a reduced level compared to historical rates, there is evidence that clearing of remaining vegetation continues to occur across the distribution of the community, for agriculture and infrastructure developments (DPE 2022b). The majority of the community's extant distribution is within private land tenures and much of its area is likely to be subject to ongoing grazing by livestock, with consequent ongoing disruptions to biotic interactions including trampling and suppression of plant regeneration, reduction in species composition and invasion by introduced plant species (e.g. Spitznagel-Reeves 2021; Rayment *et al.* 2022).

The Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions community exists at 3–6 threat-defined locations and is within the threshold for subcriteria B1c and B2c.

The Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions community is eligible to be listed as Vulnerable under subcriterion B3 because the majority of the bounded estimate for the number of threat-defined locations is <5 (*i.e.*, 3–6) and the community is subject to observed and inferred key threatening processes that may cause it to undergo collapse within a very short timeframe (*c.* 20 years).

Criterion C Environmental Degradation

An ecosystem may be listed under criterion C if it meets the thresholds for any of four subcriteria (C1, C2a, C2b, or C3), which express different levels of environmental degradation over the following time frames:

Criterion C. Environmental degradation over ANY of the following time periods:				
C1. The past 50 years, based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:		Relative severity (%)		
	Extent (%)	≥ 80	≥ 50	≥ 30
	≥ 80	CR	EN	VU
	≥ 50	EN	VU	
	≥ 30	VU		
C2a. The next 50 years, based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table; OR C2b. Any 50-year period including the past, present and future, based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:		Relative severity (%)		
	Extent (%)	≥ 80	≥ 50	≥ 30
	≥ 80	CR	EN	VU
	≥ 50	EN	VU	
	≥ 30	VU		
C3. Since 1750, based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:		Relative severity (%)		
	Extent (%)	≥ 90	≥ 70	≥ 50
	≥ 90	CR	EN	VU
	≥ 70	EN	VU	
	≥ 50	VU		

Assessment Outcome: The status of the ecosystem under all criteria C1, C2 and C3 is Data Deficient.

Justification: Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions has been and continues to be subject to a number of key threatening processes including adverse fire regimes and climatic range shifts. These key threatening processes are likely to have caused, and will continue to cause environmental degradation of the ecological community. Widespread application of chemical fertilisers (e.g., Fulkerson

NSW Threatened Species Scientific Committee

et al. 2010), causing elevated soil nitrogen and phosphorous levels is also likely to have caused environmental degradation. However, no quantitative estimate of severity or extent of changes in relevant abiotic variables is available across the distribution of the ecological community.

Criterion D Disruption of biotic processes or interactions

An ecosystem may be listed under criterion D if it meets the thresholds for any of four subcriteria (D1, D2a, D2b, or D3), which express different levels of biotic disruption over the following time frames:

Criterion D. Disruption of biotic processes or interactions over ANY of the following time periods:				
D1. The past 50 years, based on change in a <i>biotic</i> variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:	Extent (%)	Relative severity (%)		
		≥ 80	≥ 50	≥ 30
	≥ 80	CR	EN	VU
	≥ 50	EN	VU	
	≥ 30	VU		
D2a. The next 50 years, based on change in a <i>biotic</i> variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table; OR	Extent (%)	Relative severity (%)		
		≥ 80	≥ 50	≥ 30
	≥ 80	CR	EN	VU
	≥ 50	EN	VU	
D2b. Any 50-year period including the past, present and future, based on change in a <i>biotic</i> variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:	≥ 30	VU		
D3. Since 1750, based on change in a <i>biotic</i> variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:	Extent (%)	Relative severity (%)		
		≥ 90	≥ 70	≥ 50
	≥ 90	CR	EN	VU
	≥ 70	EN	VU	
	≥ 50	VU		

Assessment Outcome: Vulnerable under subcriterion D3. There is insufficient information available to assess subcriteria D1 and D2.

Justification: Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions is subject to a number of threatening processes (*i.e.*, fragmentation, degradation, weed invasion and feral animals) that have caused severe declines in biotic processes. There is evidence that a moderate to high proportion of the many small remnants are subject to ongoing biotic disruption, including reductions in native plant species composition and vegetation structural complexity, through the interacting effects of livestock grazing and weed invasion.

Degradation by invasive plants is a major threat to Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions and may be expressed in different ways. Most typically, the ground layer may become dominated by non-native perennial grasses and forbs, or the shrub layer may become dominated by thickets of *Lantana camara* and other shrubs. More rarely, non-native trees may dominate the canopy. For the purpose of assessing the severity of these degradation processes under criterion D3 (based on methods described by IUCN 2024), an appropriate invasive plant indicator was defined as the proportion of total plant cover that was non-native. This indicator was applied to each vegetation stratum (ground, shrub, tree). A Critically Endangered level of

NSW Threatened Species Scientific Committee

degradation by invasive plants was considered to occur when at least 45–68% or more of total plant cover is made up of non-native species in any stratum, i.e. degradation reaches Critically Endangered levels when almost half to more than two-thirds of plant cover in a particular stratum is non-native. Table 3 shows the thresholds for the respective categories of threat based on the invasive plant indicator.

Analysis of the impact of weeds in the ground layer and the shrub layer shows that, averaged across all sampled sites, relative severity of weed invasion across 100% of the extent of the ecological community is plausibly >50% in the shrub layer (Table 3). Given that surveys are likely to have targeted more intact remnants, the actual relative severity of degradation expressed as weed invasion is likely to be higher if the full range of degradation had been more evenly sampled. For example, SEEnv (2024) estimated only 1.6% of the ecological community (in the Sydney Basin Bioregion) was in very high condition with <1% weed cover, and 87% of the ecological community to be moderately to highly disturbed with low diversity in the understorey due to invasion by non-native species in the ground-stratum and *Lantana camara*.

Lantana camara was recorded as the most common invasive plant species, recorded at more than half of sites selected as sufficiently intact to justify survey for vegetation mapping and classification purposes (Table 2). As mentioned above, invasion by *Lantana camara* is a listed Key Threatening Process (NSW TSSC 2006) can lead to reduced richness of native fern, herb, vine and tree species, altering species composition and disrupting community structure by limiting plant recruitment through competition and allelopathic effects on seedling plants (Gooden *et al.* 2008).

Analysis of plot data from across the distribution of the ecological community indicate that, on average, 28.3% of the shrub cover comprises non-native cover (Table 3), exceeding the lower bound of degradation severity for Vulnerable status, the ground layer (15.3%) marginally meets the threshold for Vulnerable status, while the tree layer (0%) exhibits less severe degradation by invasive plants across the range of the ecological community.

NSW Threatened Species Scientific Committee

Table 2. Species of weeds occurring in more than 15% of plots of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions. Data from 106 plots downloaded from NSW Government's central resource for Sharing and Enabling Environmental Data <https://www.seed.nsw.gov.au/>. Plot locations are often biased towards remnants with greater native diversity, and the information presented in this table is likely to be an underestimate of the broader extent of weed invasion.

Weed species	Growth form	% of sites
<i>Lantana camara</i>	shrub	55.7
<i>Hypochaeris radicata</i>	forb	54.7
<i>Plantago lanceolata</i>	forb	51.9
<i>Bidens pilosa</i>	forb	42.5
<i>Senecio madagascariensis</i>	forb	40.6
<i>Paspalum dilatatum</i>	grass	39.6
<i>Setaria parviflora</i>	grass	34.0
<i>Axonopus fissifolius</i>	grass	32.1
<i>Cirsium vulgare</i>	forb	30.2
<i>Sida rhombifolia</i>	shrub	28.3
<i>Araujia sericifera</i>	vine	21.7
<i>Verbena bonariensis</i>	forb	19.8
<i>Verbena rigida</i> var. <i>rigida</i>	forb	17.9
<i>Cenchrus clandestinus</i>	grass	17.0
<i>Conyza bonariensis</i>	forb	17.0
<i>Sporobolus africanus</i>	grass	15.1

NSW Threatened Species Scientific Committee

Table 3. Assessment of degradation due to invasion by non-native plant species in the ground, shrub and tree shrub layers of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions. See footnotes for explanation. CR – Critically Endangered, EN – Endangered, VU – Vulnerable, LC – not eligible for Vulnerable status (Least Concern).

	Ground layer midpoint (plausible lower-upper bound of threshold)	Shrub layer midpoint (plausible lower-upper bound of threshold)	Tree layer midpoint (plausible lower-upper bound of threshold)
scaled CR threshold for invasive plant indicator ¹	≥57(45 – 68)%	≥ 57(45 – 68)%	≥57(45 – 68)%
scaled EN threshold for invasive plant indicator ¹	≥44(35 – 53)%	≥ 44(35 – 53)%	≥44(35 – 53)%
scaled VU threshold for invasive plant indicator ¹	≥19(15 – 23)%	≥ 19(15 – 23)%	≥19(15 – 23)%
Non-native plant cover ²	9.0	35.6	0
Total plant cover ²	58.8	19.9	28.5
Invasive plant indicator (non-native/total cover)	15.3%	28.3%	0.0%
Status under criterion D3 ³	VU-LC	VU	LC

¹Thresholds for the invasive plant indicator were transformed from thresholds of relative severity of degradation scaled to 90/70/50% (of the 50–75% invasive plant indicator), respectively, for CR/EN/VU categories as specified in IUCN (2024). The bounds for each threshold represent the uncertainty in the range of indicator values that plausibly represent CR, EN and VU thresholds, respectively.

²Estimates of non-native and total plant cover were calculated by back-transformation of cover-abundance estimates (McNellie et al. 2019) from 106 plots surveyed across the distribution of Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions. Confidence intervals were calculated to account for variation about the mean of 106 plots and found to be <0.1 for all values, hence on the means are reported.

³Status under criterion D3 was determined by comparing the estimated indicator values to the thresholds. VU indicates that estimated indicator values exceed both the lower and upper bounds of the VU degradation thresholds. VU-LC indicates that estimated indicator values exceed both the lower bound of the VU degradation thresholds, but not the upper bound.

There is insufficient information to assess disruption of biotic properties of the ecological community over the past 50 years (subcriterion D1), within the next 50 years (subcriterion D2a) or within any 50-year period (subcriterion D2b).

NSW Threatened Species Scientific Committee

Criterion E Quantitative Analysis

An ecosystem may be listed under Criterion E if it meets the thresholds for the criterion, a quantitative analysis that estimates the probability of ecosystem collapse to be:

Criterion E. Quantitative analysis that estimates the probability of ecosystem collapse to be:	
CR	≥ 50% within 50 years
EN	≥ 20% within 50 years
VU	≥ 10% within 50 years

Assessment Outcome: Data Deficient

Justification: Data sufficient to allow a quantitative analysis of ecosystem collapse to be carried out for Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions are not currently available.

References

- Adair RJ and Groves RH (1998) Impact of Environmental Weeds on Biodiversity: A Review and Development of a Methodology. National Weeds Program, Biodiversity Group, Environment Australia, Canberra.
- Berry ZC, Wevill K and Curran TJ (2011) The invasive weed *Lantana camara* increases fire risk in dry rainforest by altering fuel beds. *Weed Research* **51**, 525–533.
- Colquhoun GP, Hughes KS, Deyssing L, Ballard JC, Folkes CB, Phillips G, Troedson AL, Fitzherbert JA (2021) New South Wales Seamless Geology dataset, version 2.1 [Digital Dataset]. Geological Survey of New South Wales, Department of Regional NSW, Maitland.
- Commonwealth DCCEE (2024) Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Subregions) [Online]. Commonwealth of Australia and Department of Climate Change, Energy, the Environment and Water. Available at <https://datasets.seed.nsw.gov.au/dataset/interim-biogeographic-regionalisation-for-australia-ibra-version-7-subregions> (accessed 8 December 2025)
- CTSSC (Commonwealth Threatened Species Scientific Committee) (2010) Advice to the Minister for the Environment, Heritage and the Arts on Amendments to the List of Key Threatening Processes under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) on 'Loss and degradation of native plant and animal habitat by invasion of escaped garden plants'. Commonwealth Threatened Species Scientific Committee.
- CTSSC (2016) Approved Conservation Advice (incorporating listing advice) for the Illawarra and south coast lowland forest and woodland ecological community. Commonwealth of Australia. <https://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=144>

NSW Threatened Species Scientific Committee

- Cuneo P and Leishman MR (2015) Recovery after African Olive invasion: can a 'bottom-up' approach to ecological restoration work?. *Ecological Management and Restoration* **16**, 33–40. <https://doi.org/10.1111/emr.12139>
- Davis NE, Bennett A, Forsyth DM, Bowman DMJS, Lefroy EC, Wood SW, Woolnough AP, West P, Hampton JO and Johnson CN (2016) A systematic review of the impacts and management of introduced deer (family Cervidae) in Australia. *Wildlife Research* **43**, 515–532.
- DAWE (2022) Fire regimes that cause biodiversity decline: amendments to the list of key threatening processes. Department of Agriculture, Water and the Environment, Canberra.
- DCCEEW (NSW Department of Climate Change, Energy, the Environment and Water) (2020) State Vegetation Type Map (SVTM) Release C2.0.M2.1 <https://datasets.seed.nsw.gov.au/dataset/nsw-state-vegetation-type-map>. (accessed 15th September 2025).
- DECCW (Department of Climate Change and Water) (2011) Strategy for the Conservation and Management of Biodiversity in the Dunmore – Shellharbour Hills Area. NSW Department of Environment, Climate Change and Water. www.environment.nsw.gov.au/resources/threatenedspecies/0172conservationstrategy.pdf
- DEH (Department of the Environment and Heritage) (2003) 'Draft threat abatement plan for predation, habitat degradation, competition and disease transmission by Feral Pigs.' Department of Environment and Heritage, Canberra.
- DPE (2022a) BioNet Vegetation Classification database. Accessed 1st September 2022. <https://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx>
- DPE (2022b) Woody Vegetation Change - Statewide Landcover and Tree Study - Summary Report 2020. NSW Department of Planning and Environment, Parramatta.
- DPE (2023) NSW BioNet Atlas records of *Cervus timorensis*. Data accessed 28th February 2023.
- Eldridge DJ, Poore AGB, Ruiz-Colmenero M, Letnic M and Soliveres S (2016) Ecosystem structure, function, and composition in rangelands are negatively affected by livestock grazing. *Ecological Applications* **26**, 1273–1283. <https://doi.org/10.1890/15-1234>
- Environment Australia (2000) Interim Biogeographic Regionalisation of Australia. Version 5.1 [Online]. Available at: <http://www.deh.gov.au/parks/nrs/ibra/index.html>. (accessed 8th November 2004)
- Frost W (1994) Government, Farmers and the Environment: Australia's Wet Frontier, 1870 – 1920. Paper presented at the Conference of the Economic History of Australia and New Zealand, Armidale, July 1994, pp.19–20.
- Fulkerson B, Griffiths N, Sinclair K, Beale P (2010) Milk production from kikuyu grass based pastures. *Primefact* **1068**. NSW Department of Industry and Investment.

NSW Threatened Species Scientific Committee

- Gellie NJH (2005) Native vegetation of the Southern Forests: South-east highlands, Australian alps, south-west slopes and SE corner bioregions. *Cunninghamia* **9**(2), 219–254.
- Gentle CB, Duggin JA (1997) Allelopathy as a competitive strategy in persistent thickets of *Lantana camara* L. in three Australian forest communities. *Plant Ecology* **132**, 85–95.
- Gooden B, French K, Turner PJ (2008) Invasion and management of a woody plant, *Lantana camara* L., alters vegetation diversity within wet sclerophyll forest in southeastern Australia. *Forest Ecology & Management* **257**, 960–967.
- Groves RH, Hosking JR, Batianoff GN, Cooke DA, Cowie ID, Johnson RW, Keighery GJ, Lepschi BJ, Mitchell AA, Moerkerk M, Randall RP, Rozefelds AC, Walsh NG, Waterhouse BM (2003) Weed categories for natural and agricultural ecosystem management. (Bureau of Rural Sciences: Canberra).
- Hampton JO, Davis NE (2020) Impacts of introduced deer in Victoria. *Victorian Naturalist* **137**(6), 276–281.
- Henzell R (1990) Feral Goats and Yellow-footed Rock-wallabies. In 'Proceedings of the Yellow-footed Rock-wallaby Management Workshop'. Port Augusta. (Ed. P. Copley) p. 1–6. (South Australian National Parks and Wildlife Service: Norwood, SA).
- Hone J (2002) Feral pigs in Namadgi National Park, Australia: dynamics, impacts and management. *Biological Conservation* **105**, 231–242.
- IUCN (2024) 'Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria', Version 2.0. Keith DA, Ferrer-Paris JR, Ghoraba SMM, Henriksen S, Monyeki M, Murray NJ, Nicholson E, Rowland J, Skowno A, Slingsby JA, Storeng AB, Valderrábano M & Zager I (Eds.) IUCN: Gland, Switzerland.
- Keith DA (2004) 'Ocean Shores to Desert Dunes: the native vegetation of New South Wales and the ACT.' (Department of Environment and Conservation: Sydney)
- Lunt ID, Eldridge DJ, Morgan JW and Witt GB (2007) TURNER REVIEW No. 13. A framework to predict the effects of livestock grazing and grazing exclusion on conservation values in natural ecosystems in Australia. *Australian Journal of Botany* **55**, 401–415.
- McDonald RC, Isbell RF, Speight JR, Walker J, Hopkins MS (1990) Australian soil and land survey – field handbook, 2nd edition. Australian Collaborative Land Evaluation Program, Canberra.
- McCaffrey F (1922) History of Illawarra and its Pioneers. John Sands Ltd, Sydney.
- Mills K (1997) Ecological Study Figtree Estate and Forest Red Gum Communities of the Illawarra Coastal Plain. (prepared for Stockland Trust Group Ltd Sydney).
- Mills K, Jakeman J (1995) 'Rainforests of the Illawarra District'. Coachwood Publishing, Jamberoo.
- Mills K (2001) The Natural Vegetation in the City of Shellharbour. Report prepared for Shellharbour City Council, Kevin Mills & Associates P/L
- NPWS (2002) Wollongong LGA Bioregional Assessment (Part 1): Native Vegetation of the Illawarra Escarpment and Coastal Plain. Report to the Commission of Inquiry

NSW Threatened Species Scientific Committee

into Planning and Development on the Illawarra Escarpment, by NSW National Parks and Wildlife Service, Conservation Assessment and Data Unit, Central Conservation Programmes and Planning Division, Hurstville.

NSW TSSC (Threatened Species Scientific Committee) (1999) Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion. Final Determination to list a Threatened Ecological Community under the Threatened Species Conservation Act 1995. NSW Scientific Committee, Sydney. <https://www2.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/1996-1999/illawarra-lowlands-grassy-woodland-sydney-basin-bioregion-endangered-ecological-community-listing> (accessed 7th November 2024).

NSW TSSC (Threatened Species Scientific Committee) (2006) Invasion, establishment and spread of Lantana (*Lantana camara*) - key threatening process listing. NSW Scientific Committee, Sydney. <https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2004-2007/invasion-establishment-and-spread-of-lantana-key-threatening-process-listing#:~:text=It%20is%20one%20of%20the,integrated%20control%20methods%20is%20continuing.> (accessed 11th February 2026).

NSW TSSC (Threatened Species Scientific Committee) (2011) Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion. Final Determination minor amendment to a Threatened Ecological Community under the Threatened Species Conservation Act 1995. NSW Scientific Committee, Sydney. <https://www2.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2011-2012/illawarra-lowlands-grassy-woodland-in-the-sydney-basin-bioregion-minor-amendment-determination> (accessed 7th November 2024).

Parkes J, Henzell R, Pickles G (1996) 'Managing vertebrate pests: Feral Goats.' Australian Government Publishing Service: Canberra.

Prober SM, Thiele KR, Koen TB (2004) Spring burns control exotic annual grasses in a temperate grassy woodland. *Ecological Management and Restoration* **3**, 131–136.

Rayment J, French K, Bedward M (2022) Understanding patterns and pathways of exotic perennial grass invasion in South-eastern Australian grassy communities. *Diversity and Distributions* **28**, 1136–1150. <https://doi.org/10.1111/ddi.13520>

Richards SJ, McDonald, Alford RA (1993) Declines in populations of Australia's endemic tropical frogs. *Pacific Conservation Biology* **1**, 66–77.

SEEnv (Southeast Engineering and Environmental) (2024) Fine-scale mapping of the threatened ecological community: Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion - Technical Report. Prepared for NSW Department of Climate Change, Energy, the Environment and Water.

NSW Threatened Species Scientific Committee

- Spitznagel-Reeves Z (2021) The Impact of Herbivores on the Revegetation Potential of Illawarra Lowlands Grassy Woodland. Hons. Thesis, School of Earth, Atmospheric and Life Sciences, University of Wollongong.
- Squires VR (1980) Chemical and botanical composition of the diets of oesophageally fistulated sheep, cattle and goats in a semi-arid *Eucalyptus populnea* woodland community. *Australian Rangelands Journal* **2**, 94–103.
- Tindall D, Pennay C, Tozer M, Turner K, Keith D (2004) Native vegetation map report series. No. 4. Araluen, Batemans Bay, Braidwood, Burragorang, Goulburn, Jervis Bay, Katoomba, Kiama, Moss Vale, Penrith, Port Hacking, Sydney, Taralga, Ulladulla, Wollongong. NSW Department of Environment and Conservation and NSW Department of Infrastructure, Planning and Natural Resources, Sydney.
- Tozer MG, Turner K, Keith DA, Tindall D, Pennay C, Simpson C, MacKenzie B (2010) Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. *Cunninghamia* **11**(3), 359–406.
- Wilkinson J (1999) Dairy Industry in NSW: Past and Present. Briefing Paper No 23/99. NSW Parliamentary Library Research Service, Sydney.

NSW Threatened Species Scientific Committee

APPENDIX 1

Assessment against Biodiversity Conservation Regulation 2017 criteria.

The Clauses used for assessment are listed below for reference.

Overall Assessment Outcome: Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions was found to be eligible for listing as Endangered under Clauses 4.9(b) and 4.10(b)(d i,iii)(e)(f ii). The community was also found to be eligible for listing as Vulnerable under Clause 4.12(c).

Clause 4.9 – Reduction in geographic distribution of ecological community
(Equivalent to IUCN criterion A)

Assessment Outcome: Endangered under Clause 4.9(b).

The ecological community has undergone or is likely to undergo within a time frame appropriate to the life cycle and habitat characteristics of its component species:			
	(a)	for critically endangered ecological communities	a very large reduction in geographic distribution
	(b)	for endangered ecological communities	a large reduction in geographic distribution
	(c)	for vulnerable ecological communities	a moderate reduction in geographic distribution

Clause 4.10 - Restricted geographic distribution of ecological community
(Equivalent to IUCN criterion B)

Assessment Outcome: Endangered under Clause 4.10(b)(d i,iii)(e)(f ii).

The ecological community's geographic distribution is:			
	(a)	for critically endangered ecological communities	very highly restricted
	(b)	for endangered ecological communities	highly restricted
	(c)	for vulnerable ecological communities	moderately restricted

NSW Threatened Species Scientific Committee

and at least 1 of the following conditions apply:			
	(d)	there is a projected or continuing decline in any of the following:	
		(i)	a measure of spatial extent appropriate to the ecological community,
		(ii)	a measure of environmental quality appropriate to the characteristic biota of the ecological community,
		(iii)	a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecological community,
	(e)	There are threatening processes that are likely to cause continuing decline in either geographic distribution, environmental quality or biotic interactions within the near future,	
	(f)	The ecological community exists at:	
		(i)	for critically endangered ecological communities
			an extremely low number of locations
		(ii)	for endangered ecological communities
			a very low number of locations
		(iii)	for vulnerable ecological communities
			a low number of locations

Clause 4.11 – Environmental degradation of ecological community

(Equivalent to IUCN criterion Clause C)

Assessment Outcome: Data Deficient under Clause 4.11.

The ecological community has undergone or is likely to undergo within a time span appropriate to the life cycle and habitat characteristics of its component species:			
	(a)	for critically endangered ecological communities	a very large degree of environmental degradation
	(b)	for endangered ecological communities	a large degree of environmental degradation
	(c)	for vulnerable ecological communities	a moderate degree of environmental degradation

NSW Threatened Species Scientific Committee

Clause 4.12 – Disruption of biotic processes or interactions in ecological community
(Equivalent to IUCN criterion D)

Assessment Outcome: Vulnerable under Clause 4.12(c).

The ecological community has undergone or is likely to undergo within a time frame appropriate to the life cycle and habitat characteristics of its component species:			
	(a)	for critically endangered ecological communities	a very large disruption of biotic processes or interactions
	(b)	for endangered ecological communities	a large disruption of biotic processes or interactions
	(c)	for vulnerable ecological communities	a moderate disruption of biotic processes or interactions

Clause 4.13 – Quantitative analysis of probability of collapse of ecological community

(Equivalent to IUCN criterion E)

Assessment Outcome: Data deficient under Clause 4.13.

The probability of collapse of the ecological community is estimated to be:			
	(a)	for critically endangered species	extremely high
	(b)	for endangered ecological communities	very high
	(c)	for vulnerable species	high

Professor Angela Moles, FRSN
Chairperson
NSW Threatened Species Scientific Committee

NSW Threatened Species Scientific Committee

APPENDIX 2

Mean numbers of the most frequently recorded plant species per stratum based on 20 x 20 m floristic survey plots available at the time of assessment (n=106) for Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions. s.e.=standard error.

Stratum Mean species per plot (s.e.)	Species	Frequency (%)
Tree 3.92 (0.175)	<i>Eucalyptus tereticornis</i>	86.8
	<i>Eucalyptus eugenioides</i>	34.0
	<i>Eucalyptus globoidea</i>	26.4
	<i>Angophora floribunda</i>	24.5
	<i>Acacia maidenii</i>	22.6
	<i>Eucalyptus longifolia</i>	21.7
	<i>Streblus brunonianus</i>	20.8
Mid-stratum 5.84 (0.309)	<i>Pittosporum undulatum</i>	45.3
	<i>Breynia oblongifolia</i>	41.5
	<i>Leucopogon juniperinus</i>	37.7
	<i>Acacia mearnsii</i>	33.0
	<i>Exocarpos cupressiformis</i>	25.5
	<i>Acacia implexa</i>	23.6
	<i>Pittosporum revolutum</i>	22.6
	<i>Rubus parvifolius</i>	22.6
Ground 25.0 (0.827)	<i>Dichondra repens</i>	86.8
	<i>Microlaena stipoides</i>	80.2
	<i>Glycine clandestina</i>	75.5
	<i>Grona varians</i>	68.9
	<i>Lobelia purpurascens</i>	67.9
	<i>Carex longebrachiata</i>	66.0
	<i>Commelina cyanea</i>	56.6
	<i>Themeda triandra</i>	53.8
	<i>Eragrostis leptostachya</i>	52.8
	<i>Geitonoplesium cymosum</i>	52.8
	<i>Oplismenus imbecillis</i>	48.1
	<i>Echinopogon ovatus</i>	47.2
	<i>Pandorea pandorana</i>	47.2
	<i>Lomandra longifolia</i>	46.2
	<i>Poa labillardierei</i>	44.3
	<i>Cymbopogon refractus</i>	40.6
	<i>Glycine tabacina</i>	40.6
	<i>Echinopogon caespitosus</i>	39.6
	<i>Lepidosperma laterale</i>	39.6
	<i>Oplismenus aemulus</i>	37.7
<i>Imperata cylindrica</i>	34.9	
<i>Eustrephus latifolius</i>	34.9	

NSW Threatened Species Scientific Committee

<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	34.9
<i>Entolasia stricta</i>	33.0
<i>Oxalis perennans</i>	33.0
<i>Veronica plebeia</i>	33.0
<i>Centella asiatica</i>	28.3
<i>Entolasia marginata</i>	27.4
<i>Parsonsia straminea</i>	25.5
<i>Rytidosperma racemosum</i>	23.6
<i>Dianella longifolia</i>	23.6
<i>Solanum prinophyllum</i>	23.6
<i>Marsdenia rostrata</i>	21.7
<i>Hibbertia scandens</i>	21.7
<i>Cynodon dactylon</i>	20.8
<i>Geranium solanderi</i>	20.8
<i>Lagenophora stipitata</i>	20.8
<i>Plectranthus parviflorus</i>	20.8

NSW Threatened Species Scientific Committee

APPENDIX 3

Vegetation types, from various sources, that are wholly or partly included within the EPBC Act-listed community “Illawarra and south coast lowland forest and woodland” corresponds wholly or partially (from CTSSC 2016).

Source	Vegetation types with which the ecological community corresponds wholly or partially
Mills (2001)	Red Gum – Stringybark Forest (TER-EUG) Red Gum – Paperbark Forest (TER-MEL) Red Gum – White Box Forest (TER-QUD) part of Red Gum – Blue Gum Forest (TER-SAL) and Red Gum – Rainforest (TER-WRF) where rainforest-associated species are not dominant.
NPWS (2002)	MU23 ‘Coastal Grassy Red Gum Forest’ MU24 ‘Lowland Woollybutt-Melaleuca Forest’ part of MU13 ‘Moist box-Red Gum Foothills Forest’ where rainforest-associated species are not dominant.
Tindall <i>et al.</i> (2004)	GW 3 ‘Illawarra lowland woodland’ GW 34 ‘South Coast Grassy Woodland’.
Gellie (2005)	Forest Ecosystem 54 Coastal forest/red gum shrub/grass forest (part) possibly some overlap with Forest Ecosystem 171 Coastal shrub/grass forest-E. tereticornis. and Forest Ecosystem 27 Ecotonal coastal hind dune swamp oak-bangalay shrub forest
Tozer <i>et al.</i> (2010)	GW p3 South Coast Lowland Swamp Woodland GW p34 South Coast Grassy Woodland
OEH (2013) biometric vegetation types	SR545 Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin SR669 Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin and South East Corner.
NSW Plant Community Types (DPE 2022a)	PCT 3269 Shoalhaven Lowland Spotted Gum-Paperbark Forest PCT 3327 Illawarra Lowland Red Gum Grassy Forest, PCT 3330 South Coast Lowland Woollybutt Grassy Forest, PCT 4052 South Coast Low Hills Red Gum Grassy Forest.

NSW Threatened Species Scientific Committee

APPENDIX 4

Threatened species and populations that may occur in Illawarra and South Coast Lowland Forest and Woodland and Derived Native Grassland in the Sydney Basin and South East Corner Bioregions (DPE 2022a; CTSSC 2016the). CE=Critically Endangered; EN=Endangered; VU=Vulnerable.

Scientific Name	Common Name	EPBC Act	BC Act
Flora			
<i>Chorizema parviflorum</i>	eastern flame pea		Endangered population
<i>Cynanchum elegans</i>	white-flowered wax plant	EN	EN
<i>Grevillea raybrownii</i>		VU	VU
<i>Haloragis exalata</i> subsp. <i>exalata</i>	square raspwort	VU	VU
<i>Lespedeza juncea</i> subsp. <i>sericea</i>	Chinese lespedeza		Endangered population
<i>Pimelea curviflora</i> var. <i>curviflora</i>	curved rice flower	VU	VU
<i>Pimelea spicata</i>	spiked rice-flower	EN	EN
<i>Pterostylis gibbosa</i>	Illawarra greenhood	EN	EN
<i>Solanum celatum</i>			EN
<i>Zieria granulata</i>	Illawarra zieria	EN	EN
Fauna			
Amphibians			
<i>Heleioporus australiacus</i>	giant burrowing frog	VU	VU
<i>Litoria aurea</i>	green and golden bell frog	VU	EN
<i>Mixophyes balbus</i>	stuttering frog	VU	EN

NSW Threatened Species Scientific Committee

Scientific Name	Common Name	EPBC Act	BC Act
Bats			
<i>Chalinolobus dwyeri</i>	large-eared pied bat	EN	EN
<i>Falsistrellus tasmaniensis</i>	eastern false pipistrelle	Not Listed	VU
<i>Micronomus norfolkensis</i>	eastern coastal free-tailed bat	Not Listed	VU
<i>Miniopterus australis</i>	little bent-winged bat	Not Listed	VU
<i>Miniopterus orianae oceanensis</i>	large bent-winged bat	Not Listed	VU
<i>Myotis macropus</i>	southern myotis	Not Listed	VU
<i>Phoniscus papuensis</i>	golden-tipped bat	Not Listed	VU
<i>Pteropus poliocephalus</i>	grey-headed flying-fox	VU	VU
<i>Saccolaimus flaviventris</i>	yellow-bellied sheath-tail-bat	Not Listed	VU
<i>Scoteanax rueppellii</i>	greater broad-nosed bat	Not Listed	VU
Birds			
<i>Anthochaera phrygia</i>	regent honeyeater	CR	CR
<i>Artamus cyanopterus cyanopterus</i>	dusky woodswallow	Not Listed	VU
<i>Botaurus poiciloptilus</i>	Australasian bittern	EN	EN
<i>Burhinus grallarius</i>	bush stone-curlew	Not Listed	EN
<i>Calidris ferruginea</i>	curlew sandpiper	CR	CR
<i>Callocephalon fimbriatum</i>	gang-gang cockatoo	EN	EN
<i>Calyptorhynchus lathami lathami</i>	south-eastern glossy black cockatoo	VU	VU
<i>Circus assimilis</i>	spotted harrier	Not Listed	VU
<i>Climacteris picumnus victoriae</i>	brown treecreeper (eastern subspecies)	VU	VU

NSW Threatened Species Scientific Committee

Scientific Name	Common Name	EPBC Act	BC Act
<i>Daphoenositta chrysoptera</i>	varied sittella	Not Listed	VU
<i>Dasyornis brachypterus</i>	eastern bristlebird	EN	EN
<i>Ephippiorhynchus asiaticus</i>	black-necked stork	Not Listed	EN
<i>Falco subniger</i>	black falcon	Not Listed	VU
<i>Grantiella picta</i>	painted honeyeater	VU	VU
<i>Haliaeetus leucogaster</i>	white-bellied sea-eagle	Not Listed	VU
<i>Hieraaetus morphnoides</i>	little eagle	Not Listed	VU
<i>Hirundapus caudacutus</i>	white-throated needletail	VU	VU
<i>Lathamus discolor</i>	swift parrot	CR	EN
<i>Lophoictinia isura</i>	square-tailed kite	Not Listed	VU
<i>Melanodryas cucullata cucullata</i>	south-eastern hooded robin	EN	EN
<i>Melithreptus gularis gularis</i>	black-chinned honeyeater (eastern subspecies)	Not Listed	VU
<i>Neophema pulchella</i>	turquoise parrot	Not Listed	VU
<i>Ninox connivens</i>	barking owl	Not Listed	VU
<i>Ninox strenua</i>	powerful owl	Not Listed	VU
<i>Pachycephala olivacea</i>	olive whistler	Not Listed	VU
<i>Pandion cristatus</i>	eastern osprey	Not Listed	VU
<i>Parvipsitta pusilla</i>	little lorikeet	Not Listed	VU
<i>Petroica boodang</i>	scarlet robin	Not Listed	VU
<i>Pomatostomus temporalis temporalis</i>	grey-crowned babbler (eastern subspecies)	Not Listed	VU
<i>Pycnoptilus floccosus</i>	pilotbird	VU	VU

NSW Threatened Species Scientific Committee

Scientific Name	Common Name	EPBC Act	BC Act
<i>Pyrrholaemus sagittatus</i>	speckled warbler	Not Listed	VU
<i>Rostratula australis</i>	Australian painted snipe	EN	EN
<i>Stagonopleura guttata</i>	diamond firetail	VU	VU
<i>Tyto novaehollandiae</i>	masked owl	Not Listed	VU
Marsupials			
<i>Cercartetus nanus</i>	eastern pygmy-possum	Not Listed	VU
<i>Dasyurus maculatus</i>	spotted-tailed quoll	EN	VU
<i>Isoodon obesulus obesulus</i>	southern brown bandicoot (eastern)	EN	EN
<i>Petauroides volans</i>	southern greater glider	EN	EN
<i>Petaurus norfolcensis</i>	squirrel glider	Not Listed	VU
<i>Phascogale tapoatafa</i>	brush-tailed phascogale	Not Listed	VU
<i>Phascolarctos cinereus</i>	koala	EN	EN
<i>Potorous tridactylus tridactylus</i>	northern long-nosed potoroo	VU	VU
<i>Sminthopsis leucopus</i>	white-footed dunnart	Not Listed	VU
Reptiles			
<i>Varanus rosenbergi</i>	Rosenberg's goanna	Not Listed	VU
Rodents			
<i>Pseudomys gracilicaudatus</i>	eastern chestnut mouse	Not Listed	VU