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Notice of and reasons for the Final Determination

The NSW Threatened Species Scientific Committee, established under the *Biodiversity Conservation Act 2016* (the Act), has made a Final Determination to list the Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion as a CRITICALLY ENDANGERED ECOLOGICAL COMMUNITY in Part 1 of Schedule 2 and to remove the Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions from Part 2 of Schedule 2. Listing of ecological communities is provided for in Part 4 of the Act.

Summary of Conservation Assessment

Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion is eligible for listing as Critically endangered under Clauses 4.9 (a), 4.11 (a) and 4.12 (a) because the community has: i) undergone a very large reduction in geographic distribution; ii) experienced a very large degree of environmental degradation; and iii) experienced a very large disruption of biotic processes and interactions.

This determination contains the following information:

Parts 1 & 2: Section 1.6 of the Act defines an ecological community as "an assemblage of species occupying a particular area". These features of Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion are described in Parts 1 and 2 of this Determination, respectively.

Part 3: Part 3 of this Determination describes the eligibility for listing of this ecological community in Part 1 of Schedule 2 of the Act according to criteria prescribed by the *Biodiversity Conservation Regulation 2017*.

Part 4: Part 4 of this Determination provides additional information intended to aid recognition of this community in the field.

Part 1. Assemblage of species

1.1 Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion (hereafter referred to as the Monaro Tableland Cool Temperate Grassy Woodland) is characterised by the assemblage of species listed below.

Acacia dealbata
Acaena echinate
Ajuga australis
Asperula scoparia
Bossiaea buxifolia
Carex inversa
Chrysocephalum semipapposum
Desmodium varians
Acacia melanoxylon
Acaena novae-zelandiae
Asperula conferta
Austrostipa scabra
Carex breviculmis
Chrysocephalum apiculatum
Cymbonotus lawsonianus
Dichondra repens

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Elymus scaber	*Epilobium billardierianum*
Eucalyptus pauciflora	*Eucalyptus rubida* subsp. *rubida*
Eucalyptus stellulata	*Eucalyptus viminalis*
Euchiton japonicus	*Geranium antrorsum*
Geranium solanderi	*Glycine clandestina*
Gonocarpus tetragynus	*Haloragis heterophylla*
Hovea linearis	*Hydrocotyle laxiflora*
Hypericum gramineum	*Leptorhynchos squamatus*
Melicytus angustifolius subsp. *divaricatus*	*Microlaena stipoides* subsp. *stipoides*
Mirbelia oxylobioides s	*Oxalis perennans*
Panicum effusum	*Plantago varia*
Poa sieberiana	*Poa labillardierei*
Poranthera microphylla	*Rubus parvifolius*
Rumex brownie	*Rytidosperma laeve*
Rytidosperma pilosum	*Scleranthus biflorus*
Solenogyne gunnii	*Themeda triandra*
Veronica gracilis	*Viola betonicifolia*
Wahlenbergia communis	

1.2 The total species list of the community across all occurrences is likely to be considerably larger than that given above. Due to variation across the range of the community, not all of the above species are present at every site and many sites may also contain species not listed above. Annual species and geophytes may not be detectible at certain times of the year such as the cooler months.

Characteristic species may be abundant or rare and comprise only a subset of the complete list of species recorded in known examples of the community. Some characteristic species show a high fidelity (are relatively restricted) to the community, but may also occur in other communities, while others are more typically found in a range of communities.

The number and identity of species recorded at a site is a function of sampling scale and effort. In general, the number of species recorded is likely to increase with the size of the site and there is a greater possibility of recording species that are rare in the landscape.

Species presence and relative abundance (dominance) will vary from site to site as a function of environmental factors such as soil properties (chemical composition, texture, depth, drainage), topography, climate and through time as a function of disturbance (*e.g.* fire, logging, grazing) and weather (*e.g.* flooding, drought, extreme heat or cold).

At any one time, above ground individuals of some species may be absent but the species may be represented below ground in the soil seed bank or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers.

The species listed above are vascular plants, however the community also includes micro-organisms, fungi and cryptogamic plants as well as vertebrate and invertebrate fauna. These components of the community are less well documented.

Part 2. Particular area occupied by the ecological community

2.1.1 The assemblage of species listed in Part 1.1 above which characterises the Monaro Tableland Cool Temperate Grassy Woodland occurs within the South Eastern Highlands Bioregion. This Bioregion is defined by SEWPaC (2012) Interim Biogeographic Regionalisation for Australia, Version 7. Department of Sustainability, Environment, Water, Population and Communities.
http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/maps.html

2.2 It is the intent of the NSW Threatened Species Scientific Committee that all occurrences of the ecological community (both recorded and as yet unrecorded, and independent of their condition) that occur within this bioregion be covered by this Determination.

Part 3. Eligibility for listing

3.1 Reasons for determining eligibility for listing

3.1.1 Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion (MTCTGW) is part of the broadly circumscribed Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions which was listed as an Endangered Ecological Community under the *Threatened Species Conservation Act 1995*. Since this original listing, new data have become available and the NSW Threatened Species Scientific Committee has undertaken a review of the conservation status of the ecological community to inform the current listing status under the Act.

3.1.2 Monaro Tableland Cool Temperate Grassy Woodland is one of several related plant communities (*sensu* Keith 2004) which collectively comprised the Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland. Although these communities share many structural and compositional attributes, more recent analyses have demonstrated they occur in different environments, comprise distinct assemblages of species and differ in the extent to which they are affected by the threats listed in Sections 3.1.4 – 3.1.10. As a consequence, the NSW Threatened Species Scientific Committee has determined that it is not appropriate to include all of these related communities under a single ecological community.

3.1.3 Monaro Tableland Cool Temperate Grassy Woodland broadly corresponds to the *Eucalyptus pauciflora – E. stellulata* alliance, subformation Savannah Woodland of Costin (1954) and includes Far South East Tableland Moist Herb/Grass Forest (VG150) of Gellie (2005) and Monaro Basalt Grass Woodland (MU23B) of Keith and Bedward (1999) which was subsequently included within Frost Hollow Grassy Woodland (GWp22) of Tozer *et al.* (2010). It is the intention of the NSW Threatened Species Scientific Committee that secondary grasslands derived from any of the communities listed above are covered by this Determination. Instances of Frost Hollow Grassy Woodland (GWp22) occurring north of the Monaro Tableland correspond to Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions which is being considered for listing as Critically endangered under the Act.

3.1.4 Monaro Tableland Cool Temperate Grassy Woodland has undergone a very large reduction in distribution. Based on an analysis of maps produced by Gellie (2005) and Keith and Bedward (1999), together with maps depicting more recent vegetation clearing (Danaher 2011) the NSW Threatened Species Scientific Committee estimates that less than 15,660 ha of Monaro Tableland Cool Temperate Grassy Woodland remain, approximately 5% of its estimated pre-1750 distribution of 295,500 ha.

3.1.5 The distribution of Monaro Tableland Cool Temperate Grassy Woodland is highly restricted. The extent of occurrence of MTCTGW is 13,780 km^2 based on a minimum convex polygon enclosing known occurrences of the community as interpreted in Sections 4.2 – 4.10 and using the method of assessment recommended by IUCN (Bland *et al.* 2017). The estimated area of occupancy (AOO) is 53 10 km x 10 km grid cells, the scale recommended for assessing AOO by IUCN and applying a minimum occupancy threshold of 1% (Bland *et al.* 2017).

3.1.6 Remnants of Monaro Tableland Cool Temperate Grassy Woodland are poorly represented in the formal reserve network, and unreserved areas are subject to the threat of vegetation clearing. An estimated 1,293 ha of MTCTGW is distributed among 14 Reserves under the management of the NSW National Parks and Wildlife Service, the majority in Tallaganda National Park (NP), Kosciuszko NP and Paupong Nature Reserve. A further 147 ha occurs in Crown Reserves and 85 ha is preserved in perpetuity under Biobanking or Conservation Agreements. The total area under reservation is estimated to be 1,525 ha, equivalent to less than 1% of the estimated pre-1750 distribution or 8% of that remaining extant. Remnants are typically small and fragmented and are thus susceptible to attrition via clearing for routine land management practices. 'Clearing of native vegetation' is listed as a Key Threatening Process under the Act.

3.1.7 Monaro Tableland Cool Temperate Grassy Woodland has been subjected to grazing by domestic stock since the 1820s and extensive structural and compositional degradation was documented by the middle of the 20th century Costin 1954). The loss of the tree stratum was associated with clearing and ring barking to facilitate pastoral activities coupled with a failure to regenerate due to grazing by rabbits and domestic stock. Degradation of the ground stratum has been associated with well-documented impacts of grazing including the erosion, compaction and nutrient enrichment of the topsoil (Yates *et al*. 2000; Eddy 2002; McIntyre *et al*. 2002; Prober *et al*. 2005; Lunt *et al*. 2007). This has resulted in the partial or complete replacement of tussock forming grass species such as *Austrostipa scabra*, *Poa labillardieri* and *Themeda triandra* with other grasses such as *Austrodanthonia* spp., *Enneapogon* spp. and *Aristida* spp. as well as herbs or sub-shrubs such as *Scleranthus* spp., *Helichrysum* spp., *Asperula* spp. and *Helipterum* spp. (Costin 1954). Extensive disturbance to the ground stratum has also resulted in the establishment of shrub or bracken thickets in certain areas dominated by species such as *Cassinia longifolia*, *Bossiaea buxifolia*, *Acacia dealbata*, *A. rubida* subsp. *rubida*, *Pimelea pauciflora* and *Pteridium esculentum* (Costin 1954). Grazing impacts have been further exacerbated by the application of chemical fertilizers, the removal of large trees, tilling of the soil and the sowing of exotic crop species to increase stocking rates (Keith 2004).

3.1.8 Remnants of Monaro Tableland Cool Temperate Grassy Woodland are subject to invasion by an extensive range of naturalised plant species. Major weeds include the shrub species *Rosa rubiginosa* (Sweet Briar), *Ulex europaeus* (Gorse) and *Lycium ferocissimum* (African Boxthorn), the forb species *Argemone ochroleuca* subsp. *ochroleuca* (Mexican Poppy), *Hirschfeldia incana* (Buchan Weed), *Hypericum perforatum* (St Johns Wort), *Lepidium draba* (Hoary Cress), *Sisymbrium officinale* (Hedge Mustard), *Verbascum thapsus* (Giant Mullein), *Carthamus lanatus* (Saffron Thistle), *Centaurea calcitrapa* (Star Thistle), *Cirsium vulgare* (Spear Thistle), *Dittrichia graveolens* (Stinkwort), *Trifolium* spp. (Clover), the annual grasses *Hordeum spp.* (Barley Grass), *Bromus* spp. (Brome Grass), *Vulpia myuros* (Rat's Tail Fescue), *Lolium perenne* (Perrenial Ryegrass) and perennial grass species including *Eragrostis curvula* (African Lovegrass), *Phalaris aquatica* (Phalaris), *Dactylis glomerata* (Cocksfoot), *Festuca* spp. (Fescue) and *Nassella trichotoma* (Serrated Tussock). 'Invasion of native plant communities by exotic perennial grasses' is listed as a Key Threatening Process under the Act.

3.1.9 Remnants of Monaro Tableland Cool Temperate Grassy Woodland are subject to on-going grazing pressure from wild introduced herbivores such as the European Rabbit (*Oryctolagus cuniculus*) and Brown Hare (*Lepus capensis*). This, in combination with grazing by native marsupials and domestic stock, has resulted in higher rates of biomass consumption than occurred prior to European settlement. 'Competition and grazing by the feral European Rabbit *Oryctolagus cuniculus* (L.)' is listed as a Key Threatening Process under the Act.

3.1.10 Monaro Tableland Cool Temperate Grassy Woodland is threatened by changes in rainfall or temperature that may occur as a consequence of human-induced climate change. A decline in annual rainfall is likely to precipitate a contraction of MTCTGW at the lower end of its present rainfall range and a concomitant expansion of temperate montane grasslands. Widespread dieback of *Eucalyptus pauciflora* observed in 2009 has been attributed to the effects of drought (J. Crooks *in litt*. December 2009). Under a warming climate, based on the climatic envelopes characterising related assemblages (as described by Costin 1954), the dominant tree species (*E. pauciflora*) may be replaced by *E. melliodora, E. blakelyi* and *E. bridgesiana*, and species characteristic of White Box Yellow Box Blakely's Red Gum Woodland may expand their distribution at the expense of species characteristic of MTCTGW. 'Anthropogenic climate change' is listed as a Key Threatening Process under the Act.

3.1.11 The threats to Monaro Tableland Cool Temperate Grassy Woodland listed above are ongoing and likely to cause continuing declines in geographic distribution and disruption of biotic processes or interactions.

3.2 Criteria for listing

Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion is eligible to be listed as a Critically Endangered Ecological Community in accordance with Part 4 of the Act as, in the opinion of the NSW Threatened Species Scientific Committee, it is facing an extremely high risk of extinction in Australia in the immediate future, as determined in accordance with the following criteria as prescribed by the *Biodiversity Conservation Regulation 2017*:

Clause 4.9 – Reduction in geographic distribution of ecological community
(Equivalent to IUCN criterion A)
Assessment Outcome: Critically endangered under Clause 4.9 (a).

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, ii, iii), e.

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.~~
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 characteristic biota of the ecological community,	
		(iii)	a measure of disruption to biotic interactions appropriate to 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: Critically endangered under Clause 4.11 (a).

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 disruption of biotic processes or interactions.~~
	~~(c)~~	~~for vulnerable ecological communities~~	~~a moderate degree of environmental degradation.~~

Clause 4.12 – Disruption of biotic processes or interactions in ecological community
(Equivalent to IUCN criterion D)
Assessment Outcome: Critically endangered under Clause 4.12 (a).

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 moderately large 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 4.12 (a).

The probability of collapse of the ecological community is estimated to be:			
	~~(a)~~	~~for critically endangered species~~	~~extremely high~~
	~~(b)~~	~~for endangered ecological communities~~	~~a large disruption of biotic processes or interactions~~
	~~(c)~~	~~for vulnerable species~~	~~High~~

Dr Marco Duretto
Chairperson
NSW Threatened Species Scientific Committee

Part 4. Additional information about the ecological community

The following information is additional to that required to meet the definition of an ecological community under the Act, but is provided to assist in the recognition of the Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion (hereafter referred to as the Monaro Tableland Cool Temperate Grassy Woodland) in the field. Given natural variability, along with disturbance history, Monaro Tableland Cool Temperate Grassy Woodland may sometimes occur outside the typical range of variation in the features described below.

4.1 Monaro Tableland Cool Temperate Grassy Woodland ranges in structure from woodland to low open woodland (*sensu* Specht 1970). It is characterised by a sparse to very sparse tree stratum dominated by *Eucalyptus pauciflora* either in monospecific stands or with any of *Acacia melanoxylon*, *E. rubida* subsp. *rubida, E. stellulata* or *E. viminalis* as co-dominants. A number of other tree species have been recorded within the community, although very infrequently and always as canopy subdominants. These include *E. bridgesiana, E.dives, E. blakelyi* and *E. melliodora*. Tree height and cover vary as a function of moisture availability, drainage and past land management. The tree stratum becomes shorter and sparser with declining moisture availability or increasing levels of soil waterlogging. At any given level of annual rainfall, variation in moisture availability may arise due to the influence of wind or soil water capacity. As a consequence, trees are sparser in areas subject to frequent high winds or which have heavy-textured soils (Costin 1954). Trees may be absent as a consequence of tree removal under pastoral management and grazing by domestic stock. A continuous herbaceous ground stratum is usually present, although this is highly variable in composition and cover as a function of grazing pressure from wild herbivores (native and exotic) and domestic stock. Ground cover species include *Themeda triandra*, *Poa sieberiana, Elymus scaber, Hydrocotyle laxiflora, Scleranthus biflorus, Oxalis perennans, Plantago varia, Euchiton japonicus, Poa labillardieri, Hypericum gramineum, Desmodium varians, Geranium solanderi, Acaena echinata, Gonocarpus tetragynus, Microlaena stipoides, Dichondra repens, Solenogyne gunnii, Asperula conferta, Asperula scoparia*, *Rumex brownii*, *Rytidosperma laeve*, *Rytidosperma pilosum, Chrysocephalum apiculatum* and *Chrysocephalum semipapposum.* The Community may develop a shrub or bracken layer as a consequence of the opening up of the ground stratum following excessive grazing by rabbits and sheep. This may include species such as *Pimelea pauciflora*, *Acacia dealbata*, *Acacia melanoxylon*, *Acacia rubida* subsp. *rubida, Cassinia longifolia* and *Pteridium esculentum* (Costin 1954).

4.2 The majority of current records of Monaro Tableland Cool Temperate Grassy Woodland occur in the Southern Tablelands of New South Wales (NSW) between Captains Flat in the north and Bombala in the south. The extent of its distribution largely coincides with the extent of the Monaro Tableland and Tindery-Gourock Ranges Physiographic Regions (Pain *et al.* 2011). Within those Regions, records of the Community predominantly lie within areas bounded by the 600 mm and 800 mm average annual rainfall isohyets. The eastern boundary corresponds approximately with the crest of the Great Dividing Range between Captains Flat and Nimmitabel, and the eastern catchment boundary of the Snowy River between Nimmitabel and the Victorian Border. To the west, records of Monaro Tableland Cool Temperate Grassy Woodland occur between the Adaminaby area in the north and Ingebyra in the south and are approximately bounded by the Eucumbene and Crackenback Rivers. As a consequence of the extensive rain-shadow

centred on the Monaro Tableland, the western distribution of the Community is discontinuous with the distribution in the east, except for the areas of higher rainfall at the southern end of the Monaro plain between Bombala and Delegate.

4.3 Monaro Tableland Cool Temperate Grassy Woodland occurs on broad valley floors and the slopes and low rises of the moderately undulating tablelands on a wide variety of substrates including basalt, fine-grained sedimentary rocks, granite, acid volcanics and alluvium (Costin 1954). Records of MTCTGW fall within the following approximate ranges: elevation 700–1,200 m a.s.l.; average annual maximum temperature 22.5–25.5^{o}C; and average annual rainfall 600–800 mm. These factors are among the primary determinants of both the energy-water relations underpinning the primary production of the Community and the physiological tolerances of its constituent members. The community may occur outside the ranges stated above where other factors such as wind, topographic exposure and soil texture counteract the effects of lower or higher rainfall or temperatures, thus creating micro-climatic niches of appropriate water supply and temperature for the members of the assemblage. Records of MTCTGW at lower elevations (700–900m a.s.l.) are most common in the far south (Bombala) and north (Captains Flat) of the range. Almost two thirds of records occur at higher elevations (1,000–1,200 m a.s.l.) along the eastern and western parts of the distribution but very few occur in the range 900–1,000 m a.s.l. This bias in the distribution of samples within the climatic envelope identified for the community may reflect more extensive clearing and degradation of the community at elevations intermediate to low in the Community's range.

4.4 Monaro Tableland Cool Temperate Grassy Woodland forms part of a continuum of related vegetation communities occurring on the broad valleys and moderately undulating hills of the Southern Tablelands of NSW. These communities have been formally defined and described by quantitative analyses of plot data by Keith and Bedward (1999), Gellie (2005), Tozer *et al*. (2010) and Armstrong *et al.* (2013). Relationships among the units described by these authors were established for the purpose of this Determination by a joint analysis including more recently acquired plot data. Changes in the circumscription of these communities (their distributions and diagnostic taxa) reflect this more substantial information base as well as rationalisation of the existing units to reduce duplication and overlap. MTCTGW constitutes a single vegetation community type which corresponds broadly with Costin's (1954) *Eucalyptus pauciflora – E. stellulata* Alliance, Subformation Savannah Woodland, and includes Keith and Bedward's (1999) Monaro Basalt Grass Woodland (MU23B) in the south-east of Monaro Tableland. The plot samples which formed the basis of this Determination include a substantial number surveyed since 2013 in order to correct a dearth of plot data on the Monaro Tableland identified by Armstrong *et al.* (2013). As such, descriptions of vegetation community types such as those for VG150 (Gellie 2005) and GWp22 (Tozer *et al*. 2010) do not strongly resemble the description of MTCTGW contained herein. No equivalent vegetation type was described by Armstrong *et al.* (2013).

4.5 Patterns in the composition of the communities to which Monaro Tableland Cool Temperate Grassy Woodland is related correlate with gradients in moisture availability and temperature. In this context, MTCTGW represents the extreme end of the continuum in terms of exposure to cold and drought. MTCTGW shares this climatic envelop with Ribbon Gum – Snow Gum – *Cassinia longifolia* tall shrub-grass open forest of gullies in quartz-rich ranges in the Monaro and Kybeyan-Gourock subregions of the South Eastern

Highlands bioregion (unit m31 of Armstrong *et al*. 2013 and incorporating vg73 of Gellie 2005). However, this latter community is restricted to areas of higher water availability on the deeper, moist soils of drainage lines and records of its occurrence are located in areas retaining substantially more cover of native vegetation (Armstrong *et al*. 2013).

Monaro Tableland Cool Temperate Grassy Woodland is replaced by Werriwa Tablelands Cool Temperate Grassy Woodland on the upper reaches of the Great Dividing Range north from Canberra, in areas with similar or slightly higher rainfall but where average summer temperature maxima are approximately 2^{o}C warmer. In the Murrumbidgee River valley immediately to the north of the Monaro Tableland, MTCTGW is replaced by Armstrong *et al*.'s (2013) Yellow Box – Apple Box tall grassy woodland (u178), as rainfall falls below 650 mm and summer maxima are approximately 2^{o}C warmer.

Where rainfall exceeds 800 mm, Monaro Tableland Cool Temperate Grassy Woodland grades into either Tozer *et al*.'s (2010) Tableland Swamp Flats Grassy Woodland (GWp520) or Armstrong *et al*.'s (2013) u118 Black Sallee grass-herb woodland in drainage depressions and moist valley flats (incorporating Gellie's (2005) vg146 Tableland Dry Herb/Grass Woodland and VCA303 of Benson *et al*. (2006)).

Monaro Tableland Cool Temperate Grassy Woodland rarely occurs in areas receiving less than 600 mm of annual rainfall or where the soil experiences periods of waterlogging. In such areas, the Community is replaced by either temperate montane grasslands or montane peatlands or swamps. In the latter case, the transition is characterised by the co-dominance of *Eucalyptus pauciflora* with *E. aggregata* or *E. ovata* (in warmer areas with relatively unimpeded drainage) or *E. stellulata*, *E. camphora* or *E. parvula* (in cooler areas with substantially impeded drainage) (Costin 1954). 'Natural Temperate Grassland of the Southern Tablelands (NSW and ACT)' is listed as a Threatened Ecological Community under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). 'Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps' is listed as an Endangered Ecological Community under the NSW *Biodiversity Conservation Act 2016* (BC Act).

4.6 The transition from Monaro Tableland Cool Temperate Grassy Woodland into Ribbon Gum – Snow Gum – *Cassinia longifolia* tall shrub-grass open forest (unit m31 of Armstrong *et al*. 2013) is associated with an increase in the diversity and cover of shrub species and a corresponding decline in grass and forb species. Species which have been recorded more frequently in this community compared with MTCTGW include, in decreasing order of diagnostic power*, *Ozothamnus conditus, Cassinia longifolia, Bossiaea buxifolia, Acacia rubida* subsp. *rubida, Acacia dealbata, Pultenaea procumbens, Clematis microphylla, Eucalyptus dives, Galium gaudichaudii, Hibbertia obtusifolia, Bursaria spinosa, Brachyloma daphnoides, Wahlenbergia stricta* and *Melichrus urceolatus*. Species which have been recorded more frequently in MTCTGW include, in decreasing order of diagnostic power*, *Solenogyne gunnii, Poa labillardieri, Themeda triandra, Acaena echinata, Scleranthus biflorus, Asperula scoparia, Geranium antrorsum, Veronica gracilis, Wahlenbergia planiflora, Cullen microcephalum, Oxalis perennans, Panicum effusum, Eucalyptus stellulata, Desmodium varians, Carex breviculmis, Haloragis heterophylla, Dichondra repens, Chrysocephalum apiculatum,*

Leptorhynchos squamatus, Geranium solanderi, Rubus parvifolius, Asperula conferta, Carex inversa, Convolvulus erubescens and *Austrostipa scabra*.

[*species listed in sections 4.6 – 4.8 generally occur in more than one of the related communities. Diagnostic power is a measure of the extent to which the records of a species are concentrated in the target community]

4.7 The transition from Monaro Tableland Cool Temperate Grassy Woodland into Yellow Box – Apple Box tall grassy woodland (u178) (Armstrong *et al*. 2013) is characterised by the replacement of *Eucalyptus pauciflora, E. stellulata, E. viminalis* and *E. rubida* subsp. *rubida* with *E. melliodora, E*. *blakelyi* and *E. bridgesiana* as the dominant trees. The two communities also differ substantially in the combinations of species comprising their ground strata. Species that have been recorded more frequently in Yellow Box – Apple Box tall grassy woodland, in decreasing order of diagnostic power*, include *Crassula sieberiana, Solenogyne dominii, Austrostipa scabra, Convolvulus erubescens, Wurmbea dioica* subsp. *dioica, Acaena ovina, Vittadinia muelleri, Austrostipa bigeniculata, Bothriochloa macra, Goodenia pinnatifida, Eryngium ovinum, Bulbine bulbosa, Melichrus urceolatus, Tricoryne elatior, Aristida ramosa, Daucus glochidiatus, Lomandra filiformis, Drosera peltata, Euchiton sphaericus, Lomandra multiflora* subsp*. multiflora, Goodenia hederacea, Cheilanthes sieberi* subsp*. sieberi* and *Hibbertia obtusifolia*. Species that have been recorded more frequently in MTCTGW in decreasing order of diagnostic power* include *Euchiton japonicum, Solenogyne gunnii, Poa labillardieri, Acaena echinata, Scleranthus biflorus, Asperula scoparia, Geranium antrorsum, Veronica gracilis, Wahlenbergia planiflora, Cullen microcephalum, Ajuga australis, Carex breviculmis, Dichondra repens, Arthropodium milleflorum, Rubus parvifolius, Oreomyrrhis eriopoda, Epilobium billardierianum, Viola betonicifolia, Asplenium flabellifolium, Acaena novae-zelandiae and Acacia dealbata*.

4.8 Intergradation between Monaro Tableland Cool Temperate Grassy Woodland and Werriwa Tablelands Cool Temperate Grassy Woodland is more or less precluded by a minimal overlap between their respective temperature and rainfall envelopes. Monaro Tablelands Cool Temperate Grassy Woodland shares both *Eucalyptus pauciflora* and *E. rubida* subsp. *rubida* as dominant species but may have in addition *E. stellulata* and *E. viminalis* as co-dominants. It is further distinguished from Werriwa Tablelands Cool Temperate Grassy Woodland by the more frequent occurrence of a range of species which include, in decreasing order of diagnostic power*, *Euchiton japonicum, Solenogyne gunnii, Poa labillardieri, Acaena echinata, Scleranthus biflorus, Asperula scoparia, Plantago varia, Veronica gracilis, Wahlenbergia planiflora, Mirbelia oxyloboides, Desmodium varians, Ajuga australis, Carex breviculmis, Rytidosperma pilosum, Arthropodium milleflorum, Dichelachne inaequiglumis, Geranium solanderi, Rubus parvifolius, Oreomyrrhis eriopoda, Hydrocotyle laxiflora, Epilobium billardieranum, Viola bentonicifolia*, *Acaena novae-zelandiae, Bossiaea buxifolia, Luzula densiflora, Hovea linearis, Glycine clandestine* and *Acacia dealbata*. Species occurring more frequently in Werriwa Tableland Cool Temperate Grassy Woodland, in decreasing order of diagnostic power*, include: *Chrysocephalum apiculatum, Goodenia pinnatifida, Schoenus apogon, Solenogyne dominii, Wurmbea dioica* subsp*. dioica, Aristida ramosa, Acaena ovina, Lomandra filiformis* subsp*. filiformis, Goodenia hederacea* and *Melichrus urceolatus*.

4.9 Monaro Tableland Cool Temperate Grassy Woodland comprises part of Keith's (2004) Tableland Clay and Sub-Alpine Grassy Woodlands Classes. Parts of the distribution around Bombala occupy substantially lower elevations than other Sub-alpine Woodlands. The attribution of a single vegetation community to two different classes of vegetation highlights the anomaly of Sub-alpine woodlands occurring at relatively low elevations. Costin (1954) attributed the large elevational range occupied by his *E. pauciflora – E. stellulata* Savannah Woodland to a switching from climatic control at higher elevations to edaphic control at lower elevations.

4.10 Monaro Tablelands Cool Temperate Grassy Woodland may contain the following threatened animal and plant species listed under the BC Act or Commonwealth EPBC Act:

Species	**Common Name**	**BC Act***	**EPBC Act+**
Caladenia tessellate	Thick Lip Spider Orchid	Endangered	
Calotis glandulosa	Mauve Burr Daisy	Vulnerable	Vulnerable
Commersonia prostrata	Dwarf Kerrawang	Endangered	Endangered
Diuris aequalis	Buttercup Doubletail	Endangered	Vulnerable
Diuris ochroma	Pale Golden Moths	Endangered	Vulnerable
Diuris pedunculate	Small Snake Orchid	Endangered	Endangered
Dodonaea procumbens	Trailing Hop-bush	Vulnerable	Vulnerable
Eucalyptus aggregate	Black Gum	Vulnerable	Vulnerable
Eucalyptus parvula	Small-leaved Gum	Vulnerable	Vulnerable
Leucochrysum albicans var. *tricolor*	Hoary Sunray	Endangered	Endangered
Prasophyllum canaliculatum	Summer Leek-orchid	Critically Endangered	Endangered
Prasophyllum petilum	Tarengo Leek Orchid	Endangered	Endangered
Rutidosis leiolepis	Monaro Golden Daisy	Vulnerable	Vulnerable
Rutidosis leptorrhynchoides	Button Wrinklewort	Endangered	Endangered
Swainsona sericea	Silky Swainson-pea, Silky Pea	Vulnerable	
Thesium austral	Austral toadflax, Austral Toad-flax, Australian Toadflax	Vulnerable	Vulnerable
Animals			
Artamus cyanopterus	Dusky Woodswallow	Vulnerable	
Callocephalon fimbriatum	Gang Gang Cockatoo	Vulnerable	
Climacteris picumnus victoriae	Brown Treecreeper	Vulnerable	
Melanodryas cucullata cucullate	Hooded Robin	Vulnerable	
Pyrrholaemus sagittatus	Speckled Warbler	Vulnerable	

Stagonopleura guttata	Diamond Firetail	Vulnerable	
Ninox strenua	Powerful Owl	Vulnerable	
Tyto novaehollandiae	Masked Owl	Vulnerable	
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable	
Myotis adversus	Large-footed Myotis	Vulnerable	
Miniopterus schreibersii oceanensis	Eastern Bent-wing Bat	Vulnerable	
Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Endangered
Petroica boodang	Scarlet Robin	Vulnerable	
Petroica phoenicea	Flame Robin	Vulnerable	
Phascogale tapoatafa	Brush-tailed Phascogale	Vulnerable	
Cercartetus nanus	Eastern Pygmy Possum	Vulnerable	
Petaurus australis	Yellow-bellied Glider	Vulnerable	
Phascolarctos cinereus	Koala	Vulnerable	Vulnerable
Aprasia parapulchella	Pink-tailed Legless Lizard	Vulnerable	Vulnerable
Suta flagellum	Little Whip Snake	Vulnerable	
Paralucia spinifera	Purple Copper Butterfly	Endangered	Vulnerable

*Biodiversity Conservation Act 2016
+ Environment Protection and Biodiversity Conservation Act 1999

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