Biodiversity and Endemism within the Mount Canobolas Volcanic Complex

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Published on 23 December 2019 at https://openjournals.library.sydney.edu.au/index.php/LIN/index

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Medd, R.W. and Bower, C.C. (2019). Biodiversity and endemism within the Mount Canobolas volcanic complex. *Proceedings of the Linnean Society of New South Wales* **141**, S45-S83.

Mt Canobolas State Conservation Area (SCA) hosts a small remnant of sub-alpine vegetation consisting of seven recognisable communities with the heathlands on the rock plates appearing to be unique to the SCA. The SCA has a known biota of 884 native species that includes 14 threatened species and at least 10 endemic taxa. Some 200 species are regionally significant, being either rare or at the limits of known geographic range. The vascular flora is particularly species-rich being considerably more diverse than nearby regional reserves and over 12 fold richer than comparable areas of the Kosciusko National Park. One of three endangered ecological communities, the Mt Canobolas *Xanthoparmelia* Lichen Community, is unique to the volcanic province.

While there is some indication the endemic lithophytic lichens, the threatened *Eucalyptus canobolensis* and the heath communities may be substrate specific, there is no strong evidence of a geological association among other flora and fauna. We postulate that the presence of multiple endemic species reflects the geographic isolation which has provided an environment for species evolution by vicariance. Alternatively, Mt Canobolas has acted as a refugium for formerly widespread species that have become extinct elsewhere.

Manuscript received 14 April 2019, accepted for publication 1 October 2019.

KEYWORDS: Central Tablelands, endemic, evolution, inselberg, refugium, sub-alpine, vicariance

INTRODUCTION

Mount Canobolas is an extinct intraplate alkaline volcano (Middlemost 1981; Sutherland 2003; 2011), provincially known as The Mount Canobolas Volcanic Complex (MCVC). Extensive eruptions in probably three main episodes occurred over ± 1 million years in the Middle to Early/Late Miocene, between 13 to 11 mya (Branagan and Packham 2000). Mt Canobolas is the southernmost and youngest central volcano on the Bunya Mountains to Canobolas hotspot track (Sutherland 2003; Davies et al. 2015), also known as the Inland Hotspot Track, which includes the Nandewar Volcanic Suite and Mt Kaputar, and the Warrumbungle Ranges. Each central volcano in this chain formed tall isolated cone-shaped mountains that rose up to 2,500 m above the surrounds with lava spreading up to 80 kilometres from the source. The MCVC initially produced large outpourings of basic lava, of mainly hawaiitic composition, which radiated across the landscape. Subsequent eruptions of felsic domes and copious amounts of pyroclastic material coincided with the extrusion of more mafic trachyte kindred lavas, which comprise the volcanic pile of domical landforms in the central core (Middlemost 1981). The evidence of interlaced lavas and associated ash of various eruptions provides a complex heterogeneous matrix within the central core area, which Middlemost (1981) contends is difficult to unravel because rocks from different events are juxtaposed by volcanic subsidence.

Before the Miocene volcanism the ancient geologies, particularly of the Lachlan Fold Belt which is provincial to the Central West (CW) of NSW, underwent major tectonic events from the Silurian to Early Carboniferous epochs (Foster and Gray 2000). It remains unclear if broad uplift which occurred during these orogenic events gave rise to the eastern highlands or if they are remnants of an even older orogenic mountain range (Branagan and Packham 2000). In any event, there has been significant erosion of both the central volcanoes and adjoining highlands

over the last 10 to 25 million years. As a consequence, the volcanic provinces along the chain have decreased in size and altitude, and increased in isolation from each other, with resultant fragmentation into pockets of alpine and sub-alpine areas on high peaks. Mt Canobolas being the youngest and smallest volcano is now the most intact, prominently protruding as a 'landlocked island' up to half a kilometre above the surrounding plateau of the western Central Tablelands (CT). Mt Canobolas ranges in altitude from c. 900 m to 1,397 m at the summit with several peaks, steep valleys and waterfalls (NPWS 2003a). It is surrounded by highlands having variable relief of up to 1,000 m altitude of the extensive CT plateau but dips away to the west into the Central Western Slopes (CWS). The boundary between the CT and CWS is an undulating series of erosional step-down scarps.

Situated on the western boundary of the CT, the MCVC is separated from coastal drainage by the Great Divide (GD), c. 120 km to the east. The western CT can be regarded as a western trending spur of the GD. The so-called Canobolas Divide is a north-west trending range and passes through the centre of the MCVC, forming the watershed dividing the inland drainage of the northern Macquarie-Darling River system from the southern Lachlan River system (Chan 2003). The different constructional landforms that have evolved from the tempestuous geological past have given rise to polymorphic drainage patterns and microclimates around the mountain. The high altitudes dictate a climate of the mountain's own making and the geology provides a geodiversity not found elsewhere in the region (Branagan and Packham 2000). Also, Mt Canobolas supports a significant isolated remnant of vegetation with montane and sub-alpine affinities; the only such area of this ecosystem on the western CT. Much of the high altitude remnant vegetation is contained within the Mt Canobolas State Conservation Area (SCA) covering an area of 1,672 ha (NPWS 2003a) which is situated within the South Eastern Highlands Bioregion in the Interim Biogeographic Regionalisation for Australia (IBRA) sub-region of Orange (NPWS 2003b).

Mt Canobolas shares many characteristics with Mt Kaputar. Both were produced by the same magma source on the Inland Hotspot Track with Mt Kaputar arising some seven million years earlier. Like Mt Canobolas, the summit of Mt Kaputar supports remnant montane and sub-alpine plant communities that are isolated by large distances from other occurrences of these vegetation types on the Northern Tablelands along the GD to the east. The biota of Mt Kaputar includes some 18 species (8 plants and 10 invertebrates, mainly molluscs) considered to be endemic to the mountain (OEH 2018a; Murphy and Shea 2015). Given the similar geology, geographical isolation, high altitudes, and remnant montane and sub-alpine vegetation, it seems plausible that Mt Canobolas may similarly host a range of unique endemic life forms.

However, there has been no comprehensive documentation of the biodiversity of the MCVC, with knowledge of the mountain's biota confined to a limited number of scientific publications and records of opportunistic specimen collections in various institutional and national databases. Accordingly, the biodiversity of Mt Canobolas is poorly known and its scientific significance and conservation value has not been widely appreciated.

The purpose of this paper is to compile for the first time a record of the biodiversity of the Mt Canobolas SCA which covers the core of the MCVC. Emphasis is given to identifying the endemic species and discussing the importance of the area for speciation by vicariance and as a refugium for montane and sub-alpine taxa. The possibility of rare species being linked to a previously more coherent volcanic continuum, allowing the movement of biota along it, is also considered.

MATERIALS AND METHODS

Species lists, arranged by family, of the main components of biodiversity known for the SCA have been compiled mainly from literature sources and the Atlas of Living Australia database (ALA 2018). For plants, recordings were compiled from the Australasian Virtual Herbarium (AVH 2018) as these are based on specimen records held in herbaria, as well as from the literature (Hunter 2002), personal observations by the authors and other recent surveys (M. Porteners pers. comm.). Fungi and invertebrate records from the Biosecurity Collections Unit, NSW Department of Primary Industries at Orange, have been included.

Records of endemics and threatened species were extracted from these data lists. The distribution of each plant and fungal species was examined in the AVH/ALA distribution maps to determine core range limits, with outliers that occur distant to the MCVC noted. Data for vascular plant species occurring in 22 other conservation reserves located within the near CW have also been extracted from BioNet (2018a) to use comparatively. Physiographic data from individual reserve Plans of Management and other sources have also been compiled for each of the reserves. The near CW is defined as within c. 150 km west of the GD Range summit. Most of these reserves

are situated within or in close proximity to the CT Botanical Subdivision (Anderson 1961). The western portions of the large Wollemi and Blue Mountain NPs falling within the CT have not been considered.

No published vegetation classification currently exists for the CT west of the Blue Mountains. The only classification available for this area is the online BioNet Vegetation Classification (BVC) (OEH 2018b) which is derived from cluster analysis of data from multiple surveys conducted by government and consultant botanists. The survey data is published and accessible online in the BioNet Vegetation Classification application (OEH 2018b). The output vegetation associations (Plant Community Types [PCT]) are vetted by the Plant Community Type Change Control Panel to ensure its reliability and robustness (OEH 2018b). The BVC supports a state-wide environmental assessment regulatory regime.

For this study, montane and sub-alpine vegetation communities described by Hunter (2002) in the Mt Canobolas SCA were compared with PCTs currently recognised in similar habitats on the Great Dividing Range over 100 km to the east (BioNet 2018b). BioNet (2018b) assigns PCTs to threatened ecological communities (TEC) and the conformity of the relevant PCT on the mountain to each TEC was checked against the community description in the Final Determination (Scientific Committee 2018).

Comments on data accuracy, points of interest about species and threatened communities are provided.

RESULTS AND DISCUSSION

The SCA occupies the core of the MCVC consisting predominately of trachyte kindred rocks and encompasses the high altitude components of the primary ecosystem remnants. Few orders or classes of biota have been systematically surveyed by specialists on Mt Canobolas and much of the data available has not been formally published. Consequently, substantial listings of species have been published only for the bryophytes (Downing et al. 2002) and vascular plants (Hunter 2002). Other non-commissioned surveys of lichens, birds, reptiles, amphibians and mammals have also been undertaken with results recorded only in online databases. The currently known native biota of the SCA consists of 884 species, however systematic surveys have not occurred for many groups so the figure is likely to underestimate the overall numbers. Current knowledge of each major grouping is summarised below. Reference is also made to some of the most important publications for Mt Canobolas relating to taxonomic works describing new species endemic to the mountain.

Vegetation Communities

Hunter (2000; 2002) defined seven vegetation communities within the SCA (Fig. 1). The significance of these is discussed in relation to similar high altitude vegetation types on the GD to the east (Table 1). One Endangered Ecological Community (EEC) and one Critically Endangered Ecological Community (CEEC) are represented.

Community 1. Stringybark–Peppermint Shrubby Open Forests and Woodlands

Covering around 26% of the SCA in areas above 1000 m altitude, this community is characterised by predominantly *Eucalyptus macrorhyncha* and *E. dives,* in association with *E. canobolensis, E. pauciflora, E. dalrympleana* subsp. *dalrympleana, Acacia dealbata, A. melanoxylon* and *Exocarpos cupressiformis.* It has a well-developed shrub layer and ground cover of herbs and grasses. Hunter (2002) states the occurrence within the SCA is significant due to the unusual assortment of associated species, and the community is at its north western geographic limit of occurrence. Hunter's observation that this community, which principally occurs on upper slopes and ridgetops around the peripheral areas of the SCA (Fig. 1), has an unusual assemblage of tree species is pertinent. There are no PCTs in the BioNet Vegetation Classification database (BioNet 2018b) that closely match it. Most recognised PCTs dominated by *E. macrorhyncha* and *E. dives* occur in drier environments than on Mt Canobolas as reflected in their understory shrubs and grasses. The closest PCT in BioNet (2018b) is PCT 730, which does not include *E. canobolensis* as a dominant.

Communities 2 and 4. Outcrop Heaths and Shrublands / Outcrop Low Open Woodlands

These two closely similar communities (Table 1) are found on skeletal soils on rock outcrops. Together they occupy some 6% of the SCA, occurring as small highly disjunct patches throughout (Fig. 1). The main difference between the two is that Community 2 lacks trees. Community 4 may have scattered trees of *E. canobolensis*, *E. bridgesiana* and *A. dealbata.* In both communities the shrubs are scattered and depauperate, although sometimes forming dense thickets, and occur in association with cryptogams, scattered herbs and grasses. These rock outcrops contain the endangered Mt Canobolas *Xanthoparmelia* lichen community.

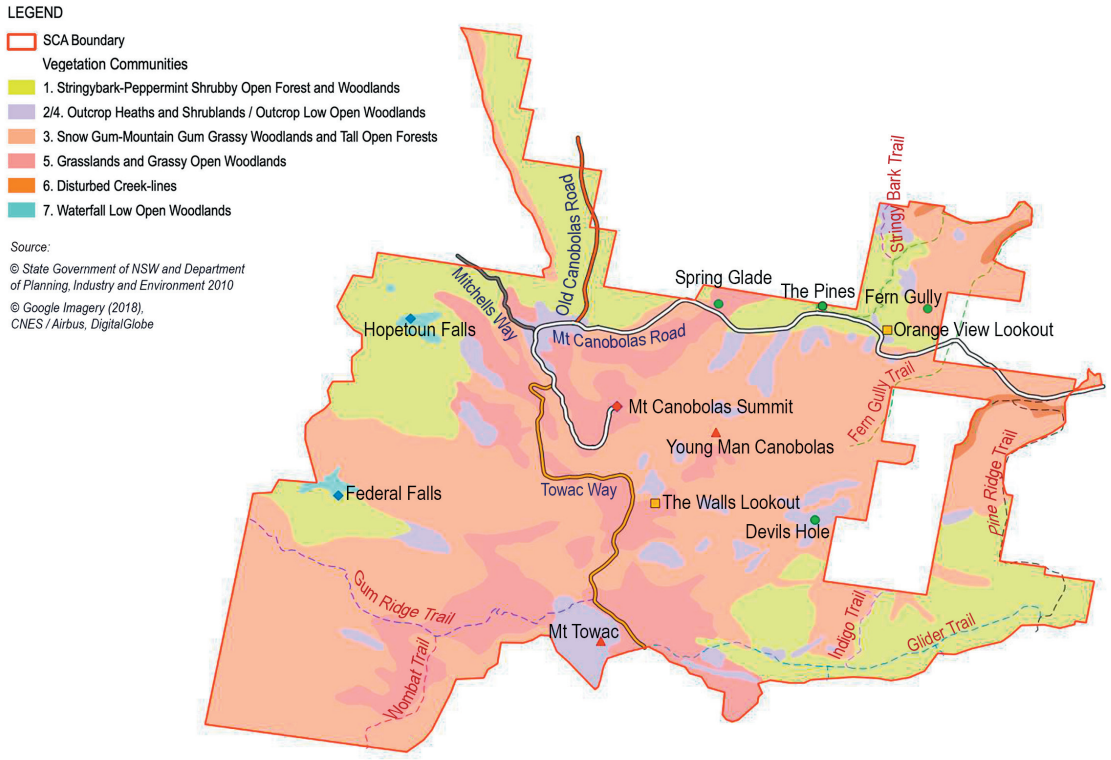

Figure 1. Vegetation communities occurring within the Mt Canobolas State Conservation Area (after Hunter 2002).

Hunter (2002) considers these communities to be restricted to the SCA and unique. No floristically similar heathlands are recognised as PCTs in the BioNet Vegetation Classification (BioNet 2018b).

Community 3. Snow Gum-Mountain Gum Grassy Woodland and Tall Open Forest

This community occupies some 52% of the SCA (Fig. 1) and occurs above 900 m altitude. It is characterised by predominantly *E. pauciflora, E. dalrympleana* subsp. *dalrympleana*, and *E. canobolensis* in association with *E. dives, E. macrorhyncha, E. viminalis* and *A. dealbata*. It has a well-developed layer of low and tall shrubs and a dense ground layer of 80 to 100% cover of climbers and trailers, herbs and grasses. PCT 1197 is closest to community 3 (Table 1).

Community 5. Grasslands and Grassy Open Woodlands

Trees are a minor component of this community which occurs above 1200 m altitude and occupies around 15% of the SCA area (Fig. 1). It is characterised by low densities of *E. pauciflora, E. canobolensis, E. dalrympleana* subsp. *dalrympleana, A. dealbata* and *A. melanoxylon*. The shrub layer is of low stature and sparse or absent whereas the ground layer of twiners, herbs and grasses is well developed. This assemblage is most similar to PCT 1197 in the BioNet Vegetation Classification (BioNet 2018b) (Table 1).

Community 6. Disturbed Creek-lines

Occupying about 1% of its area this community occurs in the north eastern lower reaches of the SCA (Fig. 1). It is characterised by tall open stands of *E. viminalis, E. stellulata, E. pauciflora, E. dalrympleana* subsp. *dalrympleana* and *A. melanoxylon* with a scattered to dense shrub layer, ferns and herbs. This assemblage is most similar to PCT 1191 that is dominated by *E. viminalis, E. pauciflora*, *E. rubida* and *E. stellulata* (BioNet 2018b). Within the SCA, *E. rubida* (Candlebark) is replaced by the threatened *E. canobolensis* (Silver-leaf Candlebark).

Community 7. Waterfall Low Open Woodlands

This community is restricted to locations at Federal and Hopetoun Falls, occupying less than 1% of the SCA (Fig. 1). It is an open shrubland community with occasional stunted trees of *Eucalyptus goniocalyx, E. canobolensis* and *A. melanoxylon*

Table 1. Vegetation Communities in the Mt. Canobolas State Conservation Area.

Hunter (2002)	Dominant Eucalypts and/or shrubs	Nearest PCT[1]	EEC[2]	Comment
1. Stringybark – Peppermint Shrubby Open Forests and Woodlands	*E. macrorhyncha, E. canobolensis, E. dives, E. dalrympleana*	730. Broad-leaved Peppermint - Mountain Gum dry open forest of the Central Tablelands area of the South Eastern Highlands Bioregion	Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions	Although PCT 730 is closest to community 1, it is a dry forest type with sparser grass cover than the moist community on Mt Canobolas.
2. Outcrop Heaths and Shrublands	*Mirbelia oxylobioides, Calytrix tetragona, Kunzea parvifolia, Phebalium* sp.	N/A	-	No currently listed PCTs resemble this community.
3. Snow Gum – Mountain Gum Grassy Woodlands and Tall Open Forests	*E. pauciflora, E. dalrympleana*	1197. Snow Gum – Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion	Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions	
4. Outcrop Low Open Woodlands	*E. canobolensis, E. bridgesiana / Mirbelia oxylobioides, Calytrix tetragona, Phebalium* sp.	N/A	-	This community occurs on similar sites to community 2, albeit with slightly more soil and scattered tree cover. No currently listed PCTs resemble this community.
5. Grasslands and Grassy Open Woodlands	*E. pauciflora, E. canobolensis, E. dalrympleana*	1197. Snow Gum – Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion	Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions	
6. Disturbed Creek-lines	*E. viminalis, E. stellulata, E. pauciflora*	1191. Snow Gum – Candlebark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	-	This community is similar to the Monaro Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion CEEC[3].
7. Waterfall Low Open Woodlands	Minor *E. goniocalyx*, *E. canobolensis*	N/A	-	A minor community related to communities 2 and 4.

[1]PCT = Plant Community Type (OEH 2018b)

[2]EEC = Endangered Ecological Community listed under the *Biodiversity Conservation Act 2016.*

[3]CEEC = Critically Endangered Ecological Community listed under the *Biodiversity Conservation Act 2016.*

in shallow soils around the falls' margins and often with taller *E. viminalis* near the base of the falls. This community is of very limited extent and it is doubtful that it deserves recognition as an entity distinct from the surrounding vegetation (Table 1).

Communities 1, 3 and 5 conform to the *Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions Endangered Ecological Community*. This EEC is generally a tall montane forest dominated by *Eucalyptus dalrympleana* (Mountain Gum) and *E. pauciflora* (Snow Gum) (Scientific Committee 2008). It is known to occur between 600 and 900 m altitude on the eastern parts of the CT. On Mt Canobolas, Tableland Basalt Forests occur extensively as tall open forests in valleys and on ridges in deep volcanic soils above 900 m altitude, hence representing a high altitude variant of the EEC on the western CT.

Community 6 closely resembles the newly recognised *Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion Critically Endangered Ecological Community*, which is predicted by the NSW Office of Environment and Heritage (OEH) to occur in the Orange district (OEH 2019a).

Bryophytes

Bryophytes include mosses, liverworts and hornworts. They are often referred to as 'lower plants' and form an important component of the vegetation but are regularly overlooked in biological surveys.

A rich and diverse mix of 79 species of bryophytes is recorded for Mt Canobolas in 29 families and 51 genera (Table 2), mostly from an initial survey by Downing et al. (2002).

Although no endemic bryophyte species are recorded, the assemblage includes an unusual mix of alpine, arid zone and rainforest species, with 6 species being at their northern range limits and 7 at their westernmost range. Exposed rock platforms with seepage areas on the upper flanks of the mountain are particularly species-rich. The geology of the area is complex and Downing et al. (2002) considered the presence of certain species at particular locations is probably determined by the chemical composition of the substrate rock, although clear patterns could not be discerned. Downing et al. (2002) gave an example of a curious combination of two opposed species growing together: *Encalypta vulgaris*, a calcicole (i.e. a species found only on calcareous substrates) and *Campylopus introflexus*, a calcifuge (i.e. a species never found growing on calcareous substrates). Around the summit some rare alpine species previously known only from Yarrangobilly Caves in the Alps and Kosciuszko National Park occurred together with species from the arid zones to the west. Elsewhere in the SCA in a cool moist and shady gully habitat a thallose epiphytic liverwort occurred; a species usually associated with rainforest gullies of the coast and coastal ranges to the east. Other rare and uncommon mosses, liverworts and hornworts are highlighted in their manuscript. It is unclear if the disjunct and rare species consisting of contiguous arid zone, alpine and rainforest specialists are stranded relics from past climatic ages or whether such species have arrived through superior long-distance dispersal abilities.

Downing et al. (2002) also noted several rare and uncommon species occurred on roadside banks, walking trail margins, fallen logs, on rough basal bark of eucalypts and exposed rocks in the grassy woodlands, which elsewhere in NSW are usually devoid of bryophytes. The bryoflora of the nearby Towac Pinnacle outcrop, to the east of the SCA, was found to include a few species that were either not recorded or uncommon within the SCA, indicating that other species may well occur on the many volcanic outcrops, dykes, domes and plugs comprising the MCVC.

Vascular plants

Vascular plants constitute the largest component of the currently known biota within the SCA. Some 14 fern, 138 monocotyledon and 262 dicotyledon species are present (Table 2). The diversity spans 78 families and 228 genera (Appendix 1). Almost half of the 416 vascular plants are assigned to just 6 superfamilies, namely Asteraceae (47), Cyperaceae (18), Fabaceae (35), Myrtaceae (14), Orchidaceae (40) and Poaceae (47). A number of the species listed by Hunter (2002) cannot be substantiated and so have been excluded from the compilation.

Approximately 60% of the vascular flora species occurring in the SCA can be considered generalists in the sense that they have widespread distribution and display plasticity in being adaptable to a wide range of edaphic, climatic and other environmental variables. As Hunter (2000) observed, these species are generally the most common ones and are found in most of the communities. The remaining flora exhibits varying degrees of specialisation from narrow endemic species to regionally significant species.

Among the plants are at least five endemic species: *Prostanthera gilesii* (Conn and Wilson 2015), *Eucalyptus canobolensis* (Hunter 1998), *Bulbine* sp. (J. Bruhl pers. comm.), *Caladenia* sp. aff. *patersonii* and *Prasophyllum* sp. aff. *odoratum* (D. Jones pers. comm.). Other taxa, including the herb

Table 2. Summary of known biodiversity within the Mt Canobolas State Conservation Area.

Biodiversity	Families	Genera	Native species	Exotic species	Endemic species	Regionally significant species	EEC[1]	TS[2]
Vegetation communities							2	
Bryophytes	29	51	79			13		
Gymnosperms	2	2	1	1				
Ferns and Allies	6	11	14			5		
Monocotyledons	12	61	121	17	3 +	39		
Dicotyledons	58	154	192	70	2 +	76		2
Fungi	28	47	102	1	4	46	1	
Mammals	19	30	29	9		5		5
Birds	35	69	97	2				7
Amphibians	3	4	5					
Reptiles	4	15	20			5		
Fish	1	1	1					
Molluscs	6	10	10	2	?	8		
Insects	81	154	210 +		?			
Velvet worms	1	1	1		1	1		
Flat worms	1	2	2		?	2		
TOTAL	286	612	884 +	102	10 +	200	3	14

[1] Endangered Ecological Communities listed under the *Biodiversity Conservation Act 2016.*

[2] Threatened Species listed under the *Biodiversity Conservation Act 2016* and/or *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*

Craspedia sp. aff. *lamicola* and shrubs in the genera *Asterolasia, Melichrus* and *Phebalium* are likely also to be endemics (I. Telford and J. Bruhl pers. comm.), along with two recently found orchids *Diuris* sp. aff. *chryseopsis* and *Dipodium* sp. aff. *atropurpureum* (Bower 2019).

Two of the endemic plants *P. gilesii* and *E. canobolensis* are listed as threatened (Table 2). The shrub *P. gilesii* (formerly *P*. sp. C) (Giles' Mintbush) is only known from two small colonies and is listed as Critically Endangered under the BC Act 2016 (Scientific Committee 2017). *E. canobolensis* (syn. *E. rubida* subsp. *canobolensis*) (Silver-leaf Candlebark) occurs throughout the SCA and is endemic to the MCVC. Its stronghold is above 1,000 m altitude within the SCA but it occurs sporadically down to ± 900 m altitude on the slopes surrounding the mountain. With a propensity to form hollows, the species provides valuable nesting and roosting habitat as well as copious manna exudate as a food source for arboreal mammals and birds. It is listed as Vulnerable under the BC Act and Endangered under the EPBC Act (Department of the Environment 2008).

The sub-alpine forests and woodlands support 11 eucalypt species as canopy dominants and a broad array of understory shrubs, forbs and grasses, totalling 416 species. Approximately 120 of these can be considered as regionally significant because of their rarity or because they are at their geographical range limits within the CT. By comparison, 475 plant species occur in an area of almost 23,000 ha of montane forests occurring between 1,000 and 1,400 m altitude within Kosciuszko National Park (Doherty et al. 2015). The richness of the flora of the SCA is over 12 fold that of Kosciuszko NP, being almost 260 species per 1,000 ha compared with 20.6

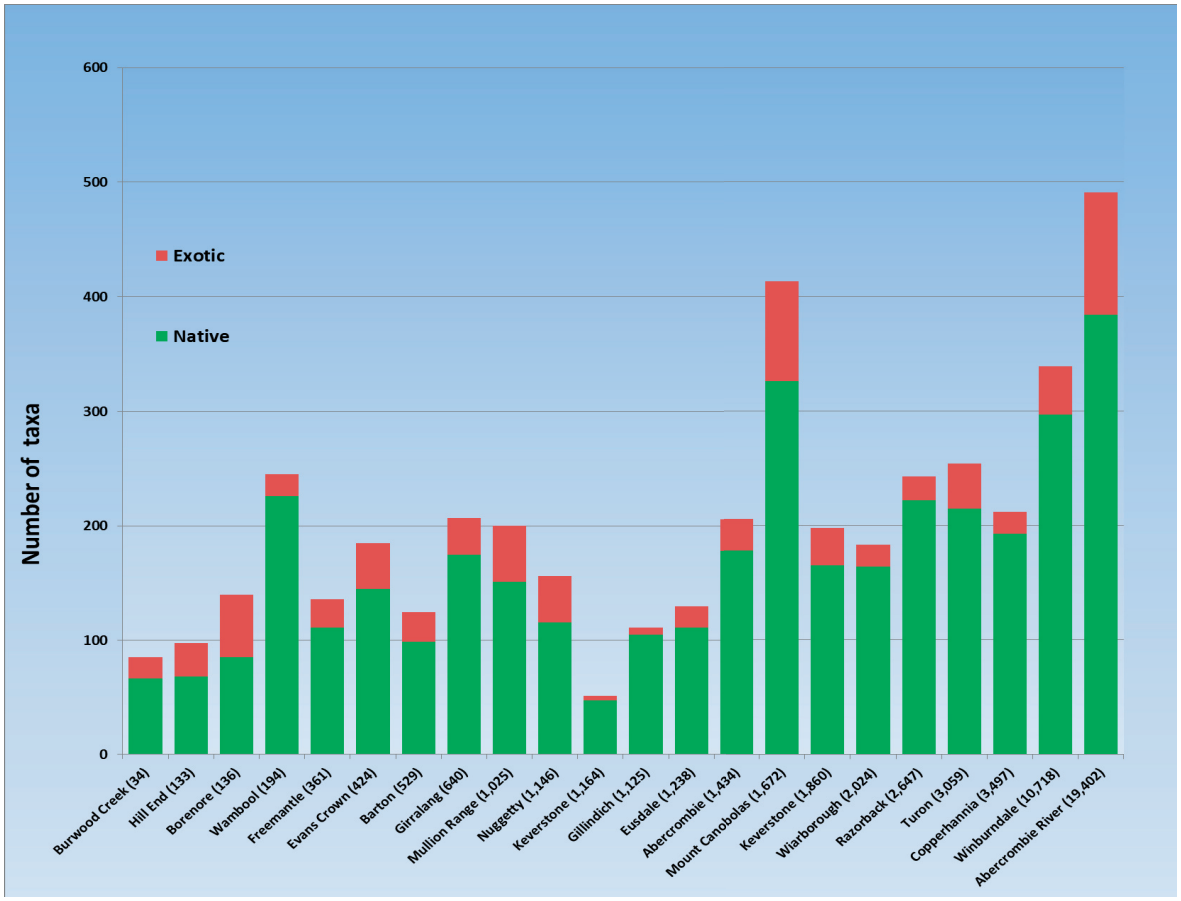

Figure 2. Number of native and exotic vascular plant species recorded for 22 conservation reserves (arranged by increasing area) in the near (eastern) Central West of NSW. Numbers in parentheses following reserve names indicated the area (ha) of each. Data from Bionet (2018a, see Appendix 2).

species per 1,000 ha respectively. Compositionally there are also differences in the floras with the ratio of dicotyledons to monocotyledons being lower in the SCA with 1.6:1 compared with 2.8:1 in Kosciuszko NP. No endemic species occur in the montane forests of Kosciuszko NP and 105 species, which are either disjunct or occurring at their geographic range limits is proportionally much lower than the 120 species for the SCA. In both reserves however, the dicotyledons were similarly dominated by taxa in the Asteraceae, Fabaceae and Myrtaceae and monocotyledons by Cyperaceae, Orchidaceae and Poaceae.

A rich and eclectic suite of 40 terrestrial orchid species occurs within the SCA (Appendix 1). A number of these orchids are unnamed and currently subject to further examination. At least one of these, *Prasophyllum* sp. aff. *odoratum*, recorded after a summer fire in 1982 and again in 2018, is considered to be a fire ephemeral (Bower 2019). Twenty-one orchid species are rare, confined to or at their geographic range limits in the SCA (Appendix 1). The SCA ranks among the most diverse areas for orchids in the near CW along with the Calula Range north of Orange where some 60 species occur (C. Bower pers. obs.), Wambool NR with at least 47 species and Abercrombie Karst Conservation Reserve with 30 or more species (Bionet 2018a). Terrestrial Orchids are intrinsically important as bioindicators of ecosystem health (Swarts and Dixon 2009) so the presence of such a large species diversity is indicative of the stability and resilience of the ecosystems in the SCA.

Most conservation reserves in the near CW are < 2,000 ha in area and have been gazetted since the late 1960s (Appendix 2). The recorded diversity of the vascular flora generally is < 250 species for these reserves (Fig. 2). Mt Canobolas SCA stands out with 416 species, only being surpassed by 491 taxa within Abercrombie Rivers NP, which is almost 12 times larger in area. All of these reserves have been utilised since European settlement, mainly for grazing and or forestry, and in many cases for mining activities. Mt Canobolas had grazing leases in place until about the 1950s before being reserved for conservation and eventually gazetted in 1997. This, together with

the SCA's high perimeter to area ratio, rich volcanic soils and being surrounded by cleared and developed silvicultural, agricultural and horticultural lands, has facilitated invasion by exotic species. Twenty-one percent of the vascular flora is exotic, somewhat higher than the mean of 17.2 % for the comparable reserves in the near CW (Appendix 2). In Kosciuszko NP, which also has a history of post-European land use, exotic species contribute 23% of the flora (Doherty et al. 2015) which is higher than for most of the near CW reserves, including the SCA (Appendix 2).

Fungi

No published account of fungi exists for Mt Canobolas, but extensive lichen records (ALA 2018) are known from field work within the SCA, especially by JA Elix of the Australian National University and his colleagues.

Ascomycota fungi records, mainly lichens, show a great diversity among the > 90 species growing on logs, tree trunks, branches, soil and rocky outcrops or platforms in the SCA (Appendix 3). Together with Basidiomycetes, these occur in some 28 families and 47 genera (Table 2). Four lichens, *Gyalideopsis halocarpa*, *Sarcogyne sekikaica* (McCarthy and Elix 2014), *Megalaria montana* (McCarthy and Elix 2016) and *Xanthoparmelia metastrigosa* (Scientific Committee 2001) are endemic to the SCA. One particular assemblage of at least nine species of foliose lichens, including the endemic *X. metastrigosa*, is listed as an Endangered Ecological Community; the only lichen community in Australia with such legal protection. It has been recognised as unique to the SCA, and gazetted as the *Mt Canobolas Xanthoparmelia Lichen Community Endangered Ecological Community* (Scientific Committee 2001).

The assemblage consists of *Cladia fuliginosa, Xanthoparmelia canobolasensis, X. digitiformis, X. metaclystoides, X. metastrigosa, X. multipartita, X. neorimalis* and *X. sulcifera.* It occurs mainly above 1,100 m altitude on rock faces and soils unique to the MCVC. *Xanthoparmelia metastrigosa* is endemic to Mt Canobolas and *X. canobolasensis* is known only from Mt Canobolas and one locality in Tasmania while *X. sulcifera* and *C. fuliginosa* are each known from a limited number of other localities within NSW.

Some 46 species of fungi are regionally significant as they are rare or at their natural geographical range limits. Opportunistic observations of Basidiomycota fungi have resulted in the recording of eight species, which is considered particularly depauperate and dedicated study will undoubtedly identify many additional taxa.

Vertebrates

Knowledge of the vertebrate fauna of the SCA is predominantly from opportunistic records as few systematic surveys have been undertaken and there are no published accounts. The array of 163 vertebrate species in 62 families and 119 genera involves mainly generalist species with no recorded endemics, but does include 12 threatened species (Table 2) that have undergone population decline principally through loss of habitat.

Twenty nine native mammal species have been recorded, five of which are threatened species (Table 3). The mammals include six species of gliders and possums, two species of marsupial mice, four macropods, the *Tachyglossus aculeatus* (Short-beaked Echidna) and *Vombatus ursinus* (Bare-nosed Wombat) (Appendix 4). Most species have widespread distributions, but five have geographic range limits in the SCA. *Miniopterus schreibersii oceanensis* (Eastern Bent-wing Bat), *Petauroides volans* (Greater Glider), *Petaurus australis* (Yellow-bellied Glider) and *Antechinus stuartii* (Brown Antechinus) occur at their western limits whilst *Antechinus agilis* (Agile Antechinus) occurs at its northernmost limit. Presence of the Agile Antechinus has been verified by molecular evidence (A. Kerle pers. comm.) but confirmation of both the Brown Antechinus and Yellow-bellied Glider is required as there have been no recent sightings of either. A camera trap record of *Rattus fuscipes* (Southern Bush Rat) has yet to be verified by live trapping (S. Woodhall pers. comm.). Indicative of the richness of the habitat of the SCA is the diversity of 11 micro bats recorded on the mountain, including three threatened species (Table 3). Nine exotic mammal species also have been recorded, namely Dog, Goat, Horse, House Mouse, Pig, Rabbit, Red Fox, Red Deer and Ship Rat.

Avifauna recorded within the SCA includes 97 native and two exotic species across 35 families and 69 genera (Table 2) from mostly opportunistic observations (Appendix 4). All are widespread species with many being permanent residents; others are migratory. Seven species recorded in the SCA are listed as Vulnerable (Table 3) and are relatively widespread species that have suffered significant population declines since European settlement. Mt Canobolas is important as one place in the highly developed landscape that still provides refuge to these species. Other species use particular niche habitats in the SCA. *Falco peregrinus* (Peregrine Falcon) uses cliff habitats around Federal Falls for nesting and hunting. The mountainous terrain attracts raptors such as *Aquila audax* (Wedge-tail Eagle) which is commonly observed hunting and soaring on thermals as well as,

Table 3. Threatened plant and animal species within the Mt Canobolas State Conservation Area. V = Vulnerable listing, E = Endangered listing and CE = Critically Endangered listing under Threatened Species Acts.

	Family Name	Scientific Name	Common Name	Conservation		Remarks and Reference
				BC Act[1]	EPBC Act[2]	
Plants	Lamiaceae	*Prostanthera gilesii*	Giles' Mintbush	CE		Endemic. Only two small disjunct colonies known; (OEH 2019b)
	Myrtaceae	*Eucalyptus canobolensis*	Silver-leaf Candlebark	V	E	Endemic. Common throughout SCA; (OEH 2019c)
Mammals	Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail Bat	V		Recorded 2004; (OEH 2017a).
	Miniopteridae	*Miniopterus schreibersii* infrasp. *oceanensis*	Eastern Bent-wing Bat	V		Recorded 2004; (OEH 2019d).
	Petauridae	*Petaurus australis*	Yellow-bellied Glider	V		No recent sighting records; (OEH 2017b).
	Petauridae	*Petauroides volans*	Greater Glider		V	15 records 1997 to 2009; (Department of the Environment 2016).
	Vespertilionidae	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V		Recorded 2018; (OEH 2017c).
Birds	Accipitridae	*Hieraaetus morphnoides*	Little Eagle	V		Three records 2002 to 2009; (Scientific Committee 2010a).
	Artamidae	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V		Recorded 2001, 2019; (Scientific Committee 2016).
	Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	V		Two records 1997 to 2014; (Scientific Committee 2010b).
	Petroicidae	*Petroica boodang*	Scarlet Robin	V		Six records 1999 to 2019; (OEH 2017d). 1997-09-27
	Petroicidae	*Petroica phoenicea*	Flame Robin	V		43 records 1997 to 2019; (OEH 2017e).
	Psittacidae	*Neophema pulchella*	Turquoise Parrot	V		Recorded 1978; (OEH 2017f).
	Strigidae	*Ninox strenua*	Powerful Owl	V		Recorded 2019; (OEH 2017g).

[1]Threatened Species listed under the *Biodiversity Conservation Act 2016.*

[2]Threatened Species listed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999.*

but less commonly, *Hieraaetus morphnoides* (Little Eagle) and *Falco berigora* (Brown Falcon). Single records of *Acanthiza uropygialis* (Chestnut-Rumped Thornbill), *Acanthagenys rufogularis* (Spiny-cheeked Honeyeater) and *Neophema pulchella* (Turquoise Parrot) are unusual for the area and require further verification. These are likely observations of vagrants, like *Certhionyx variegatus* (Pied Honeyeater) recently sighted in the area, having ventured eastwards during drought conditions.

Currently five widespread amphibians are recorded for the area (Appendix 4). The amphibian record for the SCA is likely to be an under-estimate given that 10 species have been recorded in the Orange district (ALA 2018 and authors' pers. obs.).

Twenty reptilian species have been recorded for the SCA (Appendix 4). These records contain only one snake *Austrelaps ramsayi* (Highland Copperhead), again indicative of the lack of intensive survey. Seven snake species are recorded for inhabited areas near the SCA, along with one turtle. The 19 lizard taxa recorded for the SCA are all widespread common species, however four, along with the Highland Copperhead snake occur at their westernmost range limits (Appendix 4). The lizards are a mixture of highland south-eastern, coastal and western inland species. As with the snakes, the known lizard diversity is likely to be conservative.

One fish species is among the biota recorded near the boundary of the SCA, in Towac/Molong Creek (Appendix 4).

Invertebrates

Over 210 species of invertebrates (Table 2), have been recorded for the SCA (ALA and other database sources, 2018), notwithstanding a lack of systematic survey and published accounts. The insects range across some 14 Orders within 81 families and over 150 genera. A compilation of the invertebrates by Dr Murray Fletcher is available from the authors upon request.

A single rare species *Cephalofovea pavimenta* (Mt Canobolas Velvet Worm) is endemic to Mt Canobolas (Reid et al. 1995) and lives inside rotting logs where it hunts for other small invertebrates. In eastern Australia several Velvet Worms exist as distinct populations that have been isolated from other populations for millions of years (Tait et al. 1990), and may even date back to the breakup of the Gondwana supercontinent. Each is considered rare and vulnerable (New 1995) and hence their presence is a good indicator of environmental quality. Two fluorescent yellow Planarian Worm species occur on the mountain. One is considered an outlying colour variant of *Fletchamia* cf. *sugdeni* isolated from its known distribution in Victoria and Tasmania (L. Winsor pers. comm.). It appears after rain and is commonly observed along walking tracks (S. Woodhall pers. comm.). The other is possibly also a colour variant of *Caenoplana* cf. *sulphurea*, a more widespread species in south eastern Australia and also at its northern range limit in the region (L. Winsor pers. comm.). These species are predatory and normally live in deep leaf litter to avoid desiccation.

A cricket, a flightless darkling beetle, several moths and leafhoppers represent unnamed taxa (M. Fletcher pers. comm.) and two named species, *Monomorium crinitum* and *Johnrehnia canoblaensis* have their type localities as Mt Canobolas. Twelve mollusc species have been observed within the SCA, five of which are endemic to NSW; *Anabellia occidentalis, Brevisentis atratus, B. jacksoniensis, Elsothera brazieri,* and *Galadistes molong* while *Scelidoropa sarahjaneae* is endemic to NSW and NE Victoria. Eight species are rare, regionally significant and also likely indicative of the relictual nature of the mountain.

CONCLUSION

Mount Canobolas is a prominent volcanic inselberg with a distinct relictual montane and sub-alpine flora displaying independently evolving biodiversity that is compositionally distinct from those in all other high altitude areas of the continent. It is an iconic natural remnant area located within the heavily cleared landscapes of Central Western NSW. The physiography of the MCVC, its altitude, geology, soils, isolation from other high altitude areas and influence on the local weather have united to produce a biota specific to the mountain, especially within the SCA. At a landscape level, geodiversity and climate are important drivers of vegetation (Keith 2011). However, there is only tenuous evidence that the MCVC geology has had an influence on the biota. No association could be discerned among the bryoflora whereas there does appear to be some substrate-specific specialisation among the lichens. Likewise the trachyte rock plate heathlands appear to be compositionally different and unique to the MCVC. The endemic *E. canobolensis* also shows a strong affinity to the MCVC footprint, and an *Asterolasia* shrub is suggested as a possible basaltic specialist. The heterogeneity of the core volcanic pile of the MCVC, on which the SCA is centred, may be a factor precluding any strong geological associations. In other respects Mt Canobolas functions as both a

refugium for declining species and an evolutionary nursery for new species, driven by its isolation from other high altitude areas along the GD.

This SCA is a scientifically important area containing unique components of genetic variation and irreplaceable biodiversity of high conservation value and is invaluable for biogeographical comparisons. Significantly it hosts at least 10 endemic species and 14 threatened species including 2 plant, 5 mammal and 7 bird species. Mt Canobolas hosts unique sub-alpine rock plate communities with a combination of uncommon cryptogams, including an Endangered lichen community, along with several plant species rarely recorded elsewhere.

The presence of multiple endemic species in diverse groups of flora and fauna in the SCA parallels the findings of high levels of endemism on Mt Kaputar, suggesting that similar evolutionary forces are operating on the two dormant central volcanoes. Both are geographically isolated landlocked islands of high altitude habitats that appear to provide ideal environments for speciation. After the Late Miocene, when the MCVC had ceased activity, the land surface of the eastern highlands would have been much higher with alpine and sub-alpine vegetation considerably more widespread and interconnected than it is today. A long period of erosional activity has lowered the land surfaces resulting in the contraction and fragmentation of sub-alpine habitats which ultimately led to the stranding of remnant communities and populations on Mt Canobolas. The isolation of Mt Canobolas has been in place for long enough to allow the evolution of multiple new life forms, a process known as vicariant speciation, essentially by the splitting of populations into isolated fragments that subsequently evolve independently (e.g. Crisp and Cook 2007; Rix and Harvey 2012). It is postulated that many of the endemic species with close relatives elsewhere have evolved into new species on Mt Canobolas by vicariance where exchange of genetic material has been prevented by geographical and ecological isolation.

Alternatively, Mt Canobolas could have acted as a refugium for formerly widespread species that have become extinct elsewhere (Hope et al. 2004). For these species Mt Canobolas SCA is an important refugium. The Velvet Worm and other relictual species may fit into this category.

The evidence for specialist basalt taxa being responsible for endemism is limited, but nevertheless a possibility. *Asterolasia rupestris* subsp. *rupestris* is restricted to two of the volcanoes on the Inland Hotspot Track. Relict populations of the species are endemic to the volcanic track itself. It is possible this taxon evolved on the track as a basalt specialist and was formerly more widespread when the volcanic chain was more continuous. The *Asterolasia* has now retreated to high altitude refugia on Mt Canobolas and Mt Kaputar. However, the Mt Canobolas and Mt Kaputar populations appear to have been isolated from each other for sufficient time to have differentiated morphologically into distinct taxa (J. Bruhl and I. Telford pers. comm.). *Phebalium* populations restricted to trachyte rock outcrops in the Warrumbungles and the MCVC are possible further substrate specific specialists that are not conspecific.

Two endangered ecological plant communities exist within the SCA. In addition, Hunter (2002) noted the unique composition of the rock outcrop heathland vegetation and its susceptibility to loss owing to the small size and fragmentation of remnants. He also noted the unusual dominance of the endemic *Eucalyptus canobolensis* which confers a unique composition to the SCA's woodland and forest communities, especially Community 1, Stringybark-Peppermint Shrubby Open Forests and Woodlands. As such, the vegetation of the SCA is of considerable conservation significance. The vegetation communities on Mt Canobolas are the result of long-standing ecological and evolutionary processes. Accordingly, the Mt Canobolas SCA provides examples of the ecological responses of vegetation assemblages to isolation, longitudinal displacement and climatic gradients.

A vast and under-explored reservoir of genetic diversity resides in and around the SCA, particularly among the vascular flora (120 taxa) and fungi (46 taxa) that are disjunct, rare or at the limits of their natural geographic ranges. In all 200 species (Table 2), c. 23% of the known native biota, are at their range limit in or in close proximity to the SCA. Whilst the majority of these are among the cryptogams and vascular plants, for most of the invertebrate taxa however, there isn't sufficient information to determine their status in this context. A small number of species, five vascular plants and two fungi are northern species which occur at their southernmost range limits around or on the mountain. A larger number, (24 fungi, 20 vascular plant and 8 bryophytes) are clearly species with their distributional strongholds in southern regions, being at their northernmost range limit on or near the MCVC. Many of these have strong sub-alpine affinities. Others (93 vascular plant, 16 fungi and 5 bryophyte species) are at their westernmost distribution within the CW of NSW and comprise many coastal and Blue Mountains species. Many of these species at the edges of their ranges have become stranded outlying populations that are ecologically and geologically disconnected from occurrences elsewhere. This disconnection has

likely set them on a distinct evolutionary pathway over the millennia, potentially leading to speciation.

Range edges are known to be characterized by increased genetic isolation, genetic differentiation, and variability in individual and population performance (Sexton et al. 2009) so are highly important for conservation.

As well as offering abundant opportunities for taxonomic research, examples of ecological, refugium and evolutionary vicariance responses have been identified within the SCA. They provide many fertile avenues for research and education into landlocked island systems, longitudinal displacement and climatic gradients. These same features of the SCA, coupled with the biodiversity, species richness and unusually high representation of irreplaceable species and communities, not only amplify its fundamental scientific value but vindicate the imperative for its nature conservation, in perpetuity.

ACKNOWLEDGEMENTS

We thank Prof. John Elix for reviewing the lichen records (Appendix 3). Thanks also to Dr Jordan Bailey who checked the fungal records and provided additions from the Biosecurity Collections Unit of NSW DPI in Orange (Appendix 3). Alison Downing kindly checked a number of bryophyte records and provided advice on range distributions. Dr Murray Fletcher compiled the species listing and precis for invertebrates and he, Vicki Glover and Rosemary Stapleton checked the bird data listed in Appendix 4. The State Government of NSW Department of Planning, Industry and Environment made available information for the vegetation map (Fig. 1) ably prepared by Suzanne Bower. Constructive suggestions provided by two referees have been incorporated to improve the manuscript.

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Appendix 1. Vascular plants recorded for Mt Canobolas State Conservation Area (AVH database 2018 and authors' observations) (*Exotic species).

Family	Scientific name	Common name	Regional distribution	Range limit	Remarks
GYMNOSPERMS					
Cupressaceae	*Callitris endlicheri*	Black Cypress Pine	Widespread		Localised, Devils Hole
Pinaceae	**Pinus radiata*	Monterey Pine	Widespread		Wilding, scattered throughout, especially perimeter areas
FERNS AND FERN ALLIES					
Aspleniaceae	*Asplenium flabellifolium*	Necklace Fern	Widespread		Common
	Pleurosorus subglandulosus	Blanket Fern	Widespread		Localised
Blechnaceae	*Blechnum nudum*	Fishbone Water Fern	Widespread	Westernmost	Outlier at Mingham Springs
Dennstaedtiaceae	*Histiopteris incisa*	Bat's Wing Fern	Widespread		Localised, Federal Falls
	Pteridium esculentum	Bracken	Widespread		Common
Dryopteridaceae	*Lastreopsis acuminata*	Creeping Shield Fern	Widespread	Westernmost	Disjunct. Localised, Federal Falls
	Polystichum proliferum	Mother Shield Fern	Widespread	Westernmost	Disjunct. Localised, Fern Gully, The Walls
Ophioglossaceae	*Ophioglossum lusitanicum*	Adders Tongue	Widespread		Occasional
Pteridaceae	*Adiantum aethiopicum*	Common Maidenhair	Widespread		Occasional
	Cheilanthes austrotenuifolia	Rock Fern	Widespread		Common
	Cheilanthes distans	Bristly Cloak Fern	Widespread		Uncommon
	Cheilanthes sieberi subsp. *sieberi*	Poison Rock Fern	Widespread		Common
	Pellaea falcata	Sickle Fern	Widespread	Westernmost	Uncommon
	Pellaea nana	Dwarf Sickle Fern	Widespread	Westernmost	Localised, Federal Falls
MONOCOTYLEDONS					
Antheriaceae	*Arthropodium milleflorum*	Pale Vanilla-lily	Widespread		Common
	Arthropodium minus		Widespread		
	Caesia calliantha	Grass Lily	Widespread	Westernmost	Localised, Orange View Lookout area
	Thysanotus tuberosus	Common Fringe Lily	Widespread		Common
Asphodelaceae	*Bulbine bulbosa*	Native Leek	Widespread		Common
	Bulbine sp. (ms)		Restricted	Endemic	Several rocky locations in SCA
Colchicaceae	*Burchardia umbellata*	Milkmaids	Widespread	Northernmost	Fire ephemeral. Possible outliers at Wellington, Harvey Ranges
	Wurmbea dioica subsp. *dioica*	Early Nancy	Widespread		Occasional
Cyperaceae	*Carex appressa*	Tall Sedge	Widespread		Soaks
	Carex breviculmis		Widespread	Westernmost	Outlier at Warrumbungles
	Carex gaudichaudiana		Widespread	Westernmost	
	Carex incomitata		Widespread	Westernmost	Common

	Carex inversa	Knob Sedge	Widespread		
	Carex longebrachiata		Widespread	Westernmost	Rare
	Cyperus flavidus	Yellow Flat-sedge	Widespread	Westernmost	Outlier at Mullengudgery
	Cyperus sanguinolentus		Widespread		Common, damp areas
	Eleocharis acuta		Widespread		Uncommon, soaks
	Eleocharis atricha		Widespread	Westernmost	Common, damp areas
	Isolepis australiensis		Widespread		
	Isolepis gaudichaudiana	Benambra Club-sedge	Widespread	Westernmost	Outlier at Keewong Creek
	Isolepis hookeriana		Widespread		
	Isolepis subtilissima		Widespread	Westernmost	
	Lipocarpha microcephala	Button Rush	Widespread	Range extn	Rare. Unrecorded for CT
	Lepidosperma gunnii		Widespread	Westernmost	Localised, Devils Hole
	Lepidosperma laterale		Widespread		
	Schoenus apogon	Common Bog-rush	Widespread		Common, soaks
Hypoxidaceae	*Hypoxis hygrometrica* var. *hygrometrica*	Golden Weather-grass	Widespread	Westernmost	Uncommon, soaks
Iridaceae	**Iris germanica*	Tall Bearded Iris	Widespread		
Juncus	*Juncus australis*		Widespread	Westernmost	Outlier at Cowra
	Juncus bufonius	Toad Rush	Widespread		
	Juncus fockei		Widespread	Westernmost	Outlier at Keewong Creek
	Juncus homalocaulis		Widespread		
	Juncus remotiflorus		Widespread		
	Juncus sarophorus		Widespread		
	Juncus subsecundus		Widespread		
	Juncus vaginatus		Widespread		
	Luzula densiflora		Widespread		Occasional
	Luzula flaccida		Widespread		Common
	Luzula modesta		Widespread	Westernmost	
	Luzula ovata		Widespread	Westernmost	
Lomandraceae	*Lomandra confertifolia* subsp. *pallida*	Mat-rush	Widespread	Southernmost	
	Lomandra filiformis subsp. *filiformis*	Wattle Mat-rush	Widespread		Common
	Lomandra filiformis subsp. *flavior*	Wattle Mat-rush	Widespread		New record
	Lomandra longifolia	Spiny-headed Mat-rush	Widespread		
	Lomandra multiflora subsp. *multiflora*	Many-flowered Mat-rush	Widespread		Common

Orchidaceae	*Caladenia carnea*	Pink Fingers	Widespread		Uncommon
	Caladenia congesta	Black Tongue Caladenia	Widespread	Northernmost	Uncommon, Devils Hole. Outlier in Calula Range, possibly also Mudgee
	Caladenia fitzgeraldii	Spider Orchid	Widespread	Westernmost	Rare
	Caladenia fuscata	Dusky Fingers	Widespread		Uncommon
	Caladenia gracilis	Musky Caladenia	Widespread		
	Caladenia phaeoclavia	Brown-clubbed Spider Orchid	Widespread	Westernmost	Common. Outlier at Bowan Park
	Caladenia sp. aff. *patersonii*		Extinct?	Endemic	Rare, possibly extinct. One plant only ever seen
	Calochilus campestris	Copper Beard Orchid	Widespread		Uncommon to rare
	Calochilus robertsonii	Purplish Beard Orchid	Widespread		Uncommon to rare
	Chiloglottis trilabra		Widespread	Westernmost	
	Chiloglottis valida	Large Bird Orchid	Widespread	Northernmost	Common
	Corybas hispidus	Bristly Helmet Orchid	Widespread	Westernmost	Occasional
	Corybas incurvus	Slaty Helmet Orchid	Widespread	Northernmost	Occasional. Outlier at Barrington Tops
	Dipodium punctatum	Hyacinth Orchid	Widespread	Westernmost	Occasional, localised. Outlier in Warrumbungles
	Dipodium sp. aff. *atropurpureum*		Unknown	?Endemic	Occasional to common
	Diuris pardina	Leopard Orchid	Widespread	Northernmost	Common, localised. Outliers to north
	Diuris sp. aff. *chryseopsis*		Restricted	Endemic?	Rare
	Diuris sulphurea	Tiger Orchid	Widespread		Scattered, common
	Eriochilus cucullatus	Parsons Bands	Widespread		Common
	Gastrodia procera	Potato Orchid	Widespread	Westernmost	Disjunct. Rare
	Gastrodia sesamoides	Cinnamon Bells	Widespread	Westernmost	Disjunct. Occasional, scattered
	Genoplesium sagittiferum	A Midge Orchid	Widespread	Westernmost	Disjunct. Common. Conimbla material reclassified *G. systenum*
	Microtis parviflora	Slender Onion Orchid	Widespread		Common
	Microtis unifolia	Common Onion Orchid	Widespread		Abundant
	Prasophyllum brevilabre	Short-lipped Leek Orchid	Widespread	Westernmost	Uncommon. Outlier in Pilliga
	Prasophyllum sp. aff. *odoratum*		Restricted	Endemic	Rare, localised, fire ephemeral
	Pterostylis aestiva	Long-tongue Summer Greenhood	Widespread	Northernmost	Disjunct. Localised, uncommon
	Pterostylis decurva	Summer Greenhood	Widespread	Westernmost	Rare
	Pterostylis falcata	Sickle Greenhood	Extinct?		Not seen in last 50 years, likely locally extinct
	Pterostylis nutans	Nodding Greenhood	Widespread		Uncommon, localised

	Pterostylis rubescens		Widespread		Uncommon
	Pterostylis sp. B		Widespread		Rare
	Pterostylis tenuis		Restricted	Southernmost	Mostly confined to CT. Outlier at Glen Elgin
	Thelymitra brevifolia		Widespread	Northernmost	Outlier at Barrington Tops
	Thelymitra carnea	Tiny Sun Orchid	Widespread		Uncommon
	Thelymitra megcalyptra	Scented Sun Orchid	Widespread		Uncommon
	Thelymitra pauciflora	Slender Sun Orchid	Widespread		Common
	Thelymitra peniculata		Widespread		Occasional
	Thelymitra simulata		Restricted	Westernmost	Disjunct. Rare, localised, Devils Hole
	Thelymitra sp. aff. *ixioides*		Widespread		Common
Phormiaceae	*Dianella caerulea* var. *caerulea*	Blue Flax Lily	Widespread	Westernmost	
	Dianella longifolia var. *longifolia*	Blueberry Lily	Widespread		
	Dianella revoluta var. *revoluta*	Blueberry Lily	Widespread		
	Dianella tasmanica	Tasman Flax-lily	Widespread	Westernmost	
	Stypandra glauca	Nodding Blue Lily	Widespread		Abundant after fire
Poaceae	**Agrostis stolonifera*	Creeping Bent	Widespread		
	**Aira cupaniana*	Silvery Hairgrass	Widespread		
	Anthosachne scabra	Common Wheatgrass	Widespread		Occasional
	Aristida echinata		Widespread	Range extn	
	Austrostipa densiflora		Widespread		Uncommon
	Austrostipa scabra subsp. *falcata*	Speargrass	Widespread		Occasional
	Austrostipa scabra subsp. *scabra*	Speargrass	Widespread		Occasional
	**Briza maxima*	Quaking Grass	Widespread		
	**Briza minor*	Shivery Grass	Widespread		
	**Bromus diandrus*	Great Brome	Widespread		
	**Bromus hordeaceus*	Soft Brome	Widespread		
	**Bromus molliformis*	Soft Brome	Widespread		
	**Bromus sterilis*	Sterile Brome	Widespread		
	Cymbopogon refractus	Barbed Wire Grass	Widespread		Uncommon
	**Dactylis glomerata*	Cocksfoot	Widespread		
	Dichelachne crinita	Longhair Plumegrass	Widespread		Occasional
	Dichelachne inaequiglumis		Widespread		Occasional
	Dichelachne micrantha	Shorthair Plumegrass	Widespread		Occasional
	Dichelachne rara		Widespread		Occasional

	Dichelachne sieberiana		Widespread		Occasional
	Digitaria brownii	Cotton Panic Grass	Widespread		Occasional
	Echinopogon caespitosus	Bushy Hedgehog-grass	Widespread		Occasional
	Echinopogon ovatus	Forest Hedgehog-grass	Widespread		Common
	Eragrostis brownii	Brown's Lovegrass	Widespread		
	Festuca asperula	Graceful Fescue	Widespread		Rarely seen, but proliferated after fire
	**Holcus lanatus*	Yorkshire Fog	Widespread		
	**Hordeum leporinum*	Barley Grass	Widespread		
	Imperata cylindrica	Blady Grass	Widespread	Westernmost	Uncommon
	Microlaena stipoides var. *stipoides*	Weeping Grass	Widespread		Common
	Panicum simile	Two-colour Panic	Widespread		Uncommon
	**Paspalum dilatatum*	Paspalum	Widespread		
	**Poa annua*	Winter Grass	Widespread		
	Poa labillardierei var. *labillardierei*	Tussock	Widespread		Occasional
	Poa sieberiana var. *cyanophylla*		Widespread	Northernmost	Occasional
	Poa sieberiana var. *sieberiana*	Snowgrass	Widespread		Abundant
	Poa tenera	Slender Tussock-grass	Widespread	Northernmost	Occasional. Outliers at Cookamidgera, Cox's Gap, Olinda
	Rytidosperma erianthum	Wallaby Grass	Widespread		Common
	Rytidosperma penicillatum	Slender Wallaby Grass	Widespread	Westernmost	Possible outlier in Weddin Mts
	Rytidosperma pilosum	Smooth-flower Wallaby Grass	Widespread		Occasional
	Rytidosperma racemosum var. *racemosum*		Widespread		Common
	Rytidosperma setaceum	Smallflower Wallaby Grass	Widespread		Occasional
	**Sorghum halepense*	Johnson Grass	Widespread		
	Sporobolus creber	Western Rat-tail Grass	Widespread		Rare
	Themeda triandra	Kangaroo Grass	Widespread		
	Tripogon loliiformis	Fiveminute Grass	Widespread		Localised and uncommon
	* *Vulpia bromoides*	Squirrel Tail Fescue	Widespread		
	**Vulpia muralis*		Widespread		
Xanthoraceae	*Xanthorrhoea glauca* subsp. *angustifolia*	A Grass Tree	Widespread		Localised and uncommon
DICOTYLEDONS					
Adoxaceae	**Sambucus nigra*	Elderberry	Widespread		

Ameranthaceae	*Alternanthera* sp. A		Widespread		Uncommon
Apiaceae	*Actinotus gibbonsii*		Widespread		Localised, Devils Hole
	Daucus glochidiatus form F	Native Carrot	Widespread		
	Hydrocotyle algida	Pennywort	Widespread	Northernmost	Possible outlier at Tenterfield
	Hydrocotyle laxiflora	Stinking Pennywort	Widespread		Common
	Hydrocotyle sibthorpioides		Widespread	Westernmost	Occasional
	Lilaeopsis polyantha		Widespread	Westernmost	Disjunct
	Oreomyrrhis eriopoda	Australian Carraway	Widespread	Westernmost	Occasional
Araliaceae	*Astrotricha ledifolia*		Widespread	Northernmost	Occasional. Outliers at Olinda, Tamworth, Tenterfield
	**Hedera helix*	English Ivy	Widespread	Westernmost	
	Polyscias sambucifolia subsp. *decomposita*	Ferny Panax	Widespread	Westernmost	Disjunct. Occasional along Towac Creek
	**Tetrapanax papyrifer*	Rice Paper Plant	Widespread		
Asteraceae	**Bidens pilosa*	Cobblers Pegs	Widespread		
	Brachyscome dissectifolia	Swamp Daisy	Widespread	Southernmost	Disjunct. Devils Hole in soaks
	Brachyscome ptychocarpa	Tiny Daisy	Widespread	Westernmost	Damp areas across SCA. Possible outlier at Trundle
	Brachyscome spathulata		Widespread	Westernmost	Common
	Calotis scabiosifolia var. *integrifolia*	Rough Burr-daisy	Widespread	Northernmost	Occasional. Outliers at Taree and Manara
	Cassinia aculeata subsp. *aculeata*	Common Cassinia	Widespread	Northernmost	Common. Outliers at Mt Airly and Point Lookout
	Cassinia laevis	Cough Bush	Widespread		Occasional
	Cassinia longifolia	Shining Cassinia	Widespread	Northernmost	Common. Range extends sporadically to Kandos/Rylstone with rare outliers. Northern records possibly *C. straminea.*
	Cassinia sifton	Sifton Bush	Widespread		Common
	**Centaurea calcitrapa*	Star Thistle	Widespread		
	**Chondrilla juncea*	Skeleton Weed	Widespread		
	Chrysocephalum apiculatum	Common Everlasting	Widespread		
	Chrysocephalum semipapposum	Clustered Everlasting	Widespread		
	**Cirsium vulgare*	Spear Thistle	Widespread		
	**Conyza bonariensis*	Flaxleaf Fleabane	Widespread		
	**Conyza sumatrensis*	Tall Fleabane	Widespread		
	Coronidium scorpioides	Button Everlasting	Widespread	Westernmost	Occasional
	Craspedia sp. aff. *lamicola*	Billy-buttons	?Restricted	?Endemic	Mostly above 1000 m
	**Crepis capillaris*	Smooth Hawksbeard	Widespread		

	Cymbonotus lawsonianus	Bears-ear	Widespread		Occasional
	Cymbonotus preissianus	Austral Bear's Ear	Widespread	Northernmost	Outliers in Mullion Range, Barrington Tops and Yetman
	Euchiton involucratus	Star Cudweed	Widespread		
	Euchiton japonicus	Creeping Cudweed	Widespread	Westernmost	Outlier in Mandagery SF
	Euchiton sphaericus		Widespread		
	**Hypochaeris radicata*	Catsear, Flatweed	Widespread		
	**Lactuca serriola*	Prickly Lettuce	Widespread		
	Lagenophora stipitata	Blue Bottle-daisy	Widespread	Westernmost	Occasional
	**Madia sativa*	Tarweed, Pitchweed	Widespread		
	Microseris lanceolata	Yam Daisy	Widespread		Occasional
	Olearia chrysophylla		Widespread	Westernmost	Disjunct. Uncommon, upper slopes
	Olearia erubescens		Widespread	Northernmost	Rare, Devils Hole. Outliers to north
	Olearia megalophylla	Large-leaf Daisy Bush	Widespread	Westernmost	Disjunct. Rare, possible misidentification
	Olearia phlogopappa subsp. *continentalis*	Dusty Daisy-bush	Widespread	Westernmost	Disjunct. Localised, common, Devils Hole
	Senecio bathurstianus		Widespread		Common
	Senecio diaschides		Widespread	Westernmost	Occasional
	Senecio hispidulus	Hill Fireweed	Widespread	Westernmost	Outliers at Condobolin, Lake Cargelligo
	Senecio linearifolius var. *macrodontus*	Fireweed Groundsel	Widespread	Westernmost	Uncommon
	Senecio minimus		Widespread	Westernmost	Uncommon
	Senecio pinnatifolius var. *pinnatifolius*	Variable Groundsel	Widespread		
	Senecio prenanthoides		Widespread	Westernmost	Occasional
	Senecio quadridentatus	Cotton Fireweed	Widespread		Common
	Sigesbeckia australiensis		Widespread		Occasional
	Sigesbeckia orientalis subsp. *orientalis*	Indian Weed	Widespread		Occasional
	**Silybum marianum*	Variegated Thistle	Widespread		
	Solenogyne dominii		Widespread		Uncommon
	**Sonchus oleraceus*	Common Sowthistle	Widespread		
	**Taraxacum officinale*	Dandelion	Widespread		
	Vittadinia cuneata var. *cuneata*	Fuzzweed	Widespread		
Boraginaceae	**Amsinckia calycina*		Widespread		
	**Amsinckia intermedia*	Common Fiddleneck	Widespread		
	**Anchusa arvensis*	Wild Bugloss	Widespread		
	Cynoglossum australe		Widespread		Common

	**Echium vulgare*	Vipers Bugloss	Widespread		
	Hackelia suaveolens		Widespread		
	Myosotis australis	Australian Forget-me-not	Widespread		Occasional
	**Myosotis discolor*	Forget-me-not	Widespread		
Brassicaceae	*Cardamine gunnii*		Widespread	Westernmost	
	Cardamine paucijuga		Widespread		
	**Hirschfeldia incana*	Buchan Weed	Widespread		
Callitrichaceae	**Callitriche stagnalis*	Common Starwort	Widespread		
Campanulaceae	*Isotoma fluviatilis* subsp. *fluviatilis*	Swamp Isotome	Widespread	Westernmost	Uncommon, soaks
	Lobelia gibbosa	Tall Lobelia	Widespread		Occasional, fire ephemeral
	Lobelia pedunculata	Matted Pratia	Widespread	Westernmost	Uncommon, soaks
	Wahlenbergia communis	Tufted Bluebell	Widespread		Uncommon
	Wahlenbergia luteola		Widespread		Occasional
	Wahlenbergia multicaulis	Tadgell's Bluebell	Widespread		Occasional
	Wahlenbergia planiflora subsp. *longipila*	Flat Bluebell	Widespread	Southernmost	Disjunct
	Wahlenbergia stricta subsp. *stricta*	Tall Bluebell	Widespread		Occasional
	Wahlenbergia victoriensis		Unknown	Northernmost	Uncommon, moist gully
Caprifoliaceae	**Lonicera japonica*	Japanese Honeysuckle	Widespread		
Caryophyllaceae	**Cerastium balearicum*	Lesser Mouse-ear Chickweed	Widespread		
	**Cerastium glomeratum*	Mouse-ear Chickweed	Widespread		
	**Petrorhagia nanteuilii*		Widespread		
	Scleranthus sp. Fitzs Hill	Knawel	Widespread	Southernmost	Common
	**Silene coronaria*	Rose Campion	Widespread		
	Stellaria angustifolia	Swamp Starwort	Widespread		Uncommon, damp areas
	Stellaria flaccida		Widespread	Westernmost	
	Stellaria pungens	Prickly Starwort	Widespread	Westernmost	Abundant. Outlier in Hervey Ranges
Centrolepidaceae	*Centrolepis strigosa* subsp. *strigosa*		Widespread		Rare, in soaks
Chenopodiaceae	*Dysphania pumilio*	Small Crumbweed	Widespread		Common
Clusiaceae	*Hypericum gramineum*	Small St. John's Wort	Widespread		Occasional
	Hypericum japonicum		Widespread	Westernmost	Damp areas
	**Hypericum perforatum*	St. John’s Wort	Widespread		
Convolvulaceae	*Convolvulus angustissimus*	Blushing Bindweed	Widespread		Occasional

	Dichondra repens	Kidney Weed	Widespread		Common
Crassulaceae	*Crassula sieberiana* subsp. *sieberiana*	Australian Stonecrop	Widespread		Occasional
Dilleniaceae	*Hibbertia calycina*	Lesser Guinea Flower	Widespread		Uncommon
	Hibbertia obtusifolia	Hoary Guinea Flower	Widespread		Common
	Hibbertia riparia	Erect Guinea Flower	Widespread		Occasional
Droseraceae	*Drosera auriculata*		Widespread		
	Drosera peltata	Sundew	Widespread		
Epacridaceae	*Acrotriche serrulata*	Honeypots	Widespread	Westernmost	Outlier at Yenda
	Leucopogon attenuatus	Beard-heath	Widespread		Occasional
	Leucopogon ericoides	Pink Beard-heath	Widespread		Occasional
	Leucopogon fraseri		Widespread	Westernmost	Uncommon. Outlier in Goobang NP
	Leucopogon virgatus		Widespread		Occasional
	Melichrus Mt Canobolas	Urn-heath	?Restricted	?Endemic	Uncommon, scattered
	Monotoca scoparia	Broom-heath	Widespread		Occasional, scattered
Fabaceae	*Acacia brownii*	Heath Wattle	Widespread		
	Acacia buxifolia subsp. *buxifolia*	Box-Leaf Wattle	Widespread		
	Acacia dealbata subsp. *dealbata*	Silver Wattle	Widespread		Abundant
	Acacia gunnii	Ploughshare Wattle	Widespread		Occasional
	Acacia lanigera var. *lanigera*	Woolly Wattle	Widespread		
	Acacia melanoxylon	Blackwood	Widespread	Westernmost	Common. Possible outlier near Dubbo
	Acacia ulicifolia	Prickly Moses	Widespread		
	Acacia verniciflua	Varnish Wattle	Widespread		
	Bossiaea buxifolia		Widespread		Common
	**Cytisus scoparius* subsp. *scoparius*	Scotch Broom	Widespread		
	Daviesia latifolia	Hop Bitter-pea	Widespread		Occasional
	Daviesia leptophylla		Widespread		Occasional
	Desmodium gunnii	Slender Tick-trefoil	Widespread	Westernmost	
	Desmodium varians	Slender Tick-trefoil	Widespread		
	Dillwynia phylicoides		Widespread		
	**Genista monspessulana*	Montpellier Broom	Widespread		
	Glycine clandestina		Widespread		Common
	Glycine tabacina		Widespread		Occasional
	Hardenbergia violacea	Purple Coral Pea	Widespread		
	Hovea heterophylla		Widespread	Westernmost	Outliers at Bowen Park, Bumberry
	Indigofera adesmiifolia	Tick Indigo	Widespread		Occasional
	Indigofera australis	Australian Indigo	Widespread		Common

	Lotus australis	Australian Trefoil	Widespread		Uncommon
	**Medicago polymorpha*	Burr Medic	Widespread		
	Mirbelia oxylobioides	Mountain Mirbelia	Widespread	Northernmost	Disjunct. A southern species, outliers north of Lees Pinch and at Mt Kaputar, Pilliga
	Pultenaea polifolia	Dusky Bush-pea	Widespread	Westernmost	Uncommon. Outlier in Goobang NP
	Pultenaea setulosa	Stony Bush-pea	Widespread		
	Pultenaea spinosa	Spiny Bush-pea	Widespread		Occasional
	Pultenaea subternata		Widespread	Westernmost	Scattered on slopes to west
	**Trifolium arvense*	Haresfoot Clover	Widespread		
	**Trifolium campestre*	Hop Clover	Widespread		
	**Trifolium dubium*	Yellow Suckling Clover	Widespread		
	**Trifolium repens*	White Clover	Widespread		
	**Ulex europaeus*	Gorse	Widespread		
	**Vicia villosa* subsp. *villosa*	Russian Vetch	Widespread		
Gentianaceae	**Centaurium erythraea*	Common Centaury	Widespread		
	**Centaurium tenuiflorum*		Widespread		
Geraniaceae	*Geranium homeanum*		Widespread	Westernmost	
	**Geranium molle* subsp. *molle*	Cranesbill Geranium	Widespread		
	Geranium potentilloides var. *potentilloides*		Widespread	Westernmost	
	Geranium solanderi var. *solanderi*	Native Geranium	Widespread		Common
	Pelargonium australe	Native Storksbill	Widespread		Prolific fire ephemeral
Goodeniaceae	*Goodenia hederacea* subsp. *hederacea*	Forest Goodenia	Widespread		
Haloragaceae	*Gonocarpus elatus*		Widespread		Occasional
	Gonocarpus tetragynus	Raspwort	Widespread		Common
	Haloragis heterophylla	Rough Raspwort	Widespread		
	Haloragis serra		Widespread		Occasional
Lamiaceae	*Ajuga australis*	Austral Bugle	Widespread		
	**Marrubium vulgare*	White Horehound	Widespread		
	Mentha satureioides	Native Pennyroyal	Widespread		Uncommon
	**Mentha spicata*	Spearmint	Widespread		Towac Creek
	Prostanthera gilesii		Restricted	Endemic	Critically endangered
	**Prunella vulgaris*	Self-heal	Widespread		
	Scutellaria humilis	Dwarf Skullcap	Widespread		Occasional
Lauraceae	*Cassytha pubescens*		Widespread		
Loranthaceae	*Amyema miquelii*		Widespread		

	Amyema pendula subsp. *pendula*		Widespread		
Malaceae	**Cotoneaster glaucophyllus*	Glaucous Cotoneaster	Widespread		
	**Crataegus monogyna*	Hawthorn	Widespread		
Myrtaceae	*Calytrix tetragona*	Common Fringe-myrtle	Widespread		Common
	Eucalyptus blakelyi	Blakely's Red Gum	Widespread		Uncommon
	Eucalyptus bridgesiana	Apple Box	Widespread		Occasional
	Eucalyptus canobolensis	Silver-leaf Candlebark	Restricted	Endemic	Abundant. Localised Mt Canobolas volcanics
	Eucalyptus dalrympleana subsp. *dalrympleana*	Mountain Gum	Widespread	Westernmost	Abundant. Disjunct
	Eucalyptus dives	Broad-leaved Peppermint	Widespread	Westernmost	Abundant
	Eucalyptus goniocalyx	Bundy	Widespread		Occasional
	Eucalyptus macrorhyncha	Red Stringybark	Widespread		Abundant
	Eucalyptus pauciflora	Snow Gum	Widespread	Westernmost	Abundant
	Eucalyptus polyanthemos subsp. *polyanthemos*	Red Box	Widespread		Uncommon
	Eucalyptus stellulata	Black Sally	Widespread	Westernmost	Uncommon
	Eucalyptus viminalis	Ribbon Gum	Widespread	Westernmost	Occasional
	Kunzea parvifolia	Violet Kunzea	Widespread		Common
	Leptospermum myrtifolium	Myrtle Tea-tree	Widespread	Westernmost	Possible outlier West Wyalong
Nyctaginaceae	*Boerhavia dominii*	Tarvine	Widespread		
Onagraceae	*Epilobium billardiereanum* subsp. *cinereum*	A Willow-herb	Widespread		
Orobanchaceae	**Orobanche minor*		Widespread		
Oxalidaceae	*Oxalis chnoodes*		Widespread	Westernmost	
	Oxalis exilis		Widespread	Westernmost	Scattered on slopes to west
	Oxalis perennans		Widespread		Common
Phyllanthaceae	*Phyllanthus occidentalis*		Widespread		Occasional
	Poranthera microphylla		Widespread		
Pittosporaceae	*Billardiera scandens*	Hairy Apple Berry	Widespread	Westernmost	Uncommon
	Rhytidosporum procumbens		Widespread		
Plantaginaceae	*Gratiola peruviana*	Australian Brooklime	Widespread	Westernmost	
	**Plantago lanceolata*	Lamb's Tongues	Widespread		
	Plantago varia		Widespread		Common
	**Veronica anagallis-aquatica*	Blue Water Speedwell	Widespread		
	**Veronica arvensis*	Wall Speedwell	Widespread		
	Veronica calycina	Hairy Speedwell	Widespread	Westernmost	Outlier in Warrumbungles

	Veronica derwentiana subsp. *derwentiana*		Widespread	Westernmost	
	Veronica derwentiana subsp. *subglauca*		Widespread	Westernmost	Specimen in RBG needs verification
	Veronica gracilis	Slender Speedwell	Widespread	Westernmost	Possible outlier near Barmedman
Polemoniaceae	**Navarretia squarrosa*	Californian Stinkweed	Widespread		
Polygonaceae	**Acetosella vulgaris*	Sorrel	Widespread		
	Rumex brownii	Swamp Dock	Widespread		Occasional
Portulacaceae	*Neopaxia australasica*		Widespread	Westernmost	Soaks
	Montia fontana subsp. *chondrosperma*		Widespread	Northernmost	A southern species
Primulaceae	**Lysimachia arvensis*	Scarlet Pimpernel	Widespread		
Proteaceae	*Hakea decurrens* subsp. *decurrens*		Widespread		Uncommon
	Persoonia rigida		Widespread		
Ranunculaceae	*Ranunculus amphitrichus*	Small River Buttercup	Widespread	Northernmost	A southern species. Outliers at Moonan Brook, Uralla, Walcha
	Ranunculus inundatus	River Buttercup	Widespread	Westernmost	
	Ranunculus lappaceus	Common Buttercup	Widespread		Common
	Ranunculus pumilio var. *politus*	Ferny Buttercup	Widespread	Easternmost	Outlier Richmond
	Ranunculus pumilio var. *pumilio*	Ferny Buttercup	Widespread		
Rhamnaceae	*Cryptandra amara* var. *amara*	Bitter Cryptandra	Widespread		
	Pomaderris aspera	Hazel Pomaderris	Widespread	Westernmost	Disjunct. Rare
Rosaceae	*Acaena novae-zelandiae*	Bidgee-widgee	Widespread	Westernmost	Common
	Acaena ovina	Sheep's Burr	Widespread		
	Aphanes australiana		Widespread		
	**Prunus laurocerasus*	Cherry Laurel	Widespread		
	**Rosa rubiginosa*	Sweet Briar	Widespread		
	**Rubus anglocandicans*	Blackberry	Widespread		
	Rubus parvifolius	Native Raspberry	Widespread		
	**Rubus ulmifolius*	Blackberry	Widespread		
	**Sanguisorba minor*	Salad Burnet	Widespread		
Rubiaceae	*Asperula conferta*	Common Woodruff	Widespread		Common
	Asperula scoparia	Prickly Woodruff	Widespread	Westernmost	
	Coprosma quadrifida	Prickly Currant Bush	Widespread	Westernmost	Disjunct. Rare
	**Galium aparine*	Cleavers	Widespread		
	**Galium divaricatum*	Slender Bedstraw	Widespread		
	Galium gaudichaudii	Rough Bedstraw	Widespread		

	Galium leptogonium		Widespread		
	**Galium murale*	Small Bedstraw	Widespread		
	Opercularia aspera	Coarse Stinkweed	Widespread		Occasional
	Opercularia hispida	Hairy Stinkweed	Widespread		Occasional
	Pomax umbellata	Skullcaps	Widespread		Common
Rutaceae	*Asterolasia rupestris* subsp. *rupestris*		Restricted	?Endemic	Localised to one area, rare
	Phebalium squamulosum complex	Scaly Phebalium	Restricted	?Endemic	Localised in disparate colonies
Salicaceae	**Salix* x *fragilis* nothovar. *fragilis*	Crack Willow	Widespread		
Santalaceae	*Exocarpos cupressiformis*	Native Cherry	Widespread		Common
	Exocarpos strictus	Dwarf Cherry	Widespread		
Sapindaceae	*Dodonaea boroniifolia*	Fern-leaf Hop-bush	Widespread		Common
	Dodonaea viscosa subsp. *angustissima*	Narrow-leaved Hopbush	Widespread		Common
Scrophulariaceae	**Verbascum thapsus* subsp. *thapsus*	Great Mullein	Widespread		
	**Verbascum virgatum*	Twiggy Mullein	Widespread		
Solanaceae	**Datura stramonium*	Common Thornapple	Widespread		
	**Solanum chenopodioides*	Whitetip Nightshade	Widespread		
	**Solanum nigrum*	Black-berry Nightshade	Widespread		
	**Solanum triflorum*	Three-flowered Nightshade	Widespread		
Stackhousiaceae	*Stackhousia monogyna*	Creamy Candles	Widespread		Occasional
Stylidiaceae	*Stylidium graminifolium*	Grass Trigger-plant	Widespread		Occasional
Thymelaeaceae	*Pimelea curviflora* var. *gracilis*	Rice Flower	Widespread	Westernmost	Occasional
	Pimelea latifolia subsp. *hirsuta*	Rice Flower	Widespread	Westernmost	Disjunct
	Pimelea ligustrina subsp. *ligustrina*	Tall Rice Flower	Widespread	Westernmost	Disjunct
	Pimelea linifolia subsp. *caesia*	Slender Rice-flower	Widespread	Westernmost	Disjunct
Urticaceae	*Urtica incisa*	Stinging Nettle	Widespread		Occasional
Valerianaceae	**Centranthus ruber* subsp. *ruber*	Red Valerian	Widespread		
Verbenaceae	**Verbena bonariensis*	Purpletop	Widespread		
Violaceae	*Viola betonicifolia*	Native Violet	Widespread		Common
	Viola hederacea	Ivy-leaved Violet	Widespread	Westernmost	Occasional

Appendix 2. Summary of conservation reserves in the near (eastern) Central West indicating year gazetted, area, along with native and exotic vascular plant species recorded in Bionet (2018a).

Conservation Reserve	Year Gazetted	Area (ha)	Total Flora (No Species)	Native Flora (No Species)	Exotic Flora (No Species)	Exotic species (%)
Abercrombie KCR	1997	1,434	206	178	28	13.6
Abercrombie River NP	1995	19,402	491	384	107	21.8
Barton NR	1972	529	125	99	26	20.8
Borenore KCR	1997	136	140	85	55	39.2
Burwood Creek NR	?	34	85	66	19	22.3
Copperhannia NR	1972	3,497	212	193	19	8.9
Eusdale NR	2006	1,238	130	111	19	14.6
Evans Crown NR	1975	424	185	145	40	21.6
Freemantle NR	1973	361	136	111	25	18.4
Gillindich NR	2010	1,225	111	105	6	5.4
Girralang NR	1999	640	207	175	32	15.4
Hill End HS	1967	133	98	68	30	30.6
Keverstone SCA	2011	1,164	51	47	4	7.8
Keverstone NP	1979 to 2011	1,860	198	165	33	16.7
Mount Canobolas SCA	1997	1,672	425	337	88	20.7
Mullion Range SCA	1999	1,025	200	151	49	24.5
Nuggetty SCA	2010	1,146	156	116	40	25.6
Razorback NR	1988	2,647	243	222	21	8.6
Turon NP	2002	3,059	254	215	39	15.4
Wambool NR	1987	194	245	226	19	7.8
Wiarborough NR	2010	2,024	183	164	19	10.4
Winburndale NR	1967	10,718	339	297	42	12.4
Mean			200	166	34	17.4

Appendix 3. Fungi recorded for Mt Canobolas SCA (ALA and other database sources 2018) (*exotic species).

Family	Scientific name	Regional distribution	Range limit	Remarks
Phylum *Ascomycota*				
Acarosporaceae	*Acarospora citrina*	Widespread		Volcanic rock. Northern slopes below summit
	Acarospora fuscata	Restricted	Northernmost	Volcanic rock around summit; restricted to SE mainland
	Acarospora nodulosa	Widespread	Easternmost	An inland species
	Sarcogyne sekikaica	Restricted	Endemic	Volcanic rock around summit
Candelariaceae	*Candelariella* cf. *coralliza*	Widespread		Volcanic rock around summit
Cladoniaceae	*Cladia aggregata*	Widespread		On soil between boulders, summit
	Cladia corallaizon	Widespread		On soil, NE forest slopes
	Cladia fuliginosa	Restricted	Northernmost	Scattered small loose colonies, NE forest slopes and grasslands; restricted to SE Australia
	Cladia muelleri	Widespread		On soil, NE forest slopes
	Cladonia chlorophaea	Widespread		On soil, W face of mountain
	Cladonia corniculata	Widespread	Westernmost	On damp soils and crevices among rocks, W face of mountain
	Cladonia fimbriata	Widespread	Westernmost	On soil, slopes and rocky outcrops with stunted trees
	Cladonia glebosa	Widespread		On charred wood, W face of mountain
	Cladonia sarmentosa	Widespread	Westernmost	On shaded, moist earth bank, W face of mountain
	Cladonia sulcata var. *striata*	Widespread	Westernmost	On soil, NE forest slopes
Collemataceae	*Collema leucocarpum*	Widespread		On mossy volcanic rocks and on *Acacia melanoxylon*, W face of mountain
	Lathagrium durietzii	Widespread		On soil and rock, stunted forest on rocky outcrops, W face of mountain
Gomphillaceae	*Gyalideopsis halocarpa*	Restricted	Endemic	Near summit, exposed heath
Lecanoraceae	*Lecanora bicincta*	Restricted	Northernmost	Volcanic rocks around summit and grassy frost pockets in sub-alpine Snow Gum woodland; restricted to Alpine areas
	Lecanora farinacea	Widespread	Westernmost	Weathered volcanic rocks around summit, woodland
	Lecanora galactiniza	Widespread		Volcanic rocks and scree around summit, woodland
	Lecanora oreinoides	Widespread		Weathered trachyte rocks, heathlands on W face of mountain
	Lecanora pseudistera	Widespread		Volcanic rocks around summit and grassy frost pockets in sub-alpine Snow Gum woodland
	Lecanora rupicola	Widespread	Northernmost	Rocky outcrops

	Lecidella stigmatea	Widespread		Volcanic rocks around summit
	Ramboldia petraeoides	Widespread		Volcanic rocks around summit and dead tree trunks
	Ramboldia sanguinolenta	Widespread	Southernmost	Weathered rocks, woodlands on NW slopes of mountain; outlier recorded near Nimmitabel
	Scoliciosporum umbrinum	Restricted	Northernmost	Volcanic rocks around summit; only mainland record, elsewhere Kangaroo Island and Tasmania
Lecideaceae	*Lecidea atrobrunnea*	Restricted	Northernmost	Volcanic rocks, summit grassy Snow Gum woodland; rare with few records for Vic. alps and WA
	Lecidea capensis	Widespread		Weathered rocks, heath and woodlands, W face of mountain
	Lecidea ochroleuca	Widespread		On rocks, NE forest slopes
Lobariaceae	*Pseudocyphellaria neglecta*	Widespread	Westernmost	Shaded rocks amongst mosses, NE forest slopes
Megalariaceae	*Megalaria montana*	Restricted	Endemic	
Megasporaceae	*Aspicilia contorta*	Widespread	Easternmost	Summit and rock ledge, W slopes of mountain
Mycosphaerellaceae	*Cercospora* sp.	Unknown		Isolated from *Hardenbergia violaceae*
	Mycosphaerella sp.	Unknown		Isolated from *Stypandra glauca*
Pannariaceae	*Fuscopannaria subimmixta*	Widespread		Soil over rocks, Federal Falls
	Psoroma hypnorum	Widespread	Northernmost	Mossy rocks, W face of mountain
Parmeliaceae	*Austroparmelina labrosa*	Widespread	Westernmost	On tree trunks and branches of shrubs, summit and W slopes
	Austroparmelina pruinata	Widespread		On tree trunks and branches of shrubs, summit and W slopes
	Austroparmelina pseudorelicina	Widespread		On tree trunks and branches of shrubs, summit and W slopes
	Flavoparmelia haysomii	Widespread	Westernmost	On volcanic rocks, W face of mountain
	Hypogymnia billardierei	Widespread		On *Leptospermum* twigs
	Hypogymnia pulverata	Widespread	Westernmost	On dead wood, rocky heath and woodlands, W face of mountain
	Hypogymnia subphysodes var. *subphysodes*	Widespread	Westernmost	On dead wood, woodlands, W face of mountain
	Notoparmelia signifera	Widespread		On volcanic rocks, W face of mountain
	Parmotrema reticulatum	Widespread		On volcanic rocks, W face of mountain
	Punctelia borreri	Widespread	Westernmost	On volcanic rocks, W face of mountain
	Usnea inermis	Widespread		On dead *Acacia* branch and bark, rocks in woodland
	Xanthoparmelia atrocapnodes	Widespread		Weathered rock, summit and woodlands on W slopes
	Xanthoparmelia canobolasensis	Restricted	Northernmost	On rocks, woodland NE slopes; only mainland record, elsewhere one location in Tasmania

	Xanthoparmelia congesta	Widespread		Weathered rock, summit and woodlands on W slopes
	Xanthoparmelia dichotoma	Widespread	Northernmost	On soil, NE woodlands; outliers at Tenterfield and Mt Cordeaux Qld.
	Xanthoparmelia digitiformis	Widespread		Shaded rock face, summit areas, Snow Gum woodland
	Xanthoparmelia elixii	Widespread		Exposed rocky outcrops and stunted forests
	Xanthoparmelia flavescentireagens	Widespread		Weathered rock, The Walls, summit areas and woodlands on W slopes
	Xanthoparmelia furcata	Widespread		Rock outcrops, The Walls
	Xanthoparmelia loxodella	Widespread		Volcanic rocks summit and grassy frost pockets in sub-alpine Snow Gum woodland, W slopes
	Xanthoparmelia metaclystoides	Widespread		Weathered rock, NW slopes
	Xanthoparmelia metamorphosa	Widespread		On soil and pebbles, The Walls woodland
	Xanthoparmelia metastrigosa	Restricted	Endemic	Weathered rock and soil, summit and woodlands NE slopes
	Xanthoparmelia mexicana	Widespread		Dead tree trunk among rock outcrops
	Xanthoparmelia multipartita	Restricted	Northernmost	Recorded as a component of Mt Canobolas *Xanthoparmelia* Endangered Ecological Community
	Xanthoparmelia neorimalis	Widespread		Recorded as a component of Mt Canobolas *Xanthoparmelia* Endangered Ecological Community
	Xanthoparmelia oleosa	Widespread		Weathered rocks, summit woodlands
	Xanthoparmelia parviloba	Widespread		
	Xanthoparmelia pulla	Widespread		On rock, summit woodlands
	Xanthoparmelia scabrosa	Widespread		Rock outcrop N slope from summit, Snow Gum woodland
	Xanthoparmelia semiviridis	Widespread		On soil, summit woodlands
	Xanthoparmelia substrigosa	Widespread		On soil and pebbles, The Walls woodland
	Xanthoparmelia sulcifera	Restricted	Westernmost	On soil and pebbles, grasslands around summit; restricted to SE mainland
	Xanthoparmelia willisii	Widespread	Southernmost	On soil, grasslands around summit; outliers in Tasmania
Pertusariaceae	*Pertusaria lophocarpa*	Widespread	Westernmost	Weathered rock, summit area woodlands
Physciaceae	*Buellia aethalia*	Widespread		Summit area
	Buellia canobolasensis	Restricted	Northernmost	Known only from the summit area and another mountain top in the ACT
	Buellia homophylia	Widespread		Volcanic rock, summit area woodlands
	Buellia maficola	Widespread		Type specimen from summit area
	Buellia ocellata	Restricted	Northernmost	Volcanic rock, summit area woodlands; restricted to SE Australia
	Physcia adscendens	Widespread	Northernmost	Shaded rocks, but usually on wood; outliers at Guyra and Lamington NP

	Physcia austrocaesia	Widespread	Northernmost	Dead twigs, woodlands W face; outlier on rock at Stanthorpe
	Physcia jackii	Widespread		On dead *Acacia*, summit and W slopes
	Physcia poncinsii	Widespread	Westernmost	Volcanic rock, summit area woodlands
Porpidiaceae	*Paraporpidia leptocarpa*	Widespread		Amongst rock outcrops in stunted woodlands
Pyronemataceae	*Pyronema omphalodes*	Widespread		
Rhizocarpaceae	*Rhizocarpon distinctum*	Restricted	Northernmost	Weathered rock, heathlands on W face; restricted to SE Australia
	Rhizocarpon geminatum	Restricted	Northernmost	Weathered rock, heathlands on W face; restricted to SE Australia
	Rhizocarpon geographicum	Widespread		On rock, summit and woodlands on W slopes
	Rhizocarpon reductum	Widespread		On rock, summit and woodlands on W slopes
Stereocaulaceae	*Stereocaulon corticatulum*	Widespread	Northernmost	On rock amongst other lichens; outliers at Barrington Tops and Point Lookout
Teloschistaceae	*Caloplaca crenulatella*	Widespread	Rare in NSW	Summit, on scree NW slopes
	Caloplaca rexfilsonii	Widespread		Rock outcrops around summit
	Caloplaca rubelliana	Widespread		Rock outcrops around summit
Thelotremataceae	*Diploschistes scruposus*	Widespread		Volcanic rocks around summit and grassy frost pockets in sub-alpine Snow Gum woodland
	Diploschistes sticticus	Widespread		On rock, summit and woodlands on W slopes
	Ingvariella bispora	Restricted	Northernmost	On rock, summit and heath on W slopes; restricted to SE Australia
Trapeliaceae	*Placopsis perrugosa*	Widespread	Northernmost	Shaded rock, woodlands W face; outliers at Barrington Tops and Ingham Qld
	Rimularia insularis	Restricted	Northernmost	On rock, open woodland; restricted to SE mainland
Phylum *Basidiomycota*				
Phragmidiaceae	**Phragmidium violaceum*	Widespread	Northernmost	Isolated from blackberry
Pileolariaceae	*Uromycladium robinsonii*	Unknown	Northernmost	Isolated from *Acacia melanoxylon.* Only known record for NSW; also recorded for ACT, Vic. and NZ
Pucciniaceae	*Puccinia lagenophorae*	Widespread		Isolated from *Senecio quadridentatus.*
Raveneliaceae	*Bibulocystis pulcherrima* var. *monticola*	Unknown		Isolated from a *Daviesia* sp.
Russulaceae	*Cystangium seminudum*	Widespread	Westernmost	Grassy woodland, Orange View
	Cystangium sessile	Widespread	Westernmost	Grassy woodland, Orange View
	Cystangium shultziae	Widespread	Northernmost	Grassy woodland, Orange View
Ustilaginaceae	*Ustilago comburens*	Widespread	Northernmost	Only known record for NSW; also recorded for ACT, Vic., WA and NZ

Appendix 4. Vertebrates recorded for Mt Canobolas State Conservation Area (ALA and other database sources 2018) (*exotic species).

Order	Family	Scientific name	Common name	Regional distribution	Range limit
ACTINOPTERYGII					
Salmoniformes	Galaxiidae	*Galaxias olidus*	Inland or Mountain Galaxia	Widespread	
AMPHIBIA					
Anura	Hylidae	*Litoria verreauxii*	Whistling Tree Frog	Widespread	
	Limnodynastidae	*Limnodynastes dumerilii dumerilii*	Eastern Banjo Frog	Widespread	
	Myobatrachidae	*Crinia parinsignifera*	Eastern Sign-bearing Froglet	Widespread	
		Crinia signifera	Common Froglet	Widespread	
		Uperoleia laevigata	Smooth Toadlet	Widespread	
AVES					
Anseriformes	Anatidae	*Anas gracilis*	Grey Teal	Widespread	
		Anas superciliosa	Pacific Black Duck	Widespread	
		Aythya australis	White-eyed Duck, Hardhead	Widespread	
		Chenonetta jubata	Australian Wood Duck	Widespread	
Caprimulgiformes	Podargidae	*Podargus strigoides*	Tawny Frogmouth	Widespread	
Ciconiiformes	Ardeidae	*Egretta novaehollandiae*	White-faced Heron	Widespread	
	Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis	Widespread	
Columbiformes	Columbidae	*Phaps chalcoptera*	Common Bronzewing	Widespread	
Coraciiformes	Coraciidae	*Eurystomus orientalis*	Dollarbird	Widespread	
	Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra	Widespread	
		Todiramphus sanctus	Sacred Kingfisher	Widespread	
Cuculiformes	Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo	Widespread	
		Cacomantis pallidus	Pallid Cuckoo	Widespread	
		Chalcites osculans	Black-eared Cuckoo	Widespread	
		Chrysococcyx basalis	Horsfield's Bronze-cuckoo	Widespread	
		Chrysococcyx lucidus	Shining Bronze-cuckoo	Widespread	
		Eudynamys orientalis	Common Koel, Pacific Koel	Widespread	
Falconiformes	Accipitridae	*Accipiter cirrocephalus*	Collared Sparrowhawk	Widespread	
		Accipiter fasciatus	Brown Goshawk	Widespread	

		Aquila audax	Wedge-tailed Eagle	Widespread	
		Hieraaetus morphnoides	Little Eagle	Widespread	
	Falconidae	*Falco berigora*	Brown Falcon	Widespread	
		Falco cenchroides	Nankeen Kestrel	Widespread	
		Falco peregrinus	Peregrine Falcon	Widespread	
Gruiformes	Rallidae	*Fulica atra*	Eurasian Coot	Widespread	
		Gallinula tenebrosa tenebrosa	Dusky Moorhen	Widespread	
Passeriformes	Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	Widespread	
		Acanthiza lineata	Striated Thornbill	Widespread	
		Acanthiza nana	Yellow Thornbill	Widespread	
		Acanthiza pusilla	Brown Thornbill	Widespread	
		Acanthiza reguloides	Buff-rumped Thornbill	Widespread	
		Acanthiza uropygialis	Chestnut-rumped Thornbill	Widespread	
		Gerygone fusca	Western Gerygone	Widespread	
		Gerygone olivacea	White-throated Gerygone	Widespread	
		Sericornis frontalis	White-browed Scrubwren	Widespread	
		Smicrornis brevirostris	Weebill	Widespread	
	Artamidae	*Artamus cyanopterus*	Dusky Woodswallow	Widespread	
		Artamus superciliosus	White-browed Woodswallow	Widespread	
		Cracticus nigrogularis	Pied Butcherbird	Widespread	
		Cracticus tibicen	Australian Magpie	Widespread	
		Cracticus torquatus	Grey Butcherbird	Widespread	
		Strepera graculina	Pied Currawong	Widespread	
		Strepera versicolor	Grey Currawong	Widespread	
	Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-Shrike	Widespread	
	Climacteridae	*Climacteris erythrops*	Red-browed Treecreeper	Widespread	
		Cormobates leucophaea	White-throated Treecreeper	Widespread	
	Corcoracidae	*Corcorax melanorhamphos*	White-winged Chough	Widespread	
	Corvidae	*Corvus coronoides coronoides*	Australian Raven	Widespread	
		Corvus mellori	Little Raven	Widespread	

	Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird	Widespread	
	Dicruridae	*Grallina cyanoleuca*	Magpie-lark	Widespread	
		Myiagra cyanoleuca	Satin Flycatcher	Widespread	
		Myiagra inquieta	Restless Flycatcher	Widespread	
		Myiagra rubecula	Leaden Flycatcher	Widespread	
		Rhipidura albiscapa alisteri	Grey Fantail	Widespread	
		Rhipidura leucophrys	Willie Wagtail	Widespread	
		Rhipidura rufifrons	Rufous Fantail	Widespread	
	Estrildidae	*Neochmia temporalis*	Red-browed Finch	Widespread	
	Hirundinidae	*Petrochelidon nigricans*	Tree Martin	Widespread	
	Maluridae	*Malurus cyaneus*	Superb Fairy-wren	Widespread	
	Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater	Widespread	
		Acanthorhynchus tenuirostris	Eastern Spinebill	Widespread	
		Anthochaera carunculata	Red Wattlebird	Widespread	
		Caligavis chrysops	Yellow-faced Honeyeater	Widespread	
		Certhionyx variegatus	Pied Honeyeater	Widespread	
		Entomyzon cyanotis	Blue-faced Honeyeater	Widespread	
		Manorina melanocephala	Noisy Miner	Widespread	
		Melithreptus lunatus	White-naped Honeyeater	Widespread	
		Nesoptilotis leucotis	White-eared Honeyeater	Widespread	
		Philemon citreogularis	Little Friarbird	Widespread	
		Philemon corniculatus	Noisy Friarbird	Widespread	
		Ptilotula penicillata	White-plumed Honeyeater	Widespread	
	Motacillidae	*Anthus novaeseelandiae*	Australian Pipit	Widespread	
	Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	Widespread	
	Oriolidae	*Oriolus sagittatus*	Olive-Backed Oriole	Widespread	
	Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-Thrush	Widespread	
		Falcunculus frontatus frontatus	Eastern Shrike-tit	Widespread	
		Pachycephala pectoralis	Golden Whistler	Widespread	
		Pachycephala rufiventris	Rufous Whistler	Widespread	

	Pardalotinae	*Pardalotus punctatus*	Spotted Pardalote	Widespread	
		Pardalotus striatus	Striated Pardalote	Widespread	
	Petroicidae	*Eopsaltria australis*	Eastern Yellow Robin	Widespread	
		Petroica boodang	Scarlet Robin	Widespread	
		Petroica goodenovii	Red-capped Robin	Widespread	
		Petroica phoenicea	Flame Robin	Widespread	
		Petroica rosea	Rose Robin	Widespread	
	Sturnidae	**Sturnus vulgaris*	Common Starling	Widespread	
	Turdidae	**Turdus merula*	Common Blackbird	Widespread	
	Zosteropidae	*Zosterops lateralis*	Silvereye	Widespread	
Psittaciformes	Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo	Widespread	
		Calyptorhynchus funereus	Yellow-tailed Black-cockatoo	Widespread	
		Eolophus roseicapillus	Galah	Widespread	
	Psittacidae	*Alisterus scapularis*	Australian King-Parrot	Widespread	
		Glossopsitta concinna	Musk Lorikeet	Widespread	
		Neophema pulchella	Turquoise Parrot	Widespread	
		Platycercus elegans	Crimson Rosella	Widespread	
		Platycercus eximius	Eastern Rosella	Widespread	
Strigiformes	Strigidae	*Ninox novaeseelandiae*	Southern Boobook, Morepork	Widespread	
		Ninox (Rhabdoglaux) strenua	Powerful Owl	Widespread	
MAMMALIA					
Artiodactyla	Bovidae	**Capra hircus*	Goat	Widespread	
	Cervidae	**Cervus elaphus*	Red Deer	Widespread	
	Suidae	**Sus scrofa*	Pig	Widespread	
Carnivora	Canidae	**Canis lupus familiaris*	Dog	Widespread	
		**Vulpes vulpes*	Red Fox	Widespread	
Chiroptera	Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	Widespread	
	Miniopteridae	*Miniopterus schreibersii oceanensis*	Eastern Bent-wing Bat	Widespread	Westernmost [outliers Balranald & Narrabri]

	Molossidae	*Austronomus australis*	White-striped Freetail-bat	Widespread	
		Mormopterus (Ozimops) planiceps	Little Mastiff-bat	Widespread	
		Mormopterus (Ozimops) ridei	Ride's Free-tailed Bat	Widespread	
	Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	Widespread	
		Chalinolobus morio	Chocolate Wattled Bat	Widespread	
		Falsistrellus tasmaniensis	Eastern False Pipistrelle	Widespread	
		Nyctophilus geoffroyi geoffroyi	Lesser Long-eared Bat	Widespread	
		Scotorepens orion	Eastern Broad-nosed Bat	Widespread	
		Vespadelus darlingtoni	Large Forest Bat	Widespread	
		Vespadelus regulus	Southern Forest Bat	Widespread	
		Vespadelus vulturnus	Little Forest Bat	Widespread	
Dasyuromorphia	Dasyuridae	*Antechinus agilis*	Agile Antechinus	Widespread	Northernmost
		Antechinus stuartii	Brown Antechinus	Widespread	Westernmost
Diprotodontia	Acrobatidae	*Acrobates pygmaeus*	Feathertail Glider	Widespread	
	Macropodidae	*Macropus giganteus*	Eastern Grey Kangaroo	Widespread	
		Macropus rufogriseus	Red-necked Wallaby	Widespread	
		Osphranter robustus robustus	Wallaroo	Widespread	
		Wallabia bicolor	Swamp Wallaby	Widespread	
	Petauridae	*Petaurus australis*	Yellow-bellied Glider	Widespread	Westernmost
		Petaurus breviceps breviceps	Sugar Glider	Widespread	
	Phalangeridae	*Trichosurus vulpecula*	Australian Brushtail Possum	Widespread	
	Pseudocheiridae	*Petauroides volans*	Greater Glider	Widespread	Westernmost
		Pseudocheirus peregrinus	Common Ringtail Possum	Widespread	
	Vombatidae	*Vombatus ursinus*	Bare-nosed Wombat	Widespread	
Lagomorpha	Leporidae	**Oryctolagus cuniculus*	Rabbit	Widespread	
Monotremata	Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna	Widespread	
Perissodactyla	Equidae	**Equus caballus*	Horse	Widespread	

Rodentia	Muridae	**Mus musculus*	House Mouse	Widespread	
		Rattus fuscipes	Southern Bush Rat	Widespread	
		**Rattus rattus*	Ship Rat	Widespread	
REPTILIA					
Squamata	Agamidae	*Amphibolurus muricatus*	Jacky Lizard	Widespread	
		Rankinia diemensis	Mountain Dragon	Widespread	Westernmost
	Elapidae	*Austrelaps ramsayi*	Highland Copperhead	Widespread	Westernmost
	Scincidae	*Acritoscincus platynotus*	Red-throated Skink	Widespread	
		Ctenotus robustus	Robust Ctenotus	Widespread	
		Ctenotus taeniolatus	Copper-tailed Skink	Widespread	
		Egernia cunninghami	Cunningham's Skink	Widespread	
		Egernia striolata	Tree Skink	Widespread	
		Eulamprus heatwolei	Yellow-bellied Water Skink	Widespread	Westernmost
		Eulamprus quoyii	Eastern Water-skink	Widespread	
		Hemiergis decresiensis	Three-toed Earless Skink	Widespread	
		Lampropholis delicata	Dark-flecked Garden Skink	Widespread	
		Lampropholis guichenoti	Pale-flecked Garden Sunskink	Widespread	
		Liopholis whitii	White's Skink	Widespread	
		Menetia greyii	Common Dwarf Skink	Widespread	
		Pseudemoia entrecasteauxii	Tussock Cool-skink	Widespread	Westernmost
		Saproscincus mustelinus	Weasel Skink	Widespread	Westernmost
		Tiliqua rugosa	Shingle-back	Widespread	
		Tiliqua scincoides	Eastern Blue-tongue	Widespread	
	Varanidae	*Varanus gouldii*	Gould's Goanna	Widespread	