# Vegetation of Ironbark Nature Reserve and *Bornhardtia* Voluntary Conservation Agreement, Northern Tablelands, New South Wales

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***Abstract***: The vegetation of Ironbark Nature Reserve (1603 ha) and *Bornhardtia* Voluntary Conservation Agreement (704 ha), 75 km north west of Armidale, 30 km north east of Barraba (30°19'S, 150°53'E) in the Barraba Shire, in the Northern Tablelands Bioregion NSW, is described. Eleven communities are defined based on flexible UPGMA analysis of cover-abundance scores of all vascular plant taxa. These communities are mapped based on ground truthing, air photo interpretation and substrate. All communities are simple in structure being primarily of woodlands or shrublands.

Communities described are: (1**)** *Eucalyptus macrorhyncha* (Red Stringybark) – *Eucalyptus blakelyi* (Red Gum) Woodlands**,** (2**)** *Eucalyptus caleyi* (Caley's Ironbark) – *Eucalyptus andrewsii* (Western New England Blackbutt) Woodlands**,** (3**)** *Eucalyptus prava* (Orange Gum) – *Eucalyptus andrewsii* (Western New England Blackbutt) Woodlands, (4) *Eucalyptus dealbata* (Tumbledown Gum) – *Eucalyptus caleyi* (Caley's Ironbark) Woodlands, (5) *Eucalyptus prava* (Orange Gum) – *Eucalyptus blakelyi* (Red Gum) Woodlands, (6) *Eucalyptus quinniorum* (Quinn's Gum) – *Eucalyptus prava* (Orange Gum) Forests, (7) *Angophora floribunda* (Rough-barked Apple) – *Eucalyptus blakelyi* (Red Gum) Woodlands**,** (8**)** *Casuarina cunninghamiana* (River Oak) – *Eucalyptus blakelyi* (Red Gum) – *Angophora floribunda* (Apple) Forests, (9) *Calytrix tetragona* (Fringe Myrtle) – *Ozothamnus obcordatus* (Daisy Bush) Open Shrublands, (10**)** *Homoranthus bornhardtiensis* Open Shrublands and (11) *Leptospermum polygalifolium* (Tea-tree) Wetland.

All communities described here are inadequately represented in the conservation network with one (White-Box – Yellow-Box – Blakely's Red Gum Woodland) listed as endangered on the NSW *TSC Act*. Both conservation areas and neighbouring parcels of land contain extensive areas of little disturbed high quality 'old growth'. 38 species are of conservation significance of which one is listed as Vulnerable and one Endangered on the NSW *TSC Act*. The broader remnant is under increasing pressure for clearing for grazing production and the combined area of both reserves is considered to be inadequate to protect the significant features of the local region.

***Cunninghamia* (2003) 8(1): 93–110**

## Introduction

Ironbark Nature Reserve and the adjoining land of the *Bornhardtia* Voluntary Conservation Agreement (VCA) are located within Northern Tablelands Botanical Division, 75 km north west of Armidale and 30 km east north east of Barraba (lat 30°19'S long 150°53') (Figure 1). They lie in the New England Tablelands Bioregion though the western boundary of Ironbark NR and the southern boundary of the VCA correspond with the Nandewar and Northern Tablelands Bioregion's common boundary. Both areas are within the local government area of Barraba Shire and the County and Parish of Darling. At present, Ironbark Nature Reserve covers 1603 ha and *Bornhardtia* VCA , an additional 750 ha (including 36 ha of road reserves). *Bornhardtia* adjoins nearly 2 km of the south eastern boundary of the Nature Reserve and runs south for almost five kilometres. The Ironbark 9037-II-N 1: 25 000 map sheet covers the majority of the area with a small portion on the Linton 9037-II-S 1: 25 000 sheet. All current boundaries are with freehold lands.

This paper gives part of the results of a flora survey to provide baseline data for the joint management plan for the Nature Reserve and the Voluntary Conservation Agreement (VCA) to map vegetation communities and to provide information on the distribution of rare or geographically restricted or disjunct taxa. This information will be used to assist the development of appropriate management strategies (Hunter 2002a). A VCA is an agreement negotiated between the Minister for the Environment and private landholders. The agreement is binding and is registered on the title of the land. The name of the private property is *Bornhardtia*, hence the agreement is the *Bornhardtia* VCA.

### *Climate and landform*

The median rainfall for the area is 773 mm per annum but fluctuates greatly, with yearly rainfall from as little as 473 mm up to 1108 mm per annum. On average seasonal rainfall peaks between October and January, with January being the highest rainfall month. Seasonal snowfalls occur but are rare, though frosts are common in the winter months. Average annual temperature varies from 14.6–17.7°C, with an average maximum of 32°C and minimum of –2.2°C. Climate varies greatly over the study area due to the rugged topography and changes in elevation.

The study area is a rugged landscape located on an eastern arm of the Nandewar Range. Elevation ranges from 640 m at the

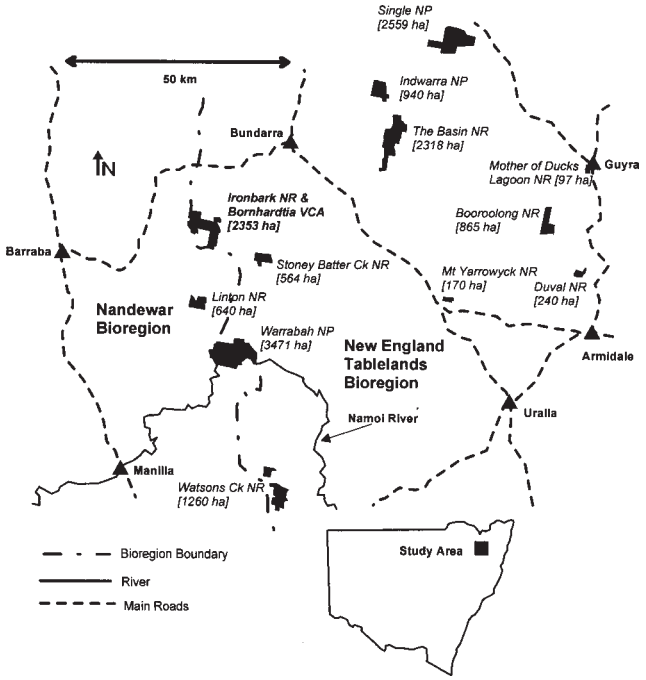


**Fig. 1.** Location of Ironbark Nature Reserve and *Bornhardtia* Voluntary Conservation Agreement, and nearby conservation areas in northeastern NSW.

point where Long Swamp Creek leaves the Nature Reserve to 1010 m at the top of Little Bald Rock within *Bornhardtia*.

The topography is dominated by exposed inselbergs, flatrocks, boulder piles, boulder fields and subsurface flatrocks. Areas of low relief are uncommon but in some small areas sections occur along deeply incised sections of Long Swamp Creek.

Drainage flows to the west. The majority of water from *Bornhardtia* flows into Bald Rock Swamp Creek which later joins to Long Swamp Creek on the southern boundary of Ironbark NR. All water catchments within both conservation areas drain into Long Swamp Creek, which joins Ironbark Creek to the west. Ironbark Creek then heads south to join the Namoi River; this flows into Lake Keepit.

*Geology*

Ironbark and *Bornhardtia* are situated within the Central Block (Gilligan & Brownlow 1987) of the southern New England Orogen, east of the Tamworth Belt and the Peel Fault System. The majority of the study area is within the Bundarra Plutonic Suite, an S-type post-tectonic unstressed granitoid belt of about 290 million years old that runs from Howell (Copeton Dam) south of Inverell, south to Bendemeer north of Tamworth (Ashley & Flood 1997). The western boundary of Ironbark at the point that Long Swamp Creek leaves the reserve is a small area of the Whitlow Formation that includes low-grade regionally metamorphosed and multiply deformed lithic wacke. Minor inclusions of the Cara Formation, that includes low grade regionally metamorphosed and multiply deformed metabasalt, also occur here and in a few minor localities within Ironbark.

*European landuse and history*

Portion 3 of the Shire of Barraba, Parish and County of Darling, resumed from sale on the 4 August 1897, forms the majority of Ironbark Nature Reserve. By 1897, the more open areas with deeper soil along Long Swamp Creek had been cleared with some areas showing regrowth (Plan of Portion 3, Parish Map LB 98/3137, 1898). Prickly Pear was noted to be infesting at least a quarter of the portion. By 1911 areas included within the current Reserve had been ring-barked with suckers mattocked or thick regeneration occurring (Plan of Portion 3, Parish Map SL082, 1911) Up until the area was taken over by the National Parks & Wildlife Service in 1985 it was grazed and Long Swamp Creek burnt for green pick up for stock. Areas in the south-eastern corner of Ironbark also appear to have been selectively cleared in the past.

Much of *Bornhardtia* appears to have been unmodified, particularly the southern two thirds. It originally formed part of the Ironbark and Tea-tree Gold Fields and then *Stoney Batter* which was gazetted as a pastoral holding in 1851 and included 204 800 acres, of which 66 560 was considered to be mountains and scrub (Harris 2000). Areas in the northern third of the property appear to have been partially cleared, particularly in the north-eastern corner which adjoins and had similar past treatment to adjoining areas in Ironbark. Creeklines, particularly the larger ones had been burnt seasonally for green pick. The top third of the property was used for winter grazing between the later 1980s and 1997 when this practice stopped after purchase by the current owners. A small area of approximately 20 ha was selectively cleared and ring-barked in the mid-1990s by the previous owner.

Ironbark Nature Reserve was gazetted in November 1985 with 1230 ha; an additional 373 ha adjoining the eastern boundary purchased in 1988 to incorporate a significant cultural heritage site. *Bornhardtia* was subdivided and purchased from *Granite Heights* in 1997. On the 18 October 2001, under a Voluntary Conservation Agreement, 704 ha (excluding road reserves and 9.5 ha in the southeastern corner) were gazetted. The derivation of the property name is from a 'Bornhardt', a basic inselberg feature described as a large dome-shaped monolith, bald and steeply sided with few fractures whereas the surrounding landscape is highly fractured (Twidale 1982).

Within close proximity and conserving similar vegetation types are Stoney Batter Nature Reserve (563 ha, gazetted in 1999); Linton Nature Reserve (161 ha, gazetted in 1979; and Warrabah National Park (3556 ha, gazetted in 1984), the largest reserve in the region. Despite the number of reserves in the general vicinity, all combined there are only 6587 ha of land conserved in the region.

*Previous investigations*

Greg Roberts, local NPWS ranger and naturalist visited Ironbark Nature Reserve on its dedication and provided a brief synopsis of the major floristic patterns and some of the more unusual species (Roberts, unpublished). Roberts completed

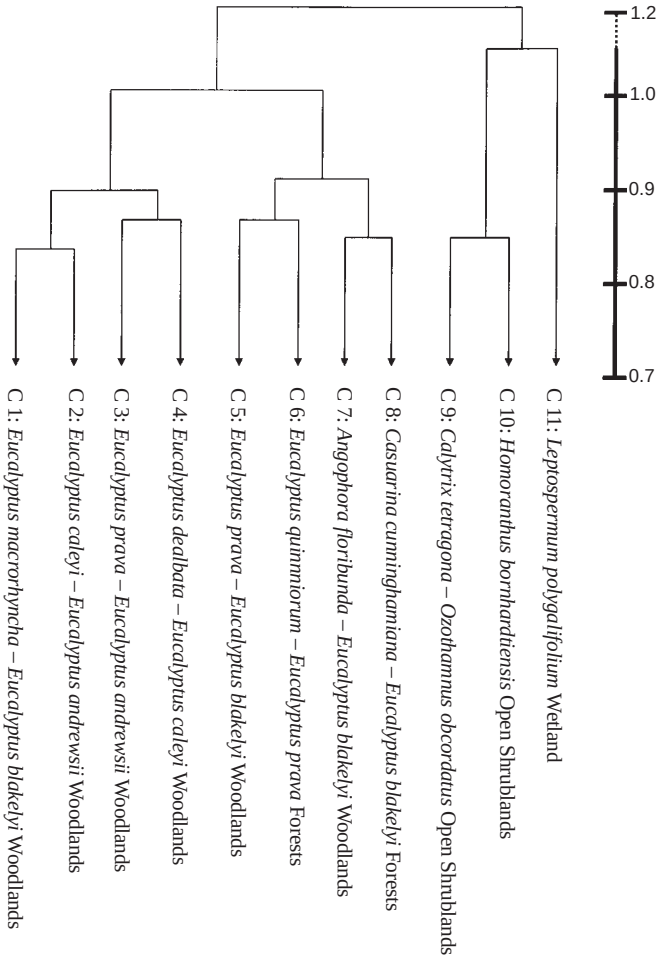


**Fig. 2.** Summary dendrogram of the full floristic dataset of sites using Kulczynski association and flexible UPGMA fusion strategy.

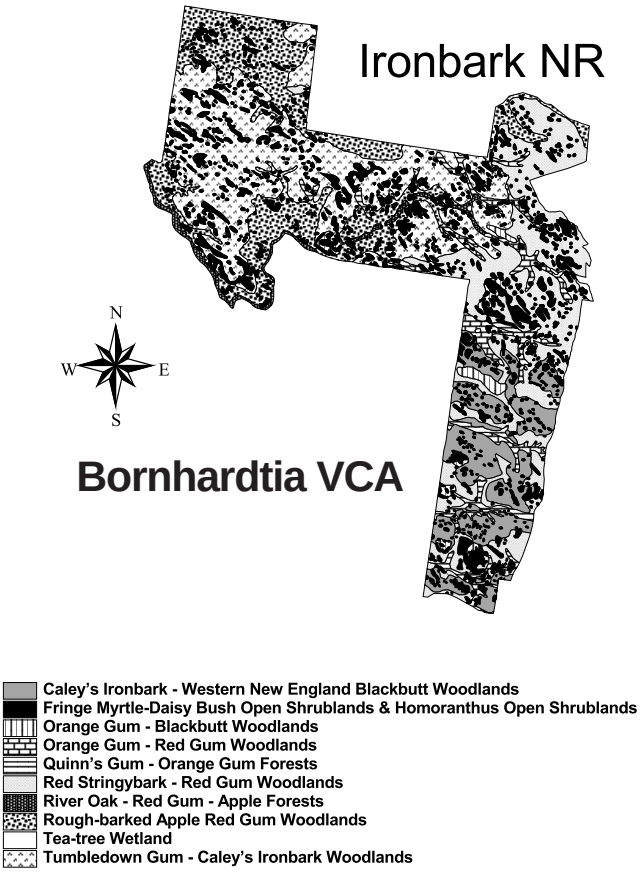


**Fig. 3.** Map of vegetation communities for Ironbark Nature Reserve and *Bornhardtia* Voluntary Conservation Agreement.

a masters preliminary thesis on the vegetation on granite on the Northern Tablelands and North Western Slopes, but no sites were placed in the study area (Roberts 1983). Roberts (1992) mapped the vegetation of the region using LANDSAT TM images. As part of the owner's application for NPWS purchase of *Granite Heights*, the author made a checklist of 120 species on a half-day visit in 1996 during a preliminary investigation of the property (Hunter, unpublished). Hunter returned later in 1996 and placed 30 × 0.1 ha full floristic survey sites (Hunter & Clarke 1998; Hunter 1999). Hunter described two new species from what was to become *Bornhardtia* (Hunter 1998; Hunter & Bruhl 1999).

## Methods

Vascular plants were scored using the Braun-Blanquet (1982) six point cover abundance scale from 110, 20 × 20 m quadrats. Quadrats were placed using a stratified random method using altitude, aspect and physiography (crest & upper slope, lower slope & flats, open depressions). The survey was conducted over a period of 14 days during September 2001 and April 2002.

Good quality specimens were retained as vouchers by the New England Tablelands Region of the NSW NPWS and duplicates of significant collections submitted to the National Herbarium of NSW. Nomenclature follows that of Harden (1990–1993) except where recent changes have been made.

Analyses and data exploration were performed using options available in the PATN Analysis Package (Belbin 1995a, b). For final presentation of results all species and their relative abundance scores were used and the analysis performed using Kulczynski association measure which is recommended for ecological applications (Belbin 1995a, b) along with flexible Unweighted Pair Group arithMetic Averaging (UPGMA) and the default PATN settings.

Delineation of community boundaries in Figure 3 was based on the location of sites and their position within the multivariate analysis, air photograph interpretation, substrate and ground truthing. The vegetation map is based on a 1:25 000 scale. Structural names follow Specht et al. (1995) and are based on the most consistent uppermost stratum.

## Results

Eleven communities were recognised at the dissimilarity measure of c. 0.8. A summary of the community relationships is given in the dendrogram (figures 2 & 3). A

| Community | Number of sites | Richness per 400 m² (average) | Number of Species | Number of Introduced Species | Proportion of reserves | Number of Hectares |
|---|---|---|---|---|---|---|
| C 1: *Eucalyptus macrorhyncha* – *Eucalyptus blakelyi* Woodlands | 20 | 35–54 (44.8) | 179 | 11 | 20.3% | 548.9 |
| C 2: *Eucalyptus macrorhyncha* – *Eucalyptus andrewsii* Woodlands | 21 | 29–52 (41.6) | 168 | 7 | 9.5% | 255.2 |
| C 3: *Eucalyptus prava* – *Eucalyptus andrewsii* Woodlands | 6 | 16–45 (28.7) | 92 | 0 | 1.2% | 32.0 |
| C 4: *Eucalyptus dealbata* – *Eucalyptus caleyi* Woodlands | 8 | 24–46 (36.3) | 110 | 3 | 28.8% | 778.5 |
| C 5: *Eucalyptus prava* – *Eucalyptus blakelyi* Woodlands | 8 | 33-65 (49.5) | 179 | 21 | 3.7% | 100.8 |
| C 6: *Eucalyptus quinnniorum* –*Eucalyptus prava* Forests | 10 | 32-67 (49.6) | 164 | 7 | 1.6% | 43.6 |
| C 7: *Angophora floribunda* – *Eucalyptus blakelyi* Woodlands | 15 | 22-60 (37.1) | 165 | 17 | 18.1% | 490.1 |
| C 8: *Casuarina cunninghamiana* – *Eucalyptus blakelyi* Forests | 3 | 30-39 (33.7) | 73 | 11 | 1.4% | 38.2 |
| C 9: *Calytrix tetragona* – *Ozothamnus obcordatus* Open Shrublands | 9 | 19-24 (20.2) | 79 | 2 | ?7.6% | ?206.0 |
| C 10: *Homoranthus* Open Shrublands | 9 | 17-38 (25.6) | 107 | 3 | ?7.6% | ?206.0 |
| C 11: *Leptospermum polygalifolium* Wetland | 1 | 21 | 21 | 3 | 0.1% | 3.4 |

**Table 1. Selected attributes of the eleven defined communities at Ironbark Nature Reserve and the *Bornhardtia* VCA.**

total of 477 vascular plant taxa were recorded from 140 sites overall. From the 110 survey sites for this work 402 taxa were recorded. A further 75 taxa were recorded opportunistically and collated from previous surveys. The number of taxa captured represents about 7% of the total NSW flora and about 24% of the flora of the Northern Tablelands.

The 477 taxa occurred in 93 families and 269 genera. The families with the greatest number of taxa are: Asteraceae (55), Poaceae (53), Fabaceae (49), Myrtaceae (24), Cyperaceae (22), Orchidaceae (20), Juncaceae (11), Caryophyllaceae (11), Rubiaceae (10), Apiaceae (10), Epacridaceae (9) and Proteaceae (9). The richest genera are: *Acacia* (14), *Eucalyptus* (11), *Juncus* (10), *Cyperus* (8), *Hibbertia* (6), *Leptospermum* (6), *Pterostylis* (6), *Brachyscome* (5), *Goodenia* (5), *Leucopogon* (5), *Lomandra* (5), *Olearia* (5), *Pultenaea* (5), *Senecio* (5), *Wahlenbergia* (5).

## Vegetation communities

Many of the vegetation communities within Ironbark Nature Reserve and *Bornhardtia* Voluntary Conservation Agreement are woodlands with either a predominantly shrubby or grassy understorey. Shrublands and herbfields do occur but are of restricted distribution primarily on shallow skeletal soils. Grasslands, except for those of a derived nature, were not found. Sedgelands were also missing, apart from minor occurrences directly associated with creek banks. Forests are found, but these are infrequent and usually associated with protected sites on deeper soils. *Callitris endlicheri* is the most prominent tree species in the area and has often been subsumed in the community names to enable greater differentiation of floristic units. Other overstorey trees are ubiquitous or at least subdominant in several assemblages. The general fidelity of associated understorey species changes considerably allowing the recognition of communities despite many overstorey similarities. Overall, communities within the study area are *Callitris endlicheri*, *Eucalyptus blakelyi* and *Eucalyptus caleyi* subsp. *caleyi* dominant with occurrences of *Eucalyptus macrorhyncha* and *Eucalyptus melliodora* on better and deeper soils. A summary of relevant statistics for each community are presented in Table 1. Extreme values are given in brackets within the following descriptions of communities.

### Community 1: *Eucalyptus macrorhyncha* (Red Stringybark) – *Eucalyptus blakelyi* (Red Gum) Woodlands

**Environmental relationships:** usually on mid to upper slopes but sometimes also on lower slopes and flats. Soils are usually sandy loam, loam or rarely loamy sand, are deep or shallow and are usually dark to light brown or grey brown.

**Structure:** primarily grassy woodlands but also shrubby woodlands and open forests. Tree layer: (12–) 20–25 (–30) m tall; 20–30 (–40)% cover. Tall shrub layer: absent. Low shrub layer: 1–3 (–4) m tall; (5–) 20–30 (–40)% cover. Understorey layer: < 1 m tall; (30–) 50–90% cover. (Fig. 4).

**Trees:** *Eucalyptus macrorhyncha, Callitris endlicheri, Angophora floribunda, Eucalyptus blakelyi, Eucalyptus bridgesiana, Eucalyptus melliodora, Eucalyptus prava, Eucalyptus andrewsii, Eucalyptus caleyi.*

**Shrubs:** *Cassinia quinquefaria, Leucopogon muticus, Hibbertia obtusifolia, Melichrus urceolatus, Pultenaea* sp. *G, Brachyloma daphnoides* ssp. *glabrum, Lissanthe strigosa, Olearia elliptica, Olearia viscidula, Hibbertia riparia, Dodonaea viscosa* var. *angustifolia, Acacia neriifolia, Acacia leiocalyx, Pultenaea* sp. *C, Indigofera adesmiifolia.*

**Fig. 4.** Community 1 *Eucalyptus macrorhyncha* and *Eucalyptus blakelyi* Woodlands

**Fig. 5.** Community 2 *Eucalyptus caleyi* subsp. *caleyi* and *Eucalyptus andrewsii* Woodland

**Climbers & trailers:** *Desmodium varians, Glycine clandestina, Hardenbergia violacea, Clematis glycinoides.*

**Ground cover:** *Cymbopogon refractus, Aristida vagans, Geranium solanderi* var. *solanderi, Dichelachne micrantha, Lomandra multiflora, Echinopogon caespitosus* var. *caespitosus, Luzula flaccida, Dichondra repens, Dianella caerulea, Senecio diaschides, Caladenia fuscata, Aristida calycina, Themeda australis, Cheilanthes sieberi, Hydrocotyle peduncularis, Dianella revoluta, Wahlenbergia planifolia* ssp. *pilosa, Oxalis chnoodes, Joycea pallida, Acaena novae-zelandiae, Viola betonicifolia, Veronica calycina, Goodenia macbarroni, Plantago varia, Lepidosperma laterale, Imperata cylindrica, Ranunculus lappaceus, Chrysocephalum apiculatum, Austrodanthonia laevis, Vittadinia cuneata, Scleranthus biflorus, Poa sieberiana, Microlaena stipoides, Goodenia hederacea, Hypericum gramineum, Euchiton sphaericus, Wahlenbergia gracilis, Sorghum leiocladum, Haloragis heterophylla, Galium migrans, Sigesbeckia australiensis, Pomax umbellata, Opercularia diphylla, Galium gaudichaudii, Fimbristylis dichotoma, Dichondra* sp. *A, Carex breviculmis, Scutellaria humilis, Poranthera microphylla, Lomandra longifolia, Goodenia bellidifolia, Echinopogon ovatus.*

**Introduced taxa:** *Hypochaeris radicata, Conyza albida, Centaurium erythraea, Trifolium repens, Lactuca serriola, Verbena rigida, Verbena bonariensis, Secale cereale, Rubus chloocladus, Petrorhagia nanteuilii, Cirsium vulgare.*

**Variability:** this is predominantly a grassy and herbaceous assemblage with often a minor shrub component. However, in a few sites, particularly in more exposed positions or where soils are shallower, shrubs can become more prominent and be up to 40% cover.

**Conservation status:** although likely to extend from at least Inverell to Warrabah this assemblage is only reserved locally, here and in Warrabah NP and potentially Stoney Batter Ck NR. Thus, this community is not represented formally in conservation areas across its range. In addition, the number of combined hectares in reserve are likely to be low. Thus, this assemblage should be considered poorly conserved locally in terms of area, and also inadequately in terms of representation within the reserve network. Parts of this community are dominated by Yellow Box – Blakely's Red Gum and as such would be considered Endangered on the NSW *TSC* Act and the *EPB&C Act*.

### Community 2: *Eucalyptus caleyi* (Caley's Ironbark) – *Eucalyptus andrewsii* (Western New England Blackbutt) Woodlands

**Environmental relationships:** primarily on crests and upper slopes, but also in other physiographic positions. Soils are well-drained or occasionally moist. Soil colour is usually brown, from light to grey brown or occasionally red brown, and sandy loam in texture or rarely loamy sand or loam.

**Structure:** primarily shrubby woodlands or open forests. Tree layer: (8–) 15–20 (–30) m tall; 20–30 (–40)% cover. Tall shrub layer: 3–10 (–12) m tall; 10–20 (–40)% cover, but usually absent. Low shrub layer: 1–3 m tall; (10–) 20–30 (–40)% cover. Understorey layer: < 1 m tall; (10–) 30–60 (–80)% cover. (Fig. 5).

**Trees:** *Callitris endlicheri, Eucalyptus caleyi, Eucalyptus prava, Eucalyptus andrewsii, Eucalyptus macrorhyncha, Eucalyptus quinniorum, Angophora floribunda, Eucalyptus melliodora, Eucalyptus bridgesiana.*

**Shrubs:** *Pultenaea* sp. *G, Cassinia quinquefaria, Leucopogon muticus, Hibbertia obtusifolia, Brachyloma daphnoides* ssp. *glabrum, Acacia neriifolia, Olearia elliptica, Lissanthe strigosa, Melichrus urceolatus, Leucopogon lanceolatus, Dodonaea viscosa* subsp. *angustifolia, Acacia penninervis, Correa reflexa, Persoonia sericea, Indigofera australis, Pultenaea spinosa, Olearia rosmarinifolia, Acacia buxifolia.*

**Climbers & trailers:** *Hardenbergia violacea, Glycine clandestina, Glycine tabacina, Clematis glycinoides, Billardiera scandens, Desmodium varians.*

**Ground cover:** *Joycea pallida, Lepidosperma laterale, Dichelachne micrantha, Lomandra multiflora, Cymbopogon refractus, Goodenia hederacea, Luzula flaccida, Macrozamia heteromera, Caladenia fuscata, Pomax umbellata, Dianella caerulea, Senecio diaschides, Wahlenbergia planiflora* subsp. *pilosa, Geranium solanderi* var. *solanderi, Patersonia sericea, Gonocarpus tetragynus, Plantago varia, Oxalis chnoodes, Dianella revoluta, Cheilanthes sieberi, Derwentia arcuata, Vittadinia cuneata, Lomandra longifolia, Carex breviculmis, Aristida vagans, Euchiton sphaericus, Themeda australis, Ranunculus lappaceus, Opercularia diphylla, Goodenia macbarroni, Derwentia arenaria, Arthropodium milleflorum, Aristida calycina, Brachyscome microcarpa, Wahlenbergia gracilis, Lomandra filiformis, Hypericum gramineum, Hydrocotyle peduncularis, Galium gaudichaudii, Dichondra repens, Crassula sieberiana, Viola betonicifolia, Veronica calycina, Poa sieberiana.*

**Introduced taxa:** *Hypochaeris radicata, Conyza albida, Opuntia stricta, Centaurium erythraea, Paronychia brasiliana, Arenaria leptoclados, Aira cupaniana.*

**Variability:** two fairly distinctive sub-assemblages are readily recognised in the field. More sheltered sites, such as on the southern side of dry shallow ridges or amongst a large collection of boulders a sub-assemblage dominated by *Eucalyptus andrewsii, E. quinniorum* and *E. macrorhyncha* occurs. The understorey is primarily dominated by *Pultenaea* sp. *G* in the shrub layer and *Joycea pallida* and *Austrodanthonia* spp. are more common in the ground layer. In exposed localities such as ridges or northern slopes a second sub-assemblage occurs which is dominated by *Eucalyptus caleyi, E. prava* and *E. macrorhyncha* with an understorey of *Cassinia quinquefaria* and *Leucopogon muticus* in the shrub layer and a dominance of *Cymbopogon refractus* and *Joycea pallida* in the ground layer.

**Conservation status:** Wall (2000) considered similar assemblages to be 64% cleared with only 2.4% of its reservation target met. This is likely to represent an overestimate of the area cleared as this type of assemblage is usually of poor agricultural quality and is often what is left in remnants. This community can be said to be reserved across its range of occurrence, but that representation is probably inadequate in terms of the area conserved.

### Community 3: *Eucalyptus prava* (Orange Gum) – *Eucalyptus andrewsii* (Western New England Blackbutt) Woodlands

**Environmental relationships:** commonly on slopes, particularly mid-slopes, but also on crests. On well drained or rarely moist soils, which are sandy loam or loamy sand in texture. Soils are dark brown or dark grey brown in colour.

**Structure:** usually low woodlands or low open woodlands verging on shrublands. Tree layer: 8–18 (–25) m tall ; 10–30% cover. Tall shrub layer: absent. Low shrub layer: 1–3 m tall; (5–) 10–20% cover. Understorey layer: < 1 m tall; 20–60 (–80)% cover. (Fig. 6).

**Trees:** *Eucalyptus prava, Callitris endlicheri, Eucalyptus andrewsii, Eucalyptus quinniorum, Eucalyptus macrorhyncha, Eucalyptus caleyi, Eucalyptus melliodora, Angophora floribunda*.

**Shrubs:** *Leucopogon muticus, Pultenaea* sp. C, *Cassinia quinquefaria, Acacia penninervis, Hibbertia acicularis, Pultenaea foliolosa, Notelaea microcarpa, Monotoca scoparia, Lissanthe strigosa, Hibbertia obtusifolia, Goodenia macbarroni, Acacia neriifolia, Ozothamnus obcordatus, Olearia viscidula, Melichrus urceolatus, Leucopogon virgatus, Hibbertia* sp. 'grandiflora', *Grevillea triternata, Brachyloma daphnoides* subsp. *daphnoides.*

**Climbers & trailers:** *Hardenbergia violacea.*

**Ground cover:** *Joycea pallida, Pomax umbellata, Lomandra multiflora, Gonocarpus tetragynus, Dichelachne micrantha, Imperata cylindrica, Wahlenbergia communis, Patersonia sericea, Opercularia diphylla, Goodenia macbarroni, Dianella revoluta, Dianella caerulea, Stylidium graminifolium, Poa sieberiana, Lomandra longifolia, Lomandra filiformis, Lepidosperma laterale, Entolasia stricta, Dichelachne sieberiana.*

**Introduced taxa:** non-apparent.

**Variability:** this assemblage is highly variable in structure but is generally a low open grassy woodland. It occurs in a variety of situations, but usually in exposed situations with shallow to almost skeletal soils on the margins of rock outcrops or areas with a great deal of loose surface rock. Tall shrub layers are absent and only a sparse low shrub layer is present. Despite this the ground layer is often sparse. The greatest overall variability is how low and open the canopy is and in the level of ground cover.

**Fig. 6.** Community 3: *Eucalyptus prava* and *E. andrewsii* Woodland

**Conservation status:** Wall (2000) considered that 58.6% of this type of assemblage has been cleared and that only 6.8% of the reservation target has been met. DeVries (2000) considered that 40% of this type of assemblage has been cleared in the Nandewar Bioregion. It is possible that the estimated amount of clearance of this type of community is overestimated, but the amount in reservation would still be minimal. Both in the strict and broad sense this community is poorly conserved across its range and the number of hectares reserved is minimal.

### Community 4: *Eucalyptus dealbata* (Tumbledown Gum) – *Eucalyptus caleyi* (Caley's Ironbark) Woodlands

**Environmental relationships:** found usually on crests and upper slopes on well drained soils. Soils are generally sandy loam, or loamy sand or rarely loamy in texture and are grey brown to dark brown in colour. Shallow soils are most common with deep or skeletal soils being rare.

**Structure:** usually low open woodlands to woodlands. Tree layer: 8–15 (–25) m tall ; 10–30% cover. Tall shrub layer: absent. Low shrub layer: 1–3 m tall; 20–30 (–50)% cover. Understorey layer: < 1 m tall; 20–70% cover. (Fig. 7).

**Trees:** *Eucalyptus dealbata, Callitris endlicheri, Eucalyptus caleyi* subsp. *caleyi, Eucalyptus prava, Eucalyptus quinniorum, Eucalyptus macrorhyncha, Eucalyptus andrewsii, Eucalyptus albens, Brachychiton populneus, Angophora floribunda, Eucalyptus melliodora.*

**Shrubs:** *Cassinia quinquefaria, Olearia elliptica, Hibbertia obtusifolia, Correa reflexa, Leucopogon muticus, Acacia neriifolia, Pultenaea* sp. *G, Maytenus silvestris, Bursaria spinosa, Pultenaea* sp. *C, Notelaea microcarpa, Indigofera adesmiifolia, Melichrus urceolatus, Acacia penninervis.*

**Climbers & trailers:** *Desmodium varians, Glycine tabacina, Parsonsia eucalyptophylla, Clematis glycinoides.*

**Ground cover:** *Aristida vagans, Joycea pallida, Cymbopogon refractus, Lepidosperma laterale, Dichelachne micrantha, Lomandra multiflora, Cheilanthes distans, Aristida calycina, Wahlenbergia communis, Scleranthus biflorus, Dichondra* sp. *A, Dianella revoluta, Cheilanthes sieberi, Arthropodium milleflorum, Scleria mackaviensis, Pomax umbellata, Poa sieberiana, Austrodanthonia racemosa* subsp. *obtusata, Lomandra filiformis, Themeda australis, Lomandra longifolia, Echinopogon caespitosus, Trachymene incisa, Scutellaria humilis, Plantago varia, Panicum effusum, Oxalis chnoodes, Opercularia aspera, Luzula flaccida, Goodenia hederacea, Geranium solanderi* var. *solanderi, Desmodium brachypodum, Derwentia arenaria, Cyperus fulvus, Commelina cyanea, Carex appressa.*

**Introduced taxa:** *Opuntia stricta, Secale cereale, Bromus diandrus.*

**Variability:** few canopy species have fidelity in this assemblage. *Eucalyptus dealbata* is most commonly associated with *E. caleyi, E. prava* and *E. macrorhyncha* in one sub-assemblage on more exposed sites, with *Aristida* spp., *Joycea pallida* and *Cymbopogon refractus* common in the ground layer. In more protected sites other eucalypt taxa are also found with little fidelity, but which may commonly include *Eucallptus andrewsii* and *E. caleyi* and a ground layer commonly dominated by *Joycea pallida*, *Lomandra* spp. and *Cymbopogon refractus*. Both sub-assemblages have a shrub layer dominated by *Olearia elliptica* and *Cassinia quinquefaria*.

**Conservation status:** according to DeVries (2000) between 55–58% of similar assemblages have been cleared in the past in the Nandewar Bioregion. This assemblage in a stricter sense is likely to only occur within Ironbark NR and Warrabah NP. In both areas the distribution is limited and thus this assemblage should be considered poorly reserved both locally and across its range. The areas that include White Box – Yellow Box are considered Endangered on the NSW *TSC Act* and the *EPB&C Act*.

**Fig. 7.** Community 4: *Eucalyptus dealbata* and *Eucalyptus caleyi* subsp. *caleyi* Woodland

**Fig. 8.** Community 5: *Eucalyptus prava* and *Eucalyptus blakelyi* Woodland

**Community 5: *Eucalyptus prava* (Orange Gum) – *Eucalyptus blakelyi* (Red Gum) Woodlands**

**Environmental relationships:** found almost exclusively in open depressions but also rarely on lower slopes. Soils are usually moist but also rarely well drained or water logged. Soil texture is loam or sandy loam or rarely loamy sand or clay loam and is distinctly brown in colour.

**Structure:** woodlands. Tree layer: 10–25 m tall; 20–30% cover. Tall shrub layer: absent. Low shrub layer: 1–3 (–6) m tall; 10–60% cover. Understorey layer: < 1 m tall; 40–100% cover. (Fig. 8).

**Trees:** *Callitris endlicheri, Eucalyptus prava, Angophora floribunda, Eucalyptus blakelyi, Eucalyptus bridgesiana, Eucalyptus macrorhyncha, Eucalyptus quinniorum, Eucalyptus caleyi* subsp. *caleyi, Eucalyptus andrewsii*.

**Shrubs:** *Leptospermum polygalifolium, Callistemon pungens, Cassinia quinquefaria, Dodonaea viscosa* subsp. *angustifolia, Acacia neriifolia, Olearia viscidula, Olearia elliptica, Leucopogon muticus, Correa reflexa, Calytrix tetragona.*

**Climbers & trailers:** *Glycine clandestina, Desmodium varians, Clematis glycinoides, Rubus parvifolius.*

**Ground cover:** *Imperata cylindrica, Hydrocotyle peduncularis, Arthropodium milleflorum, Echinopogon caespitosus, Cymbopogon refractus, Carex gaudichaudiana, Lomandra longifolia, Dianella caerulea, Juncus subsecundus, Euchiton sphaericus, Haloragis heterophylla, Epilobium billardierianum, Juncus vaginatus, Entolasia stricta, Gonocarpus micranthus, Aristida calycina, Stellaria angustifolia, Microlaena stipoides, Luzula flaccida, Galium migrans, Dichondra repens, Carex appressa, Schoenus apogon, Geranium solanderi* var. *solanderi, Viola betonicifolia, Themeda australis, Senecio diaschides, Hypericum gramineum, Gratiola peruviana, Centipeda minima, Carex breviculmis, Wahlenbergia communis, Rumex brownii, Rhodanthe anthemoides, Ranunculus lappaceus, Lepidosperma laterale, Fimbristylis dichotoma, Dichelachne micrantha, Dianella revoluta, Acaena novae-zelandiae, Wahlenbergia gracilis, Viola hederacea, Scleranthus biflorus, Poranthera microphylla, Panicum simile, Lotus cruentus, Lotus australis, Juncus bufonius, Isolepis hookeriana, Hypericum japonicum, Arundinella nepalensis, Aristida vagans..*

**Introduced taxa:** *Hypochaeris radicata, Conyza albida, Trifolium repens, Rubus chloocladus, Paronychia brasiliana, Lotus uliginosus, Cirsium vulgare, Acetosella vulgaris, Vicia villosa, Verbena bonariensis, Cerastium glomeratum, Centaurium erythraea, Taraxacum officinale, Sonchus oleraceus, Plantago lanceolata, Petrorhagia nanteuilii, Paspalum dilatatum, Lactuca serriola, Axonopus affinis, Anagallis arvensis, Aira cupaniana.*

**Variability:** structure varies considerably in the understorey. This assemblage often occurs along drainage lines, some of which are mere ephemeral creeks and others are areas of permanent running water. The presence and density of tea-tree can change the character greatly. Areas with more permanent water, or that are damper, have a reasonably dense stand of tea-tree whereas other areas have little or none with a dense understorey of *Carex*. Some areas have been frequently burnt for green pick and are dominated by *Imperata*. In more protected localities the overstorey is taller, and may have a prominence of *E. quinniorum* and *E. bridgesiana* compared to more open situations where *E. blakelyi* and *E. prava* occur. In general, the occurrences of this assemblage are in slightly more exposed situations and sometimes shallower soils than the following Community 6.

**Conservation status:** similar associations are described by Wall (2000) as being nearly 60% cleared with only 1.6% of their reservation target met. These Grassy Box-Gum woodlands are usually the most intensively used for agriculture in this type of granite country and elsewhere as well. This assemblage should be considered poorly conserved across its range and potentially vulnerable and parts would be considered to be Yellow Box – Blakely's Red Gum Grassy Woodland and are endangered on the NSW *TSC Act*.

**Community 6: *Eucalyptus quinniorum* (Quinn's Gum) – *Eucalyptus prava* (Orange Gum) Forests**

**Environmental relationships:** usually in open depressions but also on lower and sometimes mid slopes. Soils are sandy loam to loam in texture and are usually deep or sometimes shallow. Soil colour is usually a dark brown, either grey or reddish.

**Structure:** mostly open forests but also woodlands. Tree layer: (10–) 20–30 (–40) m tall; 20–40% cover. Tall shrub layer: 5–12 m tall; 20% cover, usually absent. Low shrub layer: 1–3 m tall; 10–30 (–90)% cover, rarely absent. Understorey layer: < 1 m tall; 40–90% cover. (Fig. 9).

**Trees:** *Eucalyptus quinniorum, Angophora floribunda, Eucalyptus prava, Eucalyptus macrorhyncha, Eucalyptus andrewsii, Eucalyptus bridgesiana, Pittosporum undulatum, Eucalyptus blakelyi, Callitris endlicheri, Eucalyptus subtilior, Eucalyptus caleyi* subsp. *caleyi, Eucalyptus melliodora.*

**Shrubs:** *Olearia viscidula, Pultenaea* sp. *G, Leptospermum polygalifolium, Acacia neriifolia, Olearia elliptica, Leucopogon muticus, Hibbertia obtusifolia, Brachyloma daphnoides* subsp. *glabrum, Cassinia quinquefaria, Correa reflexa, Pultenaea campbellii, Notelaea microcarpa, Leptospermum brevipes, Persoonia sericea.*

**Climbers & trailers:** *Clematis glycinoides, Desmodium varians, Hardenbergia violacea, Rubus parvifolius, Glycine clandestina, Glycine tabacina, Cassytha pubescens.*

**Fig. 9.** Community 6: *Eucalyptus quinniorum* and *Eucalyptus prava* Forest

**Ground cover:** *Scleranthus biflorus, Luzula flaccida, Geranium solanderi* var. *solanderi, Lomandra longifolia, Lepidosperma laterale, Imperata cylindrica, Joycea pallida, Dichondra repens, Cymbopogon refractus, Carex breviculmis, Galium migrans, Aristida vagans, Cheilanthes sieberi, Themeda australis, Senecio diaschides, Microlaena stipoides, Dianella revoluta, Cassinia quinquefaria, Veronica calycina, Scutellaria humilis, Oxalis chnoodes, Entolasia stricta, Echinopogon caespitosus, Carex appressa, Arthropodium milleflorum, Adiantum aethiopicum, Lomandra multiflora, Dichelachne micrantha, Dianella caerulea, Caladenia fuscata, Aristida calycina, Acaena novae-zelandiae, Plantago varia, Pellaea nana, Macrozamia heteromera, Euchiton sphaericus, Ajuga australis, Wahlenbergia planiflora, Wahlenbergia gracilis, Viola betonicifolia, Solanum elegans, Pterostylis curta, Pteridium esculentum, Hydrocotyle peduncularis, Derwentia arenaria, Craspedia variabilis.*

**Introduced taxa:** *Hypochaeris radicata, Conyza albida, Cirsium vulgare, Rubus chloocladus, Trifolium repens, Solanum nigrum, Bidens pilosa.*

**Variability:** two distinct sub-assemblages are recognisable. In more exposed situations, usually on shallower soils, *Eucalyptus prava* frequently dominates with an assortment of other species such as *Eucalyptus macrorhyncha, Eucalyptus quinniorum* and *E. caleyi*. The understorey is often of *Leptospermum brevipes* and *Leucopogon muticus* with a ground layer of *Joycea pallida* and *Lomandra longifolia.* The second sub-assemblage occurs in protected localities and is dominated by *Eucalyptus quinniorum* and *Angophora floribunda* with *Eucalyptus andrewsii* and *Eucalyptus macrorhyncha*. The understorey often has a prominent layer of *Olearia elliptica* and *Olearia viscidula* and an understorey of *Imperata cylindrica* and *Cymbopogon refractus*. Two sampled localities within Ironbark also are slightly different in that they contained *Pittosporum undulatum* and a ground layer including ferns.

**Conservation status:** no directly synonymous assemblages are described, so the extent of this community in other reserves is hard to establish. However, it is very likely that much less than 1000 ha is reserved across its range, even if described in the broader sense. Thus, this assemblage is highly restricted in distribution and inadequately represented in the reserve network and should be considered poorly conserved.

### Community 7: *Angophora floribunda* (Rough-barked Apple) – *Eucalyptus blakelyi* (Red Gum) Woodlands

**Environmental relationships:** usually on lower slopes, but also mid-slopes or rarely upper slopes or open depressions. Soils are usually sandy loam in texture but also may be loamy sand or clay loam. Soils are usually moist and deep and are light brown to dark brown in colour.

**Structure:** woodlands and open forests. Tree layer: 10–20 (–40) m tall; (10–) 20–40% cover. Tall shrub layer: 4–8 m tall; 20% cover, usually absent. Low shrub layer: 1–3 (–6) m tall; 10–30 (–70)% cover. Understorey layer: < 1 m tall; (20–) 70–90% cover. (Fig. 10).

**Trees:** *Angophora floribunda, Eucalyptus dealbata, Eucalyptus blakelyi, Eucalyptus melliodora, Callitris endlicheri, Eucalyptus macrorhyncha, Eucalyptus albens, Eucalyptus bridgesiana, Brachychiton populneus, Eucalyptus caleyi* subsp. *caleyi, Eucalyptus andrewsii*.

**Shrubs:** *Hibbertia obtusifolia, Notelaea microcarpa, Olearia viscidula, Melichrus urceolatus, Cassinia quinquefaria, Olearia elliptica, Leptospermum polygalifolium, Leptospermum brevipes, Brachyloma daphnoides* subsp. *glabrum, Acacia neriifolia, Phyllanthus subcrenulatus, Callistemon pungens, Xanthorrhoea johnsonii, Sida cunninghamii, Maytenus silvestris, Dodonaea viscosa* var. *angustifolia, Acacia implexa.*

**Climbers & trailers:** *Desmodium varians, Glycine tabacina, Glycine clandestina, Clematis glycinoides, Hardenbergia violacea, Glycine stenophita.*

**Ground cover:** *Cymbopogon refractus, Aristida calycina, Dichondra* sp. *A, Echinopogon caespitosus, Cheilanthes sieberi, Aristida vagans, Scleranthus biflorus, Geranium solanderi* var. *solanderi, Eragrostis leptostachya, Imperata cylindrica, Wahlenbergia communis, Austrodanthonia racemosa* subsp. *obtusata, Arundinella nepalensis, Microlaena stipoides, Lomandra multiflora, Chrysocephalum apiculatum, Aristida ramosa, Juncus pauciflorus, Carex appressa, Acaena novae-zelandiae, Scutellaria humilis, Rumex brownii, Oxalis chnoodes, Desmodium brachypodum, Dichelachne micrantha, Poa sieberiana, Plantago varia, Panicum effusum, Dichondra repens, Tripogon loliiformis, Lomandra longifolia, Dianella revoluta, Cyperus gracilis, Arthropodium milleflorum, Vittadinia muelleri, Sigesbeckia australiensis, Senecio diaschides, Lepidosperma laterale, Epilobium billardierianum, Commelina cyanea, Oxalis perennans, Lespedeza juncea, Joycea pallida, Hypericum gramineum, Hydrocotyle laxiflora, Gonocarpus tetragynus, Galium migrans, Fimbristylis dichotoma, Eragrostis elongata, Echinopogon ovatus, Dianella caerulea, Centipeda cunninghamii, Carex breviculmis..*

**Introduced taxa:** *Conyza albida, Hypochaeris radicata, Opuntia stricta, Hypochaeris glabra, Conyza bonariensis, Cyperus aggregatus, Acetosella vulgaris, Tradescantia fluminensis, Stellaria media, Sonchus oleraceus, Bidens pilosa, Verbascum thapsus, Secale cereale, Rubus chloocladus, Cirsium vulgare, Centaurium erythraea, Anagallis arvensis.*

**Variability:** this is a highly variable assemblage with up to three sub-assemblages, each with a highly diverse set of dominant trees with relatively low fidelity. The first sub-assemblage occurs in open and exposed sites and often is dominated by *E. albens* and *E. dealbata*

**Fig. 10.** Community 7: *Angophora floribunda* and *Eucalyptus blakelyi* Woodland.

with *E. melliodora* and *E. blakelyi* also associated. The understorey is of scattered *Cassinia quinquefaria* and *Notelaea microcarpa* and *Olearia viscidula*. The ground layer is often dominated by *Cymbopogon refractus*. Sites are on lower slopes with soils that are moist to well drained, loamy in texture (clay loam, loam or sandy loam) and are light to yellow brown. The second sub-assemblage is mainly dominated by *E. blakelyi* and *Angophora floribunda*, with other species such as *E. melliodora*, *E. bridgesiana* and *E. andrewsii*. The understorey often contains *Leptospermum polygalifolium* and sometimes *Notelaea microcarpa* and *Callistemon pungens*. The ground layer often contains *Imperata cylindrica*, *Lomandra longifolia* and *Arundinella nepalensi*s. Soils are usually moist and sandy loam in texture, with a light to dark brown colour. The third sub-assemblage is commonly dominated by *E. melliodora* and *Angophora floribunda* with subdominant *E. blakelyi* and *E. macrorhyncha*. Understorey shrubs commonly include *Notelaea microcarpa*, *Olearia viscidula* and *Leptospermum brevipes*. The ground cover is usually of *Cymbopogon refractus* and *Aristida* spp and the sub-assemblage is usually found on mid and lower slopes on well drained soils which are sandy loam in texture and dark to grey brown in colour.

**Conservation status:** DeVries (2000) considered that 94% of similar assemblages within the Nandewar Bioregion have been cleared. This community type would correspond to the Endangered White Box – Yellow Box – Blakely's Red Gum listed on the *TSC Act* in most areas. This community type is represented in a number of reserves but is usually highly modified, as has occurred here in the past, and of limited extent. Thus, this community should be considered Endangered and poorly conserved both locally and across its range.

### Community 8: *Casuarina cunninghamiana* (River Oak) – *Eucalyptus blakelyi* (Red Gum) – *Angophora floribunda* (Apple) Forests

**Environmental relationships:** restricted to open depressions or flats associated with permanent major creeks. Soils are moist to damp, sandy loam, clay loam or loamy sand in texture and are dark or yellow brown in colour and are deep.

**Structure:** open forests. Tree layer: 20–40 m tall; 30–60% cover. Tall shrub layer: 5–12 m tall; 10% cover, usually absent. Low shrub layer: 2–8 m tall; 20–30% cover. Understorey layer: < 1 m tall; 70–90% cover. (Fig. 11).

**Trees:** *Eucalyptus blakelyi, Casuarina cunninghamiana, Angophora floribunda, Eucalyptus bridgesiana, Eucalyptus macrorhyncha, Eucalyptus prava, Brachychiton populneus.*

**Shrubs:** *Notelaea microcarpa, Olearia viscidula, Maytenus silvestris, Callistemon pungens.*

**Climbers & trailers:** *Desmodium varians, Glycine clandestina.*

**Ground cover:** *Microlaena stipoides, Juncus pauciflorus, Imperata cylindrica, Dichondra repens, Cyperus lucidus, Cymbopogon refractus, Commelina cyanea, Arundinella nepalensis, Rumex brownii, Lomandra longifolia, Juncus vaginatus, Hydrocotyle peduncularis, Echinopogon caespitosus, Aristida ramosa, Viola hederacea, Viola caleyana, Vernonia cinerea, Urtica incisa, Scutellaria humilis, Scirpus polystachyus, Pteridium esculentum, Persicaria hydropiper, Oplismenus imbecillis, Isotoma fluviatilis, Isolepis hookeriana, Geranium solanderi* var. *solanderi, Einadia trigonos, Dichondra* sp. *A, Chenopodium pumilio, Carex appressa, Adiantum aethiopicum.*

**Introduced taxa:** *Conyza albida, Cyperus aggregatus, Modiola caroliniana, Hypochaeris radicata, Conyza bonariensis, Stellaria media, Solanum nigrum, Rubus chloocladus, Ciclospermum leptophyllum, Bidens pilosa, Anagallis arvensis.*

**Variability:** only three sites were placed within this assemblage thus only minimal variation can be described. The most obvious difference between sites is the occurrence or not of *Casuarina cunninghamiana*. This species is the most readily recognisable member of this assemblage, however the fringing 'floodplain' or areas of previous stream bank flow, where vegetation is without River Oak, also falls into the circumscription of this assemblage. Within the main creek channel many species occur, particularly wetland taxa such as *Carex*, that do not occur in the fringing vegetation, which often is dominated by *Imperata cylindrica*.

**Conservation status:** DeVries (2000) considered that 79% of similar assemblages have been cleared in the Nandewar Bioregion. This community probably occurs thoughout the north western slopes and into western south east Queensland. Areas within the current reserve network are very small, and in most situations are highly disturbed or invaded by exotic species. This community should be considered as poorly reserved across its range with much that is reserved being of poor quality.

### Community 9: *Calytrix tetragona* (Fringe Myrtle) – *Ozothamnus obcordatus* (Daisy Bush) Open Shrublands

**Environmental relationships:** restricted to rock platforms and outcrops. Soils are well drained, sandy peat to sandy loam or loam. They are black to brown or red brown in colour and skeletal.

**Structure:** usually open shrublands but also woodlands, herbfields or grasslands. Tree layer: 5–12 m tall ; 10 (–30)% cover, usually absent. Tall shrub layer: 2–4 m tall; 10% cover, rarely present. Low shrub layer: 1–3 m tall; 10 (–30)% cover. Understorey layer: < 1 m tall; (10–) 20 (–30)% cover. (Fig. 12).

**Trees:** *Callitris endlicheri, Eucalyptus prava, Eucalyptus dealbata.*

**Shrubs:** *Calytrix tetragona, Ozothamnus obcordatus, Homoranthus bornhardtiensis, Prostanthera nivea, Leptospermum novae-angliae,*

**Fig. 11.** Community 8: *Casuarina cunninghamiana* and *Eucalyptus blakelyi* Forest.

**Fig. 12.** Community 9: *Calytrix tetragona* and *Ozothamnus obcordatus* Open Shrubland.

*Leucopogon muticus, Acacia neriifolia, Boronia anethifolia, Acacia triptera, Cyphanthera albicans, Acacia viscidula, Kunzea parvifolia, Hibbertia* sp. 'grandiflora', *Cryptandra amara, Acacia cheelii, Mirbelia pungens, Leptospermum brevipes, Hibbertia cistoidea.*

**Climbers & trailers:** *Cassytha pubescens.*

**Ground cover:** *Tripogon loliiformis, Lepidosperma laterale, Stypandra glauca, Gonocarpus tetragynus, Cheilanthes sieberi, Cyperus secubans, Thelionema grande, Brachyscome stuartii, Isotoma anethifolia, Crassula sieberiana, Trachymene incisa, Pomax umbellata, Austrodanthonia laevis, Aristida calycina, Cymbopogon refractus, Gonocarpus teucrioides, Fimbristylis dichotoma, Lobelia gracilis, Gonocarpus oreophilus, Entolasia stricta, Digitaria ramularis, Aristida vagans, Vittadinia muelleri, Ophioglossum lusitanicum, Laxmannia gracilis, Joycea pallida, Isotoma axillaris, Drosera burmannii, Dichelachne micrantha, Cheilanthes distans, Calandrinia eremaea, Brachyscome nova-anglica, Austrodanthonia monticola, Aristida ramosa, Actinotus helianthi.*

**Variability:** structurally highly variable. Two distinct sub-assemblages occur which are largely based on changes in herbaceous vegetation, one sub-assemblage appears to be restricted to peaty black soils which are associated with colder, wetter and more protected localities, and the other has sandy loam to loamy brown to red brown soils. The latter are usually in more exposed drier localities. Overall, outcrop communities are highly structured by stochastic distributions and frequent sporadic colonisation and extinction and hence they can appear structurally very dissimilar even when in close proximity to each other. The occasional tree can be present giving a low open woodland appearance. Shrubs can be prominent and dense in some localities, such as *Leptospermum brevipes* or *L. novae-angliae* giving a dense tall heath appearance. However, overall a large enough number of shared species occur, including many outcrop endemics, that enable delineation of the assemblage based purely on floristics.

**Conservation status:** Hunter & Clarke's (1998) community 7f within Element 7 is directly synonymous with this assemblage. Element 7 was considered be under-represented within the reserve network as a whole. This community is restricted to *Bornhardtia* and Ironbark and is one of only three communities out of a total of eight within this Element to be reserved. Despite the Element as a whole being under-represented, the extensive outcrop areas within Ironbark and *Bornhardtia* mean that locally this community is adequately reserved. This does not mean that further inclusions of this assemblage would not be important as Hunter (2000a, 2002c, 2003c) has shown the nature of naturally fragmented ecosystems means that any addition to the reserve network would significantly increase species richness and resilience of this assemblage.

### Community 10: *Homoranthus bornhardtiensis* Open Shrublands

**Environmental relationships:** restricted entirely to skeletal soils on rock outcrops in gravel basins and within the cracks and fissures on the outcrops. Sometimes associated with the immediate fringe of flat rocks around inselbergs and near-surface fugitive outcrops.

**Structure:** primarily shrublands but occasionally grasslands, herbfields or low open woodlands. Tree layer: 6–15 m tall; 10% cover, usually absent. Tall shrub layer: 3–10 m tall; 10–20% cover, usually absent. Low shrub layer: 1–3 m tall; 5–20% cover. Understorey layer: < 1 m tall; 20–40 (–80)% cover. (Fig. 13).

**Trees:** *Callitris endlicheri, Eucalyptus prava, Eucalyptus dealbata, Eucalyptus caleyi* subsp. *caleyi, Eucalyptus blakelyi.*

**Shrubs:** *Homoranthus bornhardtiensis, Cassinia quinquefaria, Leucopogon muticus, Calytrix tetragona, Melichrus urceolatus, Hibbertia obtusifolia, Acacia neriifolia, Ozothamnus obcordatus, Pultenaea* sp. *G., Olearia elliptica, Notelaea microcarpa, Leptospermum brevipes, Grevillea triternata, Mirbelia pungens, Brachyloma daphnoides* subsp. *glabrum.*

**Fig. 13.** Community 10: *Homoranthus bornhardtiensis* Open Shrubland.

**Climbers & trailers:** *Glycine tabacina, Desmodium varians.*

**Ground cover:** *Tripogon loliiformis, Cymbopogon refractus, Cheilanthes sieberi, Aristida calycina, Fimbristylis dichotoma, Pomax umbellata, Dichelachne micrantha, Arthropodium milleflorum, Thelionema grande, Chrysocephalum apiculatum, Cheilanthes distans, Trachymene incisa, Joycea pallida, Hypericum gramineum, Eragrostis elongata, Dianella caerulea, Aristida vagans, Aristida ramosa, Wurmbea biglandulosa, Lepidosperma laterale, Goodenia macbarroni, Cyperus fulvus, Chrysocephalum semipapposum, Austrodanthonia racemosa* ssp. *obtusata, Vittadinia cuneata, Triptilodiscus pygmaeus, Plantago varia, Goodenia hederacea, Gonocarpus teucrioides, Drosera peltata, Cyperus secubans, Crassula sieberiana, Commelina cyanea, Brachyscome multifida, Wahlenbergia planiflora* subsp. *pilosa, Vittadinia muelleri, Senecio lautus, Poa sieberiana, Panicum effusum, Murdannia graminea, Luzula flaccida, Laxmannia compacta, Hydrocotyle peduncularis, Haloragis heterophylla, Gonocarpus tetragynus, Galium migrans, Eragrostis leptostachya, Entolasia stricta, Digitaria breviglumis, Cymbopogon obtectus, Brachyscome nova-anglica, Actinotus helianthi.*

**Introduced taxa:** *Hypochaeris radicata, Opuntia stricta, Aira cupaniana.*

**Variability:** highly variable in structure. *Homoranthus bornhardtiensis*, though highly abundant in many sites, is not ubiquitous. Two sub-assemblages are apparent, the first of which usually does not have this species as a component, or at least not as a dominant. This first sub-assemblage occurs on loam or sandy loam soils that are usually yellow brown in colour. The second sub-assemblage is usually dominated by *Homoranthus bornhardtiensis* and occurs on sandy loam or loamy sand soils that are chocolate to orange brown in colour. In some situations grasses predominate, giving the structure of a small grassland, or herbfield if grasses are absent.

**Conservation status:** Community 7f within Element 7 of Hunter and Clarke (1998) is directly synonymous with this assemblage, thus the comments made in the previous community are relevant to this one also.

### Community 11: *Leptospermum polygalifolium* (Tea-tree) Wetland

**Environmental relationships:** restricted to permanently waterlogged sites.

**Structure:** woodlands to herbfields. Tall shrub layer: 2–5 m tall; 40% cover. Low shrub layer: 1–2 m tall; 10% cover. Understorey layer: > 1 m tall; 100% cover. (Fig. 14).

**Trees:** none apparent.

**Shrubs:** *Leptospermum polygalifolium, Hakea microcarpa, Callistemon pungens.*

**Climbers & trailers:** none apparent.

**Fig. 14.** Community 11: *Leptospermum polygalifolium* Wetland.

**Ground cover:** *Stellaria angustifolia, Ranunculus* sp. *A, Phragmites australis, Gonocarpus micranthus, Geranium solanderi* var. *grande, Epilobium billardierianum, Baloskion stenocoleum, Schoenus apogon, Eryngium vesciculosum, Juncus vaginatus, Juncus fockei, Hydrocotyle peduncularis, Carex gaudichaudiana, Arthropodium milleflorum, Rhynchospora brownii.*

**Introduced taxa:** *Trifolium repens, Lotus uliginosus, Axonopus affinis.*

**Variability:** only one formal site sampled this assemblage therefore, community variability cannot be adequately discussed. However, the assemblage is likely to be very stochastic both in temporal and spatial terms. Differences in extent of water-logging and duration will significantly affect what species are present in the long term and also how extensive the community is. Some areas have extensive and dense *Phragmites* stands and *Leptospermum polygalifolium* may or may not be present as a significant feature.

**Conservation status:** this assemblage only occurs in small areas of less than one hectare, with a sporadic and isolated distribution. It is under significant threat from various land uses and by feral animals, particularly pigs, and weeds. This type of assemblage should be considered vulnerable and poorly conserved, both locally and across its range if it is synonymous with more widespread associations.

## Discussion

*Phytogeography*

Based on analysis and mapping, the two conservation areas (Ironbark and *Bornhardtia*) capture significantly different proportions of communities, and a number of the communities are confined to one or the other. Overall the two conservation areas complement each other. For example, Community 2 is entirely restricted to *Bornhardtia* where it is very common, Communities 1, 5, 6 and 9 have the bulk of their distribution within *Bornhardtia*, while Communities 4, 7, and 8 only occur in Ironbark. The remaining Communities 3, 10 and 11 are common in both areas.

Community 1 in broad terms is likely to occur from south of Inverell and Howell area extending south to the eastern and higher altitude areas of Warrabah NP but no direct correlates are described in the literature. Unlike some other assemblages described herein, *Olearia* species do not dominate, and unlike Community 2 *Pultenaea* sp. *G* is usually absent or rare in the shrub layer.

In broad circumscription, Communities 2 and 3 are likely to occur from the Sundown area of Queensland as far south as Warrabah, but they are likely to be more common from south of Goonoowiggal to Warrabah and as far east as Single NP and the Basin NR. In the strictest sense, these communities only occur from the study area south to the high altitude eastern parts of Warrabah National Park and surrounds. Community 2 has a very distinct shrub layer characterised by *Pultenaea, Cassinia* and *Leucopogon*, with only a moderately dense grassy understorey, which is in contrast to Community 1.

White Box – Yellow Box – Red Gum occurs within Community 4. This mix is very limited in distribution within Ironbark and is known only from small intrusions of differing lithology along the western boundary of the Nature Reserve. In general, this assemblage had been selectively cleared for grazing.

No directly synonymous assemblages to Communities 4 or 5 are described in the literature. These assemblages are probably included within much more widespread Blakely's Red Gum Associations in broad scale mapping, or under Grassy Box-Red Gum Alliances. Community 4 in the broad sense is likely to occur from west of Tenterfield to Warrabah, but in the strict sense only in more western areas of Copeton Dam to western areas of Warrabah. Community 5 and synonymous assemblages are likely to be common along the western side of the tablelands and along the slopes from over the Queensland border south to northern Victoria. However, in the stricter sense Community 5 is likely to be largely restricted to the study area, with small occurrences as far north as west of Tenterfield and as far south as Warrabah.

The most prominent tree within Community 6 is the rare *Eucalyptus quinniorum*, which has a very restricted distribution from Ironbark to Warrabah NP, with some isolated stands within the Bendemeer and Moonbi areas. A broadly similar assemblage occurs on the eastern fall of Mt Kaputar, which is dominated by *Eucalyptus volcanica*, a close relative of *Eucalyptus quinniorum* (Hunter & Alexander 2000). This assemblage in the broad sense is thus likely to occur from the eastern fall of Mt Kaputar east to Ironbark and Stoney Batter Creek Nature Reserve and as far south as Warrabah, with potential extension as far south as Bendemeer and higher altitude parts of the Moonbi Ranges.

Community 7 most closely resembles the widespread Yellow Box – Red Gum alliance that is found from south eastern Queensland to the northern parts of Victoria along the western margin of the tablelands and along the western slopes. This variant as described here is likely to be more or less restricted to the areas west of Glen Innes to the Tamworth region.

*Casuarina cunninghamiana* communities are widespread in New South Wales. Beadle (1981) states that *Casuarina cunninghamiana* communities fringing rivers are common from southern New South Wales to Cape York and even to Arnhem Land. However, there are no regularly associated

species. It appears that although riverine communities similar to Community 8 occur throughout this part of the state they have been rarely sampled or described.

Communities 9 and 10 would both be placed within Element 7: Western New England Shrublands and Herbfields by Hunter and Clarke (1998). Both assemblages in broad circumscription occur from Sundown NP in Queensland to Bendemeer in New South Wales and potentially west to Mt Kaputar, excluding the Howell–Copeton Dam area.

The most synonymously described assemblage to Community 11 occurs in Single National Park in similar situations (Clarke et al. 2000). The distribution of this type of assemblage is likely to be very small and highly scattered, with stands usually less than 1 ha in size.

It appears that some of the assemblages described here, particularly those that could be described as part of the box–red gum alliances have broad affinities with similar associations occurring from south-eastern Queensland to as far south as northern Victoria. Most of the assemblages may in broad circumscription be similar to others occurring from the Sundown area of south-eastern Queensland to Tamworth. Most assemblages, though, appear to be highly restricted with greatest affinities to others occurring from the south of Inverell to Warrabah NP, thus supporting Province 16 (Eastern Nandewars), of Morgan and Terry (1999).

In broad terms of floristic affinities, the taxa within the study area indicate a cross-over between the North Western Slopes and the Northern Tablelands floras. 90% of all species found are also recorded for the North Western Slopes. This is not unexpected as the western and southern boundaries of the study area fall on the boundary between the New England Tablelands and Nandewar Bioregions. 80% of all species found are also recorded for the North Coast and Central Coast regions of New South Wales, indicating that in general, floristic affinities are shared with warmer areas such as coastal regions before they are shared with other tablelands areas.

*Species richness*

477 taxa were found within Ironbark Nature Reserve and the *Bornhardtia* Voluntary Conservation Agreement. In terms of average site species richness on a 0.04 ha site the study area is medial (35 per 0.04 ha) and is similar to that found at Gibraltar Range and Arakoola National Parks and Burnt Down Scrub and Curry's Gap Nature Reserves (Hunter *in review*; Hunter & Harrison 2002, Sheringham & Hunter 2002). Kings Plains National Park (51 per 0.04 ha) has the highest recorded richness in the north east of NSW (Hunter 2000b) while Gibraltar Nature Reserve (26 per 0.04 ha) (Hunter 2002b) has the lowest.

*Conservation issues*

Strategically the location of Ironbark and *Bornhardtia* conservation areas is important as they are within a 13 075 ha little developed vegetated remnant (DeVries 2000) that is currently under pressure for further clearing for grazing. Morgan and Terry (1999) considered the Eastern Nandewars (Province 16), of which the study area is included, to be at a critical stage of development where many ecosystem functions may be lost if development were to increase in the region.

More generally within the New England Tableland Bioregion, these conservation areas are of importance, since approximately 60% of its woody vegetation has been cleared (Benson 1999). Temperate eucalypt woodlands are amongst the most poorly conserved and threatened ecosystems in Australia, having borne the brunt of agricultural development for well over 150 years (Yates & Hobbs 2000). Tree cover has been reduced to only 15% of its original cover on the slopes of the Namoi Catchment (DeVries 2000). Dieback is a significant problem in the Namoi Catchment, particularly in the Tablelands areas and along watercourses (DeVries 2000). Severe soil damage is likely if current development practices continue (Morgan & Terry 1999) and at present soil structure decline is moderate to severe over 35% of the Namoi catchment (DeVries 2000). Most of the developed areas are on acid soils, and leached nutrients from the overuse of nitrogenous fertilisers and introduced legumes are causing problems in the Namoi River (Morgan & Terry 1999). In addition, the Namoi Catchment is a major source of phosphorus to the Barwon-Darling River (DeVries 2000). The riparian vegetation of most creeks in the upper catchment of the Namoi River is in poor condition because of grazing pressure and clearing which is usually extended to creek banks (DeVries 2000).

Throughout both conservation areas grassy White Box – Yellow Box – Blakely's Red Gum Woodlands occur. This community is listed as Endangered under the NSW *Threatened Species Conservation Act.* In addition, Grassy White Box Woodlands are considered Endangered on the Federal *Environmental Protection and Biodiversity & Conservation* Act. Areas of Grassy White Box Woodlands occur within Ironbark Nature Reserve.

In terms of the communities as circumscribed here, none are adequately represented in the conservation network. Communities 2, 3, 9 and 10 are potentially conserved adequately within the local region but are poorly conserved across their range. Community 7 is potentially endangered and Communities 4, 8 and 11 are possibly vulnerable.

Quality is often not considered adequately in discussion of representation within conservation areas, yet this is as important as the capture of assemblages (Hunter 2003a). One of the more significant features of both conservation areas are sections that have had minimal European disturbance and which contain over mature trees. Such areas are often termed 'old growth' and examples of this quality occur across all the woodland assemblages described here.

At present, the most significant threats to these assemblages are pigs and stray cattle. Pigs in particular have caused extensive damage in creek and gully areas and on rock outcrops.

Outcrop endemic taxa are susceptible to browsing by goats (Hunter 2003b), which have degraded some outcrop vegetation significantly.

38 species were considered of conservation significance within the Ironbark and *Bornhartia* conservation areas. Two of these are also listed on the NSW *TSC Act*: one as Vulnerable and one as Endangered and 6 have been reported under the RoTAP criteria (Briggs & Leigh 1996). These include: *Homoranthus bornhardtiensis* (*TSC* Endangered), *Goodenia macbarronii* (*TSC* Vulnerable; 3VC-), *Callistemon pungens* (3RCa), *Derwentia arenaria* (3RCa), *Eucalyptus quinniorum* (3RCa), *Thelionema grande* (3RCa), *Zieria odorifera* (3RCi), and *Pultenaea campbellii* (3K). *Thelionema grande* is at its southernmost distributional limit within *Bornhartia*. Two of these species, *Eucalyptus quinniorum* and *Homoranthus bornhardtiensis*, are thought to be largely restricted to the study area; both have their type localities within *Bornhartia*. Many of the species of significance are outliers from other regions. In particular, a number of species associated with vine thickets and western dry rainforest were found in low numbers, particularly in protected gullies. Thirty species were thought to be at or near their geographic limits or were considered as significant due to being locally or regionally rare. These taxa are: *Acacia cheelii, Acacia montana, Alectryon subdentatus, Baloskion stenocoleum, Cassine australis, Centrolepis strigosa, Cymbidium canaliculatum, Cyperus secubans, Cyphanthera albicans, Geranium solanderi* subsp. *grande, Haloragis serra, Hibbertia* sp., *Jasminum sauvissimum, Lilaeopsis polyantha, Lomandra* sp., *Lyperanthus suaveolens, Mirbelia speciosa, Olearia erubescens, Ophioglossum latiusculum, Parsonsia eucalyptophylla, Pelargonium australe, Pittosporum undulatum, Portulaca bicolor, Psydrax odoratum, Psilotum nudum, Pultenaea* sp. *G, Sida cunninghamii* and *Viola caleyana*.

## Conclusion

Ironbark Nature Reserve and *Bornhardtia* Voluntary Conservation Area complement each other in terms of the species found and the communities described. A number of species and some of the communities are only found in one or other of the conservation areas but not both. Eight nationally significant flora species and up to 39 locally significant flora species occur in these conservation areas. At least one community is listed as Endangered on the NSW *TSC* Act, another is listed on the *EPB&C* Act; all assemblages described are inadequately reserved across their range. Many areas exist that are minimally disturbed by Europeans and constitute Old Growth, although past clearing and grazing has occurred in more accessible areas. The representation of old growth woodlands across many vegetation assemblages is as important a feature of these conservation areas as are the endangered species and communities.

The study area represents a crossover of the floras of the NSW slopes and tablelands, and is a highlighted significant remnant within a major north-south western regional corridor. The region is at a critical stage of development where further degradation will cause significant ecological and biodiversity changes to the region.

The conservation areas alone (total area 2307 ha) are not large enough to ensure continued ecosystem processes or the long-term viability of all species. Addition of lands to the Nature Reserve, or the incorporation of lands under conservation agreements around these areas is needed to ensure the values within the study area.

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## Appendix: Flora of Ironbark Nature Reserve and the *Bornhardtia* Voluntary Conservation Agreement.

Taxa found within the survey sites are scored according to their occurrence in each of the 11 communities defined. Some taxa were found in previous surveys or opportunistically (0) and therefore are not assigned to a specific community.

1 = Red Stringybark – Red Gum Woodlands,
2 = Caley's Ironbark – Western New England Blackbutt Woodlands,
3 = Orange Gum – Western New England Blackbutt Woodlands,
4 = Tumbledown Gum – Caley's Ironbark Woodlands,
5 = Orange Gum – Red Gum Woodlands,
6 = Quinn's Gum – Orange Gum Forests,
7 = Rough-barked Apple – Red Gum Woodlands,
8 = River Oak – Red Gum – Rough Barked Apple Forests,
9 = Fringe Myrtle – Daisy Bush Open Shrublands,
10 = *Homoranthus* Open Shrublands,
11 = Tea-tree Wetlands.

* denotes introduced taxa. Nomenclature follows Harden 1990–93.

| | |
|---|---|
| PTERIDOPHYTES & ALLIES | |
| **Adiantaceae** | |
| *Adiantum aethiopicum* | 5, 6, 7, 8 |
| *Adiantum hispidulum* | 6 |
| **Aspleniaceae** | |
| *Asplenium flabellifolium* | 4, 6 |
| *Pleurosorus subglandulosus* | 0 |
| **Blechnaceae** | |
| *Blechnum wattsii* | 0 |
| *Doodia aspera* | 6 |
| *Doodia caudata* | 0 |
| **Dennstaedtiaceae** | |
| *Histiopteris incisa* | 6 |
| *Hypolepis glandulifera* | 0 |
| *Pteridium esculentum* | 2, 6, 7, 8 |
| **Grammitaceae** | |
| *Grammitis billardieri* | 0 |
| **Ophioglossaceae** | |
| *Ophioglossum latiusculum* | 9 |
| **Polypodimaceae** | |
| *Pyrrosia rupestris* | 0 |
| **Psilotaceae** | |
| *Psilotum nudum* | 2 |
| **Sinopteridaceae** | |
| *Cheilanthes distans* | 2, 4, 9, 10 |
| *Cheilanthes sieberi* subsp. *sieberi* | 1, 2, 3, 4, 5, 6, 7, 9, 10 |
| *Pellaea nana* | 2, 4, 6 |
| *Pellaea paradoxa* | 6 |
| CYCADS | |
| **Zamiaceae** | |
| *Macrozamia heteromera* | 1, 2, 3, 6, 10 |
| CONIFERS | |
| **Cupressaceae** | |
| *Callitris endlicheri* | 1, 2, 3, 4,5, 6, 7, 9, 11 |
| MONOCOTYLEDONS | |
| **Anthericaceae** | |
| *Arthropodium milleflorum* | 1, 2, 4, 5, 6, 7, 8, 9, 10, 11 |
| *Arthropodium* sp. *A* | 5 |
| *Laxmannia compacta* | 3, 4, 5, 9, 10 |
| *Tricoryne elatior* | 1, 2 |

**Asphodelaceae**
*Bulbine bulbosa* 0

**Centrolepidaceae**
*Centrolepis strigosa* subsp. *strigosa* 0

**Colchicaceae**
*Wurmbea biglandulosa* 1, 2, 6, 10

**Commelinaceae**
*Commelina cyanea* 4, 7, 8, 9, 10
*Murdannia graminea* 1, 5, 7, 10

**Cyperaceae**
*Carex appressa* 1, 4, 5, 6, 7, 8
*Carex breviglumis* 1, 2, 5, 6, 7
*Carex gaudichaudiana* 1, 5, 6, 7, 8, 11
**Cyperus aggregatus* 7, 8
*Cyperus bifax* 0
*Cyperus fulvus* 4, 10
*Cyperus gracilis* 1, 6, 7, 9
*Cyperus lucidus* 8
*Cyperus sanguinolentus* 5
*Cyperus secubans* 2, 9, 10
*Cyperus sphaeroides* 5
*Eleocharis pusilla* 5
*Eleocharis sphacelata* 0
*Fimbristylis dichotoma* 1, 5, 7, 9, 10
*Gahnia aspera* 2, 3, 4, 5, 10
*Isolepis hookeriana* 5, 8
*Lepidosperma gunnii* 2
*Lepidosperma laterale* 1, 2, 3, 4, 5, 6, 7, 9, 10
*Rhynchospora brownii* 11
*Schoenus apogon* 1, 2, 5, 6, 11
*Scirpus polystachyus* 8
*Scleria mackaviensis* 4

**Haemodoraceae**
*Haemodorum planifolium* 0

**Hydrocharitaceae**
*Vallisneria gigantea* 0

**Hypoxidaceae**
*Hypoxis hygrometrica* 7

**Iridaceae**
*Patersonia sericea* 1, 2, 3
*Sisyrinchium* sp. *A* 0

**Juncaceae**
**Juncus bufonius* 5, 7
*Juncus continuus* 0
*Juncus fockei* 5, 11
*Juncus holoschoenus* 0
*Juncus pauciflorus* 6, 7, 8
*Juncus remotiflorus* 0
*Juncus subglaucus* 0
*Juncus subsecundus* 5, 6
*Juncus usitatus* 1, 5
*Juncus vaginatus* 1, 5, 6, 7, 8, 11
*Luzula flaccida* forma *B* 1, 2, 4, 5, 6, 7, 10

**Juncaginaceae**
*Triglochin multifructum* 5

**Lomandraceae**
*Lomandra confertiflora* subsp. *pallida* 1
*Lomandra filiformis* subsp. *filiformis* 1, 2, 3, 4, 6, 7
*Lomandra longifolia* 1, 2, 3, 4, 5, 6, 7, 8, 10
*Lomandra multiflora* 1, 2, 3, 4, 5, 6, 7, 8, 10
*Lomandra* sp. aff. *cylindrica* 1, 6

**Luzuriagaceae**
*Eustrephus latifolius* 5, 6

**Orchidaceae**
*Acianthus collinus* 0
*Acianthus exsertus* 0
*Caladenia fimbriatus* 0
*Caladenia fuscata* 1, 2, 5, 6, 9, 10
*Calochilus gracillimus* 0
*Corybas fimbriatus* 2, 6
*Cymbidium canaliculatum* 0
*Dipodium variegatum* 1
*Diuris abbreviata* 2, 9
*Dockrillia linguiforme* 0
*Lyperanthus suaveolens* 0
*Microtus unifolia* 0
*Pterostylis coccina* 0
*Pterostylis curta* 1, 2, 5, 6
*Pterostylis longiflora* 2
*Pterostylis mutica* 1, 6, 10
*Pterostylis parviflora* 2, 5
*Pterostylis rufa* 1, 9
*Spiranthes sinensis* subsp. *australis* 0
*Thelymitra pauciflora* 2

**Phormiaceae**
*Dianella caerulea* subsp. *caerulea* 1, 2, 3, 4, 5, 6, 7, 10
*Dianella revoluta* var. *revoluta* 1, 2, 3, 4, 5, 6, 7, 8
*Stypandra glauca* 9, 10
*Thelionema grande* 2, 5, 9, 10

**Poaceae**
*Aira cupaniana* 2, 5, 10
*Aristida calycina* var. *calycina* 1, 2, 3, 4, 5, 6, 7, 9, 10
*Aristida jerichoensis* var. *subspinulifera* 0
*Aristida ramosa* var. *speciosa* 4, 7, 8, 9, 10
*Aristida vagans* 1, 2, 3, 4, 5, 6, 7, 9, 10
*Arundinella nepalensis* 5, 7, 8, 10
*Austrodanthonia fulva* 0
*Austrodanthonia laevis* 1, 2, 6, 9
*Austrodanthonia monticola* 9
*Austrodanthonia racemosa* var. *obtusata* 2, 4, 6, 7, 10
*Austrostipa ramosissima* 4
*Austrostipa scabra* 7
*Austrostipa setacea* 1, 4, 5, 6, 7, 10
*Austrostipa verticillata* 1
**Axonopus affinis* 5, 11
*Bothriochloa decipiens* 5, 7
**Briza minor* 0
**Bromus diandrus* 4
*Chloris truncata* 4
*Cleistochloa rigida* 2
*Cymbopogon obtectus* 10
*Cymbopogon refractus* 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
*Deyeuxia mckiei* 0
*Dichelachne crinita* 4
*Dichelachne micrantha* 1, 2, 3, 4, 5, 6, 7, 9, 10
*Dichelachne sieberiana* 3, 5
*Digitaria breviglumis* 7, 10
*Digitaria ramularis* 4, 5, 7, 9
*Echinopogon caespitosus* var. *caespitosus* 1, 2, 4, 5, 6, 7, 8
*Echinopogon cheelii* 7
*Echinopogon ovatus* 1, 5, 7
*Entolasia stricta* 2, 3, 5, 6, 7, 9, 10
*Eragrostis brownii* 0
*Eragrostis elongata* 1, 4, 7, 9, 10
*Eragrostis lacunaria* 1
*Eragrostis leptostachya* 1, 4, 5, 7, 10
*Festuca asperula* 10
*Imperata cylindrica* var. *major* 1, 3, 4, 5, 6, 7, 8
*Joycea pallida* 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
*Microlaena stipoides* var. *stipoides* 1, 3, 5, 6, 7, 8
*Notodanthonia longifolia* 9
*Oplismenus aemulus* 4, 5, 6, 8
*Panicum effusum* 1, 2, 4, 7, 10
*Panicum simile* 2, 5, 7
**Paspalum dilatatum* 5
*Pennisetum alopecurioides* 5
*Phragmites australis* 5, 11
*Poa sieberiana* 1, 2, 3, 4, 6, 7, 10
**Secale cereale* 1, 4, 7

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|---|---|
| *Sorghum leiocladum* | 1, 2, 4, 5, 7 |
| *Sporobolus creber* | 10 |
| *Themeda australis* | 1, 2, 3, 4, 5, 6 |
| *Tripogon loliiformis* | 1, 2, 4, 7, 9, 10 |
| **Restionaceae** | |
| *Baloskion stenocoleum* | 5, 11 |
| **Xanthorrhoeaceae** | |
| *Xanthorrhoea johnsonii* | 1, 2, 4, 6, 7 |

DICOTYLEDONS

| | |
|---|---|
| **Amaranthaceae** | |
| *Alternanthera denticulata* | 8 |
| **Apiaceae** | |
| *Actinotus helianthi* | 3, 9, 10 |
| **Ciclospermum leptophyllum* | 8 |
| *Daucus glochidiatus* | 1, 7 |
| *Eryngium visculosum* | 11 |
| **Foeniculum vulgare* | 0 |
| *Hydrocotyle geraniifolia* | 6 |
| *Hydrocotyle laxiflora* | 5, 6 |
| *Hydrocotyle peduncularis* | 1, 2, 5, 6, 8, 10, 11 |
| *Lilaeopsis polyantha* | 0 |
| *Trachymene incisa* | 2, 4, 9, 10 |
| **Apocynaceae** | |
| *Parsonsia eucalyptophylla* | 4 |
| **Araliaceae** | |
| *Astrotricha longifolia* | 0 |
| **Asclepiadaceae** | |
| **Gomphocarpus fruticosus* | 0 |
| **Asteraceae** | |
| *Bidens pilosa* | 6, 7, 8 |
| *Brachyscome aculeata* | 0 |
| *Brachyscome microcarpa* | 1, 2 |
| *Brachyscome multifida* var. *multiflora* | 1, 2, 3, 5, 10 |
| *Brachyscome nova-anglica* | 9, 10 |
| *Brachyscome stuartii* | 9 |
| *Bracteantha bracteata* | 2 |
| *Calotis cuneifolia* | 2 |
| *Calotis lappulaceae* | 7 |
| *Cassinia quinquefaria* | 1,2, 3, 4, 5, 6, 7, 9, 10 |
| *Cassinia uncata* | 1 |
| *Centipeda cunninghamii* | 7 |
| *Centipeda minima* var. *minima* | 5 |
| *Chrysocephalum apiculatum* | 1, 2, 6, 7, 10 |
| *Chrysocephalum semipapposum* | 1, 2, 3, 10 |
| **Cirsium vulgare* | 1, 5, 6, 7 |
| **Conyza albida* | 1, 2, 5, 6, 7, 8 |
| **Conyza bonariense* | 7, 8 |
| *Craspedia variabilis* | 1, 2, 5, 6 |
| *Cymbanotus lawsonianus* | 1, 7 |
| *Euchiton involucratus* | 0 |
| *Euchiton sphaericus* | 1, 2, 5, 6, 7 |
| *Glossogyne tannensis* | 4 |
| *Hyalosperma semisterile* | 9 |
| **Hypochaeris glabra* | 7, 9 |
| **Hypochaeris radicata* | 1, 2, 5, 6, 7, 8, 9, 10 |
| **Lactuca serriola* | 1, 5 |
| *Lagenifera stipitata* | 1, 5, 7 |
| *Leucochrysum albicans* var. *albicans* | 10 |
| *Microseris lanceolata* | 5, 6 |
| *Olearia elliptica* | 1, 2, 3, 4, 5, 6, 7, 8, 10 |
| *Olearia erubescens* | 2 |
| *Olearia ramosissima* | 2 |
| *Olearia rosmarinifolia* | 2, 6 |
| *Olearia viscidula* | 1, 2, 3, 4, 5, 6, 7, 8 |
| *Ozothamnus obcordatus* | 3, 9, 10 |
| *Podolepis jaceoides* | 1, 7 |
| *Podolepis neglecta* | 10 |
| *Rhodanthe anthemoides* | 5 |
| *Rhodanthe diffusa* subsp. *leucactina* | 0 |
| *Senecio diaschides* | 1, 2, 4, 5, 6, 7 |
| *Senecio hispidulus* var. *dissectus* | 2, 6, 8 |
| *Senecio hispidulus* var. *hispidulus* | 6 |
| *Senecio lautus* subsp. *dissectifolius* | 2, 6, 10 |
| *Senecio* sp. *E* | 5 |
| *Sigesbeckia australiensis* | 1, 2, 6, 7 |
| **Sigesbeckia orientalis* subsp. *orientalis* | 0 |
| **Sonchus oleraceus* | 5, 7 |
| **Taraxacum officionale* | 5 |
| *Triptilodiscus pygmaeus* | 10 |
| *Vernonia cinerea* | 2, 7, 8 |
| *Vittadinia cervicularis* var. *cervicularis* | 4, 8 |
| *Vittadinia cuneata* var. *cuneata* f. *minor* | 1, 2, 5, 6, 7 |
| var. *hirsuta* | 10 |
| *Vittadinia muelleri* | 0 |
| *Vittadinia sulcata* | 0 |
| **Bignoniaceae** | |
| *Pandorea pandorana* | 0 |
| **Brassicaceae** | |
| *Lepidium pseudohyssopifolium* | 7 |
| **Cactaceae** | |
| **Opuntia aurantiaca* | 0 |
| **Opuntia stricta* | 2, 4, 7, 10 |
| **Campanulaceae** | |
| *Wahlenbergia communis* | 1, 2, 3, 4, 5, 6, 7, 10 |
| *Wahlenbergia gracilis* | 1, 2, 5, 6, 9 |
| *Wahlenbergia graniticola* | 1, 6 |
| *Wahlenbergia luteola* | 1 |
| *Wahlenbergia planiflora* subsp. *longipila* | 1, 2, 4, 5, 6, 7, 10 |
| **Caryophyllaceae** | |
| **Anagallis arvensis* | 5, 7, 8 |
| **Arenaria leptocladus* | 2 |
| **Cerastium glomeratum* | 5 |
| **Cerastium vulgare* | 0 |
| **Paronychia brasiliana* | 2, 5 |
| **Petrorhagia nanteuilii* | 1, 5 |
| *Scleranthus biflorus* | 1, 2, 3, 4, 5, 6, 7 |
| *Stellaria angustifolia* | 5, 6, 7, 8, 11 |
| *Stellaria flaccida* | 5 |
| **Stellaria media* | 7, 8 |
| *Stellaria pungens* | 6, 7 |
| **Casuarinaceae** | |
| *Casuarina cunninghamiana* | 8 |
| **Celastraceae** | |
| *Cassine australis* var. *angustifolia* | 0 |
| *Maytenus silvestris* | 1, 4, 6, 7, 8 |
| **Chenopodiaceae** | |
| *Chenopodium pumilio* | 8 |
| *Einadia hastata* | 4 |
| *Einadia polygonoides* | 7, 8 |
| *Einadia trigonos* subsp. *stellulata* | 8 |
| **Clusiaceae** | |
| *Hypericum gramineum* | 1, 2, 5, 6, 7, 9, 10 |
| *Hypericum japonicum* | 1, 2, 5 |
| **Convulvulaceae** | |
| *Dichondra repens* | 1, 2, 4, 5, 6, 7, 8 |
| *Dichondra* sp. *A* | 1, 3, 4, 6, 7, 8 |
| **Crassulaceae** | |
| *Crassula helmsii* | 5 |
| *Crassula sieberiana* | 1, 2,3, 5, 6, 9, 10 |
| **Dilleniaceae** | |
| *Hibbertia acicularis* | 3, 4 |
| *Hibbertia cistoidea* | 9 |
| *Hibbertia linearis* | 2, 9 |
| *Hibbertia obtusifolia* | 1, 2, 3, 4, 5, 6, 7, 8, 10 |
| *Hibbertia riparia* | 1, 2, 3, 9, 10 |
| *Hibbertia* sp. *nov.* | 3, 9 |

**Droseraceae**
*Drosera burmannii* 2, 9, 10
*Drosera peltata* 5, 6, 10
*Drosera spatulata* 0

**Epacridaceae**
*Brachyloma daphnoides* subsp. *glabrum* 1, 2, 3, 4, 6, 7, 9, 10
*Leucopogon lanceolatus* var. *lanceolatus* 1, 2, 6, 9
*Leucopogon melaleucoides* 4
*Leucopogon muticus* 1, 2, 3, 4, 5, 6, 7, 9, 10
*Leucopogon neo-anglicus* 9
*Leucopogon virgatus* 1, 3
*Lissanthe strigosa* subsp. *subulata* 1, 2, 3, 5, 6, 7
*Melichrus urceolatus* 1, 2, 3, 4, 5, 6, 7, 10
*Monotoca scoparia* 1, 2, 3, 4, 5, 6, 7

**Euphorbiaceae**
*Phyllanthus gunnii* 0
*Phyllanthus subcrenulatus* 7
*Phyllanthus virgatus* 1, 7
*Poranthera microphylla* 1, 2, 5, 6, 7

**Fabaceae**
*Acacia buxifolia* subsp. *buxifolia* 2, 3, 6
*Acacia cheelii* 4, 9
*Acacia implexa* 3, 4, 7, 8
*Acacia leucocalyx* 1, 2, 5
*Acacia montana* 0
*Acacia neriifolia* 1, 2, 3, 4, 5, 6, 7, 9, 10
*Acacia obtusifolia* 2
*Acacia penninervis* 1, 2, 3, 4, 6, 7, 10
*Acacia pruinosa* 1, 3, 7
*Acacia rubida* 5
*Acacia triptera* 6, 7, 9, 10
*Acacia ulicifolia* 1, 2
*Acacia venulosa* 0
*Acacia viscidula* 3, 5, 9
*Aotus subglauca* var. *filiformis* 0
*Bossiaea obcordata* 0
*Bossiaea prostrata* 1, 2
*Daviesia latifolia* 2
*Desmodium brachypodum* 1,4, 6, 7, 10
*Desmodium varians* 1, 2, 4, 5, 6, 7, 8, 10
*Dillwynia retorta* 0
*Dillwynia sieberi* 5
*Glycine clandestina* 1, 2, 4, 6, 7, 8
*Glycine stenophita* 7
*Glycine tabacina* 1, 2, 3, 4, 6, 7, 10
*Hardenbergia violacea* 1, 2, 3, 4, 5, 6, 7
*Hovea apiculata* 2, 9
*Hovea graniticola* 3, 10
*Hovea heterophylla* 1, 2, 3, 5
*Hovea lanceolata* 10
*Indigofera adesmiifolia* 1, 2, 4, 5, 6
*Indigofera australis* 1, 2, 3, 7
*Jacksonia scoparia* 0
*Lespedeza juncea* subsp. *sericea* 1, 7, 8
*Lotus australis* 1, 5
*Lotus cruentus* 1, 2, 5
**Lotus uliginosus* 5, 11
**Medicago polymorpha* 0
*Mirbelia pungens* 9, 10
*Mirbelia speciosa* subsp. *speciosa* 0
*Pultenaea campbellii* [*P. setulosa*] 2, 6
*Pultenaea spinosa* 0
*Pultenaea foliolosa* 1, 2, 3
*Pultenaea* sp. *C* 1, 3, 4, 6, 7
*Pultenaea* sp. *G* 1, 2, 4, 5, 6, 10
*Swainsona galegifolia* 7
**Trifolium repens* 1, 5, 6, 11
**Vicia villosa*. 5
*Zornia dyctiocarpa* var. *dyctiocarpa* 5, 7

**Gentianaceae**
*Centaurium erythraea* 1, 2, 5, 7

**Geraniaceae**
*Geranium solanderi* var. *grande* 11
*Geranium solanderi* var. *solanderi* 1, 2, 4, 5, 6, 7, 8, 10, 11
*Pelargonium australe*

**Goodeniaceae**
*Goodenia bellidifolia* subsp. *argentea* 1
*Goodenia glabra* 0
*Goodenia hederacea* subsp. *hederacea* 1, 2, 3, 4, 5, 6, 10
*Goodenia macbarronii* 1, 2, 3, 5, 10
*Goodenia rotundifolia* 2

**Haloragaceae**
*Gonocarpus micranthus* subsp. *micranthus* 5, 11
*Gonocarpus teucrioides* 9
*Gonocarpus tetragynus* 1, 2, 3, 5, 6, 7, 9, 10
*Haloragis heterophylla* 1, 5, 6, 7, 10
*Haloragis serra* 6, 7
*Myriophyllum crispatum* 5, 8
*Myriophyllum pedunculatum* 0

**Lamiaceae**
*Ajuga australis* 1, 2, 3, 4, 6, 7, 10
*Mentha satureioides* 5, 6, 7
*Plectranthus graveolens* 4
*Plectranthus parviflorus* 0
*Prostanthera graniticola* 9
*Prostanthera nivea* var. *nivea* 5, 9
*Scutellaria humilis* 1, 2, 4, 5, 6, 7, 8
*Westringia eremicola* 1, 2, 5, 6

**Lauraceae**
*Cassytha pubescens* 2, 6, 9

**Lentibulariaceae**
*Utricularia dichotoma* 0

**Lobeliaceae**
*Isotoma anethifolia* 9, 10
*Isotoma fluviatilis* subsp. *borealis* 5, 8
*Lobelia gracilis* 9, 10
*Pratia purpurascens* 0

**Loranthaceae**
*Amyema miquelii* 1, 4, 5, 7
*Amyema miraculosum* subsp. *boormanii* 9
*Amyema pendula* 0
*Dendrophthoe glabrescens* 0

**Lythraceae**
*Lythrum salicaria* 0

**Malvaceae**
**Modiola caroliniana* 8
*Sida cunninghamii* 7

**Menyanthaceae**
*Nymphoides geminata* 0

**Moraceae**
**Ficus carica* 0
*Ficus rubiginosa* 2, 4, 6

**Myrtaceae**
*Angophora floribunda* 1, 2, 3, 4, 5, 6, 7, 8
*Callistemon pungens* 5, 6, 7, 8, 11
*Calytrix tetragona* 2, 3, 5, 6, 9, 10
*Eucalyptus albens* 4, 7
*Eucalyptus andrewsii* 1, 2, 3, 4, 5, 6, 7
*Eucalyptus blakelyi* 1, 5, 6, 7, 8, 10
*Eucalyptus bridgesiana* 1, 2, 5, 6, 7, 8
*Eucalyptus caleyi* subsp. *caleyi* 1, 2, 3, 4, 5, 6, 7, 10
*Eucalyptus dealbata* 1, 2, 4, 7, 9, 10
*Eucalyptus macrorhyncha* 1, 2, 3, 4, 5, 6, 7, 8
*Eucalyptus melliodora* 1, 2, 3, 4, 6, 7
*Eucalyptus prava* 1, 2, 3, 4, 5, 6, 8, 9, 10

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| *Eucalyptus quinniorum* | 1, 2, 3, 4, 5, 6 |
| *Eucalyptus subtilior* | 6 |
| *Homoranthus bornhardtiensis* | 9, 10 |
| *Kunzea obovata* | 0 |
| *Kunzea parvifolia* | 7, 9 |
| *Leptospermum brachyandrum* | 0 |
| *Leptospermum brevipes* | 6, 7, 9, 10 |
| *Leptospermum novae-angliae* | 9 |
| *Leptospermum polygalifolium* | |
| subsp. *montanum* | 11 |
| subsp. *transmontanum* | 1, 5, 6, 7 |
| *Leptospermum variabile* | 0 |
| *Micromyrtus sessilis* | 0 |
| **Oleaceae** | |
| *Jasminum sauvissimum* | 3 |
| *Notelaea microcarpa* var. *microcarpa* | 1, 3, 4, 5, 6, 7, 8, 10 |
| var. *velutina* | 8 |
| **Onagraceae** | |
| *Epilobium billardierianum* | |
| subsp. *cinereum* | 1, 5, 6, 7, 11 |
| **Oxalidaceae** | |
| *Oxalis chnoodes* | 1, 2, 4, 5, 6, 7 |
| *Oxalis perennans* | 1, 5, 8 |
| **Phytolaccaceae** | |
| **Phytolacca octandra* | 0 |
| **Pittosporaceae** | |
| *Billardiera scandens* var. *scandens* | 2, 6 |
| *Bursaria spinosa* var. *obovata* | 4, 6, 7 |
| *Pittosporum undulatum* | 4, 6 |
| *Rhytidosporum procumbens* | 1, 3 |
| **Plantaginaceae** | |
| *Plantago debilis* | 1, 6 |
| **Plantago lanceolata* | 5 |
| *Plantago varia* | 1, 2, 4, 5, 6, 7, 10 |
| **Polygalaceae** | |
| *Polygala japonica* | 1 |
| **Polygonaceae** | |
| **Acetosella vulgaris* | 5, 7 |
| *Persicaria decipiens* | 5 |
| *Persicaria hydropiper* | 7, 8 |
| *Persicaria praetissima* | 0 |
| *Rumex brownii* | 1, 5, 6, 7, 8 |
| **Portulacaceae** | |
| *Calandrinia eremaea* | 2, 3, 5, 9, 10 |
| *Portulaca bicolor* | 0 |
| **Proteaceae** | |
| *Grevillea floribunda* | 0 |
| *Grevillea triternata* | 1, 3, 4, 5, 7, 10 |
| *Hakea eriantha* | 0 |
| *Hakea microcarpa* | 11 |
| *Lomatia silaifolia* | 2, 6 |
| *Persoonia chamaepeuce* | 3 |
| *Persoonia cornifolia* | 1, 2, 3, 5, 6, 7 |
| *Persoonia fastigata* | 0 |
| *Persoonia sericea* | 1, 2, 3, 5, 6 |
| **Ranunculaceae** | |
| *Clematis aristata* | 0 |
| *Clematis glycinoides* | 1, 2, 3, 4, 5, 6, 7 |
| *Ranunculus lappaceus* | 1, 2, 5, 6 |
| *Ranunculus sessiliflorus* var. *sessiliflorus* | 6 |
| *Ranunculus* sp. *A* | 11 |
| **Rhamnaceae** | |
| *Cryptandra amara* var. *floribunda* | 4, 9, 10 |
| **Rosaceae** | |
| *Acaena novae-zelandiae* | 1, 2, 4, 5, 6, 7 |
| **Rosa rubiginosa* | 0 |
| **Rubus chloocladus* | 1, 5, 6, 7, 8 |
| *Rubus parvifolius* | 2, 5, 6 |
| **Rubiaceae** | |
| *Asperula conferta* | 1, 5, 6, 7 |
| *Galium binifolium* | 1, 5, 6 |
| *Galium gaudichaudii* | 1, 2, 6, 7 |
| *Galium migrans* | 1, 2, 5, 6, 7, 8, 10 |
| *Galium propinquum* | 1, 2, 6 |
| *Opercularia aspera* | 1, 4, 7 |
| *Opercularia diphylla* | 1, 2, 3, 7, 10 |
| *Opercularia hispida* | 2, 5 |
| *Pomax umbellata* | 1, 2, 3, 4, 5, 9, 10 |
| *Psydrax odoratum* | 0 |
| **Rutaceae** | |
| *Boronia anethifolia* | 9 |
| *Correa reflexa* var. *reflexa* | 1, 2, 3, 4, 5, 6 |
| *Zieria aspalathoides* | 0 |
| *Zieria cytisoides* | 5, 7 |
| *Zieria odorifera* | 3 |
| **Santalaceae** | |
| *Exocarpos cupressiformis* | 1, 2, 3, 6 |
| *Leptomeria drupacea* | 0 |
| **Sapindaceae** | |
| *Alectryon subdentatus* | |
| forma *subdentatus* | 0 |
| *Dodonaea boroniifolia* | 2 |
| *Dodonaea viscosa* subsp. *spatulata* | 1, 2, 3, 5, 7, 10 |
| **Scrophulariaceae** | |
| *Derwentia arenaria* | 2, 4, 5, 6, 7 |
| *Derwentia perfoliata* | 1, 2, 3, 5, 6 |
| *Gratiola peruviana* | 5, 6 |
| **Verbascum thapsus* | 7 |
| *Veronica calycina* | 1, 2, 3, 6 |
| **Solanaceae** | |
| *Cyphanthera albicans* subsp. *albicans* | 9 |
| *Solanum amblymerum* | 3 |
| *Solanum cinereum* | 0 |
| *Solanum elegans* | 2, 6 |
| **Solanum nigrum* | 6, 8 |
| **Stackhousiaceae** | |
| *Stackhousia monogyna* | 1, 2, 6, 7 |
| *Stackhousia viminea* | 1, 2 |
| **Sterculiaceae** | |
| *Brachychiton populneus* | 1, 4, 7, 8 |
| **Stylidiaceae** | |
| *Stylidium graminifolium* | 1,3, 7 |
| **Thymelaeaceae** | |
| *Pimelea linifolia* subsp. *caesia* | 3 |
| *Pimelea strigosa* | 4 |
| **Urticaceae** | |
| *Urtica incisa* | 7, 8 |
| **Verbenaceae** | |
| **Verbena bonariensis* | 1, 5 |
| **Verbena rigida* | 1 |
| **Viscaceae** | |
| *Notothixos subaureus* | 0 |
| **Violaceae** | |
| *Hybanthus monopetalus* | 1 |
| *Viola betonicifolia* | 1, 2, 3, 5, 6 |
| *Viola caleyana* | 5, 8 |
| *Viola hederacea* | 5, 8 |