

Vegetation of Basket Swamp National Park, Northern Tablelands, New South Wales

John T. Hunter

School of Human & Environmental Studies, University of New England NSW 2351, AUSTRALIA Email: flora@austarnet.com.au

Abstract: The vegetation of Basket Swamp National Park (2820 ha), 30 km north east of Tenterfield (28°54'S, 152°09'E) in the Tenterfield Shire, in the Northern Tablelands Bioregion NSW, is described. Seven vegetation communities are mapped based on survey of plots, subsequent ground-truthing, air photo interpretation and substrate.

Communities described are: (1) *Eucalyptus campanulata* (Blackbutt) – *Eucalyptus cameronii* (Diehard Stringybark) Open Forests, (2) *Eucalyptus campanulata* (Blackbutt) – *Eucalyptus cameronii* (Diehard Stringybark) Grassy Open Forests, (3) *Leptospermum trinervium* (Tea-tree) – *Leptospermum polygalifolium* subsp. *transmontanum* (Creek Tea-tree) Riparian Scrub, (4) *Leptospermum trinervium* (Tea-tree) – *Kunzea obovata* (Pink Kunzea) – *Leptospermum novae-angliae* (New England Tea-tree) Heaths & Shrublands, (5) *Ceratopetalum apetalum* (Coachwood) – *Lophostemon confertus* (Brush Box) Closed Forest, (6) *Eucalyptus obliqua* (Messmate) – *Eucalyptus campanulata* (Blackbutt) Tall Open Forests, and (7) *Baeckea omissa* (Baeckea) – *Baloskion stenocoleum* (Sedge) Heathy Sedgeland.

All but two communities (3 & 7) were considered adequately reserved locally, no listed endangered or vulnerable communities were found. Thirty-six taxa were considered to be of conservation significance of which two are listed as vulnerable on Schedule 2 of the NSW *TSC Act*. A further nine have been reported under the RoTAP criteria.

Cunninghamia (2004) 8(4): 453–466

Introduction

Basket Swamp National Park is located approximately 30 km north east of Tenterfield and 10 km west of the Mount Lindsay Highway (28°54'S, 152°09'E) (Fig. 1). Basket Swamp National Park lies within the New England Tablelands Bioregion, the Northern Tablelands Botanical division and the local government areas of the Tenterfield Shire and the County of Clive. The Park encompasses 2 820 ha, which includes part of the former Boonoo State Forest and was gazetted in 1999. The reserve is bounded on three sides by vegetated private freehold land and on the north by State Forest.

Climate

Overall, rainfall ranges from 1300–1400 mm annually within the region. Rain falls mostly in the summer (60–70%) due to a predominantly easterly airflow from the Pacific Ocean and the effects of tropical cyclones from the north east. Snow occurs occasionally at higher altitudes and frosts are frequent in winter. Mean annual temperatures are greatest within the gorge areas (16–17°C) but are at their lowest on the higher parts of the reserve (11–12°C). Dry southwest to westerly winds predominate in the winter months.

Landform

Apart from the larger landform features such as Bornhardts (larger rock outcrops) the landform is generally undulating to hilly with wide flat valleys. These valleys usually contain broad meandering swampy ground fed by the high runoff from outcrops and ridges. Elevations vary from a maximum of

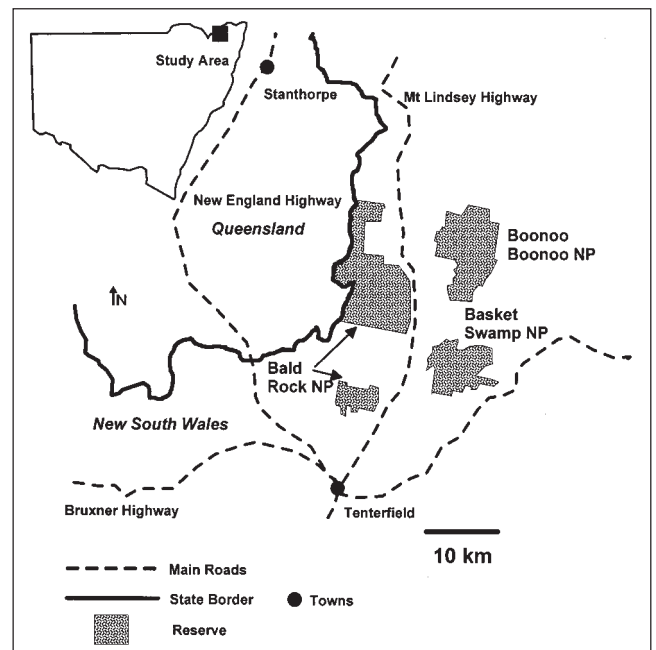


Fig. 1. Location of Basket Swamp National Park, and nearby conservation areas in northeastern NSW.

1163 m (ASL) at Timbarra Lookout to 700 m (ASL) in the lower parts of the Cataract River gorge in the east. Slopes within the gorge areas can be steep.

Drainage is predominantly to the east. Three named channels are associated with the reserve and include Basket Swamp Creek, which flows from the large Basket Swamp, Wellingtons Creek that flows into Basket Swamp Creek and the Cataract River all of which form part of the eastern boundary.

Geology

Basket Swamp National Park lies within the New England Orogen. The New England Orogen (NEO), of the New England Fold Belt (NEFB), is a belt of complex geology interpreted to be a tectonic collage of a number of terranes that amalgamated with, and accreted to the eastern margin of Gondwana during the late Paleozoic-early Mesozoic (Flood & Fergusson 1984, Flood & Aitchison 1993).

Methods

Vascular plants were scored using the Braun-Blanquet (1982) six point cover abundance scale from 40, 20 × 50 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 during 5 days in January 2002 when seasonal rainfall was below average.

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 cover 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. Nomenclature follows that of Harden (1992–2002) except where recent changes have been made.

C1: *Eucalyptus campanulata* – *Eucalyptus cameronii*
Shrubby Open Forest

C2: *Eucalyptus campanulata* – *Eucalyptus cameronii*
Grassy Open Forest

C3: *Leptospermum trinervium* – *Leptospermum polygalifolium*
Riparian Scrub

C4: *Leptospermum trinervium* – *Leptospermum polygalifolium* –
Kunzea obovata Outcrop Heath

C5: *Ceratopetalum apetalum* – *Lophostemon confertus*
Closed Forest

C6: *Eucalyptus obliqua* – *Eucalyptus campanulata*
Tall Open Forest

C7: *Baeckea omissa* – *Baloskion stenocoleum*
Heathy/Sedgeland

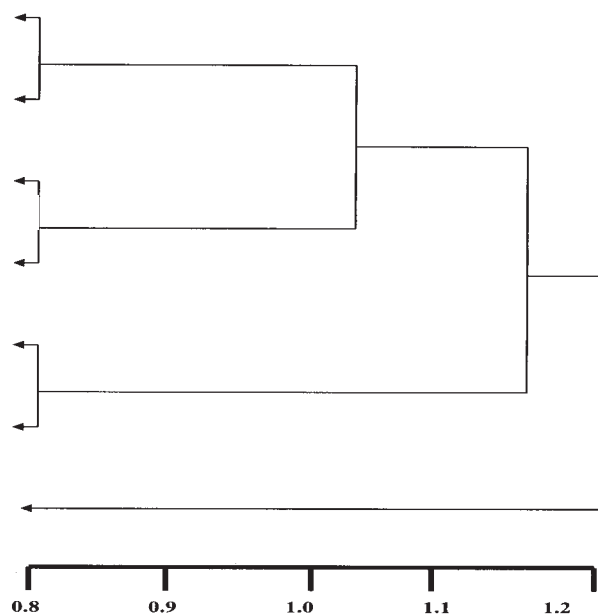


Fig. 2. Summary dendrogram of full dataset of sites using Kulczynski association and flexible UPGA fusion strategy.

Results

Seven communities were recognised at the dissimilarity measure of 0.8. A summary of the community relationships is given in the dendrogram and map (Figs 2 & 3). A total of 430 vascular plant taxa were recorded from 40 sites and opportunistic collections. Three hundred and thirty five taxa were recorded within sites and an additional 95 were recorded opportunistically or from previous records. The number of taxa captured represents about 7% of the total NSW flora and about 20% of the Northern Tablelands flora.

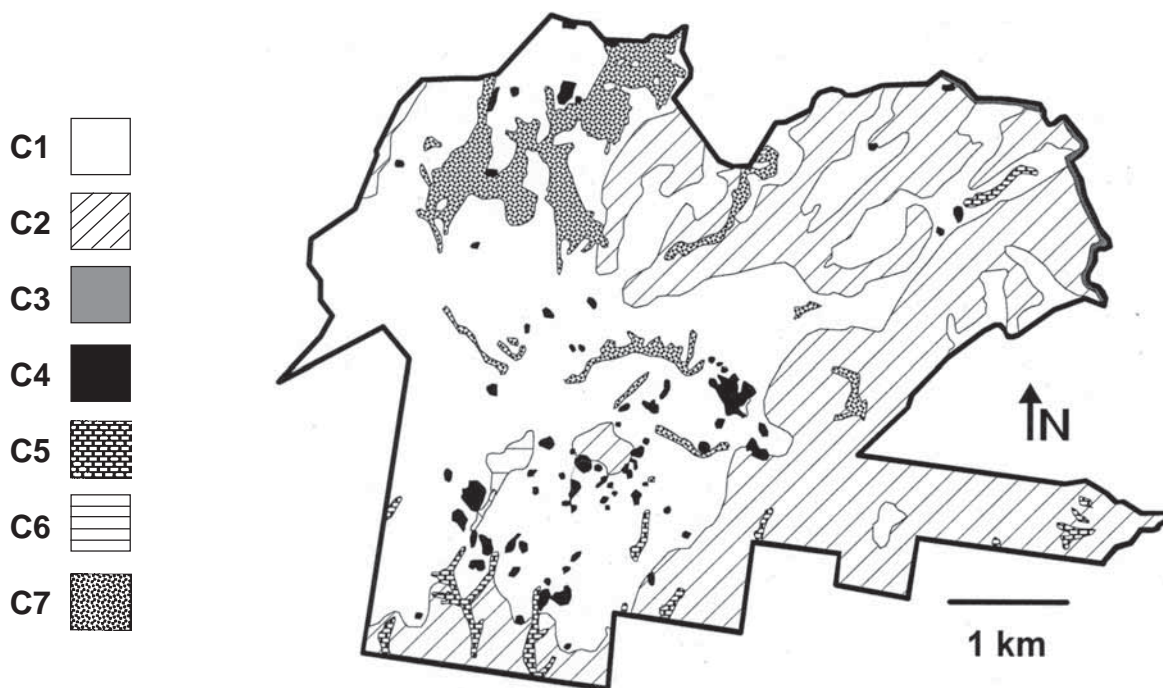
The 430 taxa occurred in 105 families and 269 genera. The families with the greatest number of taxa are: Fabaceae (42), Poaceae (34), Asteraceae (34), Myrtaceae (30), Cyperaceae (20), Epacridaceae (13), Proteaceae (12), Dilleniaceae (9), and Apiaceae (8). The richest genera are: *Acacia* (14), *Eucalyptus* (14), *Hibbertia* (8), *Leptospermum* (6), *Juncus* (5), *Pultenaea* (5), and *Wahlenbergia* (5). During the survey 15 taxa (3.6%) were found to be exotic in origin.

Vegetation communities

The structure of communities within Basket Swamp National Park varies, with most showing a woodland or forest structure. In more protected sites tall open and closed forests occur, while heaths and open woodlands develop in areas of impeded drainage. Some specialised communities as rock outcrop shrublands and *Sphagnum* swamps are notable. A shrub component within forests and woodlands is often present and can form one or two layers. In some instances, this is poorly developed and grasses dominate. The order of names reflects the importance of each species in terms of their cover and fidelity to each community. 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.

Table 1: Selected attributes of the eleven defined communities in Basket Swamp National Park.

Community	No. of sites	Richness per 400 m ² (average)	No. of species	No. of introduced species	Proportion of reserve	No. ha
C1: <i>Eucalyptus campanulata</i> – <i>Eucalyptus cameronii</i> Shrubby Open Forest & Woodland	13	32–45 (39.5)	152	2	55%	1676
C2: <i>Eucalyptus campanulata</i> – <i>Eucalyptus cameronii</i> Grassy Open Forest	12	28–55 (41)	152	4	34.7%	1059
C3: <i>Leptospermum trinervium</i> – <i>Leptospermum polygalifolium</i> Riparian Scrub	1	78	78	1	0.3%	11
C4: <i>Leptospermum trinervium</i> – <i>Kunzea obovata</i> Outcrop Heath & Shrubland	5	19–43 (28)	79	0	2%	61
C5: <i>Ceratopetalum</i> – <i>Lophostemon confertus</i> Closed Forest	3	24–43 (35)	71	1	1.3%	39
C6: <i>Eucalyptus obliqua</i> – <i>Eucalyptus campanulata</i> Tall Open Forest	1	35	35	0	0.4%	11
C7: <i>Baeckea omissa</i> – <i>Baloskion stenocoleum</i> Heathy/Sedgeland	5	22–45 (31.5)	83	3	6.2%	190

**Fig. 3.** Map of vegetation communities for Basket Swamp National Park.

Community 1: *Eucalyptus campanulata* (Eastern New England Blackbutt) – *Eucalyptus cameronii* (Diehard Stringybark) – *Eucalyptus laevopinea* (Silvertop Stringybark) Shrubby Open Forest and Woodland

Environmental relationships: found on deep or rarely shallow, well-drained soils that are commonly grey brown loamy coarse sand. In a variety of topographic positions from flats to upper slopes and crests.

Structure: open forest to woodland. Tree layer: (10–) 25–35 m tall; (10–) 20–30 (–35)% cover. Tall shrub layer: 3–8 m tall; 10–30 (–50)% cover. Low shrub layer, usually absent: 1–3 m tall; (10–) 20–50 (–80)% cover when present. Understorey layer: < 1 m tall; 20–70% cover.

Trees: *Eucalyptus campanulata*, *Eucalyptus cameronii*, *Allocasuarina littoralis*, *Banksia integrifolia*, *Eucalyptus laevopinea*, *Eucalyptus williamsiana*, *Eucalyptus radiata* subsp. *sejuncta*, *Eucalyptus notabilis*, *Eucalyptus acaciiformis*, *Eucalyptus brunnea*.

Community 1 *Eucalyptus campanulata* and *Eucalyptus cameronii* Shrubby Open Forest and Woodland.

Shrubs: *Petrophile canescens*, *Podolobium ilicifolium*, *Monotoca scoparia*, *Persoonia sericea*, *Leucopogon lanceolatus*, *Banksia cunninghamii*, *Xanthorrhoea glauca*, *Leptospermum trinervium*, *Persoonia fastigiata*, *Lomatia silaifolia*, *Acacia obtusifolia*, *Notelaea ovata*, *Hibbertia villosa*, *Daviesia elliptica*, *Boronia microphylla*, *Amperea xiphioclada*, *Acrotriche aggregata*, *Acacia myrtifolia*, *Acacia ulicifolia*, *Dillwynia phyllicoides*, *Pultenaea daphnoides*, *Elaeocarpus reticulatus*, *Acacia floribunda*, *Hibbertia obtusifolia*, *Hakea eriantha*, *Exocarpos cupressiformis*, *Epacris microphylla*, *Boronia algida*.

Climbers & trailers: *Smilax australis*, *Hardenbergia violacea*, *Cassytha pubescens*, *Desmodium varians*, *Billardiera scandens*, *Morinda jasminoides*, *Eustrephus latifolius*, *Dockrillia pugioniformis*, *Desmodium rhytidophyllum*, *Davallia solida*.

Ground cover: *Entolasia stricta*, *Patersonia glabrata*, *Themeda triandra*, *Lepidosperma laterale*, *Platysace lanceolata*, *Goodenia hederacea*, *Bossiaea neo-anglica*, *Pteridium esculentum*, *Pomax umbellata*, *Gonocarpus tetragynus*, *Dianella revoluta*, *Austrostipa rudis*, *Poa sieberiana*, *Gonocarpus oreophilus*, *Dichelachne micrantha*, *Dianella caerulea*, *Stylidium graminifolium*, *Patersonia sericea*, *Imperata cylindrica*, *Schoenus melanostachys*, *Austroanthonia racemosa*, *Lomandra filiformis*, *Joycea pallida*, *Deyeuxia parviseta*, *Austrostipa scabra*.

Introduced taxa: *Hypochaeris radicata*, *Hypochaeris glabra*.

Variability: this assemblage intergrades considerably with Community 2 which it shares many of the overstorey dominants. The most distinguishing features of this assemblage are the dominance of shrubs in the understorey. There is much variability in shrub density (10–80% cover).

Conservation status: similar assemblages are reserved within Bald Rock & Boonoo NPs where 2811 ha have been mapped (Hunter 1999), additionally Western Washpool NP has an additional 8070 ha mapped (Hunter 2000b). Well reserved with potentially over 12000 ha reserved locally.



Community 2 *Eucalyptus campanulata* and *Eucalyptus cameronii* Grassy Open Forest.

Community 2: *Eucalyptus campanulata* (Eastern New England Blackbutt) – *Eucalyptus cameronii* (Diehard Stringybark) – *Eucalyptus brunnea* (Brown Gum) Grassy Open Forest

Environmental relationships: occurring on deep or shallow well drained to moist soils that are grey brown to chocolate brown and loamy coarse sand to sandy loam. Usually on mid slopes but also found other topographic positions.

Structure: tall open forest to woodland. Tree layer: 20–35 (–40) m tall; (10–) 20–35% cover. Tall shrub layer: (4–) 10–15 (–20) tall; 10–20 (–70)% cover, often absent. Low shrub layer: 1–5 m tall; 10–20 (–30)% cover, sometimes absent. Understorey layer: < 1 m tall; 30–90% cover.

Trees: *Eucalyptus campanulata*, *Eucalyptus cameronii*, *Eucalyptus brunnea*, *Banksia integrifolia*, *Allocasuarina littoralis*, *Eucalyptus saligna*, *Angophora subvelutina*, *Allocasuarina torulosa*, *Wilkiea huegeliana*, *Eucalyptus obliqua*, *Eucalyptus notabilis*, *Eucalyptus caliginosa*, *Acacia melanoxylon*.

Shrubs: *Leucopogon lanceolatus* subsp. *lanceolatus*, *Persoonia sericea*, *Podolobium ilicifolium*, *Trochocarpa laurina*, *Hibbertia obtusifolia*, *Acacia obtusifolia*, *Elaeocarpus reticulatus*, *Amperea xiphioclada*, *Acrotriche aggregata*, *Lomatia silaifolia*, *Indigofera australis*, *Pultenaea villosa*, *Polyscias sambucifolia*, *Maytenus silvestris*, *Hibbertia villosa*, *Hakea florulenta*, *Hakea eriantha*, *Acacia myrtifolia*, *Acacia floribunda*, *Acacia filicifolia*, *Acacia falciformis*

Climbers & trailers: *Hardenbergia violacea*, *Smilax australis*, *Desmodium varians*, *Glycine clandestina*, *Eustrephus latifolius*, *Billardiera scandens*, *Hibbertia scandens*, *Desmodium rhytidophyllum*, *Rubus parvifolius*, *Glycine tabacina*, *Pandorea pandorana*, *Morinda jasminoides*, *Kennedia rubicunda*, *Geitonoplesium cymosum*, *Cassytha pubescens*.

Ground cover: *Themeda triandra*, *Imperata cylindrica*, *Poa sieberiana*, *Pteridium esculentum*, *Gonocarpus oreophilus*, *Sorghum leiocladum*, *Entolasia stricta*, *Gonocarpus tetragynus*, *Dianella revoluta*, *Schoenus melanostachys*, *Calochlaena dubia*, *Viola betonicifolia*, *Lepidosperma laterale*, *Austroanthonia racemosa*, *Lomandra longifolia*, *Dianella caerulea*, *Poranthera microphylla*, *Platysace lanceolata*, *Patersonia glabrata*, *Goodenia hederacea*, *Deyeuxia parviseta*, *Stylidium graminifolium*, *Pratia purpurascens*, *Opecularia diphylla*, *Lomandra multiflora*, *Entolasia marginata*, *Brachyscome nova-anglica*, *Microlaena stipoides*, *Helichrysum scorpioides*, *Vernonia cinerea*, *Thysanotus tuberosus*, *Senecio diaschides*, *Lomandra confertifolia*, *Gahnia aspera*, *Dichelachne micrantha*, *Lycopodiella cernua*, *Helichrysum elatum*, *Dipodium variegatum*, *Baloskion stenocoleum*.

Introduced taxa: *Hypochaeris radicata*, *Conyza albida*, *Axonopus affinis*, *Picris hieracioides*.

Variability: though widespread this community is fairly uniform however at times the shrub component may be more prominent and include legumes such as *Podolobium* or *Acacia* that have germinated en-mass due to recent fires that heated the soil sufficiently to germinate seeds. Although shrubs may be common in some areas the understorey is discernibly grassy, sometimes with dense *Imperata* if fire frequencies have been high. This community intergrades considerably with Community 1.

Conservation status: similar assemblages have been described in Bald Rock and Boonoo Boonoo NPs (Hunter 1999) and Western Washpool & Capoompetta NPs (Hunter 2000b) where 6417 ha and 8460 ha have been mapped. Adequately reserved locally with potentially over 16000 ha in conservation.

Community 3: *Leptospermum trinervium* (Tea-tree) – *Leptospermum polygalifolium* subsp. *transmontanum* (Creek Tea-tree) Riparian Scrub

Environmental relationships: restricted to the rocky creek beds.

Structure: heath and shrubland. Tree layer: 10–20 m tall; 5–15% cover, usually absent. Tall shrub layer: 3–12 tall; 10–50% cover, sometimes absent. Low shrub layer: 1–2 m tall; 10–50% cover. Understorey layer: < 1 m tall; 10–30% cover.

Trees: *Allocasuarina torulosa*, *Eucalyptus campanulata*, *Eucalyptus brunnea*, *Banksia integrifolia*, *Allocasuarina littoralis*.

Shrubs: *Leptospermum trinervium*, *Epacris obtusifolia*, *Calytrix tetragona*, *Pultenaea villosa*, *Leucopogon neoanglicus*, *Leptospermum polygalifolium* subsp. *transmontanum*, *Hibbertia acicularis*, *Callistemon pallidus*, *Baeckea omissa*, *Acacia venulosa*, *Acacia fimbriata*, *Zieria fraseri*, *Xanthorrhoea glauca*, *Prostanthera* sp. *B.*



Community 3 *Leptospermum trinervium* and *Leptospermum polygalifolium* Riparian Scrub.

Pomaderris lanigera, *Pomaderris argyrophylla*, *Pimelea linifolia*, *Petrophile canescens*, *Persoonia sericea*, *Persoonia oleoides*, *Persoonia fastigata*, *Lomatia silaifolia*, *Hovea pedunculata*, *Hibbertia villosa*, *Exocarpus cupressiformis*, *Dillwynia sieberi*, *Correa reflexa*, *Coprosma quadrifida*, *Bauera rubioides*, *Banksia cunninghamii*, *Acrotriche aggregata*, *Acacia ulicifolia*, *Acacia floribunda*, *Acacia filicifolia*.

Climbers & trailers: *Cassytha pubescens*.

Ground cover: *Themeda triandra*, *Xyris operculata*, *Schoenus melanostachys*, *Rhynchospora brownii*, *Panicum simile*, *Lomandra longifolia*, *Lomandra confertifolia*, *Lepyrodia anarthria*, *Austrostipa rudis*, *Actinotus helianthi*, *Wahlenbergia planiflora*, *Utricularia dichotoma*, *Triglochin multifructum*, *Tricoryne elatior*, *Thysanotus tuberosus*, *Schoenus apogon*, *Pteridium esculentum*, *Poa sieberiana*, *Patersonia sericea*, *Patersonia glabrata*, *Lomandra multiflora*, *Lepidosperma limicola*, *Juncus sandwithii*, *Juncus bufonius*, *Hypericum japonicum*, *Hypericum gramineum*, *Goodenia hederacea*, *Gonocarpus oreophilus*, *Gonocarpus micranthus*, *Gleichenia dicarpa*, *Drosera spatulata*, *Digitaria ramularis*, *Dianella revoluta*, *Centrolepis fascicularis*, *Brachyscome stuartii*, *Austrodanthonia eriantha*.

Introduced taxa: *Hypochoeris radicata*.

Variability: this community is by nature linear with a great edge to area ratio and even common dominants may be absent often due to the great variability in substrate and depth of soil giving a rather variable structure. This assemblage is highly stochastic and most species will have a low constance. The structure also is variable and in places will be densely shrubby and in others shrubs are only a minor component.

Conservation status: Benson and Ashby (2000) consider broadly similar assemblages to be vulnerable within the state. Based on published floristic analyses this community type does not appear to be represented in other reserves and no synonymous assemblages are described. Hence, it is likely that this grouping of taxa is rather unique to the area with broad structural and some floristic similarities with communities described for Boonoo Boonoo NP (Hunter 1999) and Warra NP (Hunter 2001).

Community 4: *Leptospermum trinervium* (Tea-tree) – *Kunzea obovata* (Pink Kunzea) – *Leptospermum novae-angliae* (New England Tea-tree) Heath and Shrubland

Environmental relationships: restricted to exposed granitic outcrops. Soils are well drained skeletal and of coarse sand.

Structure: heath and shrubland. Tree layer: 10–15 m tall; 10% cover if present, usually absent. Tall shrub layer: 6–12 m tall; 5–10% cover, sometimes absent. Low shrub layer: 1–5 m tall; 10–20% cover, sometimes absent. Understorey layer: < 1 m tall; 20% cover.

Trees: *Allocasuarina littoralis*, *Eucalyptus oreades*, *Eucalyptus williamsiana*, *Eucalyptus olida*, *Eucalyptus campanulata*, *Lophostemon confertus*.



Community 4 *Leptospermum trinervium* and *Kunzea obovata* Heath and Shrubland.

Shrubs: *Leptospermum trinervium*, *Hibbertia linearis*, *Kunzea obovata*, *Monotoca scoparia*, *Phebalium squamulosum*, *Leucopogon melaleucoides*, *Acrotriche aggregata*, *Acacia obtusifolia*, *Leptospermum novae-angliae*, *Hovea pedunculata*, *Homoranthus lunatus*, *Callistemon sieberi*, *Zieria smithii*, *Mirbelia pungens*, *Leucopogon neoanglicus*, *Leucopogon lanceolatus*, *Leucopogon hookeri*, *Elaeocarpus reticulatus*, *Calytrix tetragona*, *Callitris oblonga*, *Amperea xiphoclada*, *Acacia ulicifolia*, *Pultenaea myrtooides*, *Pomaderris lanigera*, *Pomaderris eriocephala*, *Podolobium ilicifolium*, *Pimelea bracteata*, *Petrophile canescens*, *Persoonia oleoides*, *Mirbelia rubiifolia*, *Jacksonia scoparia*, *Hibbertia serpyllifolia*, *Dodonaea rhombifolia*, *Comesperma sylvestre*, *Callistemon pallidus*, *Aotus subglaucous*.

Climbers & trailers: *Davallia solida*.

Ground cover: *Lomandra longifolia*, *Laxmannia compacta*, *Lepidosperma gunnii*, *Entolasia stricta*, *Actinotus helianthi*, *Stylidium graminifolium*, *Schoenus melanostachys*, *Pomax umbellata*, *Patersonia glabrata*, *Gonocarpus tetragynus*, *Trachymene incisa*, *Stylidium laricifolium*, *Austrodanthonia monticola*, *Themeda australis*, *Thelionema grande*, *Lomandra confertifolia*, *Velleia spathulata*, *Pteridium esculentum*, *Platysace lanceolata*, *Patersonia sericea*, *Lomandra filiformis*, *Isotoma anethifolia*, *Haemodorum planifolium*, *Gleichenia dicarpa*, *Gahnia sieberiana*, *Dianella revoluta*, *Dianella caerulea*, *Cheilanthes sieberi*, *Brachyscome nova-anglica*, *Austrostipa scabra*, *Austrodanthonia racemosa*.

Introduced taxa: none apparent.

Variability: highly variable in structure. Overall, outcrop communities are highly structured by stochastic distributions 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, giving a dense tall heath appearance. However, overall a large number of shared species occur, including many outcrop endemics, that enable delineation of the assemblage based purely on floristics.

Conservation status: Hunter & Clarke (1998) suggested that this Element was inadequately reserved however with the dedication of Basket Swamp NP, Butterleaf NP and Warra NP the community should now be considered adequately reserved within the state reserve system. This does not mean that further inclusions of this assemblage would not be important as Hunter (2000, 2002b, 2003ab, 2004) 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 5 *Ceratopetalum apetalum* and *Lophostemon confertus* Closed Forest.

Community 5: *Ceratopetalum apetalum* (Coachwood) – *Lophostemon confertus* (Brush Box) – *Synoum glandulosum* (Scentless Rosewood) Closed Forest

Environmental relationships: restricted to open depressions of deeply incised gullies with a southerly aspect, or at least in a protected position. Soils are moist to damp, grey brown to chocolate brown and of loamy coarse sand or clay loam.

Structure: closed forest often with emergents. Tree layer: 35–45 m tall; 10–40% cover. Tall shrub layer: 15–25 m tall; 20–90% cover. Low shrub layer: 10–15 m tall; 80% cover, usually absent. Understorey layer: < 1 m tall; 30% cover. Figure 8.

Trees: *Ceratopetalum apetalum*, *Lophostemon confertus*, *Synoum glandulosum*, *Schizomeria ovata*, *Elaeocarpus reticulatus*, *Acmena smithii*, *Eucalyptus brunnea*, *Eucalyptus saligna*, *Rapanea variabilis*, *Pittosporum multiflorum*, *Wilkiea huegeliana*, *Endiandra sieberi*, *Acacia filicifolia*, *Quintinia sieberi*, *Eucalyptus campanulata*, *Acacia leuococlada*.

Shrubs: *Tasmania insipida*, *Notelaea* sp. A, *Cordyline rubra*, *Senecio amygdalifolius*.

Climbers & trailers: *Cissus antarctica*, *Morinda jasminoides*, *Microsorium pustulatum*, *Cephalalaria cephalobotrys*, *Pyrrosia rupestris*, *Pennantia cunninghamii*, *Pandorea pandorana*, *Microsorium scandens*, *Geitonoplesium cymosum*, *Eustrephus latifolius*, *Dendrobium kingianum*, *Davallia solida*, *Sarcophilus falcatus*, *Pyrrosia confluens*, *Kennedia rubicunda*, *Hibbertia villosa*, *Glycine tabacina*, *Dockrillia pugioniformis*, *Dendrobium tarberi*, *Clematis glycinoides*, *Cissus hypoglauca*, *Cassine australis*, *Aneilema acuminatum*.

Ground cover: *Lomandra hystrix*, *Doodia aspera*, *Dianella caerulea*, *Pellaea nana*, *Asplenium australasicum*, *Sticherus flabellatus*, *Lastreopsis decomposita*, *Calochlaena dubia*, *Blechnum wattsi*, *Pteris umbrosa*, *Peperomia tetraphylla*, *Hymenophyllum cupressiforme*, *Helichrysum elatum*, *Elatostema reticulatum*, *Cyperus tetraphyllus*, *Cyathia australis*, *Adiantum hispidulum*, *Viola hederacea*, *Viola betonicifolia*, *Solanum nobile*, *Sigesbeckia australiensis*, *Lomandra longifolia*, *Hypolepis glandulifera*, *Gahnia sieberiana*, *Dicksonia antarctica*, *Acacia leuococlada*.

Introduced taxa: *Axonopus affinis*.

Variability: the understorey is a mosaic of closed forest mesomorphic understorey to dense stands of ferns and grasses along the margins. This community is highly stochastic in terms of composition as which species occur and in what numbers depends on time since fire, its intensity and frequency all of which are different at each locality.

Conservation status: similar assemblages are considered adequately reserved across their range at present. At least 607 ha of vegetation of very similar composition is reserved within Western Washpool NP (Hunter 2000b).

Community 6: *Eucalyptus obliqua* (Messmate Stringybark) – *Eucalyptus campanulata* (Eastern New England Blackbutt) Tall Open Forest

Environmental relationships: found on lower slopes and open depressions. Soils are deep moist, grey black and sandy loam in texture.

Structure: tall open forest. Tree layer: 35–40 m tall; 30% cover. Tall shrub layer: 3–8 m tall; 20% cover. Low shrub layer: 1.5 m tall; 90% cover. Understorey layer: < 1 m tall; 20%.

Trees: *Eucalyptus obliqua*, *Eucalyptus campanulata*.

Shrubs: *Acacia obtusifolia*, *Pultenaea daphnoides*, *Lomatia silaifolia*, *Leucopogon lanceolatus*, *Elaeocarpus reticulatus*, *Acacia filicifolia*, *Trimenia moorei*, *Rapanea variabilis*, *Olearia convenyi*, *Notelaea* sp. A, *Maytenus silvestris*, *Hibbertia villosa*, *Hakea eriantha*, *Banksia cunninghamii*, *Acrotriche aggregata*.



Community 6 *Eucalyptus obliqua* and *Eucalyptus campanulata* Tall Open Forest.

Climbers & trailers: *Cissus antarctica*, *Smilax australis*, *Ripogonum discolor*, *Desmodium varians*.

Ground cover: *Calochlaena dubia*, *Gonocarpus oreophilus*, *Doodia aspera*, *Gahnia sieberiana*, *Dianella caerulea*, *Cyathea australis*, *Sticherus urceolatus*, *Pteridium esculentum*, *Patersonia glabrata*, *Microlaena stipoides*, *Lomandra filiformis*, *Lepidosperma laterale*, *Helichrysum elatum*, *Dianella revoluta*.

Introduced taxa: none apparent.

Variability: variability within this community is largely based on time since fire. Such assemblages are best developed in the deeper upland gullies and directly below the larger rock outcrops. However large edge to area ratio means that fire can and does regularly incur and change the more mesic understorey to a more sclerophyllous type of assemblage. Tree ferns or soft ground ferns may be dense and prevalent, at times if a hot fire incursion has occurred a dense cohort of legumes may be found or under lowered fire frequencies closed forest taxa commonly occur in the understorey.

Conservation status: this assemblage is well reserved across the escarpment areas of north eastern NSW and is known to occur within the Mt McKenzie NR, Gibraltar Range NP, Capoompeta NP, Western Washpool NP, Washpool NP, Guy Fawkes River NP, Bald Rock NP, Butterleaf NP, Warra NP, Boorolong NR, New England NP and Boonoo Boonoo NP and is threatened by too frequent fire regimes. Despite this the assemblage type is probably at the northern limit of its distribution and is of limited extent within Basket Swamp NP and also limited in Bald Rock and Boonoo Boonoo NPs (Hunter 1999). This community should be considered moderately conserved locally and adequately across the state.



Community 7 *Baeckea omissa* and *Baloskion stenocoleum* Heathy Sedgeland.

Community 7: *Baeckea omissa* (*Baeckea*) – *Baloskion stenocoleum* (Sedge) Heathy Sedgeland

Environmental relationships: found in open and closed depressions on Quaternary Alluvium. Soils are waterlogged to damp, dark grey to black in colour and of cracking silt and clay, loam or peaty in texture.

Structure: closed heath and sedgeland. Tall shrub layer: 8–12 m tall; 10% cover. Low shrub and sedge layer: < 2 m tall; 80–100% cover.

Trees: *Eucalyptus pauciflora*, *Eucalyptus notabilis*, *Eucalyptus dalrympleana*, *Eucalyptus campanulata*, *Eucalyptus brunnea*.

Shrubs: *Baeckea omissa*, *Callistemon ptyoides*, *Epacris microphylla*, *Banksia cunninghamii*, *Leptospermum gregarium*, *Callistemon pallidus*, *Pultenaea villosa*, *Pimelea glauca*, *Leptospermum aracnoides*, *Hakea microcarpa*, *Grevillea acanthifolia*, *Boronia parviflora*, *Pultenaea pycnocephala*, *Xanthorrhoea glauca*, *Leptospermum trinervium*, *Leptospermum polygalifolium*, *Hibbertia acicularis*, *Callistemon sieberi*, *Petrophile canescens*, *Isopogon petiolaris*, *Hibbertia pedunculata*, *Daviesia nova-anglica*, *Boronia microphylla*.

Climbers & trailers: none apparent.

Ground cover: *Baloskion stenocoleum*, *Gymnoschoenus sphaerocephalus*, *Gleichenia dicarpa*, *Xyris operculata*, *Lycopodiella cernua*, *Lepidosperma limicola*, *Thelionema grande*, *Lepyrodia anarthria*, *Gonocarpus micranthus*, *Entolasia stricta*, *Eleocharis sphacelata*, *Thelionema caespitosum*, *Schoenus melanostachys*, *Lindsaea linearis*, *Geranium solanderi*, *Gahnia sieberiana*, *Drosera binata*, *Deyeuxia imbricata*, *Craspedia variabilis*, *Austrostipa rudis*, *Schoenus apogon*, *Lepidosperma tortuosum*, *Goodenia bellidifolia*, *Utricularia dichotoma*, *Themeda triandra*, *Rhynchospora brownii*, *Nymphoides geminata*, *Juncus continuus*, *Isolepis subtilissima*, *Hypericum japonicum*, *Goodenia hederacea*, *Entolasia marginata*, *Empodisma minus*, *Deyeuxia appressa*, *Xyris complanata*, *Tricoryne elatior*, *Trachymene incisa*, *Stylidium graminifolium*, *Philydrum lanuginosum*, *Patersonia sericea*, *Myriophyllum pedunculatum*, *Lomandra multiflora*, *Lomandra longifolia*, *Lepidosperma laterale*, *Juncus usitatus*, *Imperata cylindrica*, *Haemodorum planifolium*, *Gonocarpus tetragynus*, *Gonocarpus oreophilus*, *Fimbristylis dichotoma*, *Drosera burmannii*, *Austroanthonia racemosa*.

Introduced taxa: *Axonopus affinis*, *Phalaris aquatica*, *Cyperus eragrostis*.

Variability: this community has a number of species with high constance and many that were poorly associated. This community is isolated, small and generally of limited distribution and as such although a number of species will almost always be present and dominant many other associated taxa are likely to be highly variable in occurrence. The community as defined here may be separated into grass and cyperoid dominated areas along with situations with a strong shrub component. This internal variability within individual occurrences is primarily due to depth and duration of water logging. Zones can often be distinguished that are banded based on proximity to creek channels. In a few localities *Sphagnum* bogs have developed. In some small creek lines drainage can be impeded and this community may develop and be only a few meters wide, in such instances sedges appear to be more prominent.

Conservation status: communities such as these are usually highly divergent across relatively small distances and as such most occurrences are somewhat unique. Benson and Ashby (2000) considered this type of assemblage to be poorly conserved locally but moderately conserved within the state. Similar small isolated occurrences are likely to be within most reserves on the escarpment and associated tablelands areas from the Queensland border to Barrington and Coolah Tops. Broadly, similar assemblages are known to be reserved within Gibraltar Range NP, New England NP, Warra NP, Boonoo Boonoo NP, Bald Rock NP, Girraween NP, Demon NR, Cathedral Rocks NP, Coolah Tops NP, Western Washpool NP, Capoompeta NP and Butterleaf NP. Despite the above, areas which include *Sphagnum*, should be considered critically endangered on the tablelands as only a few instances in good condition survive and it is likely that only a few hectares of these bogs occur across the whole tablelands.

Discussion

Phytogeography

Community 1 is similar to assemblages described as occurring just of the Queensland border and then as far south as Guyra (Backwater). It is in general restricted to higher altitudes above 1000 m on coarse acid soils. The drier grassy variant on Community 2 commonly occurs up to 1100 m. Binns (1995a) describes a very synonymous community in Maryland State Forest where it is extensive on granite in low relief drainage lines and lower slopes. Divergent but a somewhat floristically similar community is described by Elsol (1991) as occurring as far north as Toowoomba. In the surveys of State Forests conducted in the north east of NSW (King 1985, Binns 1991, Binns 1992, Moore & Floyd 1994, Binns 1995a, Binns 1995b, Chapman & Binns 1995) similar assemblages have been described as occurring from the Kempsey and Wauchope areas north to Tenterfield and Urbenville.

In contrast, Communities 3 and 4 have more restricted distributions at high altitudes from Tenterfield south the Walcha area. Both are associated with granitic landscapes with outcropping and subsurface granite. Community 3 shares a number of species with Community 4 but both also have a number of very distinctive species due to the predominance of particular habitat specialists. The floristics of Community 3 is dynamic due to a constant cycle of regular disturbance by flooding and fire. Community 4 is incorporated within Element 1 of Hunter & Clarke (1998) which occurs along the eastern escarpment from Girraween and Bald Rock National Parks as far south as Cathedral Rock National Park. Unlike Community 3, it is not prone to regular flooding and less likely affected by fire (Hunter, 1998, Hunter et al. 1998, Hunter 2003a).

Placement of Community 5 within other described assemblages is difficult as it appears to be a derived rather than natural assemblage due to high frequency fires and the very linear and remnant nature of stands. This is further complicated by the sites being marginal for *Lophostemon confertus* due to low soil fertility and high altitude (Binns 1995b). As stands mature they are likely to be similar to Floyds sub-alliance 35: *Ceratopetalum/Schizomeria* – *Caldcluvia* (Floyd 1990). Such assemblages are considered to be common, from south of Tenterfield along the escarpment at higher altitudes, particularly in the Washpool area where extensive stands are reserved in Washpool National Park. It is likely that under lowered fire regimes expansion of this assemblage will occur and succession to Floyds sub-alliance 35 may be an outcome.

Community 6 is closely similar to the *Eucalyptus campanulata* Alliance as described by Beadle (1981), occurring at higher altitudes from just over the Queensland border to Barrington Tops. McDonald and Whiteman (1979) describe an *E. campanulata* community that varies from a tall forest with a partial closed forest understorey to a shorter forest with a shrubbier understorey. McDonald and Whiteman

(1979) map a disjunct occurrence of this community in small areas from Canangra Creek near the Darlington Range to Tallebudgera Mountain near Lamington. Flora surveys conducted by the State Forests of New South Wales in their management areas (Binns & Chapman 1993, Binns 1995a, c) describe similar assemblages. These are found from the Tenterfield region south to the Carrai Plateau and to Barrington Tops. All described occurrences are at altitudes above 900 m. Binns (1995a) considered this association as possibly the most widespread community in the Tenterfield area above 900 m on all geological substrates.

Broadly similar assemblages to Community 7 are described as occurring at higher altitudes along the eastern escarpment from Girraween NP in Queensland to as far south as the Walcha area (Hunter 2004). However, more closely allied assemblages are probably restricted to the general area such as from Bald Rock to the Malara Plateau (Hunter 1999, Hunter et al. 1999).

Few comparable assemblages are described that are similar to Community 7. Similar assemblages are restricted to higher altitudes on the tablelands particularly along the eastern margin of the divide.

Species richness

Four hundred and thirty taxa were found within Basket Swamp National Park, which is similar to many other comparably sized reserves within the bioregion such as Single National Park (424, Clarke et al. 2000), Bluff River Nature Reserve (367, Hunter 2002a), Warra National Park (495, Hunter 2001). Species density (richness per site) (31 spp. per 0.1 ha) was lower than other reserves in the local region such as Bald Rock and Boonoo Boonoo National parks (50, Hunter 1999), Demon Nature Reserve (51, Hunter et al. 1999), Capoompeta and Western Washpool National Parks (42, Hunter 2000b), Bolivia Hill and Bluff River Nature Reserves (41, Hunter 2002a) and Gibraltar Range National Park (36, Sheringham & Hunter 2002). The reasons for this significant decline in species density within Basket Swamp NP compared to neighbouring reserves need further detailed investigation. It is possible that poor rainfall may have contributed or that past land practices such as logging have had a lingering effect. Species density is a complex issue and is often related to many unmeasured characteristics such as species pool sizes for each community type or regional energy inputs (Hunter 2005). Species density is only one aspect of biodiversity and as shown the capture of species within the park (gamma-diversity) was similar to other comparatively sized reserves within the local region, thus indicating a higher beta-diversity.

Conservation issues

Approximately 60% of the woody vegetation in the New England Bioregion has been cleared (Benson 1999). Most of the assemblages within the Park are considered adequately reserved and of little concern currently. The status of these assemblages in recent years has markedly improved in terms

of reservation status. Two assemblages though were considered inadequately reserved at this stage and potentially under threat. Community 3 is of limited extent across the tablelands and under pressure for recreation and is prone to weed invasion. This assemblage is poorly conserved within the Park with many areas occurring outside of the boundaries or shared between the reserve and neighbouring landholdings. Community 7 is moderately conserved across the region in terms of area; however swampy areas with sphagnum are of very limited extent. Sphagnum areas are also under threat from climate change. Community 7 has extensive areas with underlying sphagnum and such areas should be considered as endangered.

Thirty-six species were considered of conservation significance within the Park. Two of these are currently listed on the NSW *TSC Act* as Vulnerable and nine have been reported under the RoTAP criteria (Briggs & Leigh 1996). These include: *Callitris oblonga* subsp. *parva* (*TSC* Vulnerable), *Homoranthus lunatus* (*TSC* Vulnerable), *Eucalyptus olida* (2RCa), *Grevillea acanthifolia* subsp. *stenomera* (3RC-), *Daviesia elliptica* (3RC-), *Dodonaea rhombifolia* (3RCa), *Pultenaea pycnocephala* (3RCa), *Thelionema grande* (3RC-), and *Hibbertia villosa* (3KC-). Thirty species were thought to be at or near their geographic limits or were considered as significant due to being locally/regionally rare or highly disjunct in their distribution according to Sheringham & Westaway (1998). These taxa are: *Austroanthonia monticola*, *Boronia algida*, *Coprosma quadrifida*, *Daviesia nova-anglica*, *Dillwynia sieberi*, *Eucalyptus acaciiformis*, *Eucalyptus notabilis*, *Euchiton gymnocephalus*, *Goodenia bellidifolia* subsp. *bellidifolia*, *Gymnoschoenus sphaerocephalus*, *Helichrysum rutidolepis*, *Isotoma anethifolia*, *Joycea pallida*, *Juncus sandwithii*, *Lepyrodia leptocaulis*, *Leucopogon hookeri*, *Lomandra filiformis*, *Mirophyllum pedunculatum*, *Olearia convenyi*, *Oreomyrrhis eriopoda*, *Patersonia fragilis* and *Acacia viscidula*.

Conclusion

Though many assemblages within Basket Swamp National Park are currently well reserved, both locally and regionally, the Park is important as adjunct to the other local National Parks such as Bald Rock and Boonoo Boonoo. Together these reserves incorporate extensive areas of important little disturbed forests and woodlands of higher altitudes once very common along the eastern escarpment of the Northern Tablelands. The more widespread assemblages within Basket Swamp NP are near their northernmost limits. Communities 3 and 7 are however of limited distribution and the Park is an important area for their conservation.

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Appendix: Flora of Basket Swamp National Park

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

- 1 = Blackbutt – Stringybark Shrubby Open Forests & Woodlands,
 2 = Blackbutt – Stringybark Grassy Open Forests,
 3 = Tea-tree Riparian Scrubs,
 4 = Tea-tree Rock Outcrop Heaths & Shrublands,
 5 = Coachwood – Brushbox – Rosewood Closed Forests,
 6 = Messmate – Blackbutt Tall Open Forests,
 7 = Heathy Sedgeland.

PTERIDOTYPES & ALLIES

Adiantaceae

<i>Adiantum aethiopicum</i>	+
<i>Adiantum hispidulum</i>	5
<i>Cheilanthes sieberi</i>	2, 4
<i>Pellaea falcata</i>	+
<i>Pellaea nana</i>	5

Aspleniaceae

<i>Asplenium australasicum</i>	5
<i>Asplenium flabellifolium</i>	2

Blechnaceae

<i>Blechnum cartilagineum</i>	+
<i>Blechnum minus</i>	+
<i>Blechnum nudum</i>	+
<i>Blechnum wattsii</i>	5
<i>Doodia aspera</i>	1, 2, 5, 6

Cyatheaceae

<i>Cyathea australis</i>	2, 5, 6
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Davalliaceae

<i>Davallia solida</i> var. <i>pyxidata</i>	1, 4, 5
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Dennstaedtiaceae

<i>Calochlaena dubia</i>	2, 5, 6
<i>Hypolepis glandulifera</i>	5
<i>Pteridium esculentum</i>	1, 2, 3, 4, 6

Dicksoniaceae

<i>Dicksonia antarctica</i>	5
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Dryopteridaceae

<i>Lastreopsis decomposita</i>	5
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Gleicheniaceae

<i>Gleichenia dicarpa</i>	2, 3, 5, 7
<i>Sticherus flabellatus</i>	5
<i>Sticherus urceolatus</i>	6

Hymenophyllaceae

<i>Hymenophyllum cupressiforme</i>	5
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Lindsaeaceae

<i>Lindsaea linearis</i>	2, 7
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Lycopodiaceae

<i>Lycopodiella cernua</i>	2, 7
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Polypodiaceae

<i>Dictymia brownii</i>	+
<i>Microsorium pustulatum</i> subsp. <i>pustulatum</i>	5
<i>Microsorium scandens</i>	5
<i>Platyserium bifurcatum</i> subsp. <i>bifurcatum</i>	2, 5
<i>Pyrrosia confluens</i> var. <i>dielsii</i>	5
<i>Pyrrosia rupestris</i>	5

Pteridaceae		<i>Lomandra longifolia</i>	1, 2, 3, 4, 5, 7
<i>Pteris umbrosa</i>	5	<i>Lomandra multiflora</i>	1, 2, 3, 7
CONIFERS		Luzuriagaceae	
Cupressaceae		<i>Eustrephus latifolius</i>	1, 2, 5
<i>Callitris oblonga</i> subsp. <i>parva</i>	4	<i>Geitonoplesium cymosum</i>	2, 5
MONOCOTYLEDONS		Orchidaceae	
Anthericaceae		<i>Dendrobium kingianum</i>	5
<i>Arthropodium milleflorum</i>	2	<i>Dendrobium tarberi</i>	5
<i>Dichopogon fimbriatus</i>	+	<i>Dipodium variegatum</i>	2
<i>Laxmannia compacta</i>	4	<i>Dockrillia pugioniformis</i>	1, 5
<i>Thysanotus tuberosus</i>	1, 2, 3	<i>Microtis unifolia</i>	+
<i>Tricoryne elatior</i>	1, 2, 3, 7	<i>Sarcophilus falcatus</i>	5
Asteliaceae		Phormiaceae	
<i>Cordyline rubra</i>	5	<i>Dianella caerulea</i> var. <i>assera</i>	1, 2, 4, 5, 6
Centrolepidaceae		<i>Dianella</i> var. <i>caerulea</i>	1, 2
<i>Centrolepis fascicularis</i>	3	<i>Dianella revoluta</i>	1, 2, 3, 4, 6
Commelinaceae		<i>Styandra glauca</i>	+
<i>Aneilema acuminatum</i>	5	<i>Thelionema caespitosa</i>	7
<i>Commelina cyanea</i>	+	<i>Thelionema grande</i>	4, 7
Cyperaceae		Poaceae	
<i>Bulbostylis densa</i>	+	<i>Austrodanthonia eriantha</i>	3
<i>Carex breviculmis</i>	+	<i>Austrodanthonia monticola</i>	4
<i>Carex inversa</i>	+	<i>Austrodanthonia racemosa</i> var. <i>racemosa</i>	1, 2, 4, 7
* <i>Cyperus eragrostis</i>	7	<i>Austrodanthonia tenuior</i>	2
<i>Cyperus gracilis</i>	+	<i>Austrostipa rudis</i> subsp. <i>rudis</i>	1, 2, 3, 7
<i>Cyperus laevis</i>	+	<i>Austrostipa scabra</i>	1, 2, 4
<i>Cyperus tetraphyllus</i>	5	* <i>Axonopus affinis</i>	2, 5, 7
<i>Eleocharis sphacelata</i>	7	<i>Cymbopogon refractus</i>	+
<i>Fimbristylis dichotoma</i>	7	<i>Deyeuxia imbricata</i>	7
<i>Gahnia aspera</i>	2	<i>Deyeuxia parviseta</i> var. <i>parviseta</i>	1, 2
<i>Gahnia sieberiana</i>	2, 4, 5, 6, 7	<i>Dichelachne micrantha</i>	1, 2
<i>Gymnoschoenus sphaerocephalus</i>	7	<i>Dichelachne sieberiana</i>	1
<i>Isolepis subtilissima</i>	7	<i>Digitaria parviflora</i>	+
<i>Lepidosperma gunnii</i>	4	<i>Digitaria ramularis</i>	2, 3
<i>Lepidosperma laterale</i>	1, 2, 6, 7	<i>Echinopogon caespitosus</i> var. <i>caespitosus</i>	1, 2
<i>Lepidosperma limicola</i>	3, 7	<i>Echinopogon ovatus</i>	+
<i>Lepidosperma tortuosum</i>	1, 7	<i>Entolasia marginata</i>	1, 2, 7
<i>Rhynchospora brownii</i>	3, 7	<i>Entolasia stricta</i>	1, 2, 4, 7
<i>Schoenus apogon</i>	1, 3, 7	<i>Eragrostis elongata</i>	+
<i>Schoenus melanostachys</i>	1, 2, 3, 4, 7	<i>Imperata cylindrica</i> var. <i>major</i>	1, 2, 7
Eriocaulaceae		<i>Joycea pallida</i>	1, 2
<i>Eriocaulon scariosum</i>	+	<i>Microlaena stipoides</i> var. <i>stipoides</i>	1, 2, 6
Haemodoraceae		<i>Notodanthonia longifolia</i>	4
<i>Haemodorum planifolium</i>	1, 4, 7	<i>Oplismenus imbecillus</i>	2
Hypoxidaceae		<i>Panicum simile</i>	1, 3
<i>Hypoxis hygrometrica</i>	+	<i>Paspalum distichum</i>	1
Iridaceae		* <i>Phalaris aquatica</i>	7
<i>Patersonia fragilis</i>	+	<i>Poa queenslandica</i>	2
<i>Patersonia glabrata</i>	1, 2, 3, 4, 6	<i>Poa sieberiana</i> var. <i>sieberiana</i>	1, 2, 3
<i>Patersonia sericea</i>	1, 2, 3, 4, 7	<i>Sorghum leiocladum</i>	1, 2
Juncaceae		<i>Sporobolus creber</i>	+
* <i>Juncus bufonius</i>	3	<i>Themeda australis</i>	1, 2, 3, 4, 7
<i>Juncus continuus</i>	7	<i>Tripogon loliiformis</i>	+
<i>Juncus pauciflorus</i>	1, 2	Restionaceae	
<i>Juncus sandwithii</i>	3	<i>Baloskion stenocoleum</i>	2, 7
<i>Juncus usitatus</i>	7	<i>Empodisma minus</i>	7
<i>Luzula flaccida</i>	+	<i>Lepyrodia anarthria</i>	3, 7
Juncaginaceae		<i>Lepyrodia leptocaulis</i>	+
<i>Triglochin multifructum</i>	3	Ripogonaceae	
Lomandraceae		<i>Ripogonum discolor</i>	6
<i>Lomandra confertiflora</i> subsp. <i>pallida</i>	2, 3, 4	Smilacaceae	
<i>Lomandra filiformis</i> subsp. <i>coriacea</i>	1, 2, 4, 6	<i>Smilax australis</i>	1, 2, 6
<i>Lomandra hystrix</i>	5	Xanthorrhoeaceae	
		<i>Xanthorrhoea glauca</i> subsp. <i>glauca</i>	1, 2, 3, 7
		<i>Xanthorrhoea johnsonii</i>	

Xyridaceae		<i>Wahlenbergia planiflora</i> subsp. <i>longipila</i>	3
<i>Xyris complanata</i>	7	<i>Wahlenbergia stricta</i> subsp. <i>stricta</i>	+
<i>Xyris operculata</i>	3, 7	Caryophyllaceae	
DICOTYLEDONS		* <i>Petrorhagia nanteuilii</i>	+
Acanthaceae		<i>Scleranthus biflorus</i>	+
<i>Brunoniella australis</i>	+	Casuarinaceae	
Apiaceae		<i>Allocasuarina littoralis</i>	1, 2, 3, 4
<i>Actinotus helianthi</i>	3, 4	<i>Allocasuarina torulosa</i>	2, 3
<i>Daucus glochidiatus</i>	+	Celastraceae	
<i>Hydrocotyle laxiflora</i>	+	<i>Cassine australis</i> var. <i>australis</i>	5
<i>Hydrocotyle peduncularis</i>	2	<i>Maytenus bilocularis</i>	2
<i>Hydrocotyle tripartita</i>	+	<i>Maytenus silvestris</i>	1, 2, 6
<i>Oreomyrrhis eriopoda</i>	+	Chenopodiaceae	
<i>Platysace ericoides</i>	1	<i>Chenopodium pumilio</i>	+
<i>Platysace lanceolata</i>	1, 2, 4	Clusiaceae	
<i>Trachymene incisa</i>		<i>Hypericum gramineum</i>	2, 3
Apocynaceae		<i>Hypericum japonicum</i>	3, 7
<i>Parsonsia straminea</i>	+	Convulvulaceae	
Araliaceae		<i>Dichondra repens</i>	+
<i>Cephalalaria cephalobotrys</i>	5	Crassulaceae	
<i>Polyscias sambucifolia</i>	1, 2	<i>Crassula sieberiana</i>	2
Asclepiadaceae		Cunoniaceae	
* <i>Gomphocarpus fruticosus</i>	+	<i>Ceratopetalum apetalum</i>	5
Asteraceae		<i>Schizomeria ovata</i>	5
<i>Brachyscome microcarpa</i>	+	Dilleniaceae	
<i>Brachyscome nova-anglica</i>	1, 2, 3	<i>Hibbertia acicularis</i>	3, 7
<i>Brachyscome stuartii</i>	3	<i>Hibbertia aspera</i> subsp. <i>pilosifolia</i>	1
* <i>Bidens subalternans</i>	2	<i>Hibbertia dentata</i>	2
<i>Chrysocephalum apiculatum</i>	2	<i>Hibbertia linearis</i>	1, 4
<i>Chrysocephalum semipapposum</i>	+	<i>Hibbertia obtusifolia</i>	1, 2
* <i>Cirsium vulgare</i>	+	<i>Hibbertia pedunculata</i>	7
* <i>Conyza albida</i>	2	<i>Hibbertia scandens</i>	2, 5
* <i>Conyza bonariensis</i>	+	<i>Hibbertia serpyllifolia</i>	1, 4
<i>Craspedia variabilis</i>	7	<i>Hibbertia villosa</i>	1, 2, 3, 6
<i>Euchiton gymnocephalus</i>	+	Droseraceae	
<i>Euchiton involucratus</i>	+	<i>Drosera binata</i>	7
<i>Euchiton sphaericus</i>	1, 2	<i>Drosera burmannii</i>	7
<i>Helichrysum elatum</i>	1, 2, 5, 6	<i>Drosera spatulata</i>	3
<i>Helichrysum rutidolepis</i>	2	Elaeocarpaceae	
<i>Helichrysum scorpioides</i>	2	<i>Elaeocarpus reticulatus</i>	1, 2, 4, 5, 6
* <i>Hypochaeris glabra</i>	1	Epacridaceae	
* <i>Hypochaeris radicata</i>	1, 2, 3	<i>Acrotriche aggregata</i>	1, 2, 3, 4, 6
<i>Lagenifera stipitata</i>	+	<i>Brachyloma daphnoides</i> subsp. <i>glabrum</i>	+
<i>Olearia convenyi</i>	6	<i>Epacris microphylla</i> var. <i>microphylla</i>	1, 2, 7
<i>Ozothamnus diosmifolius</i>	+	<i>Epacris obtusifolia</i>	3
* <i>Picris hieracioides</i>	2	<i>Leucopogon hookeri</i>	+
<i>Podolepis jaceoides</i>	1, 2	<i>Leucopogon lanceolatus</i> var. <i>lanceolatus</i>	1, 2, 4, 6
<i>Podolepis neglecta</i>	+	<i>Leucopogon melaleucoides</i>	4
<i>Pseuderanthemum variabile</i>	+	<i>Leucopogon neoanglicus</i>	3, 4
<i>Senecio amygdalifolius</i>	5	<i>Lissanthe strigosa</i>	+
<i>Senecio diaschides</i>	1, 2	<i>Melichrus procumbens</i>	1
<i>Sigesbeckia australiensis</i>	5	<i>Melichrus urceolatus</i>	1, 2
<i>Solenogyne bellioides</i>	+	<i>Monotoca scoparia</i>	1, 2, 4
<i>Solenogyne dominii</i>	+	<i>Trochocarpa laurina</i>	2, 5
* <i>Taraxacum officinale</i>	+	Escalloniaceae	
<i>Vernonia cinerea</i> var. <i>cinerea</i>	1, 2	<i>Quintinia sieberi</i>	5
<i>Xerochrysum bracteatum</i>	+	Euphorbiaceae	
Baueraceae		<i>Amperea xiphioclada</i> var. <i>xiphioclada</i>	1, 2, 4
<i>Bauera rubioides</i> var. <i>rubioides</i>	3	<i>Breynia cernua</i>	+
Bignoniaceae		<i>Phyllanthus hirtellus</i>	1
<i>Pandorea pandorana</i>	2, 5	<i>Phyllanthus virgatus</i>	1
Campanulaceae		<i>Poranthera microphylla</i>	1, 2
<i>Wahlenbergia communis</i>	2	Eupomatiaceae	
<i>Wahlenbergia gracilis</i>	+	<i>Eupomatia laurina</i>	5
<i>Wahlenbergia graniticola</i>	1		
<i>Wahlenbergia luteola</i>	+		

Fabaceae

<i>Acacia falciformis</i>	1, 2
<i>Acacia filicifolia</i>	2, 3, 5, 6
<i>Acacia fimbriata</i>	2, 3
<i>Acacia floribund</i>	1, 2, 3
<i>Acacia implexa</i>	2
<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>	1
<i>Acacia leucoclada</i> subsp. <i>leucoclada</i>	2, 5
<i>Acacia melanoxydon</i>	2
<i>Acacia myrtifolia</i>	1, 2
<i>Acacia obtusifolia</i>	1, 2, 4, 6
<i>Acacia rubida</i>	+
<i>Acacia ulicifolia</i>	1, 3, 4
<i>Acacia venulosa</i>	3, 4
<i>Acacia viscidula</i>	5
<i>Aotus subglauca</i> var. <i>subglauca</i>	4, 7
<i>Bossiaea neoanglica</i>	1, 2, 3
<i>Bossiaea scortichinii</i>	2
<i>Daviesia elliptica</i>	1, 2
<i>Daviesia nova-anglica</i>	1, 7
<i>Desmodium rhytidophyllum</i>	1, 2
<i>Desmodium varians</i>	1, 2, 6
<i>Dillwynia phyllicoides</i>	1, 2
<i>Dillwynia sieberi</i>	3
<i>Glycine clandestina</i>	1, 2
<i>Glycine tabacina</i>	1, 2
<i>Gompholobium latifolium</i>	1
<i>Hardenbergia violacea</i>	1, 2
<i>Hovea heterophylla</i>	2
<i>Hovea pedunculata</i>	3, 4
<i>Indigofera australis</i>	2
<i>Jacksonia scoparia</i>	1, 4
<i>Kennedia rubicunda</i>	2, 5
<i>Mirbelia pungens</i>	4
<i>Mirbelia rubiifolia</i>	4
<i>Podolobium ilicifolium</i>	1, 2, 4
<i>Pultenaea daphnoides</i>	1, 6
<i>Pultenaea myrtoides</i>	2, 4
<i>Pultenaea pycnocephala</i>	7
<i>Pultenaea</i> sp. G	1
<i>Pultenaea villosa</i>	1, 2, 3, 7
<i>Swainsona galegifolia</i>	+

Gentianaceae

* <i>Centaurium erythraea</i>	+
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Geraniaceae

<i>Geranium solanderi</i> var. <i>grande</i>	7
<i>Geranium solanderi</i> var. <i>solanderi</i>	1, 2

Goodeniaceae

<i>Dampiera stricta</i>	1
<i>Goodenia bellidifolia</i> subsp. <i>bellidifolia</i>	1, 2, 7
<i>Goodenia hederacea</i> subsp. <i>hederacea</i>	1, 2, 3, 7
<i>Velleia spathulata</i>	4

Haloragaceae

<i>Gonocarpus micranthus</i> subsp. <i>ramosissimus</i>	3, 7
<i>Gonocarpus oreophilus</i>	1, 2, 3, 6, 7
<i>Gonocarpus tetragynus</i>	1, 2, 4, 7
<i>Gonocarpus teucroides</i>	1, 2
<i>Haloragis heterophylla</i>	+
<i>Myriophyllum pedunculatum</i> subsp. <i>pedunculatum</i>	7

ICACINACEAE

<i>Pennantia cunninghamii</i>	5
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Lamiaceae

<i>Ajuga australis</i>	2
<i>Mentha satuireioides</i>	+
<i>Plectranthus graveolens</i>	+
<i>Prostanthera</i> sp. B	1, 3

Lauraceae

<i>Cassiope pubescens</i>	1, 2, 3
<i>Endiandra sieberi</i>	5

Lentibulariaceae

<i>Utricularia dichotoma</i>	3, 7
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Lobeliaceae

<i>Isotoma anethifolia</i>	+
<i>Lobelia gibbosa</i>	1, 2
<i>Pratia purpurascens</i>	1, 2

Loranthaceae

<i>Amyema miquelii</i>	1, 4
<i>Amyema pendula</i>	+

Meliaceae

<i>Synoum glandulosum</i>	5
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Menyanthaceae

<i>Nymphoides geminata</i>	7
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Monimiaceae

<i>Hedycarya angustifolia</i>	5
<i>Wilkiea huegeliana</i>	2, 5

Menispermaceae

<i>Sarcopetalum harveyanum</i>	5
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Myrsinaceae

<i>Rapanea howittiana</i>	5
<i>Rapanea variabilis</i>	5, 6

Myrtaceae

<i>Acmena smithii</i>	5
<i>Angophora subvelutina</i>	2
<i>Baeckea omissa</i>	3, 7
<i>Callistemon pallidus</i>	3, 4, 7
<i>Callistemon pityoides</i>	7
<i>Callistemon sieberi</i>	4, 7
<i>Calytrix tetragona</i>	3, 4
<i>Eucalyptus acaciiformis</i>	1
<i>Eucalyptus brunnea</i>	1, 2, 3, 5, 7
<i>Eucalyptus caliginosa</i>	2
<i>Eucalyptus cameronii</i>	1, 2
<i>Eucalyptus campanulata</i>	1, 2, 3, 4, 5, 6, 7
<i>Eucalyptus dalrympleana</i> subsp. <i>heptantha</i>	7
<i>Eucalyptus laevopinea</i>	1
<i>Eucalyptus notabilis</i>	1, 2, 7
<i>Eucalyptus obliqua</i>	2, 6
<i>Eucalyptus olida</i>	4
<i>Eucalyptus oreades</i>	4
<i>Eucalyptus pauciflora</i>	7
<i>Eucalyptus radiata</i> subsp. <i>sejuncta</i>	1
<i>Eucalyptus saligna</i>	2, 5
<i>Eucalyptus williamsiana</i>	1, 4
<i>Homoranthus lunatus</i>	4
<i>Kunzea obovata</i>	4
<i>Leptospermum arachnoides</i>	7
<i>Leptospermum gregarium</i>	7
<i>Leptospermum minutifolium</i>	1, 2
<i>Leptospermum nova-angliae</i>	4
<i>Leptospermum polygalifolium</i> subsp. <i>transmontanum</i>	1, 3, 7
<i>Leptospermum trinervium</i>	1, 2, 3, 4, 7
<i>Lophostemon confertus</i>	1, 4, 5

Oleaceae

<i>Notelaea longifolia</i>	+
<i>Notelaea ovata</i>	1, 2
<i>Notelaea</i> sp. A	1, 5, 6
<i>Notelaea venosa</i>	+

Onagraceae

<i>Epilobium billardierianum</i> subsp. <i>cinereum</i>	+
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Oxalidaceae

<i>Oxalis chnoodes</i>	+
<i>Oxalis perennans</i>	+

Peperomiaceae			
<i>Peperomia tetraphylla</i>	5		
Philydraceae			
<i>Philydrum lanuginosum</i>	7		
Pittosporaceae			
<i>Billardiera scandens</i>	1, 2		
<i>Pittosporum multiflorum</i>	5		
<i>Pittosporum undulatum</i>	+		
<i>Rhytidisporum diosmoides</i>	1		
Plantaginaceae			
<i>Plantago debilis</i>	+		
<i>Plantago varia</i>	+		
Polygalaceae			
<i>Comesperma sylvestre</i>	1, 4		
<i>Persicaria decipiens</i>	+		
<i>Polygala japonica</i>	1, 2		
Polygonaceae			
<i>Rumex brownii</i>	+		
Primulaceae			
* <i>Anagallis arvensis</i>	+		
Proteaceae			
<i>Banksia cunninghamii</i>	1, 2, 3, 6, 7		
<i>Banksia integrifolia</i>	1, 2, 3		
<i>Grevillea acanthifolia</i> subsp. <i>stenomera</i>	7		
<i>Hakea eriantha</i>	1, 2, 6		
<i>Hakea florulenta</i>	1, 2		
<i>Hakea laevipes</i> subsp. <i>graniticola</i>	1		
<i>Hakea microcarpa</i>	7		
<i>Isopogon petiolaris</i>	1, 7		
<i>Lomatia silaifolia</i>	1, 2, 3, 6		
<i>Persoonia cornifolia</i>	1		
<i>Persoonia oleoides</i>	1, 3		
<i>Persoonia sericea</i>	1, 2, 3, 4		
<i>Persoonia tenuifolia</i>	+		
<i>Petrophile canescens</i>	1, 3, 4, 7		
Ranunculaceae			
<i>Clematis aristata</i>	+		
<i>Clematis glycinoides</i>	5		
<i>Ranunculus lappaceus</i>	1, 2		
Rhamnaceae			
<i>Pomaderris argyrophylla</i> subsp. <i>graniticola</i>	3		
<i>Pomaderris eriocephala</i>	4		
<i>Pomaderris lanigera</i>	3, 4		
Rosaceae			
<i>Acaena novae-zelandiae</i>	+		
<i>Rubus parvifolius</i>	2		
Rubiaceae			
<i>Asperula conferta</i>	+		
<i>Coprosma quadrifida</i>	3		
<i>Galium migrans</i>	2		
<i>Morinda jasminoides</i>	1, 2, 5		
<i>Opercularia aspera</i>	1		
<i>Opercularia diphylla</i>	1, 2		
<i>Pomax umbellata</i>	1, 2, 4		
<i>Psychotria loniceroides</i>	5		
Rutaceae			
<i>Boronia algida</i>	1		
<i>Boronia microphylla</i>	1, 7		
<i>Boronia parviflora</i>	7		
<i>Correa reflexa</i> var. <i>reflexa</i>	3		
<i>Phebalium squamulosum</i> subsp. <i>squamulosum</i>	4		
<i>Zieria fraseri</i> subsp. <i>compacta</i>			
<i>Zieria smithii</i> subsp. <i>smithii</i>	1, 4		
Santalaceae			
<i>Choretrum candollei</i>	+		
<i>Exocarpus cupressiformis</i>	1, 3		
Sapindaceae			
<i>Dodonaea rhombifolia</i>	4		
<i>Dodonaea viscosa</i> var. <i>angustifolia</i>	+		
Scrophulariaceae			
<i>Veronica calycina</i>	1		
<i>Veronica plebeia</i>	+		
Solanaceae			
<i>Solanum campanulatum</i>	1, 2		
<i>Solanum nobile</i>	5		
<i>Solanum prinophyllum</i>	1		
Stackhousiaceae			
<i>Stackhousia viminea</i>	+		
Stylidiaceae			
<i>Stylidium graminifolium</i>	1, 2, 4, 7		
<i>Stylidium laricifolium</i>	1, 4		
Thymelaeaceae			
<i>Pimelea bracteata</i>	4		
<i>Pimelea glauca</i>	7		
<i>Pimelea linifolia</i> subsp. <i>collina</i>	1, 3		
Tremandraceae			
<i>Tetradlea thymifolia</i>	1		
Trimeniaceae			
<i>Trimenia moorei</i>	6		
Urticaceae			
<i>Elatostema reticulatum</i> var. <i>reticulatum</i>	5		
Violaceae			
<i>Hybanthus monopetalus</i>	1, 2		
<i>Hybanthus stellarioides</i>	+		
<i>Viola betonicifolia</i>	1, 2, 5		
<i>Viola hederacea</i>	1, 5		
Vitaceae			
<i>Cissus antarctica</i>	5, 6		
<i>Cissus hypoglauca</i>	5		
Winteraceae			
<i>Tasmania insipida</i>	1, 2, 3		