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## **THE VEGETATION AND FLORA OF REDCLIFF POINT AND SURROUNDING AREAS, SOUTH AUSTRALIA**

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### **Abstract**

An account of the vegetation and flora is given for the Redcliff survey area and eleven vegetation associations are recognized. A total of 303 species is recorded consisting of 278 angiosperms, 13 bryophytes and 12 lichens. A brief comparison of the Redcliff flora was made with coastal areas to the north and south and it was found that these were much poorer floristically and had less diversity in the vegetation. A number of rare or undescribed species in the Redcliff area are discussed.

### **Introduction**

The Redcliff survey area (Map 1) is situated near Chinaman Creek, west of Nectar Brook, approximately 25 km SSE of Port Augusta. During the latter part of 1974 and early 1975 the State Herbarium of South Australia carried out a vegetation survey of the proposed Redcliff Petrochemical site and the surrounding area for the Petrochemical Consortium of South Australia.

This account of the vegetation and flora is an expanded, updated, version of my unpublished report (Chinnock, 1975) prepared for the Petrochemical Consortium. It should be pointed out that the survey was carried out in years during which the area experienced more than double the mean annual precipitation and thus the photographs and accounts of the vegetation should be considered to represent the ecosystems following that period of exceptional rainfall. However, I believe that, with regard at least to the perennial species, these descriptions remain largely accurate at all seasons and in all years.

### **Landform and Soils**

The survey area borders Spencers Gulf and gradually rises towards the Flinders Ranges. Along the coast is a series of shell ridges (stranded beach terraces) and sand dunes which stand above the surrounding mud flats. A low residual Pleistocene promontory extends inwards from the Gulf and is surrounded by mud flats and dunes. Mt Grainger (50 m), the northernmost and largest of a series of monadnocks rises at the southern edge of the survey area.

A summary of the vegetation, landforms and soils are given in Table 1 (landform and soil data from Chittleborough et al., 1974).

### **Climate**

The area experiences a semi-arid climate with no definite season of precipitation. During 1973 and 1974 exceptionally high rainfalls were recorded which were over double the mean annual rainfall for the area. Although there are no data available for Chinaman Creek itself the nearest climatic stations at Port Augusta Power Station (20 km N) and Port Germein (35 km SSE) give a good indication of the rainfall received in the area. The figures for Port Augusta Power Station are most probably the closest. Rainfall data (mean monthly and monthly falls for the years 1973, 1974, 1976 and 1977 are given in Table 2, (data provided by the Bureau of Meteorology).

Table 1. Vegetation, landform and soil correlations. (Landform and soil data after Chittleborough et al., 1974.)

Formation	Association	Land Form	Soil
Low Woodland	<i>Avicennia marina</i>	Low mud flats	Light brown silty clay with scattered shell fragments.
Low Open Woodland	<i>Myoporum platycarpum</i>	Promontory-Low Pleistocene remnant 4-12 m above sea level overlain by recent aeolian sands.	Red Fulham sand overlying stiff sandy/clays with gypseous layers (Hindmarsh clays).
Open scrub	<i>Eucalyptus socialis</i> — <i>E. oleosa</i>	(a) Coastal monadnock	Skeletal clay-loams over quartzite.
		(b) Sand dunes (recent aeolian dunes)	Fulham sand overlying red calcareous clays.
		(c) Alluvial plain	Red brown sandy loams and clay-loams overlying red calcareous sands and clays.
Low shrubland	<i>Heterodendrum</i> / <i>Pittosporum</i> / <i>Geijera</i>	Shell ridges	Ridges of shell fragments becoming coarser near coast, overlain by white sands further inland.
	<i>Acacia ligulata</i>	Low sand dune	White sand over light brown silty clays with scattered shell fragments.
	<i>Maireana pyramidata</i>	(a) Alluvial plain	Alluvial plain soils (see above)
		(b) Flat marshland—transitional between alluvial plain and tidal flats	Thin highly saline gypseous "flower" over red alluvial clays.
Closed grassland	<i>Sclerostegia (Pachycornia) tenuis</i> — <i>Halosarcia (Arthrocnemum)</i> spp.	(a) Flat marshland	Thin highly saline gypseous "flower" over red alluvial clays.
	<i>Atriplex vesicaria</i>	(b) Upper mud flats	Thin grey gypseous clay over a grey calcareous clay.
		Upper mud flats	Thin grey gypseous clay over a grey calcareous clay.
	<i>Atriplex paludosa</i> (incl. <i>Nitraria billardieri</i> zone).	Upper mud flats	Thin grey gypseous clay over a grey calcareous clay.
	<i>Halosarcia (Arthrocnemum) halocnemoides</i> — <i>H. pruinsum</i>	Low mud flats to lower upper mud flats.	Mud flat soils (see above)
Closed grassland	<i>Stipa nitida</i> with some <i>Hordeum leporinum</i> and other weeds.	Alluvial plain	Alluvial plain soils (see above).
	<i>Zostera</i> / <i>Posidonia</i>	Sand flats exposed only at low tide	Rippled white beach sand overlying gypseous sandy clays.

### Methods

Vegetation mapping was done by examination of aerial photographs and ground transects. The map was produced by the combination of field and aerial photograph observations. Voucher specimens were collected of all species and are now housed in the State Herbarium, (AD). The vegetation was classified according to Specht (1972).

Table 2. Rainfall data for Port Augusta Power Station and Port Germein

Location	Years	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	
Mean Monthly Rainfall															
Port Augusta Power Station		102	15	17	17	19	26	27	19	23	22	23	18	16	242
Port Germein		92	18	19	17	28	39	37	31	35	32	30	22	21	328
Monthly Rainfalls															
Port Augusta Power Station	1973	28	93	8	36	25	39	29	64	31	70	52	38	513	
	1974	99	59	2	48	123	20	26	28	43	79	12	<0.4	539	
	1976	7	13	9	5	4	10	2	2	7	91	9	6	165	
	1977	5	2	2	1	30	21	2	5	20	6	64	9	167	
Port Germein	1973	25	130	8	35	48	53	29	67	30	132	30	24	611	
	1974	86	46	1	88	123	19	79	32	56	88	5	10	627	
	1976	8	10	15	5	17	26	6	14	26	119	32	5	283	
	1977	12	<0.4	8	7	38	42	9	9	37	27	50	14	253	

### Vegetation and Flora

#### General

The vegetation of the Redcliff area displayed a considerable range of variation over short distances and eleven plant associations were recognized within the area.

Ephemerals were very prominent in all areas and provided an 80%-100% cover between the shrubs. Even in the very saline samphire zones numerous ephemerals occurred, especially on the raised mounds around the bases of shrubs.

A number of species were only observed once as individual plants, e.g. *Senecio magnificus*, *Myriocephalus stuartii*, *Helichrysum apiculatum*, *Alyxia buxifolia*, *Cratystylis conocephala*. Many species were found to be rare and restricted to one site, e.g. *Orobanche australiana*, *Malacocera gracilis*, *Hypoxis hookeri*, *Ranunculus pentandrus* and *Babbagia dipterocarpa*.

Adventive weeds were largely concentrated around the settlement at Chinaman Creek or along roadsides. A number of species were restricted to the settlement area including *Rumex vesicarius*, *Polycarpon tetraphyllum*, *Asphodelus fistulosus*, *Gynandris setifolia* and *Centaurea melitensis*.

*Brassica tournefortii* and *Carrichtera annua* were common in most areas near the coast and the latter was the characteristic species in over-grazed areas near Highway 1.

#### Vegetation Associations

##### 1. *Zostera*—*Posidonia* (Sea-grass) Association

Extending out into the Gulf were extensive beds of *Zostera* and *Posidonia*. This association was not mapped except for areas to the north of Chinaman Creek. These marine grasses were found to extend up the major creeks for a short distance.

##### 2. *Avicennia marina* (Mangrove) Association

From near Redcliff Point northwards was an extensive area of mangrove covering the outer portions of the lower mudflats (Fig. 1.). These mudflats were dissected by a network of major and minor tidal creeks. On the fringes of the mangroves and in the higher areas within the system *Sarcocornia quinqueflora* formed extensive carpets on the mud. *Suaeda australis* and *Sarcocornia blackiana* were common on the margins.



Fig. 1. *Avicennia marina* association, lower Chinaman Creek. Note ground layer of *Sarcocornia quinqueflora* in foreground. (Photo: D. Reilly)



Fig. 2. *Halosarcia* association near Redcliff Point. Note low shell ridge "island" in background.

### 3. *Halosarcia* (Samphire) Association

The lower mudflats were extensively covered by a low open shrubland of samphire. (Fig. 2.). Flooding occurred in the lowermost parts twice daily but over most of the mudflats they were not subject to regular flooding but only to occasional high spring tides. *Halosarcia halocnemoides*, *Sarcocornia quinqueflora*, *S. blackiana*, *Suaeda australis*, *Wilsonia humilis* and *Frankenia sessilis* were particularly common on the lower mudflats.

In the upper parts of the lower mudflats and in areas not subject to daily flooding, *Halosarcia pruinosa*, *H. pergranulata*, *Sclerostegia arbuscula* and *Disphyma clavellatum* dominated. Numerous other shrubs and ephemerals occurred in this zone including *Hemichroa diandra*, *Lawrenzia glomerata*, *Spergularia diandra*, *Sclerostegia tenuis*, *Mesembryanthemum nodiflorum*, *Angianthus* sp., *A. strictus*, *Dissocarpus biflorus* and *Atriplex spongiosa*.

### 4. *Sclerostegia tenuis*—*Halosarcia* spp. (Samphire) Association

On the transitional soils between the upper mudflats and the alluvial plain there was a somewhat variable low shrubland dominated by *Sclerostegia tenuis* 40-80 cm high (Fig. 3.). A rich ground layer of ephemerals and chenopods, a reflection of the high precipitation, carpeted the ground dominated by *Disphyma clavellatum*. Numerous low shrubs occurred in this zone. In the areas to the southern side of Chinaman Creek Road *Atriplex vesicaria* and *Halosarcia pruinosa* were common and scattered shrubs or pockets of *Maireana pyramidata*, *Lycium australe* and *L. ferocissimum* also occurred. The ground layer varied over short distances but *Atriplex lindleyi*, *A. angulata*, *Mesembryanthemum nodiflorum*, *Disphyma clavellatum*, *Parapholis incurva*, and *Medicago minima* were prominent.

A number of gypseous mounds occurred in this area immediately to the north and south of Chinaman Creek Road and a number of species were restricted to these mounds, namely *Malacocera gracilis*, *Gnephosis skirrophora*, *Babbagia dipterocharpa* var. and *Angianthus* sp. *Sclerolaena divaricata* and *Zygophyllum compressum* were common on the mounds but rare elsewhere.

The area to the north of Chinaman Creek Road was much more varied in its shrub composition than in the area to the south of the road. Here, *Lycium australe*, *Rhagodia spinescens*, *Maireana cannonii*, *M. pyramidata* and *Atriplex vesicaria* co-dominated with *Sclerostegia tenuis* to form an extensive mosaic of species. Ground layer species included *Disphyma clavellatum*, *Sclerolaena diacantha*, *S. uniflora*, *Babbagia acroptera*, *Thelkeldia salsuginosa* and numerous ephemerals, especially *Lepidium papillosum*, *Medicago* spp., *Senecio glossanthus*, *Crassula sieberana*, *Lamarckia aurea* and *Lophochloa pumila*.

### 5. *Atriplex paludosa* (Marsh saltbush) Association

In this association I have included for convenience the narrow band of *Nitraria billardieri* which extended from Redcliff Point southwards along the coast to the base of Mt Grainger.

*Atriplex paludosa* (30-40 cm tall) was the characteristic species (Fig. 4) although in depressions *Halosarcia* species predominate. The ground layer consisted of *Disphyma clavellatum*, *Frankenia* spp. and numerous ephemerals, including *Bromus rubens*, *Crassula* spp., *Helipterum pygmaeum*, *Senecio glossanthus*, *Schismus barbatus* and *Senecio* aff. *lautus*.

Along the base of the cliffs, *Atriplex paludosa* was completely replaced by *Nitraria billardieri* but then continued southwards to the base of Mt Grainger. The south-eastern section was, however, complex as tidal streams have dissected the area and enabled large



Fig. 3. *Sclerostegia tenuis*—*Halosarcia* association on the transitional mudflat—alluvial soils with rich ground layer dominated by *Disphyma clavellatum*. Note the scattered trees of *Myoporum platycarpum* and the mallee in the background.



Fig. 4. *Atriplex paludosa* association near Redcliff Point with *Senecio* aff. *lautus* prominent in the foreground.

pockets of samphire to establish. *Nitraria billardieri* formed mounds along the streams. Low fragments of shell ridges also interspersed this zone and on these *Acacia ligulata* and *Myoporum insulare* dominated. *Eremophila glabra*, *Lycium ferocissimum*, *Olearia axillaris*, *Disphyma clavellatum*, *Sarcozona praecox* and *Threlkeldia diffusa* were common associated species.

#### 6. *Heterodendrum*—*Geijera*—*Acacia ligulata* Association

The vegetation on the shell ridges and sand dunes to the north-west and south-east of the promontory were predominantly *Heterodendrum oleaefolium*, *Pittosporum phylliraeoides*, *Geijera linearifolia* and *Olearia pimeleoides*, although the composition of the larger shrubs varied considerably.

The large area to the south-east consisted of a number of ridges which fanned out into the mudflats. Along the tops of these ridges *Heterodendrum* and *Pittosporum* formed dense thickets while the areas between the ridges were dominated by *Geijera*.

The area to the north-west of the promontory was characterized by *Heterodendrum* (Fig. 5) with only scattered plants of *Pittosporum*. *Geijera linearifolia* was common in the subcanopy layer and *Myoporum deserti*, *Acacia ligulata* and *Santalum acuminatum* occasionally occurred. The understorey in this area and the area to the south consisted of *Atriplex vesicaria* and *Olearia pimeleoides* with scattered shrubs of *Lycium australe*, *Enchylaena tomentosa*, *Threlkeldia diffusa* and *Rhagodia parabolica*.

*Stipa elegantissima*, *S. platychaeta*, and *Zygophyllum* sp. were common and *Tetragonia amplexicoma* grew over and up through shrubs.

The ground cover consisted of a large variety of ephemerals and perennials the most prominent being *Schismus barbatus*, *Lophochloa pumila*, *Vulpia myuros*, *Stipa nitida*, *Nicotiana goodspeedii*, *Wahlenbergia gracilentia*, *Crassula* spp., *Calandrinia eremaea*, *Medicago minima*, *Brassica tournefortii* and *Carrichtera annua*.

A small, but well defined band of *Acacia ligulata* occurred on a low sand dune running SSE from the settlement of Chinaman Creek to near the cliffs on the edge of the promontory. It was bordered on either side by marsh saltbush and samphire communities. *Acacia ligulata* shrubs 2-3 m tall were the characteristic species with scattered *Heterodendrum oleaefolium* and *Pittosporum phylliraeoides* shrubs. Shrubs of *Eremophila glabra*, *Scaevola spinescens* and *Myoporum insulare* were common and amongst these *Carpobrotus rossii*, *Disphyma clavellatum*, *Sarcozona praecox*, *Senecio* aff. *lautus* and the weed *Brassica tournefortii* were particularly common.

#### 7. *Atriplex vesicaria* (Saltbush) Association

The upper mudflats surrounding the promontory and the areas in the north-east of the survey area were covered by a low dense shrubland dominated by *Atriplex vesicaria* (Fig. 6.). Few other large shrubs were found in this community except for *Sclerostegia tenuis* and *Halosarcia* spp. *Medicago minima* formed an extensive ground cover in more open situations and *Disphyma clavellatum* was also very prominent. *Stipa eremophila* was locally common and a large number of ephemerals occurred on the damp soil amongst and under shrubs. These included *Erodium cygnorum*, *Angianthus strictus*, *Brachyscome lineariloba*, *Gnaphalium involucratum*, *Helipterum corymbiflorum*, *H. pygmaeum*, *Schismus barbatus*, *Lophochloa* spp., *Daucus glochidiatus*, *Thysanotus baueri* and *Calandrinia* spp. The lichens, *Chondropsis semiviridis* and *Parmelia convoluta* were locally common as were various bryophyte species.

#### 8. *Myoporum platycarpum* (Sugarwood) Association

The promontory south-east of Redcliff Point was covered with a low open woodland dominated by *Myoporum platycarpum* (Fig. 7.). *Acacia papyrocarpa* (*A. sowdenii*) was common in the understorey towards the north-eastern end, while *Casuarina cristata* was common along the coast.





Fig. 5. *Heterodendrum*—*Geijera*—*Pittosporum* association with *Oleāria pimeleoides* in the foreground.



Fig. 6. *Atriplex vesicaria* association with Mt Grainger in the background.

The lower understorey was dominated by *Atriplex vesicaria* with scattered larger shrubs of *Maireana georgei*, *M. pyramidata* and *Geijera linearifolia*. Numerous other shrubs occurred around the bases of trees including *Enchylaena tomentosa*, *Lycium australe*, *Rhagodia* spp. and *Zygophyllum apiculatum*.

The ground cover consisted largely of *Sclerolaena obliquicuspis*, *Crassula sieberana*, *Riccia* sp., *Schismus barbatus*, *Lophochloa pumila* and extensive areas of *Medicago minima*.

The coastal side of the promontory ended in a low red cliff 10 m high and along this the trees were replaced by a narrow band of low shrubland consisting of *Atriplex vesicaria*, *Maireana pyramidata*, *Maireana sedifolia* and *Lycium australe*.

Along the cliff face scattered shrubs of *Geijera linearifolia* and *Casuarina cristata* grew and scattered pockets of *Santalum acuminatum* occurred along the base of the cliff. A number of species not found elsewhere occurred on the cliff face or in seeps at its base, namely *Cratystylis conocephala*, *Alyxia buxifolia*, *Ranunculus pentandrus*, *Hypoxis hookeri*, *Ixiolaena leptolepis* and *Funaria gracilis*.

#### 9. *Maireana pyramidata* (Black Bluebush) Association

A narrow irregular band of low shrubland characterized by *Maireana pyramidata* bordered the mallee woodland and it was best developed on the eastern side north of Chinaman Creek Road (Fig. 8). Scattered trees of *Myoporum platycarpum* occur in this zone as well as shrubs of *Lycium australe*, *L. ferocissimum* and *Templetonia egena*. *Disphyma clavellatum* and *Medicago* spp. were prominent in the ground cover.

#### 10. *Eucalyptus* (Mallee) Low Woodland

A low woodland of the mallees *Eucalyptus socialis*—*E. oleosa* (Fig. 9), extended northwards from Mt Grainger across the sand dunes onto the alluvial plain. North of the Chinaman Creek Road it was represented by a number of small pockets.

On the dunes, Mt Grainger, and to the areas north, the shrub understorey was largely composed of succulent elements, in particular *Lycium australe*, *Maireana pyramidata*, *Rhagodia spinescens*, *R. gaudichaudiana*, *Enchylaena tomentosa* and *Zygophyllum apiculatum*. Scattered individuals or small pockets of *Myoporum platycarpum*, *Heterodendrum oleaefolium*, *Melaleuca lanceolata*, *Acacia oswaldii* and *Santalum acuminatum* occurred throughout the association. *Disphyma clavellatum* and numerous ephemerals were common in open places.

The composition of the understorey shrubs on the slopes and summit of Mt Grainger was much more varied than in the areas to the north. On the lower slopes *Maireana pyramidata*, *Cassia nemophila* vars, *Eremophila scoparia*, *Ptilotus obovatus*, *Chenopodium ulicinum* and *Maireana radiata* were the common components. *Sclerolaena obliquicuspis* and *Maireana sclerolaenoides* were frequent in open rocky places.

The upper slopes, particularly on the western side, were rocky and the mallee was replaced by shrubs of *Dodonia lobulata*, *Eremophila alternifolia*, *Solanum petrophilum* and *Sida petrophila*. The ground cover consisted of *Pimelia micrantha*, *P. simplex*, *Arabidella trisecta*, *Vittadinia megacephala*, *Schismus barbatus*, *Danthonia caespitosa* and *Medicago minima*. The lower rocky slopes on the western side just above the limit of the mallee had a sparse cover of *Atriplex vesicaria*, *Maireana sedifolia* and *Chenopodium ulicinum*.

On the summit of Mt Grainger the mallee understorey consisted of *Rhagodia crassifolia*, *Maireana erioclada*, *M. sedifolia*, *Chenopodium ulicinum*, *Atriplex vesicaria*, *Enchylaena tomentosa* and *Threkeldia diffusa*.



Fig. 7. *Myoporum platycarpum* association with *Atriplex vesicaria* forming a low shrub layer.



Fig. 8. *Maireana pyramidata* association on the eastern side of the mallee.

### 11. *Stipa* (*Speargrass*) Grassland

The narrow corridor which extends to Highway 1 on the eastern side of the survey area was farmed with sheep, (Fig. 11.) and consisted largely of grassland dominated by *Stipa variabilis* with a few patches of barley grass (*Hordeum leporinum*). Towards the eastern end weedy species including *Carrichtera annua* (Wards weed), *Medicago* spp., *Dissocarpus paradoxa* and *Sclerolaena obliquicuspis* were prominent (Fig. 10, foreground).

Along the ephemeral drainage channels numerous shrubs of *Acacia victoriae* and *Lycium ferocissimum* occurred and scattered trees of *Eremophila longfolia* and *Acacia oswaldii* were found throughout this area.

#### *Rare and Undescribed Species*

A number of rare and undescribed species were found within the survey area and some comments on their rarity and distribution seems desirable.

#### 1. *Malacocera gracilis* Chinnock

This species has only recently been described (Chinnock, 1980) and it is only known to occur at Port Augusta, Lake Callabonna and along the road to Chinaman Creek and near Point Paterson on the northern edge of the survey area.

It is common on the gypseous mounds along the road near the small salt lake in the low samphire shrubland. The species was typified by material collected at this site. Although the recently located population at Lake Callabonna is not considered at risk, no specimens of this species have been collected recently at Port Augusta and it is possible that the species no longer exists at this locality.

#### 2. *Angianthus* sp.

This undescribed species which has affinities with *A. tomentosus* and *A. brachypappus* (Short, pers. comm.), extends from the Redcliff-Port Augusta coast across Eyre Peninsula.

#### 3. *Calandrinia volubilis* Benth.

Black (1924, 1948) misapplied this name to another species now known as *C. eremaea* Ewart and the Redcliff collections of true *C. volubilis* were the first made in this State for over 100 years. The only other South Australian material was supposedly collected by Wilhelm at Port Lincoln (see Bentham, 1863). *Calandrinia volubilis* was common at the base of *Atriplex vesicaria* plants with the flowering stems twining up through the branches of the bushes. Todd (1976) suggested that wet winters may be necessary to induce flowering. However, it seems more likely that a higher continued rainfall is required to trigger good germination and to sustain growth to the flowering stage. Vegetative plants resemble *Disphyma clavellatum* so they could easily be overlooked in dry years. Although I searched for this species in 1976 at sites where it had previously been common in 1974, I could not locate it.

This species apart from the Port Lincoln record is known only from the Redcliff area in South Australia.

#### 4. *Babbagia dipterocarpa* F. Muell.

A small population of this species was found on the samphire flats near the northernmost edge of the promontory. Although this species is widespread in north-east South Australia, it was not known previously further south than Lake Frome. In addition, what appears to be a distinct variety of *B. dipterocarpa*, or possibly a new species, was found growing on the gypseous mounds near the salt lake on the north side of Chinaman Creek Road. It differed from *B. dipterocarpa* in its dense compact habit, larger leaves and fruits which were consistently four-winged.



Fig. 9. *Eucalyptus* woodland on the northern flank of Mt Grainger. *Olearia pimeleoides* and *Maireana pyramidata* in foreground with extensive patches of lichen on sand. Scale units 10 cm.



Fig. 10. *Stipa* grassland near highway. Note the replacement of *Stipa* by *Carrichiera annua* (Wards weed) in the foreground.

### Comparison of the survey area with the adjacent coastal areas

The coastal areas, north to Port Augusta and south to Mt Mambray, and bounded on the eastern side by Highway 1, were examined for the purpose of comparison with the survey area.

To the north the vegetation was very similar. The mangrove and samphire associations extend northwards in a broad band although the mangroves gradually contract and form only small pockets from Point Paterson northwards. *Atriplex vesicaria* and *Maireana pyramidata* associations became more extensive northwards. They also formed a buffer between the mallee and samphire zones and essentially replaced the *Sclerostegia tenuis* association in this buffer zone further south. The red mallee also becomes more extensive northwards, extending inland a considerable distance. Associated sub-canopy trees were more common than in the survey area and included *Myoporum platycarpum*, *Melaleuca lanceolata*, *Heterodendrum oleaefolium*, *Acacia oswaldii* and *Acacia papyrocarpa*. *Acacia papyrocarpa* was not observed in the mallee association within the survey area. The general composition of the shrub layer in the mallee association was very similar to the survey area with species of *Atriplex*, *Chenopodium*, *Enchylaena* and *Rhagodia* predominating.

Although the general composition of the vegetation on Mt Gullet was similar to that on Mt Grainger, the floristic diversity was poorer. Many species common on Mt Grainger to the north were absent, e.g. *Eremophila alternifolia*, *Olearia calcarea*, *Dodonaea lobulata*, *Cassia nemophila* var. *coriacea*, and others were only represented by a few individuals, e.g. *Sida petrophila*, *Eremophila scoparia*, *Geijera linearifolia*. Only one species was recorded on Mt Gullet that was not on Mt Grainger, namely *Cassytha melantha*.

The areas to the south of the survey area were predominantly covered by a low shrubland of *Atriplex vesicaria* and *Maireana brevifolia*. Extensive grazing occurred along the coast to the south and *Maireana brevifolia* appeared to come in where reversion to natural scrub proceeded. Red mallee extended slightly south to Mt Grainger, but it was replaced by samphire communities on the more saline soils surrounding Yatala Harbour. Further south it only occurred on Mt Gullet. The sandy shell ridges around Yatala Harbour were covered in *Melaleuca lanceolata*, a feature absent further north. Associated shrubs were those found on the shell ridges within the survey area, e.g. *Heterodendrum oleaefolium*, *Pittosporum phylliraeoides* and *Geijera linearifolia*. *Nitraria billardieri* and *Myoporum insulare* formed a narrow band immediately behind the beach. South of Yatala Harbour the samphire zone was reduced to small pockets along the coast.

Considerable interest was taken in the coastal monadnocks south of Mt Grainger so that their vegetation could be compared; Mt Grainger was considered to be the best preserved and least disturbed of the three.

Mt. Mambray, the southernmost one, was much smaller than Mt Gullet and Mt Grainger. The predominant vegetation was *Atriplex vesicaria*/*Maireana pyramidata* with associated shrubs of *Enchylaena tomentosa*, *Rhagodia parabolica* and *R. spinescens*. A few *Heterodendrum oleaefolium* and *Exocarpos aphyllus* shrubs occurred on the upper slopes and a small group of trees of *Myoporum platycarpum* occurred on the eastern flank.

Mt Gullet, like Mt Grainger is covered by red mallee although here *Eucalyptus oleosa* was the predominant species. *Atriplex vesicaria* formed the predominant understorey layer except in the southern part where overgrazing had resulted in replacement by *Chenopodium ulicinum*. The cross-fence change was quite marked (Fig. 11).



Fig. 11. Cross fence difference at Mt Gullet, *Atriplex vesicaria* (LHS) and *Chenopodium ulicinum* (RHS).

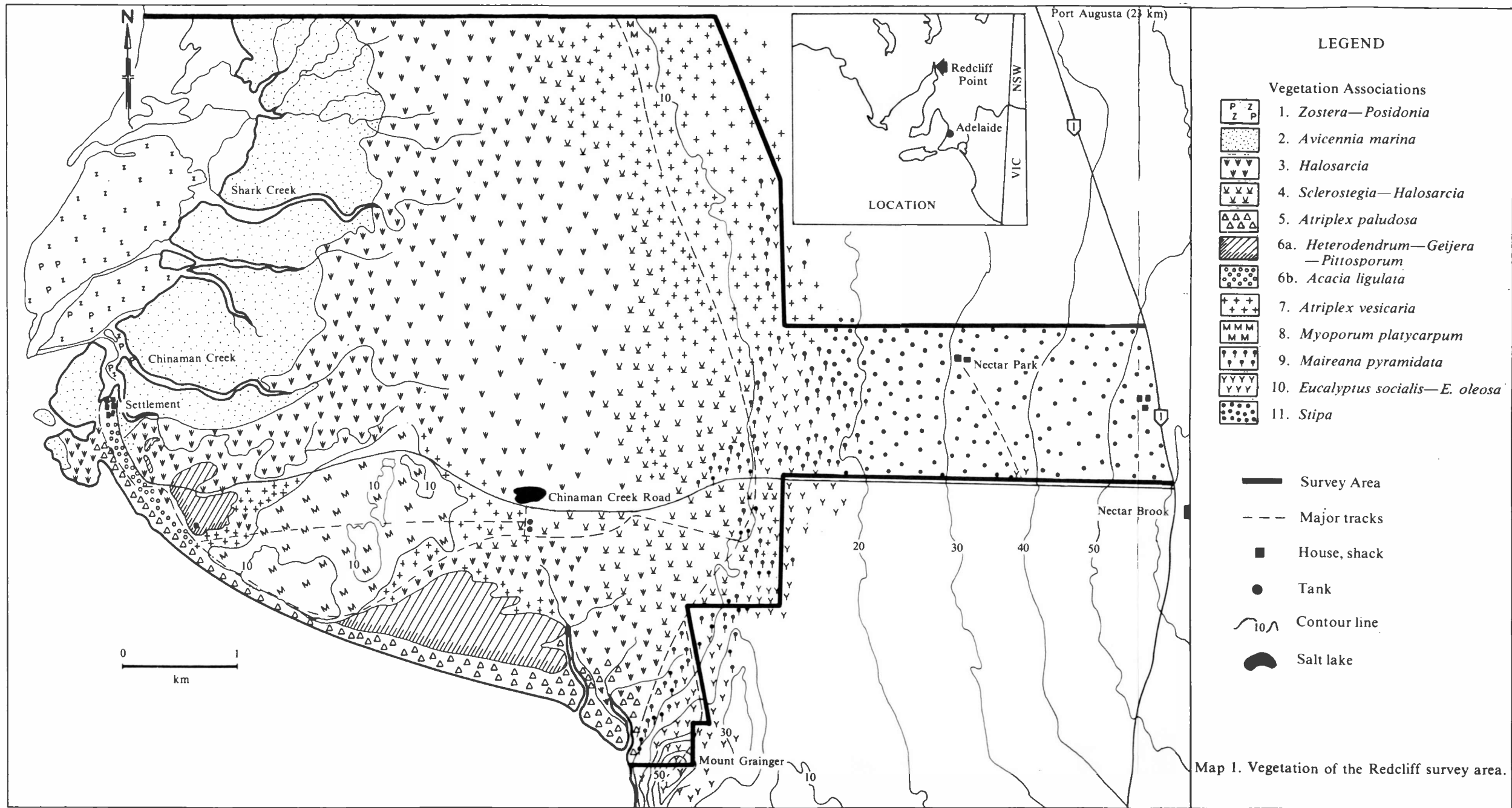
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Map 1. Vegetation of the Redcliff survey area.



## APPENDIX I

### LIST OF PLANT SPECIES

This list includes angiosperms, bryophytes and lichens. Angiosperms are listed alphabetically in families and genera, the bryophytes and lichens alphabetically in genera. The distribution of each species is recorded within the Redcliff area and numbers refer to the plant associations. Location 12 refers to the settlement area at Chinaman Creek and lists only those plants restricted to the area. The symbol \* denotes an adventive species.

	LOCATION											
	1	2	3	4	5	6	7	8	9	10	11	12
<b>Aizoaceae</b>												
* <i>Carpobrotus aequilaterus</i> (Haw.) N.E.Br.	—	—	—	—	+	+	—	—	—	—	—	—
<i>C. rossii</i> (Haw.) Schwantes	—	—	—	—	+	+	—	—	—	—	—	—
<i>Disphyma clavellatum</i> (Haw.) Chinnock	—	—	+	+	+	+	+	+	+	+	—	—
* <i>Galenia secunda</i> (L.f.) Sond.	—	—	—	—	—	—	—	—	—	—	—	+
* <i>G. pubescens</i> (Eckl. & Zeyh.) Druce	—	—	—	—	—	+	—	—	—	—	—	—
* <i>Mesembryanthemum aitonis</i> Jacquin	—	—	—	—	+	+	—	—	—	+	—	—
* <i>M. crystallinum</i> L.	—	—	—	—	+	+	—	—	—	—	—	—
* <i>M. nodiflorum</i> L.	—	—	+	+	+	+	+	—	—	—	—	—
<i>Sarcozona bicarinata</i> Blake	—	—	—	—	—	+	—	—	—	—	—	—
<i>S. praecox</i> (F. Muell.) Blake	—	—	—	—	+	+	—	—	—	—	—	—
<i>Tetragonia amplexicoma</i> (Miq.) Hook.f.	—	—	—	—	+	+	—	—	—	+	—	—
<i>T. eremaea</i> Ostenf.	—	—	—	—	+	+	—	+	—	—	—	—
<b>Amarantaceae</b>												
<i>Hemichroa diandra</i> R.Br.	—	—	+	—	—	+	—	+	—	—	—	—
<i>Ptilotus obovatus</i> (Gaudich.) F. Muell.	—	—	—	—	—	—	—	—	+	+	—	—
<b>Apocynaceae</b>												
<i>Alyxia buxifolia</i> R.Br.	—	—	—	—	—	—	—	+	—	—	—	—
<b>Boraginaceae</b>												
* <i>Echium plantagineum</i> L.	—	—	—	—	—	—	+	—	—	—	+	—
<i>Omphalolappula concava</i> (F. Muell.) Brand	—	—	—	—	—	—	+	—	—	—	+	—
<b>Campanulaceae</b>												
<i>Wahlenbergia gracilentia</i> Lothian	—	—	—	—	—	+	—	—	—	—	—	—
<i>W. stricta</i> Sweet	—	—	—	—	—	—	—	—	—	—	—	+
<b>Caryophyllaceae</b>												
* <i>Gypsophila australis</i> (Schldl.) A. Gray	—	—	—	—	—	+	—	—	—	—	—	—
* <i>Herniaria hirsuta</i> L.	—	—	+	—	—	—	—	—	—	—	—	—
* <i>Polycarpon tetraphyllum</i> var. <i>diphyllum</i> (Cav.) DC.	—	—	—	—	—	—	—	—	—	—	—	+
<i>Spergularia diandra</i> (Guss.) Heldr. & Sartar ex Heldr.	—	—	+	—	+	+	—	—	—	—	—	—
* <i>S. aff. media</i> (L.) Presl	—	—	—	—	—	+	—	—	—	—	—	—

Continued on page 344

	LOCATION											
	1	2	3	4	5	6	7	8	9	10	11	12
<b>Casuarinaceae</b>												
<i>Casuarina cristata</i> Miq.	-	-	-	-	-	-	-	+	-	-	-	-
<b>Caesalpiniaceae</b>												
<i>Cassia artemisioides</i> Gaudich. ex DC.	-	-	-	-	-	-	-	-	-	+	-	-
<i>C. nemophila</i> var. <i>coriacea</i> (Benth.) Symon	-	-	-	-	-	-	-	-	-	+	-	-
<i>C. nemophila</i> var. <i>platypoda</i> (R. Br.) Benth.	-	-	-	-	-	-	-	-	-	+	-	-
<i>C. nemophila</i> var. <i>zygophylla</i> (Benth.) Benth.	-	-	-	-	-	-	-	-	-	+	-	-
<b>Chenopodiaceae</b>												
<i>Atriplex acutibractea</i> Anderson	-	-	-	-	-	-	-	-	-	+	-	-
<i>A. angulata</i> Benth.	-	-	-	+	-	-	-	-	-	-	-	-
<i>A. cinerea</i> Poir.	-	-	-	-	+	-	-	-	-	-	-	-
<i>A. holocarpa</i> F. Muell.	-	-	+	-	-	-	-	-	-	-	-	-
<i>A. lindleyi</i> Moq.	-	-	-	+	-	-	-	-	-	-	-	-
<i>A. paludosa</i> R. Br.	-	-	+	-	+	-	-	-	-	-	-	-
<i>A. spongiosa</i> F. Muell.	-	-	+	-	-	-	-	-	-	-	-	-
<i>A. vesicaria</i> Hew. ex Benth.	-	-	-	+	-	+	+	+	-	+	-	-
<i>Babbagia acroptera</i> F. Muell. & Tate	-	-	-	+	-	-	-	-	-	+	-	-
<i>B. diptercarpa</i> F. Muell.	-	-	+	-	-	-	-	-	-	-	-	-
<i>B. aff. diptercarpa</i> F. Muell.	-	-	+	+	-	-	-	-	-	-	-	-
<i>Chenopodium cristatum</i> (F. Muell.) F. Muell.	-	-	-	-	-	+	-	-	+	-	-	-
<i>C. desertorum</i> (J. M. Black) J. M. Black	-	-	-	-	-	-	-	-	+	+	-	-
* <i>C. murale</i> L.	-	-	-	-	-	+	-	-	-	-	-	-
<i>C. ulicinum</i> Gandoger	-	-	-	-	-	-	-	-	-	+	-	-
<i>Dissocarpus biflorus</i> (R. Br.) F. Muell.	-	-	+	-	-	+	+	-	-	-	-	-
<i>D. paradoxa</i> R. Br.	-	-	-	-	-	-	-	-	-	+	+	-
<i>Enchylaena tomentosa</i> R. Br.	-	-	-	-	-	+	-	+	+	+	-	-
<i>Halosarcia halocnemoides</i> (Nees) P.G. Wilson	-	-	+	+	-	-	-	-	-	-	-	-
<i>H. pergranulata</i> (J. M. Black) P.G. Wilson	-	-	+	-	-	-	+	-	-	-	-	-
<i>H. pruinosa</i> (Paulsen) P.G. Wilson	-	-	+	+	-	-	+	-	-	-	-	-
<i>Maireana brevifolia</i> (R. Br.) P.G. Wilson	-	-	-	-	-	+	-	-	+	-	+	-
<i>M. cannonii</i> (J. M. Black) P.G. Wilson	-	-	+	+	-	-	-	-	-	-	-	-
<i>M. erioclada</i> (Benth.) P.G. Wilson	-	-	-	-	-	-	+	+	-	+	-	-
<i>M. georgei</i> (Diels) P.G. Wilson	-	-	-	-	-	-	-	+	-	-	-	-
<i>M. oppositifolia</i> (F. Muell.) P.G. Wilson	-	-	+	-	-	-	-	-	-	-	-	-
<i>M. pyramidata</i> (Benth.) P.G. Wilson	-	-	-	+	-	-	-	+	+	+	-	-
<i>M. radiata</i> (P.G. Wilson) P.G. Wilson	-	-	-	-	-	-	-	-	-	+	-	-
<i>M. sclerolaenoides</i> (F. Muell.) P.G. Wilson	-	-	-	-	-	-	-	-	-	+	-	-
<i>M. sedifolia</i> (F. Muell.) P.G. Wilson	-	-	-	-	-	-	+	+	-	+	-	-
<i>M. tomentosa</i> ssp. <i>urceolata</i> P.G. Wilson	-	-	+	-	-	+	-	-	+	-	-	-
<i>M. trichoptera</i> (J. M. Black) P.G. Wilson	-	-	-	-	-	-	-	-	-	+	-	-
<i>M. turbinata</i> P.G. Wilson	-	-	-	-	-	-	-	-	-	+	-	-
<i>Malacocera gracilis</i> Chinnock	-	-	+	+	-	-	-	-	-	-	-	-
<i>M. tricornis</i> (Benth.) Anderson	-	-	-	-	-	-	-	-	+	-	-	-

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Chenopodiaceae (continued)

	LOCATION											
	1	2	3	4	5	6	7	8	9	10	11	12
<i>Rhagodia crassifolia</i> R.Br.	—	—	—	—	—	—	—	—	—	+	—	—
<i>R. gaudichaudiana</i> Moq.	—	—	—	—	—	+	—	+	—	+	+	—
<i>R. nutans</i> R.Br.	—	—	—	—	—	+	—	+	—	—	—	—
<i>R. parabolica</i> R.Br.	—	—	—	—	—	+	—	—	—	—	+	—
<i>R. spinescens</i> R.Br.	—	—	—	+	—	—	—	+	—	+	—	—
<i>Sarcocornia blackiana</i> (Ulbrich) Scott	—	—	+	—	+	—	—	—	—	—	—	—
<i>S. quinqueflora</i> (Bunge ex Ung.-Sternb.) Scott	—	+	+	—	+	—	—	—	—	—	—	—
<i>Salsola kali</i> L.	—	—	—	—	—	+	—	—	—	+	—	—
<i>Sclerochlamys brachyptera</i> F. Muell.	—	—	—	+	—	—	—	—	—	—	+	—
<i>Sclerolaena diacantha</i> (Nees) Benth.	—	—	—	+	—	—	+	+	+	+	—	—
<i>S. divaricata</i> (R.Br.) Domin	—	—	—	+	—	—	—	—	—	+	—	—
<i>S. obliquicuspis</i> (Anderson) Ulbrich	—	—	—	—	—	—	—	+	—	+	+	—
<i>S. uniflora</i> R.Br.	—	—	—	+	—	+	+	—	—	—	—	—
<i>S. ventricosa</i> (J.M. Black) Scott	—	—	—	—	—	—	—	—	—	+	—	—
<i>Sclerostegia arbuscula</i> (Moq.) P.G. Wilson	—	—	+	—	—	—	—	—	—	—	—	—
<i>S. tenuis</i> (Benth.) P.G. Wilson	—	—	+	+	—	—	+	—	+	+	—	—
<i>Suaeda australis</i> (R.Br.) Moq.	—	+	+	—	—	—	—	—	—	—	—	—
<i>Threlkeldia diffusa</i> R.Br.	—	—	—	+	+	+	—	—	—	+	—	—
<i>T. salsuginosa</i> (F. Muell.) Benth.	—	—	—	+	—	—	—	—	—	—	—	—
<b>Compositae</b>												
<i>Actinobole uliginosum</i> (A. Gray) Eichler	—	—	—	—	—	+	—	—	—	—	—	—
<i>Angianthus</i> sp.	—	—	+	+	—	—	—	—	—	—	—	—
<i>A. strictus</i> (Steetz) Benth.	—	—	+	+	—	—	+	—	—	—	—	—
* <i>Arctotheca calendula</i> (L.) Levyns	—	—	—	—	—	—	—	—	—	—	—	+
<i>Brachyscome ciliaris</i> (Labill.) Less.	—	—	—	—	—	+	+	+	—	—	—	—
<i>B. ciliaris</i> var. <i>lanuginosa</i> (Steetz) Benth.	—	—	—	—	—	—	+	—	—	—	—	—
<i>B. leptocarpa</i> F. Muell.	—	—	—	—	—	+	—	—	—	—	—	—
<i>B. lineariloba</i> (DC.) Druce	—	—	—	—	—	+	+	—	—	—	—	—
<i>B. trachycarpa</i> F. Muell.	—	—	—	—	—	—	—	—	—	+	—	—
<i>Calotis hispidula</i> F. Muell.	—	—	—	—	—	—	—	—	+	—	—	—
* <i>Carthamus lanatus</i> L.	—	—	—	—	—	—	—	—	—	—	+	—
<i>Cassinia laevis</i> R.Br.	—	—	—	—	—	+	—	—	—	—	—	—
* <i>Centaurea melitensis</i> L.	—	—	—	—	—	—	—	—	—	—	—	+
* <i>Cirsium vulgare</i> (Savi) Ten.	—	—	—	—	—	+	—	—	—	—	—	—
<i>Cratystylis conocephala</i> (F. Muell.) S. Moore	—	—	—	—	—	—	—	+	—	—	—	—
* <i>Dittrichia graveolens</i> (L.) W. Greuter	—	—	—	—	+	—	—	—	—	—	—	+
<i>Elachanthus pusillus</i> F. Muell.	—	—	+	—	—	+	—	—	—	—	—	—
<i>Gnaphalium indutum</i> Hook.f.	—	—	—	—	—	—	—	+	—	—	—	—
<i>G. involucreatum</i> Forst.f.	—	—	—	—	—	+	+	—	—	—	—	—
<i>G. luteoalbum</i> L.	—	—	—	—	—	—	—	—	—	—	—	+
<i>Gnephosis skirrophora</i> (Sond. & F. Muell.) Benth.	—	—	—	+	—	—	—	—	—	—	—	—

Continued on page 346

## Compositae (continued)

	LOCATION											
	1	2	3	4	5	6	7	8	9	10	11	12
* <i>Hedypnois rhagadioloides</i> (L.) Willd.	—	—	—	—	—	—	—	—	—	—	+	—
<i>Helichrysum apiculatum</i> (Labill.) D. Don	—	—	—	—	—	—	—	—	—	—	—	+
<i>Helipterum corymbiflorum</i> Schldl.	—	—	+	—	—	—	+	—	—	—	—	—
<i>H. microglossum</i> (F. Muell. ex Benth.) Maiden & Betche	—	—	—	—	—	—	+	—	—	—	—	—
<i>H. polygalifolium</i> DC.	—	—	—	—	+	—	—	—	—	+	—	—
<i>H. pygmaeum</i> (DC.) Benth.	—	—	+	—	+	+	+	—	—	—	—	—
<i>H. strictum</i> (Lindl.) Benth.	—	—	—	—	—	+	—	—	—	—	—	—
* <i>Hypochoeris glabra</i> L.	—	—	—	—	—	+	—	—	—	—	—	—
* <i>H. radicata</i> var. <i>heterocarpa</i> Moris.	—	—	—	—	—	+	—	—	—	—	—	—
<i>Isoetopsis graminifolia</i> Turcz.	—	—	+	—	—	—	—	+	—	—	—	—
<i>Ixiolaena leptolepis</i> (DC.) Benth.	—	—	—	—	—	—	—	+	—	—	—	—
* <i>Lactuca</i> sp.	—	—	—	+	—	—	—	—	—	—	—	—
<i>Microseris scapigera</i> (Sol. ex A. Cunn.) Schultz-Bip.	—	—	—	—	—	—	—	+	—	—	—	—
<i>Millotia myosoidifolia</i> (Benth.) Steetz	—	—	—	—	—	—	+	—	—	—	—	—
<i>Minuria cunninghamii</i> (DC.) Benth.	—	—	—	—	—	+	—	+	+	—	—	—
<i>Myriocephalus stuartii</i> (F. Muell. & Sond. ex Sond.) Benth.	—	—	—	—	—	—	+	—	—	—	—	—
<i>Olearia axillaris</i> (DC.) F. Muell. ex Benth.	—	—	—	—	+	+	—	—	—	—	—	—
<i>O. calcarea</i> F. Muell. ex Benth.	—	—	—	—	—	—	—	—	—	+	—	—
<i>O. pimeleoides</i> (DC.) Benth.	—	—	—	—	—	+	—	—	+	+	—	—
* <i>Onopordum acaulon</i> L.	—	—	—	—	—	—	—	—	—	—	+	—
<i>Senecio glossanthus</i> (Sond.) Belcher	—	—	—	+	+	+	—	—	+	—	—	—
<i>S. aff. lautus</i> Forst. f. ex Willd.	—	—	—	—	+	+	—	+	—	+	—	—
<i>S. magnificus</i> F. Muell.	—	—	—	—	—	+	—	—	—	—	—	—
<i>S. quadridentatus</i> Labill.	—	—	—	—	—	+	—	—	—	—	—	—
* <i>Sonchus oleraceus</i> L.	—	—	—	—	—	+	—	—	—	—	—	—
* <i>S. tenerrimus</i> L.	—	—	—	—	—	—	—	—	+	—	—	—
<i>Stuartina muelleri</i> Sond.	—	—	—	—	—	—	—	+	—	—	—	—
<i>Vittadinia megacephala</i> (F. Muell. ex Benth.) Black	—	—	—	—	—	—	—	—	—	+	—	—
<i>V. triloba</i> (Gaudich.) DC.	—	—	—	—	—	—	—	—	—	—	—	+
<i>V. aff. triloba</i> (Gaudich.) DC.	—	—	—	—	—	+	—	—	—	—	—	—
* <i>Urospermum picroides</i> (L.) F. W. Schmidt	—	—	—	—	—	+	—	—	—	—	—	—
* <i>Xanthium spinosa</i> L.	—	—	—	—	—	—	—	—	+	—	—	—
<b>Convolvulaceae</b>												
<i>Convolvulus erubescens</i> Sims	—	—	—	—	—	—	—	—	—	+	+	—
* <i>Ipomoea palmata</i> Forsk.	—	—	—	—	—	—	—	—	—	—	—	+
<i>Wilsonia humilis</i> R. Br.	—	—	+	—	—	—	—	—	—	—	—	—
<b>Crassulaceae</b>												
<i>Crassula colorata</i> (Nees) Ostenf.	—	—	—	—	+	+	+	+	—	+	—	—
<i>C. sieberana</i> (Schultes) Druce	—	—	—	+	+	+	+	+	—	+	—	—

Continued on page 347

	LOCATION											
	1	2	3	4	5	6	7	8	9	10	11	12
<b>Cruciferae</b>												
<i>Arabidella trisetata</i> (F. Muell.) Schultz	-	-	-	-	-	-	-	-	-	+	-	-
* <i>Brassica tournefortii</i> Gouan	-	-	-	-	-	+	-	-	-	-	-	-
<i>Cakile maritima</i> Scop.	-	-	-	-	+	-	-	-	-	-	-	-
* <i>Carrichtera annua</i> (L.) DC.	-	-	-	-	-	+	-	-	-	-	+	-
<i>Geococcus pusillus</i> Drum. ex Harv.	-	-	-	-	-	+	-	-	-	-	-	-
<i>Hymenolobus procumbens</i> (L.) Nuttall ex Schinz & Thell.	-	-	-	-	-	+	-	-	-	-	-	-
<i>Lepidium papillosum</i> F. Muell.	-	-	-	+	-	-	-	-	-	+	-	-
<i>L. rotundum</i> (Desv.) DC.	-	-	+	+	-	-	-	-	-	-	-	-
* <i>Rapistrum rugosum</i> (L.) All.	-	-	-	+	-	-	-	-	-	-	-	-
* <i>Sisymbrium erysimoides</i> Desf.	-	-	-	-	-	+	-	-	-	-	-	-
* <i>S. irio</i> L.	-	-	-	-	-	+	-	-	-	-	-	-
* <i>S. orientale</i> L.	-	-	-	-	-	-	-	-	-	-	-	+
<i>Stenopetalum lineare</i> R.Br. ex DC.	-	-	+	-	-	+	-	-	-	-	-	-
<b>Cucurbitaceae</b>												
* <i>Citrullus lanatus</i> (Thunb.) Mansf.	-	-	-	-	-	-	-	-	-	-	+	-
* <i>Cucumis myriocarpus</i> Naud.	-	-	-	-	-	+	-	-	-	-	-	-
<b>Euphorbiaceae</b>												
<i>Euphorbia drummondii</i> Boiss.	-	-	-	-	-	+	-	-	-	-	-	-
<i>E. eremophila</i> A. Cunn. ex Hook.	-	-	-	-	-	+	-	+	-	-	-	-
* <i>E. paralias</i> L.	-	-	-	-	-	+	-	-	-	-	-	-
<b>Frankeniaceae</b>												
<i>Frankenia eremophila</i> Summerh.	-	-	-	-	-	+	-	-	-	-	-	-
<i>F. sessilis</i> Summerh.	-	-	+	-	+	+	-	-	-	-	-	-
<i>F. gracilis</i> Summerh.	-	-	-	-	+	+	-	-	-	-	-	-
<i>F. uncinata</i> Sprague & Summerh. ex Summerh.	-	-	-	-	-	-	-	-	-	+	-	-
<b>Geraniaceae</b>												
* <i>Erodium cicutarium</i> (L.) L'Hér. ex Ait.	-	-	-	-	-	+	-	-	-	-	-	-
<i>E. cygnorum</i> Nees	-	-	-	-	+	+	+	-	-	-	-	-
* <i>E. moschatum</i> (L.) L'Hér. ex Ait.	-	-	-	-	+	-	-	-	-	-	-	-
<b>Goodeniaceae</b>												
<i>Goodenia pusilliflora</i> F. Muell.	-	-	-	-	+	+	-	-	-	-	-	-
<i>Scaevola spinescens</i> R.Br.	-	-	-	-	+	+	+	-	-	+	-	-
<b>Gramineae</b>												
* <i>Avena barbata</i> Pott ex Link	-	-	-	-	-	-	-	-	-	-	+	-
* <i>Bromus arenarius</i> Labill.	-	-	-	-	-	-	+	-	-	+	-	-
* <i>B. diandrus</i> Roth	-	-	-	-	-	-	-	-	-	-	+	-
* <i>B. rubens</i> L.	-	-	-	-	+	+	-	-	-	-	-	-
<i>Cymbopogon ambiguus</i> (Steud.) A. Camus	-	-	-	-	-	+	-	-	-	-	-	-
<i>Danthonia caespitosa</i> Gaudich.	-	-	-	-	-	+	+	+	-	+	+	-

Continued on page 348

## Gramineae (continued)

	LOCATION											
	1	2	3	4	5	6	7	8	9	10	11	12
<i>D. aff. caespitosa</i> Gaudich.	—	—	+	—	—	—	—	—	—	+	—	—
<i>Distichlis distichophylla</i> (Labill.) Fasset	—	—	—	—	—	+	—	—	—	—	—	—
<i>Enteropogon acicularis</i> (Lindl.) Lazar.	—	—	—	—	—	—	—	—	—	—	+	—
<i>Eragrostis dielsii</i> Pilger	—	—	—	—	—	+	—	—	—	—	—	—
* <i>Hordeum leporinum</i> Link	—	—	—	—	+	+	—	—	+	—	+	—
* <i>Lamarckia aurea</i> (L.) Moench	—	—	—	+	—	+	+	—	+	+	—	—
* <i>Lolium</i> sp.	—	—	—	—	—	+	—	—	—	—	—	—
* <i>Lophochloa cristata</i> (L.) Hyl.	—	—	—	—	+	+	+	—	—	—	—	—
* <i>L. pumila</i> (Desf.) N.L. Bor	—	—	—	—	—	+	+	+	+	+	—	—
* <i>Parapholis incurva</i> (L.) Hubbard	—	—	—	+	—	+	—	—	—	—	—	—
* <i>Phalaris minor</i> Retz.	—	—	—	—	—	+	—	—	—	—	—	—
<i>Poa aff. crassicaudex</i> Vickery	—	—	—	—	—	—	+	—	—	—	—	—
* <i>Schismus barbatus</i> (L.) Thell.	—	—	—	—	+	+	+	+	—	+	—	—
<i>Stipa elegantissima</i> Labill.	—	—	—	—	—	+	—	—	+	—	—	—
<i>S. eremophila</i> Reader	—	—	+	—	—	—	+	+	—	—	—	—
<i>S. nitida</i> Summerh. & Hubbard	—	—	—	—	—	+	—	—	—	—	—	—
<i>S. aff. nitida</i> Summerh. & Hubbard	—	—	—	—	—	—	—	—	—	—	+	—
<i>S. platychaeta</i> Hughes	—	—	—	—	—	+	—	—	—	+	—	—
<i>S. variabilis</i> Hughes	—	—	—	—	—	—	—	—	—	—	+	—
* <i>Vulpia myuros</i> (L.) Gmel.	—	—	—	—	—	+	—	—	—	—	—	—
<b>Hypoxidaceae</b>												
<i>Hypoxis hookeri</i> Geerinck	—	—	—	—	—	—	—	+	—	—	—	—
<b>Iridaceae</b>												
* <i>Gynandris setifolia</i> (L.f.) Foster	—	—	—	—	—	—	—	—	—	—	—	+
<b>Juncaginaceae</b>												
<i>Triglochin calcitrapum</i> Hook.	—	—	—	—	—	+	—	—	—	—	—	—
<i>T. centrocarpum</i> Hook.	—	—	—	—	—	+	—	—	—	—	—	—
<b>Labiatae</b>												
* <i>Marrubium vulgare</i> L.	—	—	—	—	—	—	—	—	—	—	+	—
* <i>Salvia verbenaca</i> L.	—	—	—	—	—	—	—	—	—	—	+	—
<i>Westringia rigida</i> R.Br.	—	—	—	—	—	—	—	—	—	+	—	—
<b>Liliaceae</b>												
* <i>Asphodelus fistulosus</i> L.	—	—	—	—	—	—	—	—	—	—	—	+
<i>Bulbine semibarbata</i> (R.Br.) Haw.	—	—	—	—	—	—	+	+	—	—	—	—
<i>Thysanotus baueri</i> R.Br.	—	—	—	—	—	—	+	+	—	—	—	—
<b>Loranthaceae</b>												
<i>Amyema melaleuca</i> (Lehm. ex Miq.) Tiegh.	—	—	—	—	—	—	—	+	—	+	—	—
<i>Lysiana exocarpi</i> (Behr) Tiegh.	—	—	—	—	—	—	—	—	—	—	+	—
<b>Malvaceae</b>												
<i>Radyera farragei</i> F. Muell.	—	—	—	—	—	—	—	—	—	—	+	—
<i>Lawrenca glomerata</i> Hook.	—	—	+	—	—	—	—	—	—	—	—	—

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Malvaceae (continued)

	LOCATION											
	1	2	3	4	5	6	7	8	9	10	11	12
<i>* Malva parviflora</i> L.	--	--	--	--	--	--	--	--	--	--	+	--
<i>Selenothamnus squamatus</i> (Nees) Melville	--	--	--	--	--	+	--	--	--	--	--	--
<i>Sida intricata</i> F. Muell.	--	--	--	--	--	--	--	+	--	--	--	--
<i>S. petrophila</i> F. Muell.	--	--	--	--	--	--	--	--	--	+	--	--
<b>Mimosaceae</b>												
<i>Acacia ligulata</i> A. Cunn. ex Benth.	--	--	--	--	+	+	--	--	--	--	--	--
<i>A. oswaldii</i> F. Muell.	--	--	--	--	--	--	--	--	--	+	+	--
<i>A. papyrocarpa</i> Benth. (= <i>A. sowdenii</i> )	--	--	--	--	--	--	--	+	--	--	--	--
<i>A. victoriae</i> Benth.	--	--	--	--	--	--	--	--	--	--	+	--
<b>Myoporaceae</b>												
<i>Eremophila alternifolia</i> R. Br.	--	--	--	--	--	--	--	--	--	+	--	--
<i>E. glabra</i> (R. Br.) Ostenf.	--	--	--	--	+	+	--	--	--	--	--	--
<i>E. longifolia</i> (R. Br.) F. Muell.	--	--	--	--	--	--	--	--	--	--	+	--
<i>E. oppositifolia</i> R. Br.	--	--	--	--	--	--	--	--	--	+	--	--
<i>E. scoparia</i> (R. Br.) F. Muell.	--	--	--	--	--	--	--	--	--	+	--	--
<i>Myoporum deserti</i> A. Cunn. ex Benth.	--	--	--	--	--	+	+	--	--	--	--	--
<i>M. insulare</i> R. Br.	--	--	--	--	+	+	--	--	--	--	--	--
<i>M. platycarpum</i> R. Br.	--	--	--	--	--	--	--	+	+	+	--	--
<b>Myrtaceae</b>												
<i>Eucalyptus oleosa</i> F. Muell. ex Miq.	--	--	--	--	--	--	--	--	--	+	--	--
<i>E. socialis</i> F. Muell. ex Miq.	--	--	--	--	--	--	--	--	--	+	--	--
<i>Melaleuca lanceolata</i> Otto	--	--	--	--	--	--	--	--	--	+	--	--
<b>Orobanchaceae</b>												
<i>Orobanche australiana</i> F. Muell. ex Tate	--	--	--	--	+	--	--	--	--	--	--	--
<b>Oxalidaceae</b>												
<i>Oxalis corniculata</i> L.	--	--	--	--	--	--	+	--	--	--	--	--
<i>* O. pes-caprae</i> L.	--	--	--	--	--	--	--	--	--	--	--	+
<b>Papilionaceae</b>												
<i>* Lotus cruentus</i> Court	--	--	--	--	--	--	--	--	--	--	+	--
<i>* Medicago minima</i> var. <i>brevispina</i> Benth.	--	--	--	+	+	+	+	+	+	+	+	--
<i>* M. polymorpha</i> var. <i>vulgaris</i> (Benth.) Shinners	--	--	--	+	--	--	+	+	+	+	+	--
<i>* M. truncatula</i> Gaertn.	--	--	--	--	+	--	--	--	--	--	--	--
<i>* Melilotus indica</i> (L.) All.	--	--	--	--	--	--	--	--	--	--	+	--
<i>Templetonia egena</i> (F. Muell.) Benth.	--	--	--	--	--	--	--	--	+	+	+	--
<b>Pittosporaceae</b>												
<i>Pittosporum phylliraeoides</i> DC.	--	--	--	--	--	+	--	+	--	--	--	--
<b>Plantaginaceae</b>												
<i>Plantago drummondii</i> Dcne.	--	--	--	--	--	--	--	--	--	--	--	+
<b>Plumbaginaceae</b>												
<i>* Limonium thouinii</i> (Viv.) O. Kuntze	--	--	+	--	--	--	--	--	--	--	--	--

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	LOCATION											
	1	2	3	4	5	6	7	8	9	10	11	12
<b>Polygonaceae</b>												
* <i>Emex australis</i> Steinh.	-	-	-	-	-	-	-	-	-	-	-	+
* <i>E. spinosa</i> (L.) Campd.	-	-	-	-	-	-	-	-	-	-	+	-
* <i>Polygonum aviculare</i> L.	-	-	-	-	-	-	-	-	-	-	-	-
* <i>Rumex vesicarius</i> L.	-	-	-	-	-	-	-	-	-	-	-	+
<b>Portulacaceae</b>												
<i>Calandrinia eremaea</i> Ewart	-	-	-	-	-	+	+	+	-	-	-	-
<i>C. volubilis</i> Benth.	-	-	-	-	-	-	+	+	-	-	-	-
<b>Posidoniaceae</b>												
<i>Posidonia australis</i> Hook.f.	+	-	-	-	-	-	-	-	-	-	-	-
<b>Primulaceae</b>												
* <i>Anagallis arvensis</i> var. <i>caerulea</i> Gouan	-	-	-	-	-	-	-	-	-	-	-	+
<b>Ranunculaceae</b>												
<i>Ranunculus pentandrus</i> var. <i>platycarpus</i> (F. Muell.) Eichler	-	-	-	-	-	-	-	+	-	-	-	-
<b>Ruppiaceae</b>												
<i>Ruppia</i> sp.	-	+	-	-	-	-	-	-	-	-	-	-
<b>Rutaceae</b>												
<i>Geijera linearifolia</i> (DC.) J.M. Black	-	-	-	-	-	+	-	+	-	-	-	-
<b>Santalaceae</b>												
<i>Exocarpos aphyllus</i> R.Br.	-	-	-	-	-	-	-	-	-	+	-	-
<i>Santalum acuminatum</i> (R.Br.) A. DC.	-	-	-	-	-	+	-	+	-	+	-	-
<b>Sapindaceae</b>												
<i>Dodonaea attenuata</i> A.Cunn.	-	-	-	-	-	+	-	-	-	-	-	-
<i>D. lobulata</i> F. Muell.	-	-	-	-	-	-	-	-	-	+	-	-
<i>D. stenozyga</i> F. Muell.	-	-	-	-	-	-	-	-	-	+	-	-
<i>Heterodendrum oleaefolium</i> Desf.	-	-	-	-	-	+	-	+	-	+	-	-
<b>Solanaceae</b>												
<i>Lycium australe</i> R.Br.	-	-	-	+	+	+	+	+	+	+	-	-
* <i>L. ferocissimum</i> Miers	-	-	-	+	+	-	-	-	+	-	+	-
* <i>Nicotiana glauca</i> Grah.	-	-	-	-	-	+	-	-	-	-	-	-
<i>N. goodspeedii</i> Wheeler	-	-	-	-	-	+	-	-	-	+	-	-
<i>N. velutina</i> Wheeler	-	-	-	-	-	+	-	-	-	-	-	-
<i>Solanum coactiliferum</i> J.M. Black	-	-	-	-	-	+	-	-	-	-	-	-
* <i>S. nigrum</i> L.	-	-	-	-	-	+	-	-	-	-	-	-
<i>S. petrophilum</i> F. Muell.	-	-	-	-	-	-	-	-	-	+	-	-
<b>Thymelaeaceae</b>												
<i>Pimelea micrantha</i> F. Muell.	-	-	-	-	-	-	-	-	-	+	-	-
<i>P. microcephala</i> R.Br.	-	-	-	-	-	+	-	-	-	+	-	-
<i>P. simplex</i> F. Muell.	-	-	-	-	-	-	-	+	-	+	-	-
<b>Umbelliferae</b>												
* <i>Bupleurum semicompositum</i> L.	-	-	-	-	-	-	-	+	-	-	-	-
<i>Daucus glochidiatus</i> (Labill.) Fisch. Mey & Ave-Lal.	-	-	-	+	-	+	+	-	-	+	-	-

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	LOCATION											
	1	2	3	4	5	6	7	8	9	10	11	12
<b>Urticaceae</b>												
<i>Parietaria debilis</i> Forst.f.	-	-	-	-	-	+	-	-	-	-	-	-
<b>Verbenaceae</b>												
<i>Avicennia marina</i> var. <i>resinifera</i> (Forst.f.) Bakh.v.d. Brink	-	+	-	-	-	-	-	-	-	-	-	-
<b>Zannichelliaceae</b>												
<i>Amphibolis antarctica</i> (Labill.) Sond. & Aschers. ex Aschers.	+	-	-	-	-	-	-	-	-	-	-	-
<b>Zosteraceae</b>												
<i>Zostera muelleri</i> Irmisch ex Aschers.	+	-	-	-	-	-	-	-	-	-	-	-
<b>Zygophyllaceae</b>												
<i>Nitiraria billardieri</i> DC.	-	-	-	-	+	+	-	-	-	-	-	-
<i>Zygophyllum apiculatum</i> F. Muell.	-	-	-	-	-	-	-	+	-	+	-	-
<i>Z. aff ammophilum</i> F. Muell.	-	-	+	+	-	-	+	+	-	-	-	-
<i>Z. aurantiacum</i> Lindl.	-	-	-	-	-	-	-	-	-	+	-	-
<i>Z. billardieri</i> DC.	-	-	-	-	-	-	-	-	-	+	-	-
<i>Z. compressum</i> J.M. Black	-	-	-	+	-	-	-	-	-	-	-	-
<i>Z. eremaeum</i> (Diels) Ostenf.	-	-	-	-	-	+	-	-	-	-	-	-
<i>Zygophyllum</i> sp.	-	-	-	-	-	+	-	-	-	-	-	-
<b>Bryophytes</b>												
<b>Hepaticae</b>												
<i>Riccia</i> sp. 1.	-	-	+	-	-	-	+	+	-	-	-	-
<i>Riccia</i> sp. 2.	-	-	+	-	-	-	+	-	-	-	-	-
<b>Musci</b>												
<i>Barbula australasiae</i> (Hook. & Grev.) Brid.	-	-	-	-	-	+	-	-	-	-	-	-
<i>Barbula crinita</i> Schultz	-	-	-	-	-	-	-	-	-	+	-	-
<i>B. torquata</i> Tayl.	-	-	+	-	-	-	-	-	-	-	-	-
<i>Bryum pachytheca</i> C. Muell.	-	-	-	-	-	+	+	-	-	-	-	-
<i>B. sp. C.</i>	-	-	-	-	-	-	-	-	-	+	-	-
<i>Desmatodon convolutus</i> (Brid.) Grout	-	-	+	-	-	-	+	-	-	+	-	-
<i>Funaria gracilis</i> (Hook.f. & Wils.) Broth.	-	-	-	-	-	-	-	+	-	-	-	-
<i>F. hygrometrica</i> Hedw.	-	-	-	-	-	+	-	-	-	-	-	-
<i>Funaria</i> sp.	-	-	-	-	+	-	-	-	-	-	-	-
<i>Gigaspermum repens</i> (Hook.) Lindb.	-	-	-	-	-	+	-	-	-	-	-	-
<i>Goniomitrium enerve</i> Hook. f. & Wils.	-	-	-	-	-	-	-	-	-	+	-	-
<b>Lichens</b>												
<i>Buellia subalbula</i> (Nyl.) Mull.Arg.	-	-	-	-	-	-	-	-	-	+	-	-
<i>Chondropsis semiviridis</i> F. Muell. ex Nyl.	-	-	+	+	+	+	+	+	+	-	-	-
<i>Diploschistes scruposus</i> (Schreb.) Norm.	-	-	-	-	-	+	+	-	-	+	-	-
<i>Endocarpon pusillum</i> Hedw.	-	-	+	+	+	+	-	-	-	-	-	-
<i>Fulgensia subbracteata</i> (Nyl.) Poelt	-	-	+	-	-	+	-	-	-	-	-	-
<i>Lecidia coarctata</i> (J.E. Smith) Nyl.	-	-	-	-	-	+	+	-	-	-	-	-
<i>L. decipiens</i> (Hoffm.) Ach.	-	-	-	-	-	+	+	-	-	-	-	-
<i>Parmelia adhaerens</i> Nyl.	-	-	-	-	-	-	-	-	-	+	-	-
<i>P. convoluta</i> Krempf.	-	-	-	-	-	+	+	+	+	-	-	-
<i>Parmelia</i> sp.	-	-	-	-	-	-	-	-	-	+	-	-
<i>Toninia caeruleonigricans</i> (Lightf.) Th.Fr.	-	-	-	-	-	+	+	+	+	-	-	-
<i>Xanthoria ectanea</i> (Ach.) Räs.ex R. Filson	-	-	-	-	+	+	+	+	+	-	-	-