



Mt Pleasant Gold Mine

Baseline Assessment of Vegetation in the
Golden Flag Project Area

November 2004



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Executive Summary

In November 2004, Outback Ecology Services (OES) was commissioned by Placer Dome Asia Pacific to conduct a vegetation survey of a proposed Golden Flag pit and waste dump areas on lease numbers M24/390 and M24/165. GPS locations for each area were provided prior to the commencement of the vegetation survey. Six semi-permanent transects (G01 – G06) were established within the Golden Flag project area.

A total of 28 plant taxa from 11 families and 16 genera were identified on the six transects within the Golden Flag Project Area. The dominant plant families included Chenopodiaceae, Frankeniaceae and Myrtaceae. No Declared Rare or Priority Flora species (as listed by the Department of Conservation and Land Management, 2003) were identified within the six transects. All of the vegetation communities appeared well represented in the surrounding areas, therefore no communities identified were considered ecologically significant.

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1.0 INTRODUCTION

Outback Ecology Services was commissioned in November 2004 by Placer Dome Asia Pacific to conduct a vegetation survey of a proposed Golden Flag pit and waste dump areas on lease numbers M24/390 and M24/165.

The Golden Flag study area was located approximately 5km south-east of the Mt Pleasant mine site and was approximately 20 hectares in size.

1.1 Objectives

The objectives of the vegetation survey were to:

- Obtain an overview of vegetation dynamics and community structure on the proposed Golden Flag mining areas
- Search for rare and priority flora within the study area.

1.2 Climate

The survey area is located within an arid area that is characterised by cool winters and hot dry summers with rainfall occurring in winter or non-seasonally. The average annual rainfall of the Kalgoorlie area is 262mm (Bureau of Meteorology, 2004).

1.3 Flora and Vegetation

The survey area lies within the Coolgardie Botanical District within the South-western Interzone, as classified by Beard (1990). This district is predominantly eucalypt woodlands, becoming open and with a saltbush/bluebush understorey on the more calcareous soils. Predominant plant families expected in the area include Myrtaceae (*Eucalyptus* and *Melaleuca* species), Chenopodiaceae (salt bushes and blue bushes), Poaceae (grasses) and Asteraceae (daisies).

1.4 Soils and Topography

The topography of this district is gently undulating with occasional ranges of low hills. Sandplains dominate the western part. At the lowest points of the terrain of the Coolgardie Botanical District, a number of large salt flats incorporating playa lakes are present. The soils of the Coolgardie Botanical District are principally brown calcareous earths (Beard, 1990).

1.5 Declared Rare and Priority Flora

Rare Flora are gazetted under section 2 of section 23F of the Wildlife Conservation Act (1950) and as such it is an offence to damage rare flora. Priority Flora is not afforded the same legal protection as Declared Rare Flora, however there is the potential for Priority Flora to be upgraded to Rare status in the future. **Table 1** presents the definition of Declared Rare and Priority Flora Species. There were no Rare or Priority Flora collected or sited during the vegetation assessment of the Golden Flag area.

Table 1 Definition of Declared Rare and Priority Flora Species (CALM, 2003)

Conservation Code	Category Description
R	<p>Declared Rare Flora – Extant Taxa</p> <p>“Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.”</p>
P1	<p>Priority One – Poorly Known Taxa</p> <p>“Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as ‘rare flora’, but are in urgent need of further survey.”</p>
P2	<p>Priority Two – Poorly Known Taxa</p> <p>“Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as ‘rare flora’ but are in urgent need of further survey.”</p>
P3	<p>Priority Three – Poorly Known Taxa</p> <p>“Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as ‘rare flora’ but are in need of further survey.”</p>
P4	<p>Priority Four – Poorly Known Taxa</p> <p>“Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia) are not currently threatened by any identifiable factors. These taxa require monitoring every 5 – 10 years.”</p>

2.0 MATERIALS & METHODS

The field survey was conducted on the 18th of November by Stacey Coxall and Adam West of Outback Ecology Services. The study area was divided into three sections encompassing the proposed pit and two proposed waste landform locations. GPS locations for each area were provided prior to the commencement of the vegetation survey (**Table 2**).

Six semi-permanent transects (G01 – G06) were established within the Golden Flag project area during the assessment (**Figure 1**).

Table 2 Easting and Northing locations of the six transects monitored in the Golden Flag Project Area.

Transect	Easting and Northing
G01	51 J 335244 6619461
G02	51 J 335098 6619173
G03	51 J 334567 6618997
G04	51 J 334497 6619285
G05	51 J 335068 6619994
G06	51 J 335281 6620166

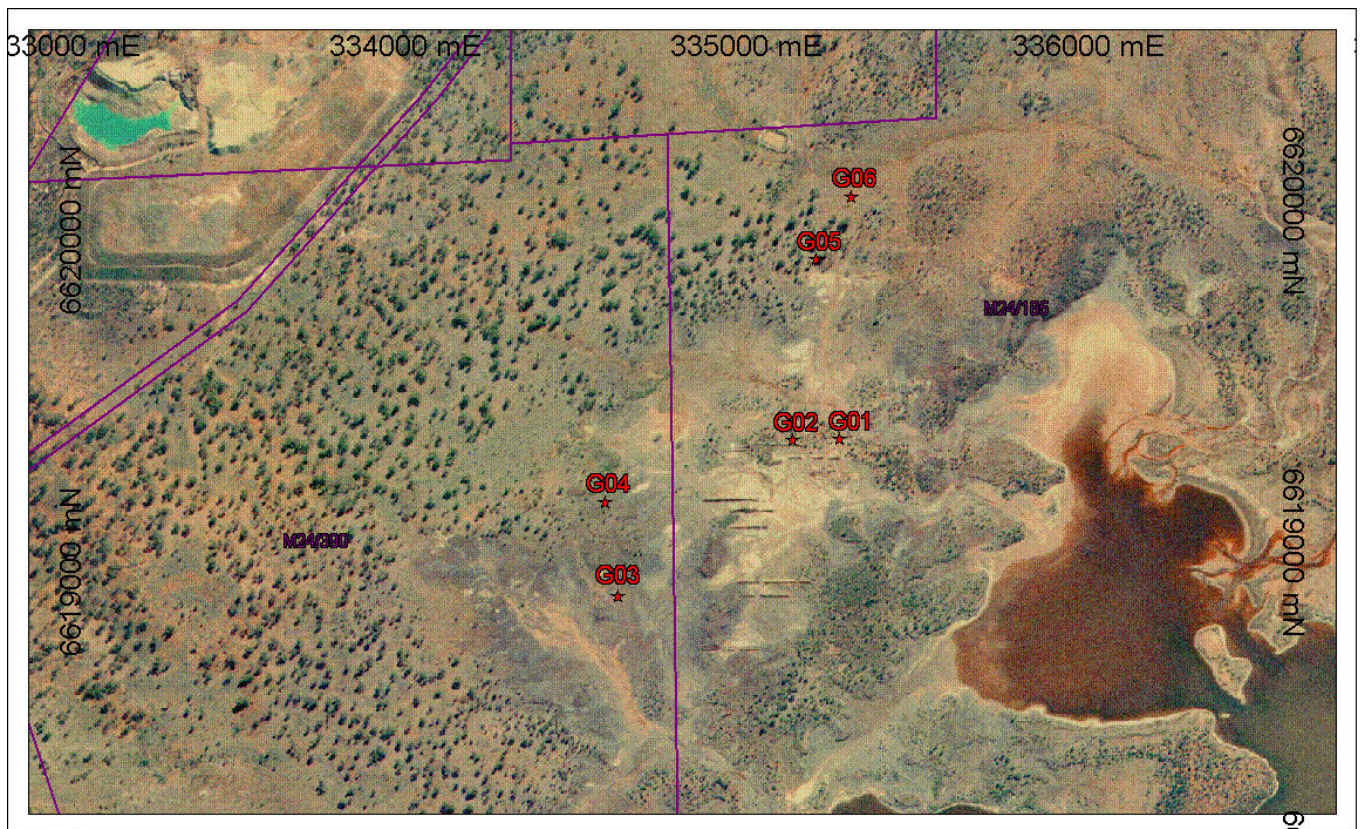


Figure 1 Locations of transects in the Golden Flag Project area.

Key indicators of vegetation dynamics are measured using the Point-Centred Quarter (PCQ) method. Measurements include plant cover (width and breadth), density (plants/ha) and diversity. The PCQ method is a plotless technique that evaluates the spatial distribution of vegetation. This method is particularly useful for collecting data for sparse and randomly distributed vegetation (Tongway, 1999). Sampling points are located at 5m intervals along the transect and the sampling area is divided into quarters by mentally placing a line perpendicular to the transect.

The width, breadth, species and distance from the tape of the nearest perennial plant nearest are measured to obtain plant cover and density for each quarter. It is important to note that only perennial plant species are recorded, because they have a greater contribution to the productivity, stability and overall functioning of an ecosystem than annual species. Perennial plants under 10 cm and grasses with less than 5cm basal width are not included.

3.0 RESULTS & DISCUSSION

3.1 Transect G01

Open Woodland of *Acacia rigens*, *Eremophila miniata* and *Casurina obesa* over an Open Shrubland of *Dodonaea viscosa* subsp *angustissima*, *Gunniopsis quadrifida* and *Cratystylis subspinescens*.

Perennial vegetation cover of this transect was 38%, while perennial plant density was 3799 plants per hectare. These figures fell within the range of values recorded previously in the Mt Pleasant region (OES, 2004). Eight species were reported on the transect and immediate surrounds. There was a high level of disturbance in this area with numerous tracks through the dune system (**Plate 1**).

Species List

Rhagodia drummondii

Frankenia ?setosa

Acacia rigens

Eremophila miniata

Casurina obesa

Dodonaea viscosa subsp *angustissima*

Gunniopsis quadrifida

Cratystylis subspinescens



Plate 1

Transect G01

3.2 Transect G02

Open Chenopod Shrubland of *Halosarcia halocnemoides* subsp. *halocnemoides*, *H. indica* subsp. *bidens*, *Hemichroa diandra* and *Frankenia setosa*.

This site was located on a shallow dune system, near a small claypan (**Plate 2**). The plant cover of this site was moderate, at 27%, while density was high at 5676 plants per hectare. The higher plant density at this site (compared with G01) was related to the small compact nature of the vegetation present at this site. Species diversity was moderate, with six species recorded on the transect and immediate surrounds. The vegetation values reported are typical for the region (OES, 2004).

Species list

Halosarcia halocnemoides subsp. *halocnemoides*

H. indica subsp. *bidens*

Frankenia setosa

Cratystylis subspinescens

Hemichroa diandra

Gunniopsis quadrifida

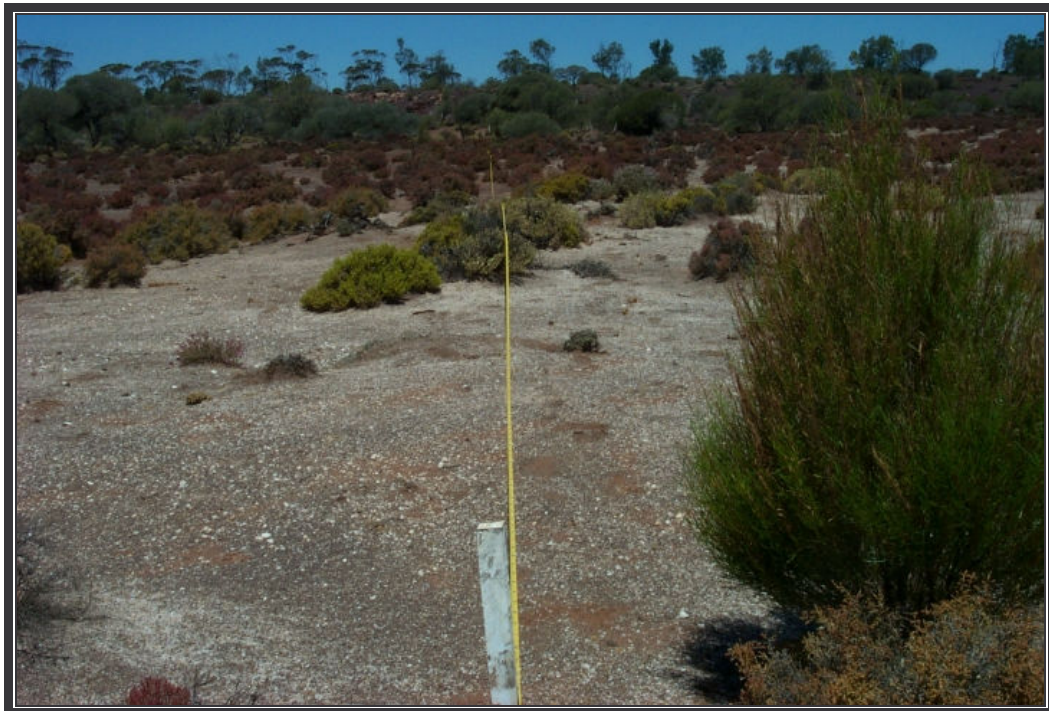


Plate 2

Transect G02

3.3 Transect G03

Open Chenopod Shrubland of *Halosarcia halocnemoides* subsp. *halocnemoides*, *Frankenia ?setosa* and *Cratystylis subspinescens* (**Plate 3**).

Perennial plant cover was approximately 30%, while plant density was higher than G01 and G02 with 11 768 plants/ha. This was related to differences in plant community structure. Species diversity was low with four species recorded on the transect. The high density value obtained is typical for *Halosarcia*/Chenopod sites in the region (OES, 2004).

Species List

Halosarcia halocnemoides subsp. *halocnemoides*

Frankenia setosa

Cratystylis subspinescens

Frankenia ?setosa



Plate 3

Transect G03

3.4 Transect G04

Shrubland of *Dodonaea lobulata* over *Ptilotus obovatus*, *Atriplex vesicaria* and *A. nummularia*,

This site differed from the previous transects and was generally flat with rocky soil cover (**Plate 4**).

Both perennial plant cover and density on the transect were high in comparison to the other transects, at approximately 55% and 8473 plants per hectare, respectively. These values were considered average for the region (OES, 2004).

Species diversity was also high, with eight species present on the transect.

Species List

Ptilotus obovatus

Maireanana sedifolia

Dodonaea lobulata

Atriplex vesicaria

Atriplex nummularia

Cratystylis subspinescens

Maireana pyramidata

Halosarcia halocnemoides subsp. *halocnemoides*

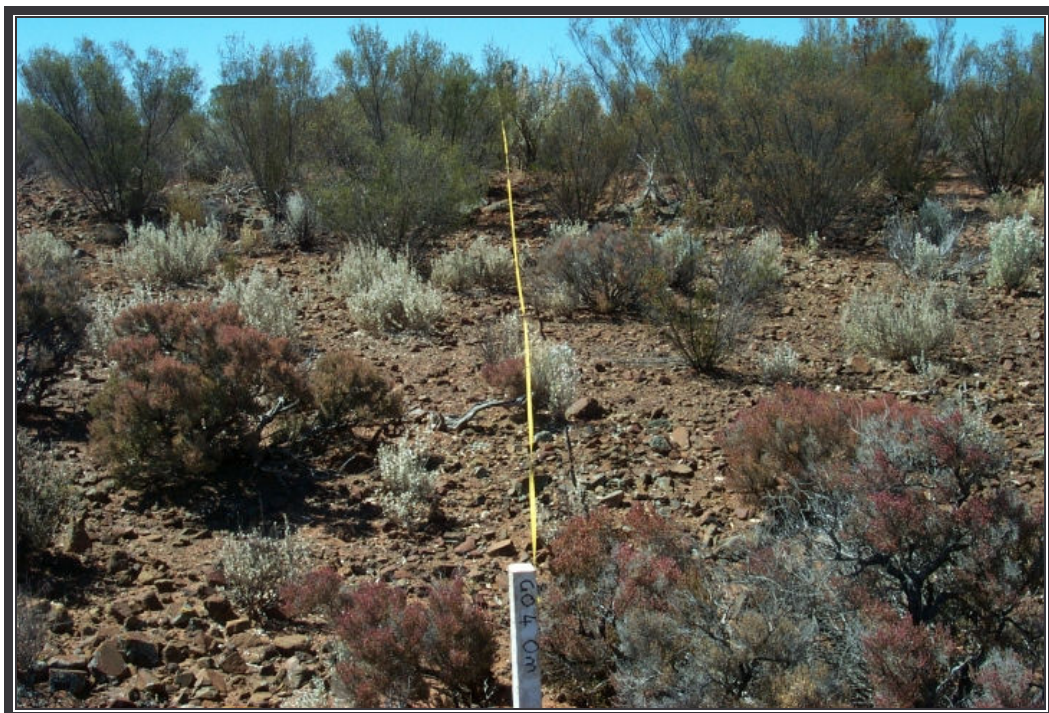


Plate 4

Transect G04

3.5 Transect G05

Open Woodland of *Eucalyptus lesouefii*, *Eucalyptus salmonophloia* and *Casurina obesa* over open chenopod shrubland of *Maireana sedifolia*, *Cratystylis subspinescens* and *Atriplex nummularia*.

Perennial plant cover was 25%, while plant density was low with 1 241 plants per hectare (**Plate 5**). These values are considered below-average in a regional context (OES, 2004).

Perennial species diversity was high with eight species recorded on the transect, and species present are common in the saline areas surrounding salt lake systems of the Goldfields.

Species List

Frankenia setosa

Maireanana sedifolia

Atriplex nummularia

Maireana tomentosa

Solanum lasiophyllum

Lycium australe

Maireana triptera

Cratystylis subspinescens

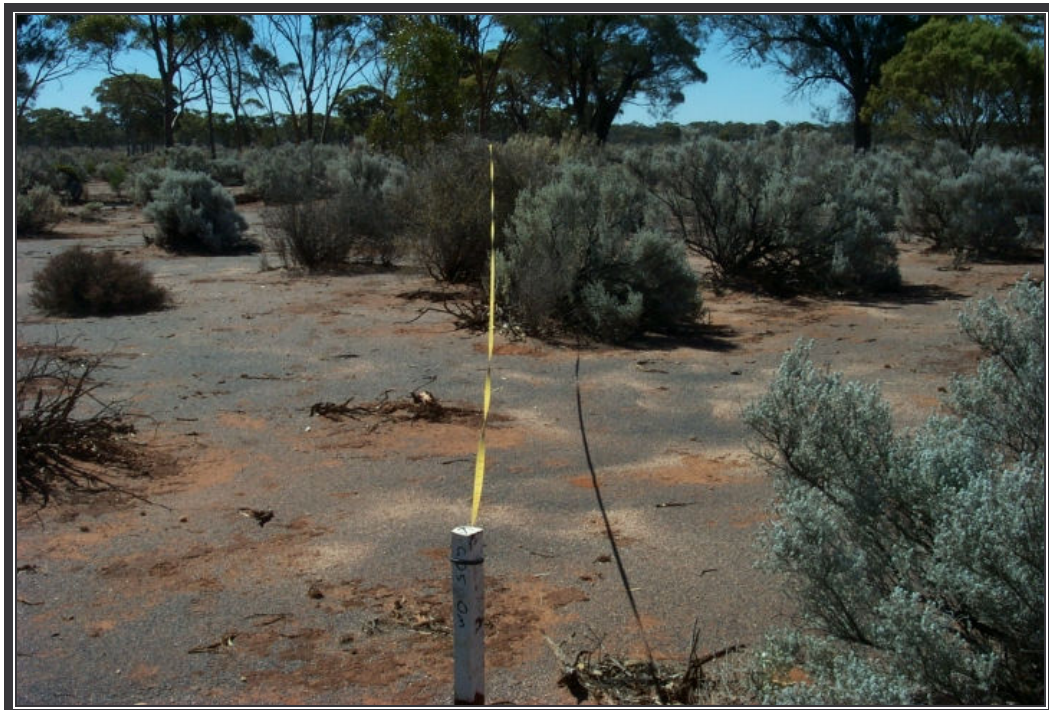


Plate 5

Transect G05

3.6 Transect G06

Open chenopod shrubland of *Halosarcia indica* subsp. *bidens* and *Maireana glomerifolia*.

Perennial plant cover was 29% and density was 5 514 plants per hectare, respectively, which is average for the region (OES, 2004). In contrast, perennial plant diversity was low with only four species recorded on the transect (**Plate 6**).

Species List

Halosarcia indica subsp. *bidens*

Maireana glomerifolia

Maireana pyramidata

Maireana aff. *tomtentosa*

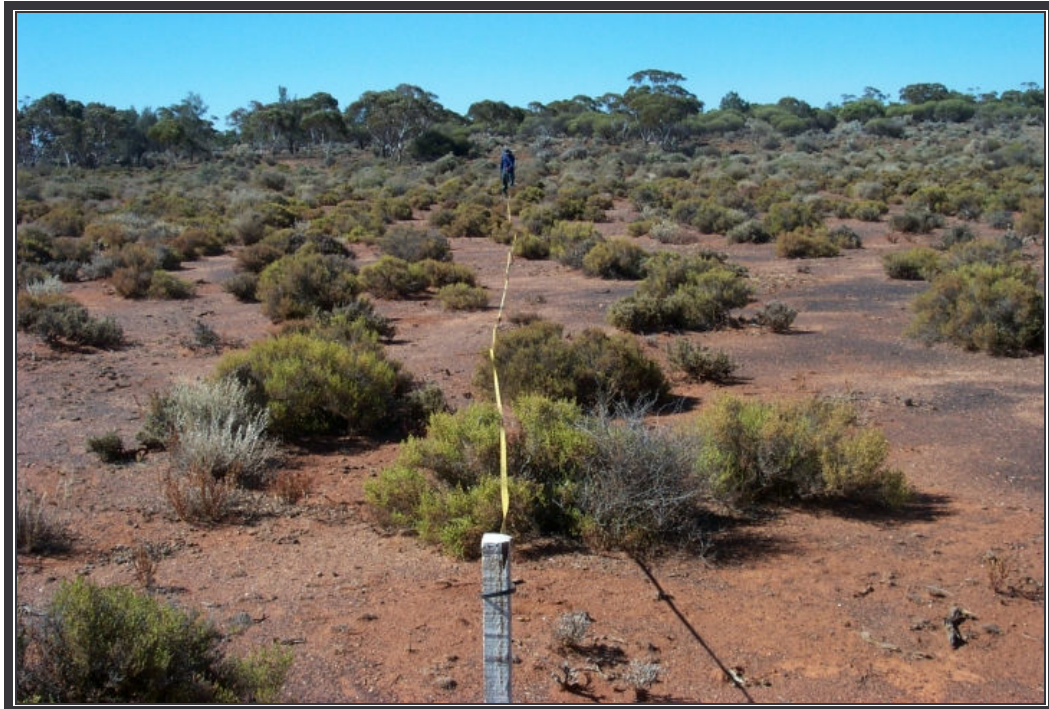


Plate 6

Transect G06

4.0 CONCLUSION

A total of 28 plant taxa from 11 families and 16 genera were identified on the six transects within the Golden Flag Project Area (**Appendix A**). The dominant plant families included Chenopodiaceae, Frankeniaceae and Myrtaceae, as was expected.

No Declared Rare or Priority Flora species (as listed by the Department of Conservation and Land Management, 2003) were identified within the six transects. All of the vegetation communities appeared well represented in the surrounding areas, therefore no communities identified were considered ecologically significant.

5.0 REFERENCES

Beard, J.S. 1990. *Plant Life of Western Australia*. Kangaroo Press, Western Australia.

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Appendix A
Species List

Table 1 Species List

Family	Species
Aziaceae	<i>Gunniopsis quadrifida</i>
Amaranthaceae	<i>Hemichroa diandra</i>
	<i>Ptilotus obovatus</i>
Asteraceae	<i>Cratystylis subspinescens</i>
Casuarinaceae	<i>Casuarina obesa</i>
Chenopodiaceae	<i>Atriplex bunburyana</i>
	<i>Atriplex nummularia</i>
	<i>Atriplex vesicaria</i>
	<i>Halosarcia halocnemoides</i> subsp. <i>halocnemoides</i>
	<i>Halosarcia indica</i> subsp. <i>bidens</i>
	<i>Maireana glomerifolia</i>
	<i>Maireana pyramidata</i>
	<i>Maireana sedifolia</i>
	<i>Maireana tomentosa</i>
	<i>Maireana</i> aff. <i>tomentosa</i>
	<i>Maireana triptera</i>
<i>Rhagodia drummondii</i>	
Frankeniaceae	<i>Frankenia setosa</i>
	<i>Frankenia ?setosa</i>
Mimosaceae	<i>Acacia species</i>
Myoporaceae	<i>Eremophila miniata</i>
Myrtaceae	<i>Eucalyptus lesouefii</i>
	<i>Eucalyptus salmonophloia</i>
Sapindaceae	<i>Dodonaea lobulata</i>
	<i>Dodonaea viscosa</i>
Solanaceae	<i>Lycium australe</i>
	<i>Solanum lasiophyllum</i>