

13/02/2020

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Dear Andrew

Offset Site Report: Condition of the Golden Sun Moth offset site, 5066 Western Highway, Beaufort, 3373

Project no. 31333

Introduction

A habitat assessment was undertaken to quantify the extent and condition of Golden Sun Moth *Synemon plana* (GSM) habitat on part of the property at 5066 Western Highway, Beaufort, approximately 46 kilometres west, north west of Ballarat (Lot 4A and part of Lot 4B of PS727373, Western Highway, Beaufort) (Figure 1). About 140 hectares of this 227.5 hectare property (Property Number 601065000) has been identified as a potential offset site for impacts to GSM associated with the development Lindum Vale, Mickleham (Referral EPBC 2015/7516). The property is within the Pyrenees Shire, is zoned as Farming Zone and is covered by a bushfire management overlay.

The purpose of the survey was to confirm the presence of GSM habitat and conduct a condition assessment to provide input into the offset management plan required to be developed for the site. The assessment also provides input into the scoring of GSM habitat within the EPBC Act offsets calculator as part of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Offsets Policy.

Methods

The irregular shaped area surveyed is bounded by to the south by the Martins Lane and to the north by Back Raglan Road, Beaufort and includes part of the headwaters of Yam Hole Creek (Figure 2).

Existing information on the native vegetation of the site was sourced from the publicly available DELWP datasets (i.e. NatureKit).

The site was surveyed by Stephen Mueck (accredited DELWP vegetation quality assessor HH173 – current until 19/4/2020) on 17 December 2019. Data was collected to provide a general assessment on the condition of the vegetation present and the overall structure of the vegetation present. Notes were taken as to the location and extent of pest plants and animals, with a focus on target weeds such as woody weeds.

Species names follow those provided by DELWPs Victorian Biodiversity Atlas and threatened species are defined as per DEPI (2014).

Photos were taken to provide a visual indication of the site condition (Appendix 2).

Results and observations

A total of 68 indigenous and 26 introduced species were recorded during the site inspection (Appendix 1).

While substantial areas of groundcover vegetation observed would satisfy the Victorian definition of a patch of native vegetation, the assessment was not designed to map the extent of native vegetation (as defined by DELWP 2017) nor to provide a habitat hectare assessment of these areas.

The site does not support any current wetlands as defined by DELWP mapping. DELWPs mapping of ecological vegetation classes (EVCs) indicates the pre-1750 vegetation of the site was dominated by Heathy Dry Forest (EVC 20) with central areas identified as a complex of Grassy Woodland (EVC 175) and Heathy Dry Forest.

The property drains from west to east and is dissected by three headwater sub-catchments and includes about six small farm dams.

The site supports a scattered cover of small patches of eucalypts and individual trees. Lower lying areas in the south east include Scentbark *Eucalyptus aromaphloia*, Grey Box *Eucalyptus macroparva* and Yellow Box *Eucalyptus melliodora*. Elsewhere the most common tree is Scentbark with other trees including Broad-leaf Peppermint *Eucalyptus dives*, Red Stringybark *Eucalyptus macrorhyncha* and Messmate Stringybark *Eucalyptus obliqua*.

The site supports an open shrub cover of scattered wattles *Acacia* species.

The ground cover is typically grassy and mostly dominated by native grasses such as Wallaby-grasses *Rytidosperma* spp., Tussock-grasses *Poa* spp., Common Wheat-grass *Anthosachne scabra*, Weeping-grass *Microlaena stipoides* and Spear-grasses *Austrostipa* species. This grassy ground cover is locally species rich with common herbaceous species including Grassland Wood-sorrel *Oxalis perennans*, Branching Bluebell *Wahlenbergia multicaulis*, Smooth Solenogyne *Solenogyne dominii*, Common Onion-orchid *Microtis unifolia*, Wattle Mat-rush *Lomandra filiformis*, Small St John's Wort *Hypericum gramineum*, Common Raspwort *Gonocarpus tetragynus*, Tall Sundew *Drosera auriculata* and Sheep's Burr *Acaena* species.

The site supports an average cover of weeds estimated at between 20% and 30%, although the more elevated areas in the west support a cover of weeds approaching 50%. The weediest areas in the west have a relatively high cover (i.e. up to 50%) of Sheep Sorrel *Acetosella vulgaris*. This likely reflects the grazing history of the site with sheep tending to camp in these elevated sites.

Woody weeds are typically absent from this property although a small infestation of Gorse *Ulex europaeus* was observed near the north eastern part of the property on the margins of an area of woodland.

Perennial grassy weeds such as Toowoomba Canary-grass *Phalaris aquatica* are relatively rare, although Brown-top Bent *Agrostis capillaris* is ubiquitous and generally has a cover of between 10% and 20%. Other perennial weeds are relatively uncommon and include Yorkshire Fog *Holcus lanatus* and Sweet Vernal-grass *Anthoxanthum odoratum*.

Common geophyte weeds include Onion Grass *Romulea rosea* which is ubiquitous but has a low cover. The introduced South African Orchid *Disa bracteata* is present and locally common. This species has the potential to become problematic.

The most common weeds on the site are annual grasses such as Hair-grasses *Aira* species, Fescue *Vulpia* species, Quaking-grasses *Briza* species and Soft Brome *Bromus hordeaceus*. While common and locally providing a visually obvious cover of up to about 10%, these annuals are not high threat weeds in this environment.

Estimated habitat scores for open grassy areas are provided in Table 1.

Table 1 Vegetation condition results for the Beaufort offset site

Site ID		1	
Habitat Zone ID		A	
EVC Name - #		Grassy Woodland (EVC 175)	
		Max Score	Score
Site Condition	Large Old Trees	10	3 (scattered large trees are present)
	Canopy Cover	5	0
	Lack of Weeds	15	6
	Understorey	25	15
	Recruitment	10	3
	Organic Matter	5	3
	Logs	5	0
	Site Score (standardised x1.36)		30
Landscape Value	Patch Size	10	8
	Neighbourhood	10	5
	Distance to Core	5	4
	Landscape Score		17
HABITAT SCORE		100	47
Habitat points = #/100		1	0.47
Habitat Zone area (ha)		138.87	
Habitat hectares (Hha)		65.3	

Wallaby-grasses and Spear-grasses are relatively abundant across all parts of the site which is assessed as good quality habitat for GSM.

A number of GSM were also observed during the site inspection and these were widely distributed across the area inspected.

Discussion

The areas of 'pasture' observed was considered structurally suitable for GSM as they occur as an open grassland or woodland with an open grassy understorey which is dominated by tussock grasses. The sedimentary slopes supported scattered to abundant GSM food plants and even areas with a relatively dense cover of trees, still supported some GSM food plants. In general the more elevated areas along the western edge of the property (i.e. above the 450 metre contour in the western quarter) had the greatest cover of weeds, mainly Sheep Sorrel, which was considered less favourable for GSM.

The vegetation supports a small infestation of woody weeds (Gorse) which otherwise do not appear to be prevalent in the landscape. The local elimination of these species is therefore a plausible management outcome.

Herbaceous weeds such as Spear Thistle *Cirsium vulgare*, Paterson's Curse *Echium plantagineum* and Variegated Thistle *Silybum marianum*, may be seasonally present although they were not observed during this assessment. Control works should allow for these regionally common noxious species to remain absent or for them to be maintained at very low levels.

The balance of the weed cover within the area is dominated by annual grasses. While this cover tends to fluctuate with seasonal conditions, a significant effort would be required to lower the cover of species such as Bromes *Bromus* spp. and Fescue. Perennial species such as Toowoomba Canary-grass do not appear to have been actively sown into this site and management should be able to remove this species. However, Brown-top Bent will require significant management inputs to reduce its abundance. Targeting this perennial weed

in conjunction with grazing management would likely encourage the expansion of the cover of perennial native grasses.

Assessable components of the habitat score for GSM are provided in Table 2.

Table 2 GSM habitat Quality score

Parameter	Score	Justification
Site context	2/3	The Offset area is larger than 10 hectares and is shaped to reduce edge effects. The site does not otherwise satisfy the criteria required to score 3/3.
Site condition	1/3	The Offset area supports moderate quality vegetation over most of the Offset area with the higher quality vegetation covering over 50% of the Offset area. As a mostly treeless version of a woodland community the VQA site condition score for the site is calculated as 31/75 (Large trees 3/10, Tree Canopy Cover 0/5, Lack of weeds 7/15, understorey 15/25, recruitment 3/5, organic litter 3/5 and logs 0/5). Both annual and perennial weeds were present throughout noting however that the offset area and the property as a whole does not have Chilean Needle Grass <i>Nassella neessiana</i> such that none of the weeds present are known food plants for GSM. Therefore the site cannot qualify for a score of 3/3.
Species stocking rate	2/4	Determined by GSM survey (Biosis 2020, Ecocentric Environmental Consulting 2019)
Quality score	5/10	

Conclusion

The current survey confirms the suitability of this property as an offset site for EPBC Act offset requirements associated with impacts to GSM at Lindum Vale. The survey also provides relevant information to provide management targets and objectives.

The owner has indicated the site can provide over 140 hectares of GSM habitat as offsets contributing to the offset prescription required for the development of Lindum Vale. This assessment confirms the suitability of this area to provide offsets for GSM and that it can be improved by active ecological management to maintain the population of GSM in the longer term. At present it is proposed to secure 132.7 hectares of the nominated area as an offset for Lindum Vale.

Please contact me on 8686 4800 if you would like to discuss further.

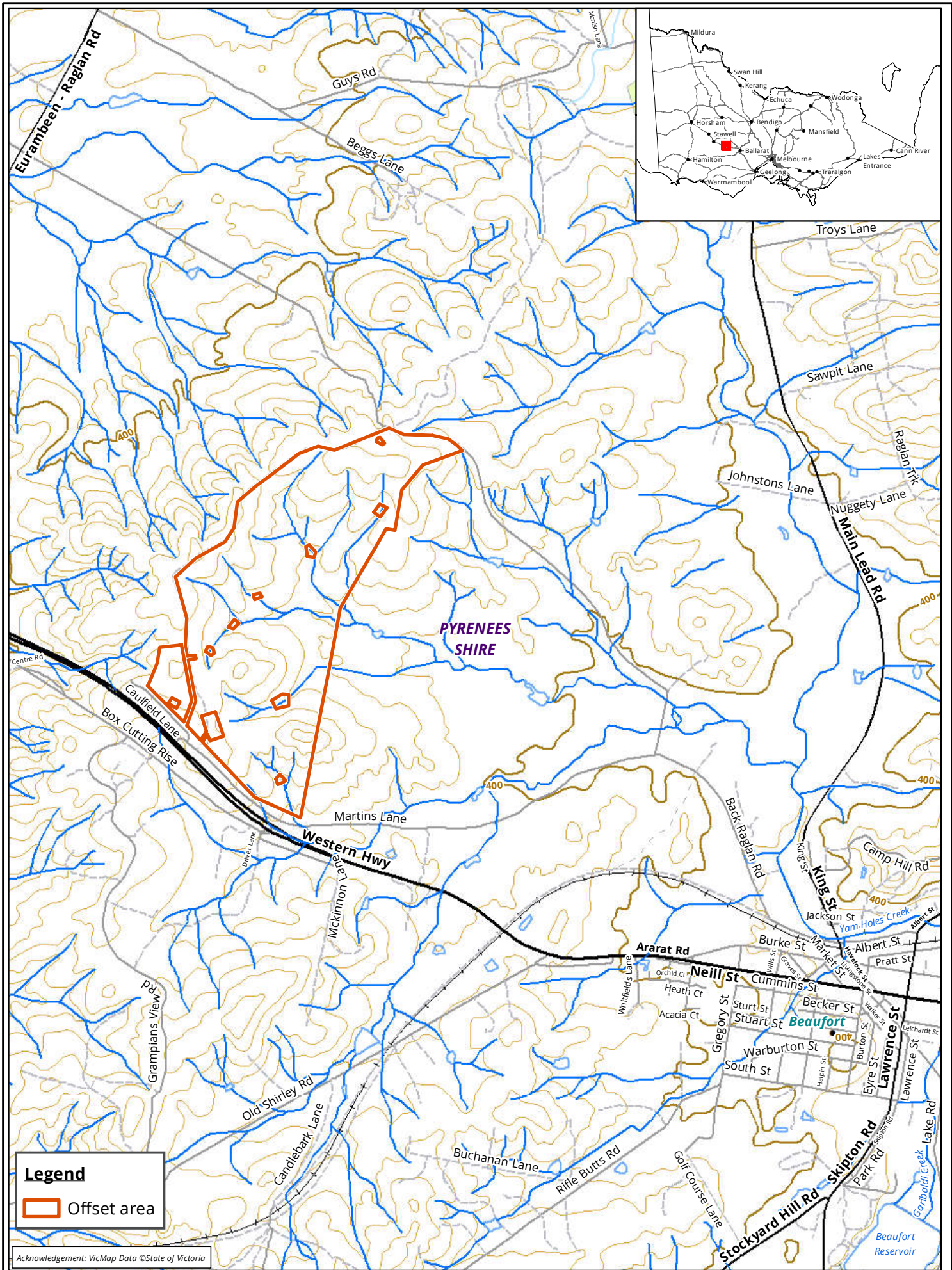
Yours sincerely

Steve Mueck
Senior Consultant Botanist

References

DEPI 2014. Advisory list of rare or threatened plants in Victoria. Department of Sustainability and Environment, Melbourne.

Ecocentric Environmental Consulting 2019. Proposed Offset Site for Golden Sun Moth (*Synemon plana*): 5066 Western Highway, Beaufort, Victoria (Lot 4A PS727373). Report to Bush Blocks Pty Ltd. Author Gannon, P., Ecocentric Environmental Consulting, North Melbourne



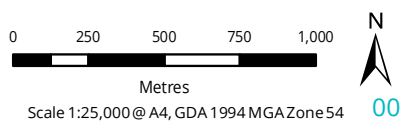
Legend
 [Orange Outline] Offset area

Acknowledgement: VicMap Data ©State of Victoria



**Figure 1 Location of the 5066 Western Highway
 Offset area, Beaufort, Victoria**

Matter: 29865/31333,
 Date: 03 April 2020,
 Checked by: SGM, Drawn by: SKM, Last edited by: smitchell
 Location: F:\29800s\29865\Mapping\29865_F1_Beaufort.mxd







Acknowledgement: VicMap Data ©State of Victoria

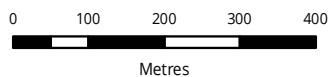


Figure 2 The extent of GSM habitat, 5066 Western Highway, Beaufort, Victoria

Matter: 29865/31333,
 Date: 03 April 2020,
 Checked by: SGM, Drawn by: SKM, Last edited by: smitchell
 Location: F:\29800s\29865\Mapping\29865_F2_GSM_habitat_Beaufort.mxd

Legend

-  Offset area
-  Golden Sun Moth (GSM) habitat



Scale 1:10,000 @ A4, GDA 1994 MGA Zone 54



Appendix 1: Plant species (68 native, 26 weeds) recorded from the property, Lane, Beaufort.

Status	Scientific Name	Common Name
Indigenous species		
P	<i>Acacia aculeatissima</i>	Thin-leaf Wattle
P	<i>Acacia genistifolia</i>	Spreading Wattle
	<i>Acacia implexa</i>	Lightwood
P	<i>Acacia mearnsii</i>	Black Wattle
	<i>Acacia melanoxylon</i>	Blackwood
	<i>Acacia paradoxa</i>	Hedge Wattle
P	<i>Acacia pycnantha</i>	Golden Wattle
	<i>Acaena agnipila</i>	Hairy Sheep's Burr
	<i>Acaena echinata</i>	Sheep's Burr
	<i>Acaena novae-zelandiae</i>	Bidgee-widgee
	<i>Amyema pendula</i>	Drooping Mistletoe
	<i>Anthosachne scabra</i> s.s.	Common Wheat-grass
	<i>Arthropodium strictum</i> s.s.	Chocolate Lily
	<i>Austrostipa rudis</i> subsp. <i>rudis</i>	Veined Spear-grass
r	<i>Bromus arenarius</i>	Sand Brome
	<i>Centella cordifolia</i>	Centella
	<i>Crassula decumbens</i> var. <i>decumbens</i>	Spreading Crassula
	<i>Drosera auriculata</i>	Tall Sundew
	<i>Drosera hookeri</i>	Branched Sundew
	<i>Elatine gratioloides</i>	Waterwort
	<i>Eleocharis acuta</i>	Common Spike-sedge
	<i>Eleocharis sphacelata</i>	Tall Spike-sedge
	<i>Eucalyptus aromaphloia</i>	Scentbark
	<i>Eucalyptus dives</i>	Broad-leaf Peppermint
	<i>Eucalyptus macrorhyncha</i>	Red Stringybark
	<i>Eucalyptus melliodora</i>	Yellow Box
	<i>Eucalyptus microcarpa</i>	Grey Box
	<i>Eucalyptus obliqua</i>	Messmate Stringybark
P	<i>Euchiton japonicus</i> s.s.	Creeping Cudweed
r	<i>Geranium</i> sp. 3	Pale-flower Crane's-bill
	<i>Gonocarpus tetragynus</i>	Common Raspwort
	<i>Goodenia blackiana</i>	Black's Goodenia
	<i>Gratiola pubescens</i>	Glandular Brooklime
	<i>Hypericum gramineum</i>	Small St John's Wort
	<i>Isolepis cernua</i> var. <i>platycarpa</i>	Broad-fruit Club-sedge
	<i>Isolepis inundata</i>	Swamp Club-sedge
	<i>Juncus bufonius</i>	Toad Rush
	<i>Juncus flavidus</i>	Gold Rush
	<i>Juncus holoschoenus</i>	Joint-leaf Rush

Status	Scientific Name	Common Name
	<i>Juncus pallidus</i>	Pale Rush
	<i>Juncus subsecundus</i>	Finger Rush
P	<i>Lissanthe strigosa</i> subsp. <i>subulata</i>	Peach Heath
	<i>Lobelia pedunculata</i> s.s.	Matted Pratia
	<i>Lomandra filiformis</i>	Wattle Mat-rush
	<i>Lomandra sororia</i>	Small Mat-rush
	<i>Luzula meridionalis</i> var. <i>densiflora</i>	Common Woodrush
	<i>Luzula meridionalis</i> var. <i>flaccida</i>	Common Woodrush
	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
P	<i>Microtis unifolia</i>	Common Onion-orchid
	<i>Myriophyllum pedunculatum</i>	Mat Water-milfoil
	<i>Myriophyllum simulans</i>	Amphibious Water-milfoil
	<i>Oxalis perennans</i>	Grassland Wood-sorrel
	<i>Poa clelandii</i>	Noah's Ark
	<i>Poa sieberiana</i> var. <i>hirtella</i>	Grey Tussock-grass
	<i>Poa sieberiana</i> var. <i>sieberiana</i>	Grey Tussock-grass
	<i>Rumex brownii</i>	Slender Dock
	<i>Rytidosperma erianthum</i>	Hill Wallaby-grass
	<i>Rytidosperma geniculatum</i>	Knead Wallaby-grass
	<i>Rytidosperma laeve</i>	Smooth Wallaby-grass
	<i>Rytidosperma pallidum</i>	Silvertop Wallaby-grass
	<i>Rytidosperma penicillatum</i>	Weeping Wallaby-grass
	<i>Rytidosperma setaceum</i>	Bristly Wallaby-grass
	<i>Schoenus apogon</i>	Common Bog-sedge
P	<i>Solenogyne dominii</i>	Smooth Solenogyne
P	<i>Thelymitra</i> spp.	Sun Orchid
	<i>Themeda triandra</i>	Kangaroo Grass
	<i>Tricoryne elatior</i>	Yellow Rush-lily
	<i>Wahlenbergia multicaulis</i>	Branching Bluebell
Introduced species		
	<i>Acetosella vulgaris</i>	Sheep Sorrel
	<i>Agrostis capillaris</i>	Brown-top Bent
	<i>Aira caryophyllea</i> subsp. <i>caryophyllea</i>	Silvery Hair-grass
	<i>Aira elegantissima</i>	Delicate Hair-grass
	<i>Aira praecox</i>	Early Hair-grass
	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
	<i>Arctotheca calendula</i>	Cape weed
	<i>Briza maxima</i>	Large Quaking-grass
	<i>Briza minor</i>	Lesser Quaking-grass
	<i>Bromus hordeaceus</i>	Soft Brome
	<i>Centaureum tenuiflorum</i>	Slender Centaury

Status	Scientific Name	Common Name
	<i>Cicendia quadrangularis</i>	Square Cicendia
	<i>Cynosurus echinatus</i>	Rough Dog's-tail
	<i>Disa bracteata</i>	South African Orchid
	<i>Holcus lanatus</i>	Yorkshire Fog
	<i>Hordeum leporinum</i>	Barley-grass
	<i>Hypochaeris radicata</i>	Flatweed
	<i>Isolepis levynsiana</i>	Tiny Flat-sedge
	<i>Leontodon saxatilis</i> subsp. <i>saxatilis</i>	Hairy Hawkbit
	<i>Phalaris aquatica</i>	Toowoomba Canary-grass
	<i>Romulea rosea</i>	Onion Grass
	<i>Trifolium dubium</i>	Suckling Clover
	<i>Trifolium repens</i> var. <i>repens</i>	White Clover
	<i>Trifolium subterraneum</i>	Subterranean Clover
RC	<i>Ulex europaeus</i>	Gorse
	<i>Vulpia bromoides</i>	Squirrel-tail Fescue

Notes to tables:

<p>EPBC Act: CR - Critically Endangered EN - Endangered VU - Vulnerable</p> <p>PMST – Protected Matters Search Tool</p>	<p>DEPI 2014a: e - endangered v - vulnerable r - rare k - poorly known</p>
<p>FFG Act: L - listed as threatened under FFG Act P - protected under the FFG Act (public land only)</p>	<p>Noxious weed status: SP - State prohibited species RP - Regionally prohibited species RC - Regionally controlled species RR - Regionally restricted species</p> <p># - Native species outside natural range</p>

Appendix 2: Images from the four photo points established in the Kinrara property, Sievers Lane, Glenhope.



Photo 1 The property supports broad areas of open grassy areas largely dominated by native Wallaby-grasses. Southern portion of the property. Red colour is areas of Sheep Sorrel.



Photo 2 Photo from the south of the property. The ground cover is mainly Wallaby-grass



Photo 3 Southern portion of the property looking east.



Photo 4 Hill top in the south looking north. Note that hilltops are more disturbed but still support GSM food plants



Photo 5 Good quality habitat in central portions of the property.



Photo 6 Wooded areas still support a grassy understorey.



Photo 7 View from the central part of the property looking north. The pale grassy ground cover is Wallaby-grass



Photo 8 Central portion of the property looking west (up hill). Note the reddish colour is the weed Sheep Sorrel.



Photo 9 Central western edge of the property looking east. Areas with a high cover of Sheep Sorrel still have Wallaby-grass



Photo 10 Central western edge of the property looking south east. Areas with a high cover of Sheep Sorrel still have Wallaby-grass.



Photo 11 Open areas at the northern end of the property are dominated by Wallaby-grass.



Photo 12 Wooded areas in the north still have a grassy rather than heathy ground cover.



Photo 13 Small patch of Gorse along the north eastern boundary.



Photo 14 Northern section of the property facing south. Note the reddish patches of Sheep Sorrel