

27/02/2020

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Dear Andrew

Offset Site Report: Condition of the Golden Sun Moth offset site, Sievers Lane, Glenhope, 3444

Project no. 29865

Introduction

A habitat assessment was undertaken to quantify the extent and condition of Golden Sun Moth *Synemon plana* (GSM) habitat on part of the Kinrara property on Sievers Lane in Glenhope, approximately 40 km south of Ballarat (Parts 8 & 9 of PS 727973, Sievers Lane Glenhope) (Figure 1). About 38 hectares of this 457 hectare property (Property Number 120655) has been identified as an available offset site for impacts to GSM associated with the development Lindum Vale, Mickleham (Referral EPBC 2015/7516). The property is within the Mitchell Shire and is zoned as Farming Zone and is covered by a bushfire management overlay and an Environmental Significance Overlay (ESO2).

The purpose of the survey was to confirm the presence of GSM habitat and provide 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 west by Sievers Lane and is traversed by a creek of unknown name (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 14 November 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 58 indigenous and 34 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 Plains Grassy Woodland (EVC 55) and Valley Grassy Forest (EVC 47) west of the creek-line, Alluvial Terraces Herb-rich Woodland / Creekline Grassy Woodland mosaic (EVC 81) along the creek-line and Heathy Dry Forest (EVC 20) east of the creek-line.

The site supports a scattered cover of small patches of eucalypts and individual trees. These include Grey Box *Eucalyptus macrocarpa*, Yellow Box *Eucalyptus melliodora* and Bundy *Eucalyptus goniocaylx*. The creek-line supports a cover of River Red-gum *Eucalyptus camaldulensis*.

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., Grey Tussock-grass *Poa sieberiana*, Common Wheat-grass *Anthosachne scabra*, Weeping-grass *Microlaena stipoides*, Brush Wire-grass *Aristida behriana* and Spear-grasses *Austrostipa* species. This grassy ground cover is locally species rich with common herbaceous species including Grassland Wood-sorrel *Oxalis perennans*, Yellowish Bluebell *Wahlenbergia luteola*, Smooth Solenogyne *Solenogyne dominii*, Wattle Mat-rush *Lomandra filiformis*, Small St John's Wort *Hypericum gramineum*, Common Raspwort *Gonocarpus tetragynus*, Vanilla-lilies *Arthropodium* spp. and Sheep's Burr *Acaena* species.

The site supports an average cover of weeds estimated at between 20% and 30%, although the drainage lines support a cover of weeds of at least 50% and would often fail to support the threshold for the definition of a patch of native vegetation. The weediest drainage-lines have a relatively high cover (i.e. over 50%) of Toowoomba Canary-grass *Phalaris aquatica*.

Woody weeds are typically rare on this property with only small scattered infestations of Gorse *Ulex europaeus* and Common Blackberry *Rubus anglocandicans* observed. A small stand of Poplar *Populus* spp. was also noted but did not appear to be naturalised.

Perennial grassy weeds such as Toowoomba Canary-grass are relatively rare on the mid and upper slopes, although Brown-top Bent *Agrostis capillaris* is ubiquitous and generally has a cover of between 10% and 20%. Other perennial grassy weeds are relatively uncommon and include Yorkshire Fog *Holcus lanatus* and Bulbous Meadow-grass *Poa bulbosa*.

The most common weeds on the site are annual grasses such as Hair-grasses *Aira* species, Fescue *Vulpia* species, Quaking-grasses *Briza* species and Bromes *Bromus* spp. While common and locally providing a visually obvious cover of up to about 20%, these annuals are not high threat weeds in this environment.

Common herbaceous weeds include Onion Grass *Romulea rosea* which is ubiquitous, Flatweed *Hypochaeris radicata* and clovers *Trifolium* spp..

High threat weeds within this offset area include Toowoomba Canary-grass, Brown-top Bent, Yorkshire Fog, Gorse, Blackberry, Yorkshire Fog and Paterson's Curse *Echium plantagineum*.

The relative abundance of Wallaby-grasses and Spear-grasses provides 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.

Estimated habitat scores for open grassy areas of the slopes and ridgetops are provided in Table 1. Note these scores do not apply to drainage lines and creek flats which often fail the criteria to be defined as patches of native vegetation while still providing some GSM habitat features.

Table 1 Vegetation condition results for the Sievers Lane 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)		
Landscape Value	Patch Size	10	8
	Neighbourhood	10	3
	Distance to Core	5	4
	Landscape Score		
HABITAT SCORE		100	45
Habitat points = #/100		1	0.45

Discussion

The areas of 'pasture' observed were considered structurally suitable for GSM. The sedimentary slopes and ridgelines 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 bands of vegetation along drainage lines and relatively flat areas along the creek-line had the greatest cover of weeds, mainly Canary-grass, Brown-top Bent and Yorkshire Fog, which was considered less favourable for GSM. While GSM have been observed flying over this vegetation, it is considered the poorest quality habitat and would require significant management effort to improve its condition.

The vegetation supports small infestations of woody weeds (Gorse, Blackberry and Poplar) 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* and Paterson's Curse *Echium plantagineum* may be seasonally abundant although they were not visually obvious during this assessment. Control works should target for these noxious species to be maintained at low levels.

The balance of the weed cover within the area is dominated by annual grasses and herbs. 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 significantly impact on the cover of this species and remove it from at least the slopes and ridge-tops. 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 a shape which is appropriate for reducing 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 native vegetation over most of the site. As a mostly treeless version of a woodland community the VQA site condition score for the offset area is calculated as 30/75 (Table 1). 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 neesiana</i> such that none of the weeds present are known food plants for GSM. Therefore the offset area cannot qualify for a score of 3/3 and just fails the criteria for 2/3.
Species stocking rate	2/4	Determined by GSM targeted survey (Biosis 2020)
Quality score	5/10	To be determined by GSM targeted survey

Conclusion

The current survey confirms the suitability of this property as an offset site for EPBC Act offset requirements associated with GSM. The survey also identified relevant management targets and objectives.

The owner has indicated the site can provide about 40 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 the nominated area can be improved by active ecological management to maintain the population of GSM in the longer term.

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

Yours sincerely

Steve Mueck
Senior Consultant Botanist

References

Biosis 2020. Sievers Lane, Glenhope: Targeted Golden Sun Moth survey. Report for Satterley Property Group. Authors: Cargill, D. Biosis Pty Ltd, Melbourne. Project no. 31333

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

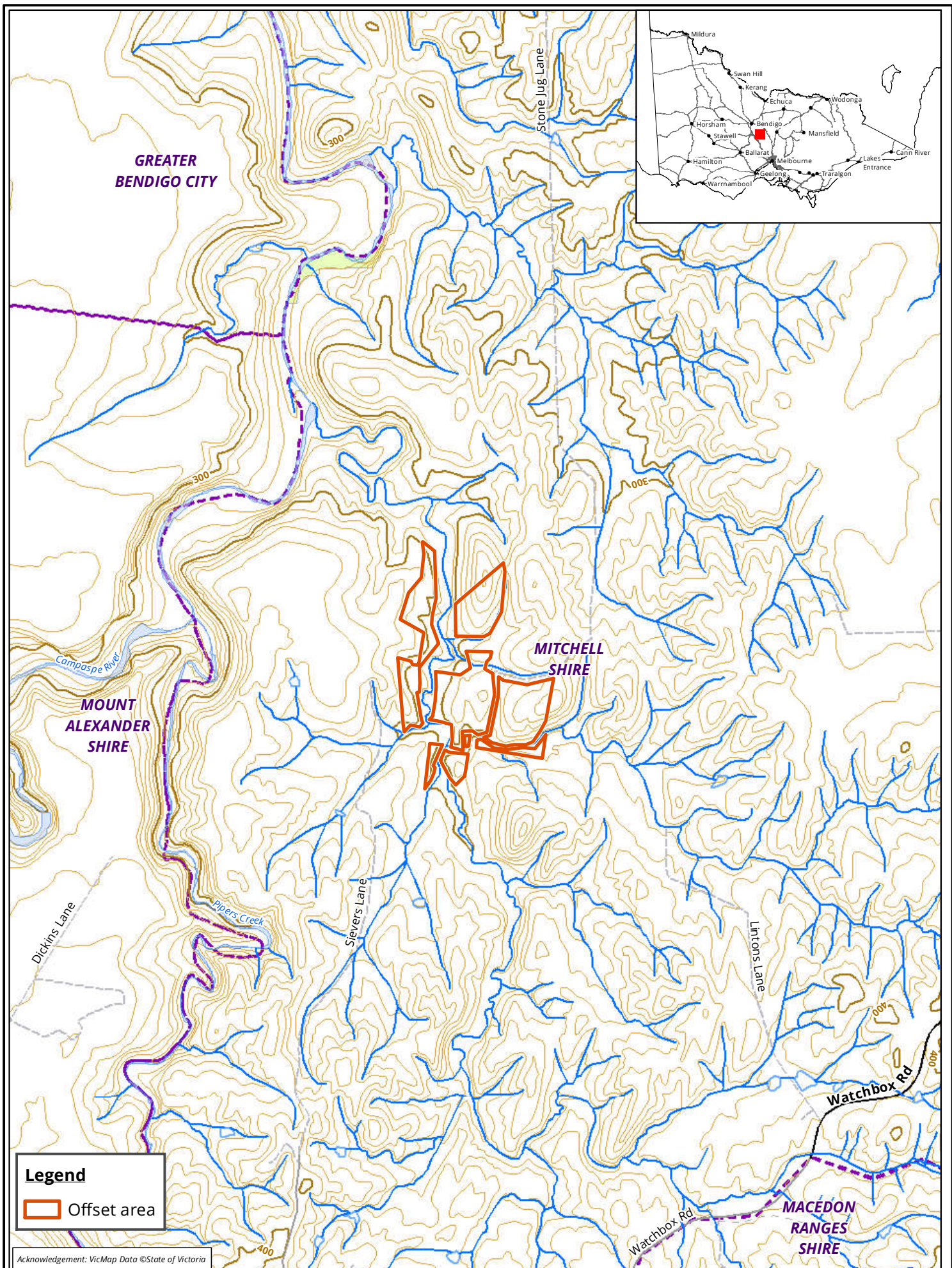
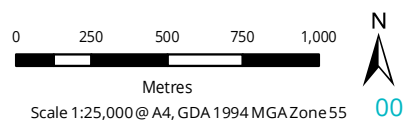
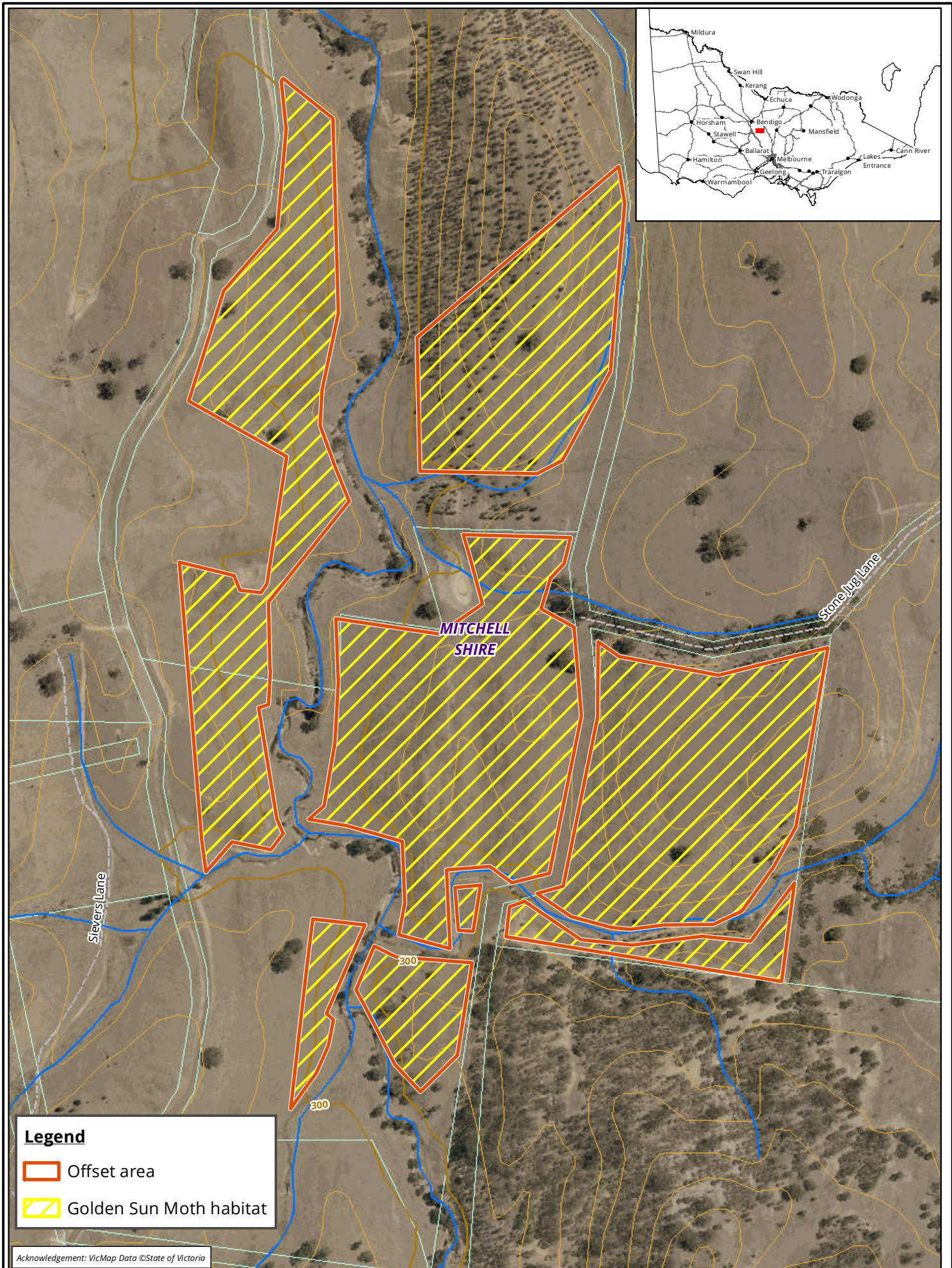




Figure 1 Location of the Sievers Lane Offset area, Glenhope, Victoria

Matter: 29865/31262,
 Date: 03 April 2020,
 Checked by: SGM, Drawn by: SKM, Last edited by: smitchell
 Location: P:\29800s\29865\Mapping\29865_F1_Sievers.mxd





Legend

-  Offset area
-  Golden Sun Moth habitat

Acknowledgement: VicMap Data ©State of Victoria



Figure 2 The extent of GSM habitat at the Sievers Lane Offset area, Glenhope, Victoria

Matter: 29865/31262,
 Date: 03 April 2020,
 Checked by: SGM, Drawn by: SKM, Last edited by: smitchell
 Location: F:\29800s\29865\Mapping\29865_F2_GSM_habitat_Sievers.mxd

0 60 120 180 240



Metres

Scale 1:6,000 @A4, GDA 1994 MGA Zone 55



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Appendix 1: Plant species (59 native, 34 weeds) recorded from the Kinrara property, Sievers Lane, Glenhope.

Status	Scientific Name	Common Name
Indigenous species		
	<i>Acacia dealbata</i>	Silver Wattle
	<i>Acacia implexa</i>	Lightwood
P	<i>Acacia mearnsii</i>	Black Wattle
P	<i>Acacia stricta</i>	Hop Wattle
	<i>Acaena agnipila</i>	Hairy Sheep's Burr
	<i>Acaena echinata</i>	Sheep's Burr
	<i>Anthosachne scabra</i> s.s.	Common Wheat-grass
	<i>Aristida behriana</i>	Brush Wire-grass
	<i>Arthropodium fimbriatum</i>	Nodding Chocolate-lily
	<i>Arthropodium minus</i>	Small Vanilla-lily
	<i>Arthropodium strictum</i> s.s.	Chocolate Lily
	<i>Austrostipa bigeniculata</i>	Kneed Spear-grass
	<i>Austrostipa mollis</i>	Supple Spear-grass
	<i>Austrostipa scabra</i> subsp. <i>falcata</i>	Rough Spear-grass
	<i>Bothriochloa macra</i>	Red-leg Grass
P	<i>Brunonia australis</i>	Blue Pincushion
	<i>Caesia calliantha</i>	Blue Grass-lily
P	<i>Cheilanthes austrotenuifolia</i>	Green Rock-fern
P	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	Narrow Rock-fern
P	<i>Chrysocephalum apiculatum</i> s.s.	Common Everlasting
	<i>Clematis microphylla</i> s.l.	Small-leaved Clematis
	<i>Convolvulus angustissimus</i>	Blushing Bindweed
	<i>Crassula decumbens</i> var. <i>decumbens</i>	Spreading Crassula
k	<i>Desmodium varians</i>	Slender Tick-trefoil
#	<i>Dysphania pumilio</i>	Clammy Goosefoot
	<i>Epilobium billardierianum</i>	Variable Willow-herb
	<i>Eryngium ovinum</i>	Blue Devil
	<i>Eucalyptus camaldulensis</i>	River Red-gum
	<i>Eucalyptus goniocalyx</i> s.s.	Bundy
	<i>Eucalyptus melliodora</i>	Yellow Box
	<i>Eucalyptus microcarpa</i>	Grey Box
	<i>Eucalyptus viminalis</i>	Manna Gum
	<i>Geranium retrorsum</i> s.s.	Grassland Crane's-bill
	<i>Glycine tabacina</i> s.s.	Variable Glycine
	<i>Gonocarpus tetragynus</i>	Common Raspwort
P	<i>Hardenbergia violacea</i>	Purple Coral-pea
	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
	<i>Hypericum gramineum</i> spp. agg.	Small St John's Wort
	<i>Hypoxis vaginata</i>	Yellow Star

Status	Scientific Name	Common Name
P	<i>Leptorhynchos squamatus</i>	Scaly Buttons
	<i>Lomandra filiformis</i>	Wattle Mat-rush
	<i>Lomandra nana</i>	Dwarf Mat-rush
	<i>Luzula meridionalis</i>	Common Woodrush
	<i>Melicytus dentatus</i> s.s.	Tree Violet
	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
	<i>Myosotis australis</i>	Austral Forget-me-not
	<i>Oxalis perennans</i>	Grassland Wood-sorrel
	<i>Pelargonium rodneyanum</i>	Magenta Stork's-bill
	<i>Pimelea humilis</i>	Common Rice-flower
	<i>Poa sieberiana</i>	Grey Tussock-grass
	<i>Rumex brownii</i>	Slender Dock
	<i>Rytidosperma erianthum</i>	Hill Wallaby-grass
	<i>Rytidosperma penicillatum</i>	Weeping Wallaby-grass
	<i>Rytidosperma racemosum</i> var. <i>racemosum</i>	Slender Wallaby-grass
	<i>Schoenus apogon</i>	Common Bog-sedge
P	<i>Solenogyne dominii</i>	Smooth Solenogyne
	<i>Themeda triandra</i>	Kangaroo Grass
P	<i>Vittadinia cuneata</i>	Fuzzy New Holland Daisy
	<i>Wahlenbergia luteola</i>	Bronze 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 cupaniana</i>	Quicksilver Grass
	<i>Arctotheca calendula</i>	Cape Weed
	<i>Avena fatua</i>	Wild Oat
	<i>Briza maxima</i>	Large Quaking-grass
	<i>Briza minor</i>	Lesser Quaking-grass
	<i>Bromus diandrus</i>	Great Brome
	<i>Bromus hordeaceus</i> subsp. <i>hordeaceus</i>	Soft Brome
	<i>Bromus madritensis</i>	Madrid Brome
	<i>Bromus rubens</i>	Red Brome
	<i>Cynosurus echinatus</i>	Rough Dog's-tail
	<i>Cyperus eragrostis</i>	Drain Flat-sedge
RC	<i>Echium plantagineum</i>	Paterson's Curse
	<i>Erodium botrys</i>	Big Heron's-bill
	<i>Holcus lanatus</i>	Yorkshire Fog
	<i>Hordeum leporinum</i>	Barley-grass
	<i>Hypochaeris radicata</i>	Flatweed
	<i>Lolium rigidum</i>	Wimmera Rye-grass

Status	Scientific Name	Common Name
	<i>Petrorhagia dubia</i>	Velvety Pink
	<i>Phalaris aquatica</i>	Toowoomba Canary-grass
	<i>Poa bulbosa</i>	Bulbous Meadow-grass
	<i>Populus</i> spp.	Poplar
	<i>Romulea rosea</i>	Onion Grass
RC	<i>Rubus anglocandicans</i>	Common Blackberry
	<i>Trifolium angustifolium</i> var. <i>angustifolium</i>	Narrow-leaf Clover
	<i>Trifolium campestre</i> var. <i>campestre</i>	Hop Clover
	<i>Trifolium dubium</i>	Suckling Clover
	<i>Trifolium glomeratum</i>	Cluster Clover
	<i>Trifolium subterraneum</i>	Subterranean Clover
	<i>Trifolium tomentosum</i> var. <i>tomentosum</i>	Woolly 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: Photo taken from the offset areas within the Kinrara property, Sievers Lane, Glenhope.



Photo 1 Ridgeline on the eastern side of Lot 9 looking south along the creek within Lot 9. Note the scattered wattles, River Red-gums along the creek and weedy (bright green) areas along the creek flats.



Photo 2 Slopes on the western side of Lot 9 looking north east. Note the good cover of Wallaby-grass on the slopes and the Canary-grass dominated creek flats.



Photo 3 Central portion of Lot 8 looking east. While the dry ridgetops include a significant cover of annual weeds, scattered patches of Canary-grass (bright green) are also present.



Photo 4 An ephemeral drainage line in Lot 8 looking south east. Note the relatively high cover of Canary Grass and Yorkshire Fog



Photo 5 The eastern edge of Lot 9 looking south. Scattered wattle regeneration over a largely native ground cover. The background light green colour is formed by native Weeping Grass.



Photo 6 Rocky ridgelines have a high cover of annual grass weeds but still support a substantial cover of native species.



Photo 7 The site supports small scattered infestations of woody weeds such as Gorse.



Photo 8 Dry slopes are predominantly native while the ephemeral drainage lines support a higher cover of weeds.



Photo 9 The south eastern edge of Lot 9 looking south. The larger infestations of gorse in the mid left of this photo are outside of the offset area



Photo 10 The southern portion of Lot 9 looking north into lot 8.



Photo 11 Canary Grass infestations on the western side of the creek in Lot 8.



Photo 12 A mosaic of Canary Grass and semi native pasture adjacent Sievers Lane in Lot 8.



Photo 13 Looking north along the eastern edge of the western section of Lot 8.



Photo 14 Looking south along Sievers Lane in the north of Lot 8