

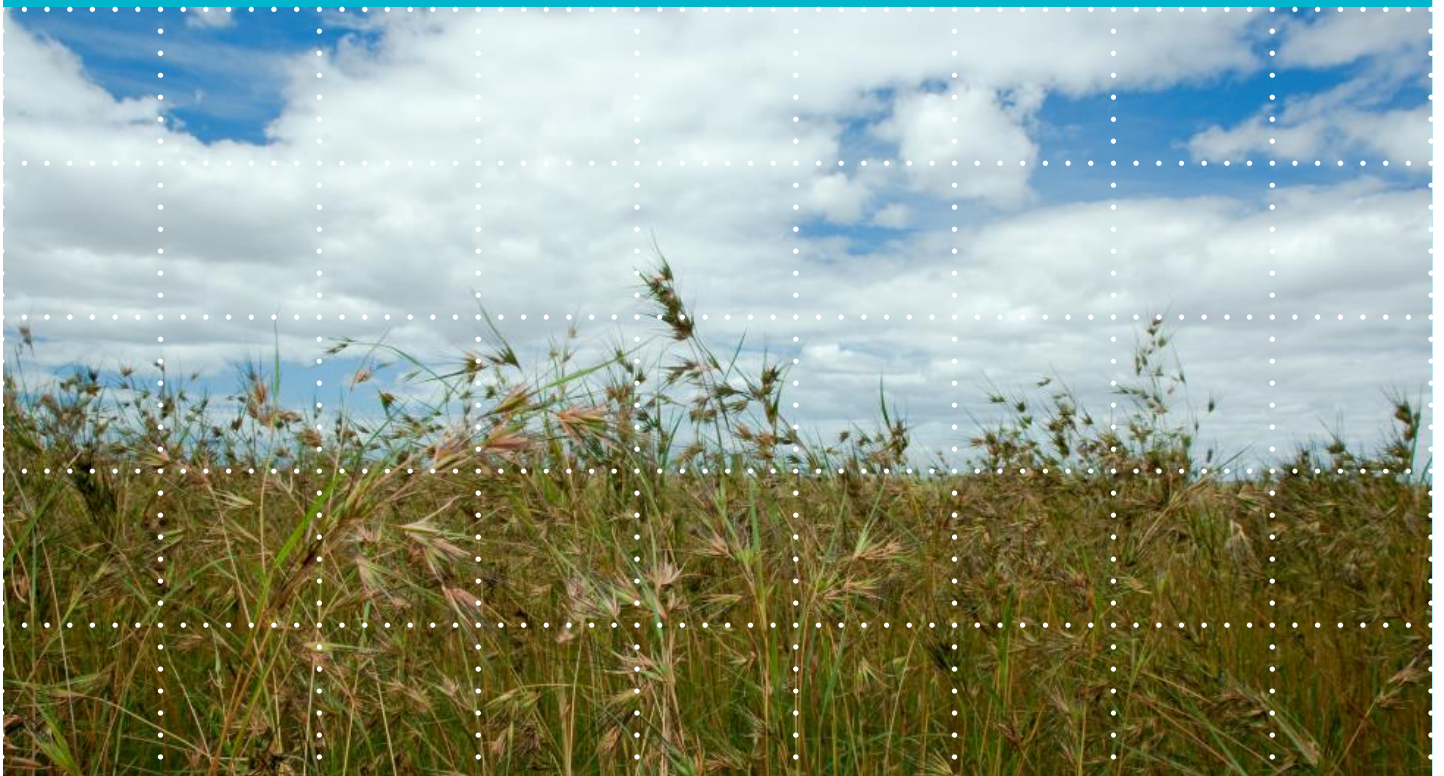
Final Report

Golden Sun Moth *Synemon plana* Population and Habitat Monitoring (2014/15), Saxon Paddock, Warrambeen, Victoria

Prepared for

Citipower and Powercor Australia

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Ecology and Heritage Partners Pty Ltd

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- Mark Nan Tie (Citipower and Powercor Australia) for project information;
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1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was engaged by Citipower and Powercor Australia to undertake Golden Sun Moth *Synemon plana* Population and Habitat Monitoring (2014/15) at the Saxon Paddock, Warrambeen, Victoria.

The Saxon Paddock comprises a total area of 42.1 hectares, of which 8.44 hectares of was identified as a suitable offset site for Golden Sun Moth (Ecology Partners Pty Ltd 2012).

The offsets were associated with the construction of a power line and access roads connecting the Mt Mercer Wind Farm to the national electricity grid, north of the township of Elaine, Victoria (Ecology Partners Pty Ltd 2012). The offset requirements were set under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the removal of 2.11 hectares of the nationally listed ecological community *Grassy Eucalypt Woodland of the Victorian Volcanic Plain* and 2.08 hectares of potential Golden Sun Moth habitat.

Population and habitat monitoring was undertaken in accordance with an approved Conservation Management Plan (CMP) to determine if Golden Sun Moth had persisted in grassland areas, to determine reproductive success and to ensure that management actions and habitats remain suitable to support a viable Golden Sun Moth population into the future (Ecology Partners Pty Ltd 2012). Annual monitoring of Golden Sun Moth populations is currently scheduled to run for an initial 5 year period, within a ten year management timeframe, to guide decisions on the success of habitat management within the offset site, and to inform the appropriate monitoring frequency for the remainder of the management timeframe.

The following report outlines the results of the 2014/15 monitoring and provides information on recommendations for managing Golden Sun Moth habitat within the offset site over subsequent years.

1.2 Scope and Objectives

The objectives of the targeted surveys were to:

- Determine the presence/absence and distribution of Golden Sun Moth throughout the offset site;
- Determine any potential impacts to Golden Sun Moth and their associated habitat in response to current management practices; and,
- Provide advice on recommendations that may be undertaken to avoid and/or mitigate potential adverse impacts on significant ecological values.

1.3 Study Area

The study area (which encompasses the offset site) is located within an area known as the Saxon Paddock, Warrambeen, Victoria, which covers 42.1 hectares and is located within the Warrambeen Demonstration

Landcare Farm, approximately 60 kilometres northwest of Geelong (Figure 1). The offset site, within the Saxon Paddock, consists of 8.44 hectares of suitable *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP) and GSM habitat (where Golden Sun Moth have been previously recorded) and is situated on the eastern side of the Saxon Paddock (Figure 2). The Warrambeen Demonstration Landcare Farm is privately owned and supports extensive areas of remnant native grassland.

According to the Department of Environment, Water, Land and Planning (DEWLP) Biodiversity Interactive Map (DEWLP 2015), the study area occurs within the Victorian Volcanic Plain Bioregion. It is located within the jurisdiction of the Corangamite Catchment Management Authority (CMA) and the Golden Plains municipality (DEWLP 2015).

1.4 Golden Sun Moth

EPBC Act Conservation Status: Critically Endangered

FFG Act Conservation Status: Listed

DEPI Advisory List: Endangered

The Golden Sun Moth typically occurs in native grassland, grassy woodland, dominated by greater than 40% cover of wallaby-grass, in particular *Rytidosperma* spp. (DSE 2004), but may also inhabit areas dominated by Kangaroo Grass *Themeda triandra* (Endersby and Koehler 2006) and introduced grassland dominated by Chilean Needle-grass *Nassella neesiana* and other introduced species (A. Taylor pers. obs.). Male flight is typically low, to about a metre above the ground, fast and can be prolonged, but they are generally not recorded flying more than 100 metres from suitable habitat (Clarke and O'Dwyer 1999).

Prior to European settlement, the Golden Sun Moth was widespread and relatively continuous throughout its range, inhabiting grassy open woodlands and grassland, although it now mainly inhabits small isolated sites (DSE 2004). The species is threatened by habitat loss, disturbance and fragmentation due to agricultural expansion and urbanisation. Many populations are isolated and fragmented, impeding the ability of the relatively immobile females to recolonise areas, thereby reducing the likelihood of genetic exchange (DSE 2004). Such populations are therefore vulnerable as there is little likelihood of recolonisation in the event of a local extinction.



Plate 1. Golden Sun Moth *Synemon plana* (Ecology and Heritage Partners Pty Ltd)

2 METHODS

2.1 Nomenclature

Common and scientific names of vascular plants follow the Victorian Biodiversity Atlas (VBA) (DEPI 2014a) and the Census of Vascular Plants of Victoria (Walsh and Stajsic 2007). Vegetation community names follow DELWP's Ecological Vegetation Classes (EVC) benchmarks (DEPI 2014b). The names of aquatic and terrestrial vertebrate and invertebrate fauna follow the VBA (DEPI 2014a).

2.2 Desktop Assessment

Relevant literature, online-resources and numerous databases were reviewed to provide an assessment of flora and fauna values associated with the study area. The following information sources were reviewed:

- The VBA (DEPI 2014a), Flora Information System (FIS) (Viridans 2013a) and Atlas of Victorian Wildlife (AVW) (Viridans 2013b) for previously documented fauna records within the project locality;
- Relevant environmental legislation and policies pertaining to target species including: EPBC Act Policy Statements; FFG Act Action Statements, National Recovery Plans, Advisory Lists;
- Relevant biological and ecological literature pertaining to the target species.
- Previous ecological assessments within the study area; and,
- Aerial photography of the study area.

2.3 Fauna Assessment

2.3.1 Golden Sun Moth

Targeted surveys for Golden Sun Moth were undertaken on 7 November, 2 and 15 December 2014, and 6 January 2015. Surveys concentrated in areas identified as supporting indigenous grassland, namely those supporting Wallaby-grass *Rytidosperma* spp. which is a known food source for Golden Sun Moth.

Areas of suitable habitat were walked or driven by qualified zoologists over a minimum of four separate days during the known flight season (i.e. late-October to early January). Surveys were undertaken at a time which is considered suitable for detecting the species (i.e. when adult males are likely to be flying). The male of this species generally flies between 11am and 3pm on calm, warm (over 20°C), sunny days.

2.4 Assessment Qualifications and Limitations

Targeted Golden Sun Moth surveys were undertaken by experienced personnel during the known flight period of the species and during appropriate conditions by following suitable survey guidelines. Fauna surveys were conducted under the Ecology and Heritage Partners Pty Ltd Research Permit (#10006893) issued by DELWP under the *Wildlife Act 1975*.

Given the species was confirmed on site as a result of previous targeted surveys, no additional 'reference' sites were visited to confirm the species flight activity prior to undertaking surveys. However, given the species presence on site and the experience of surveyors, the results of this monitoring works are considered adequate for the purposes of confirming the species presence/absence on site and providing recommendations for managing the offset site over subsequent years.

3 RESULTS

3.1 Fauna

Targeted surveys identified a total of 53 Golden Sun Moth flying within the offset site on 2 December 2014 (Plate 2). The species was located predominantly within areas of more open ground containing preferred host plants including Wallaby-grasses. While the species was not detected on any other survey days, the species was observed flying within the offset site on 11 November and 1 and 12 December 2014 in high densities (>20 moths) (Ian Taylor, Private Landowner, pers. obs.).

Table 1. Golden Sun Moth survey results during the 2014/15 flight season.

Date	Survey times	Reference Site	Temperature (°C) (9am and 3pm)		Wind (km/hr)	Cloud cover (%)	No. of days since rain	No. GSM
7/11/2014	1200 – 1330	Known site	18.1	27.8	24	10	>2	0
2/12/2014	1330 – 1430	Flying during survey	15.0	25.9	7	5	>2	53
15/12/2014	1000– 1045	Known site	17.5	27.6	15	35	>2	0
6/01/2015	1045 – 1450	Known site	15.2	35.3	7	20	>2	0

3.2 Habitat Assessment

The majority of the offset site provides favourable host plants including Wallaby-grasses *Rytidosperma spp.* mixed with native Tussock-grasses *Poa spp.* and herbs such as Blue-devil *Eryngium ovinum* and Pink Bindweed *Convolvulus arvensis*. Embedded rock was more prominent in the northern half of the study area and covered approximately 5–10% of the total offset site (Plate 3).



Plate 2. Golden Sun Moth detected during monitoring (2/12/14).



Plate 3. Remnant grassland within the Saxon Paddock.

The northern third of the study area comprised a high cover (75%) of Wild Oat *Avena fatua* and will require active management (i.e. active biomass control) to ensure the percentage cover of native grasses meets the objectives of the CMP (Plates 4 and 5) (Table 4; Figure 2).



Plate 4. Wild Oat *Avena fatua* within northern areas of the offset site.



Plate 5. Wild Oat cover within northern areas of the offset site.

3.3 Management Targets and Recommendations

The following section discusses the performance measures outlined within the Golden Sun Moth CMP (Ecology Partners Pty Ltd 2012), and the recorded coverages of biomass, bare ground, pest plant and Golden Sun Moth population densities during the 2014/15 monitoring of the Saxon Paddock offset site.

The following tables aim to match the targets of the Golden Sun Moth CMP with the current levels measured on site during the spring and summer of 2014/15.

3.3.1 Biomass Control

Table 2. Biomass targets and current levels within the Saxon Paddock offset site during the 2014/15 monitoring period.

Management Year	Offset Site Location (see Figure 2)	% Biomass Control Target*	Current Cover %	Management Recommendations
2014/15	Northern Third	70%	95%	Biomass Control is required using crash grazing during late January to reach a vegetation cover target of at least 70% across entire offset site. The northern third of the site should be prioritised given the high cover of introduced vegetation (Figure 2).
2014/15	Remaining Areas	70%	85%	

Note: (*) = Control Targets set out in the Golden Sun Moth CMP (Ecology and Heritage Partners Pty Ltd)

3.3.2 Bare Ground

Table 3. Bare ground targets and current levels within the Saxon Paddock offset site during the 2014/15 monitoring period.

Management Year	Offset Site Location (see Figure 2)	% Minimum Bare Ground Target*	Current Cover %	Management Recommendations
2014/15	Northern Third	20%	5%	Bare Ground cover was measured to be lower than the required target across the entire offset site and this is likely to be related to the presence of introduced pasture in northern sections of the site (Figure 2). Grazing must be focused across the whole site in order to meet the 20% target outlined in the CMP.
2014/15	Remaining Areas	20%	15%	

Note: (*) = Control Targets set out in the Golden Sun Moth CMP (Ecology and Heritage Partners Pty Ltd).

3.3.3 Weed Cover

Table 4. Weed Cover and current levels within the Saxon Paddock offset site during the 2014/15 monitoring period.

Management Year	Offset Site Location (see Figure 2)	% Weed Cover*	Current Cover %	Management Recommendations
2014/15	Northern Third	<25%	75%	Weed cover was measured to be higher than the required target for the northern third of the offset site and is predominantly related to the presence of introduced pasture grasses (Figure 2). While the remaining areas throughout the offset site are meeting the weed targets, grazing and weed management should be actively undertaken to ensure the required targets outlined in the CMP are met annually.
2014/15	Remaining Areas	<25%	20%	

Note: (*) = Control Targets set out in the Golden Sun Moth CMP (Ecology and Heritage Partners Pty Ltd).

Specific weed management actions (i.e. physical removal, spraying, slashing) will be undertaken by the landowner.

3.3.4 Population Monitoring

Table 5. Golden Sun Moth Population Monitoring within the Saxon Paddock offset site during the 2014/15 monitoring period.

Survey Year	Golden Sun Moth Abundances	Management Recommendations
2011/12	9	Based on the previous survey results during the 2011/12 targeted surveys and the results of the 2014/15 monitoring, Golden Sun Moth populations have not been reduced within the Saxon Paddock offset site. Active biomass control will provide more areas of open ground and higher native vegetation cover for the species in subsequent years.
2014/15	53	

Note: (*) = Control Targets set out in the Golden Sun Moth CMP (Ecology and Heritage Partners Pty Ltd)

3.3.5 Pest Animal Control

The details of any pest animal control will be provided by the landowner.

3.4 Management Actions Summary – 2014/2015

A summary of the required management actions and completion dates for 2014/15 of the CMP are provided below in Table 6.

Table 6. Management Action Table for the Saxon Paddock offset site.

2014/ 15 Actions	Offset Zone	Management action	Resource/ personnel required	Timing of action	Key performance target	Completed (Yes/No)	Date
1	Entire offset site	Conduct systematic weed control for all weed species	Bushland Management Contractor/ Landowner	Refer Table 2	Maintain weed levels below 25%	Yes	Provided by Ian Taylor (landholder)
2	Entire offset site	Monitor for populations of feral animals such as rabbits and conduct control works if required.	Pest Animal Contractor/ landowner	After peak breeding season - late summer/early autumn.	No detrimental impact on values from pest animals and reduced pest numbers	Yes	Provided by Ian Taylor (landholder)
3	Entire offset site	Monitor organic litter density and control biomass outside GSM core active period (October – January)	Landowner	Late summer - Autumn	Maintain at least 70% vegetation cover and adhere to seasonal spelling	Yes	See Section 3 above. Control methods to be provided by Ian Taylor (landholder)
4	Entire offset site	Monitor, Golden Sun Moth populations and associated habitat (i.e. biomass levels and weed levels)	Qualified ecologist on behalf of CitiPower and Powercor Australia or Landowner	Late October to early January	Undertake population and habitat management as required (Section 3.4)	Yes	See Section 3 above – Completed February 2015

3.5 Conclusion

The offset site is currently providing suitable habitat for the Golden Sun Moth and results of targeted surveys indicate that there has been no decrease in the population since initial targeted surveys were undertaken in the 2011/12 survey season.

Habitat monitoring of the Saxon Paddock indicated that biomass control and weed management, predominantly in the northern third, is required in order to meet the targets set-out within the Golden Sun Moth CMP (Ecology Partners Pty Ltd 2012).

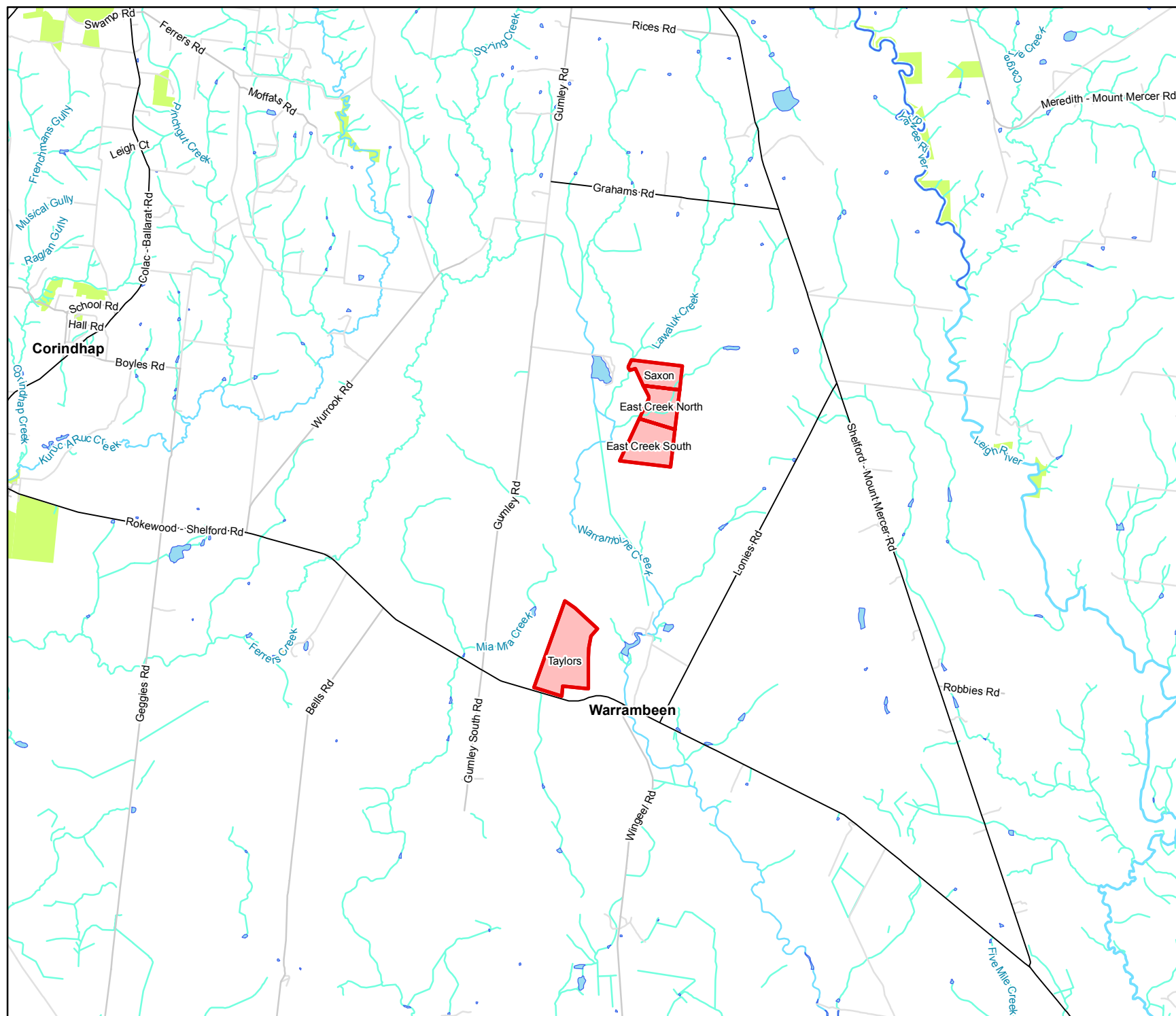
Sheep are used to periodically graze the paddock to control biomass. There are no signs of pugging within the offset site and a herb-rich understorey has been maintained, therefore it is appropriate for this grazing regime to continue.

A Management Actions Summary for 2014/15 will combine the results of this report with the active management and site monitoring undertaken by the landholder (Ian Taylor – Warrambeen Landcare Farm) in order to meet the requirements of the CMP (Ecology Partners Pty Ltd 2012).

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FIGURES




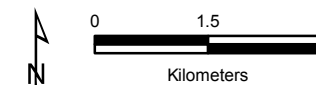
 Study Areas



Figure 1
Location of Study Areas
Taylors Paddock, Saxon Paddock, East Creek North and East Creek South, Warrambeen





Legend

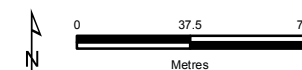
Golden Sun Moth Records

- 06/01/2011 (9 individuals)
- 02/12/2014 (53 individuals)

Vegetation

- Plains Grassland
- Proposed Biomass Control Zone
- Proposed offset site - Saxon

Figure 2
Golden Sun Moth
Monitoring - Year 1
Saxon Paddock, Warrambeen



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