



Graceful Sun Moth Surveys

Alkimos LSP

Prepared for
LandCorp WA

March 2010



Graceful Sun Moth Surveys

Alkimos LSP

PREPARED FOR	LandCorp WA
PROJECT NO	09PERPLA-0006
DATE	1 April 2010

DOCUMENT TRACKING

ITEM	DETAIL
Project Name	Alkimos LSP GSM Survey
Project Number	09PERPLA-0006
File location	
Prepared by	BD, RBC
Approved by	SD
Status	Draft
Version Number	1
Last saved on	1 April 2010

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from LandCorp WA.

Disclaimer

This document may only be used for the purpose for which it was commissioned and in accordance with the contract between Eco Logical Australia Pty Ltd and LandCorp. The scope of services was defined in consultation with LandCorp, by time and budgetary constraints imposed by the client, and the availability of reports and other data on the subject area. Changes to available information, legislation and schedules are made on an ongoing basis and readers should obtain up to date information.

Eco Logical Australia Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report and its supporting material by any third party. Information provided is not intended to be a substitute for site specific assessment or legal advice in relation to any matter. Unauthorised use of this report in any form is prohibited.

Contents

1	Introduction	3
1.1	Study Area	3
1.2	Graceful Sun Moth.....	3
1.3	EPBC Act 1999.....	4
1.3.1	EPBC Act decision thresholds and precedents.....	5
2	Survey Methods.....	6
2.1	Overall Approach and Objectives	6
2.2	Desktop Assessment.....	6
2.3	Agency Requirements (DEC)	6
2.3.1	Transects.....	6
2.3.2	Survey Effort.....	7
2.3.3	Timing and weather	7
2.3.4	Breeding habitat	7
2.3.5	Data Collected	8
2.3.6	DEC Consultation	8
3	Survey Results.....	9
3.1	Graceful Sun Moth.....	9
3.2	Weather conditions	12
3.3	Habitat	13
4	Conclusion	14
5	References	15

1 Introduction

LandCorp has engaged Eco Logical Australia to provide strategic advice and facilitation services in relation to Commonwealth environmental approvals for the Local Structure Plan (LSP) for Alkimos. LandCorp owns a 710ha parcel and is currently developing a LSP for this 279 ha portion. The advice being provided relates specifically to our approvals pathway strategy in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and the preparation of relevant documentation for an EPBC Act referral. This Report is a component of the strategic advice and facilitation services to be provided by Eco Logical Australia.

LandCorp requested Eco Logical Australia to undertake a targeted survey and report on the potential presence of the Graceful Sun Moth *Synemon gratiosa* and its habitat within the LSP site, due to the known local occurrence of this species on the Northern Swan Coastal Plain. As per discussions between Eco Logical Australia and LandCorp, survey for Graceful Sun Moth is required to progress referrals and assessment for the Alkimos LSP site towards approval under the Federal Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). This survey is required to provide sufficient detail about the occurrence of this species and its breeding habitat within the project area. The survey has been carried out according to methodology endorsed by the Department of Environment and Conservation and provides reliable evidence of presence or absence of Graceful Sun Moth within the proposed Alkimos LSP site boundary. Accordingly, this will enable the extent of potential impact on the species resulting from the proposed development to be determined.

1.1 STUDY AREA

The Alkimos LSP site is situated 40km north-west of Perth CBD and will involve works pertaining to urban housing, coastal villages, schools, major roads and transport routes and areas for conservation in Regional Open Space (ROS) and Public Open Space (POS).

Site Address: 80L Romeo Road and 2611 Marmion Avenue, Alkimos 6038 and comprises land on Lot 101 and 1004 Marmion Avenue, DP: 15760 and 61237.

Site Zoning: Urban Development under the Perth MRS.

1.2 GRACEFUL SUN MOTH

This species is listed federally as Endangered under the EPBC Act. The WA Wildlife Conservation Act 1950 lists this species as rare or likely to become extinct.

Graceful Sun Moth occurs on the Swan Coastal Plain where it is confined to the Perth region between Wanneroo in the north, to Mandurah in the south. This distribution represents a linear range of approximately 80km having an area of approximately 234.05 km², of which the area of occupancy within this distribution is < 10 percent. Within this distribution, it is known to occur in very low numbers as subpopulations within remnant bushland reserves (CALM 2005). Given the level of surveying within its expected range, it is likely that the current known distribution corresponds to the actual distribution.

The Graceful Sun Moth is a medium sized diurnal Castniid moth species that superficially resembles a butterfly (WAISS 1993). This species is active in autumn with peak activity in March. The generation length of the Graceful Sun Moth is unknown, however it is recorded to breed only once each year,

between February and April (CALM 2005). Surveys for the species are limited to the flying season, generally early March.

Breeding tends to occur on grasses, sedges and rushes (WAISS 1991), and the juvenile stages exist underground (Edwards 1997). The Graceful Sun Moth is thought to breed exclusively on *Lomandra* species. *Lomandra hermaphrodita* is one known host plant species, although other *Lomandra* spp. including *L. maritima* may also be used. Current research suggests that Graceful sun moth may have a stronger association with *L. maritima* than previously thought (Bishop et.al 2009). Within a given bushland, these host plants must occur in sufficient number and density to sustain a viable population. Figures for the minimum required number and density of host plants have not yet been determined.

1.3 EPBC ACT 1999

The Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) establishes a requirement for Australian Government environmental assessment and approval of:

- actions that are likely to have a significant impact on matters of national environmental significance;
- actions that are likely to have a significant impact on the environment on Commonwealth land; and
- actions by the Commonwealth that are likely to have a significant impact on the environment anywhere;

The matters of national environmental significance (commonly referred to as matters of NES) are:

- World Heritage properties and National Heritage places;
- Wetlands of international importance (Ramsar wetlands);
- Listed migratory species, threatened species and ecological communities;
- Commonwealth marine areas; and
- Nuclear actions (including uranium mining).

Actions that may have a significant impact on one or more matters of NES should be referred under the EPBC Act. The Australian Government Environment Minister or DEWHA (as delegate) then has 20 business days to determine if the action will require further assessment and approval¹.

The EPBC Act referrals process can produce one of four² outcomes:

- Refused – unacceptable levels of impact;
- Non-Controlled Action;

¹ A summary of the EPBC Act environmental assessment process is included at Appendix 1.

² The EPBC Act provides for a fourth possible referral outcome: "outright refusal at the referral stage", however the likelihood of the Minister making such a decision is extremely low and would only occur in the case of extreme and clearly unacceptable environmental impacts.

- Non-Controlled Action – specified manner; or
 - Controlled Action.
- i. Refused – unacceptable levels of impact: At the referral stage the Minister may determine that the referred project will have unacceptable levels of impact on matters of NES and can determine that the project should not proceed to the assessment stage.
 - ii. Non-controlled action (NCA): Assessment and approval under the EPBC Act is not required. This indicates that the project is designed or located in a way that it will not have a significant impact on any matters of national environmental significance. The project may proceed without further approval under the EPBC Act.
 - iii. Non-controlled action – specified manner (NCA-SM): Assessment and approval under the EPBC Act is not required provided the action is undertaken in a specific way (similar to conditions). This decision dictates that provided the project is undertaken in a way that avoids significant impacts on matters of NES it may proceed without further assessment or approval.
 - iv. Controlled Action (CA): The project will, or is likely, to have a significant impact on one or more matters of national environmental significance. The project will require assessment and approval before it can proceed.

1.3.1 EPBC Act decision thresholds and precedents

The Graceful Sun Moth was only included on the EPBC Act Threatened species list in January 2009. To date very few projects have been considered that may have a significant impact on the species, and no approval/refusal decisions have been made relating to this species.

The limited opportunity to survey for this species (annually in March) may mean that DEWHA will take a precautionary approach to any project with potential habitat on site. Delays and requests for field survey data to confirm presence/absence are likely.

2 Survey Methods

2.1 OVERALL APPROACH AND OBJECTIVES

The GSM survey methodology was developed in consideration of the Department of Environment and Conservation methods (Bishop et.al 2009). Due to the current relative paucity of ecological information on this species, the DEC method has been formulated to gather information on species distribution, abundance and habitat requirements. The method has also been developed to enable confident assessment of presence or absence of the Graceful Sun Moth within a given survey area on the Swan Coastal Plain.

Of the five field ecologist staff who undertook the survey, four of these have specialist training via DEC's GSM survey workshop. One other ecologist is experienced surveying other Sun Moth species, and was briefed regarding species identification and survey methodology prior to undertaking field surveys. The survey was carried out under a DEC licence to take fauna for scientific purposes, licence number SF007258. All field ecologists are familiar with diagnostic characteristics to enable GSM identification in the field.

2.2 DESKTOP ASSESSMENT

A desktop habitat assessment was undertaken for Graceful Sun Moth habitat to ascertain suitable areas for the targeted survey within the Alkimos LSP project area. This was based on a literature review of the current information on habitat preference, and distribution. Local significant records of this species were reviewed using NatureMap, the WA Government fauna database search tool. As discussed, the species is typically active in March and only fly for a very short time. While the species is still poorly understood, it has a habitat association with *Lomandra hermaphrodita* and *L. maritima*, and possibly with other *Lomandra* species. Areas identified containing *Lomandra* species were recorded and a map of potential habitat areas was produced to aid in determining transect locations.

2.3 AGENCY REQUIREMENTS (DEC)

State Government Authorities including the Environmental Protection Authority (EPA) and the Department of Conservation and Environment (DEC) provide guidance to proponents and consultants on the minimum standards required to achieve appropriate levels of fauna survey. To this end, the methodology used to carry out this survey has been done in close consultation with DEC Science Division Staff, and in accordance with specific DEC methodology requirements outlined below.

The DEC are the principle authority for WA state fauna of conservation significance therefore the Commonwealth Government will be seeking advice from the DEC in relation to the Federal Approvals process for the Graceful Sun Moth.

2.3.1 Transects

The survey method involved four (4) repeated transect searches undertaken during optimum weather conditions for GSM breeding activity. Each search followed a pre-determined transect based on habitat features, floristic composition, vegetation condition, disturbance, tracks and other clearings, topography, and fire history.

2.3.2 Survey Effort

The survey effort required for the Alkimos LSP project area was based on Table 1 below which outlines the DEC requirement for transect length based on the size of the project area. The table also includes the approximate time needed to walk the transect.

Habitat area mapped as dominated by *L.maritima* within the Alkimos LSP project area is 94 ha, accordingly the survey search transect length required is 5 to 7 km. This length is considered adequate for the given habitat area, therefore based on survey results, conclusions of presence or absence of the GSM can be made with a high degree of confidence.

Table 1. Transect length required for Project area size, as per DEC standard GSM survey methodology (Bishop et.al 2009).

Project area (Ha)	Length of transect (km)	Approximate Survey time required to walk transect (hours per person)
< 5	0.7- 1.6	1.6
6 -10	1.7- 2.2	2.2
11-20	2.3 - 3.1	3.1
21- 50	3.2 - 5	5
51-100	5 - 7	7
101-200	7- 10	9
> 200	10	10

2.3.3 Timing and weather

The timing for searches was critical as it needed to coincide with the brief but seasonal breeding period in which the species' activity is at its peak. Outside this period, the GSM is relatively undetectable. Accordingly the prescribed DEC methodology was taken into account and the survey was undertaken during the month of March.

The four replicate transect searches were conducted on separate days over the project area. The actual survey dates being 2nd, 5th, 8th and 12th March. The searches were also carried out based upon DEC method requirements for optimum weather conditions in terms of wind, sunlight, ambient temperature and time of day with all searches carried out between the hours of 09:30 and 15:30. Weather conditions were monitored throughout each search and data on time and weather recorded has been included in Table 3.

2.3.4 Breeding habitat

The search transect path was chosen in consideration of the preferred breeding habitat of the GSM. Based on breeding biology, this species is known to occupy coastal areas where one of the main plants,

Lomandra maritima, required for breeding is present or abundant. The vegetation community mapping data available (ATA Environmental 2005) provided adequate detail for the Alkimos LSP project area. This enabled a transect path to follow areas mapped as having *L.maritime* as a dominant ground stratum species. The use of previous extensive vegetation mapping provided sufficient detail to plan the transect route, and met with DEC's satisfaction with regards to the use of *Lomandra* density and abundance in choosing a transect route.

2.3.5 Data Collected

During each transect search the following data was recorded:

- GPS location of all Graceful Sun Moth specimens and time observed;
- Transect location via GPS track logger;
- Weather data including wind speed, ambient temperature, and cloud cover;
- Habitat data including vegetation community, and habitat disturbance history; and
- Topography

2.3.6 DEC Consultation

The Graceful Sun Moth survey required close liaison with DEC, as per requirements of the prescribed survey methodology. Eco Logical Australia staff met with DEC officers prior to undertaking the surveys to discuss transect routes, vegetation mapping to be used and appropriate protocols. Liaison with DEC during the survey included obtaining advice on survey design, vegetation community and habitat preference for GSM, and notification of DEC officers promptly when a GSM specimen was recorded. It also involved the provision of data, moth specimens and plant samples to the Department, as per DEC licence conditions. This was done to aid current DEC research into the species distribution and genetic composition.

3 Survey Results

3.1 GRACEFUL SUN MOTH

Graceful Sun Moths were recorded within the Alkimos LSP project area on all four days during the transect searches. The number of individual moths recorded along the survey transect varied over the four survey days from 6-61 individuals. Both male and female individuals were differentiated based on wingspan. The locations of all moths recorded are presented in Figure 1. Based on the location of individual moths, the distribution within the project area appears to be consistent with the occurrence of known suitable breeding habitat, specifically *Lomandra maritima*. During the searches, areas that lacked moths appeared to be consistent with a paucity or absence of this plant species.

This included the south-west portion of the study area covering the Regional Open Space land. The transect search in this area showed an absence or distinct paucity of *L.maritima*, and no Graceful Sun Moths were recorded in this area.

Table 2. Graceful Sun Moth numbers recorded on each search day within the Alkimos LSP project area.

Survey date	Number of Graceful Sun Moths
2/3/2010	6
5/3/2010	10
8/3/2010	50
12/3/2010	61



Figure 1. Mapped locations of all Graceful Sun Moths recorded within the Alkimos LSP project area

Two Graceful Sun Moth specimens were vouchered for DEC and subsequent lodgement with the WA Museum. This was done at the request of the DEC as part of the DEC research into the species distribution and genetic composition, and because the Alkimos area represents a new locality and minor extension of range for this species.



Figure 2. Graceful Sun Moth recorded within the Alkimos LSP project area.



Figure 3. A capture of a Graceful Sun Moth within the Alkimos LSP project area, showing typical GSM habitat within a dune saddle with a dominance of *Lomandra maritime* and some disturbance and clear patches

3.2 WEATHER CONDITIONS

Weather data monitored during the searches indicates that GSM are active and detectable over a range of weather conditions in terms of wind speed and cloud cover and ambient temperature. Moths were recorded during cloudless through to almost completely overcast conditions as evident in the search on 12 March where there was approximately 90 percent cloud cover throughout the survey. The range of wind conditions over which moths were recorded included no breeze detectable to moderate breezes with gusts of up to 35km/h. Even though Graceful Sun Moths were observed active during windy conditions, it should be noted that constant movement of vegetation reduced their detectability. Consequently it is thought Graceful Sun Moth activity was not greatly limited by either wind or cloud cover. Moth activity may have been more closely related to ambient temperature during the survey.

Table 3. Weather data monitored during each of the four search days.

1 st search: 2/03/2010					
Time	11:05	12:15	13:09	14:20	14:40
Wind Speed (km/h)	11.3	10.5	12.4	13-20	16-35
Air Temperature C	26	29	27	26.8	25.5
Cloud Cover (%)	0	0	0	5	5
2 nd search: 5/03/2010					
Time	9:44	10:00	12:13	13:30	
Wind Speed (km/h)	8.1	12-22	8-18	10-27	
Air Temperature C	24	25.5	25	24	
Cloud Cover (%)	5	10	5	20	
3 rd search: 8/03/2010					
Time	10:00	11:00	12:00	13:30	
Wind Speed (km/h)	12-17	14.5-22	10-19	4-8	
Air Temperature C	27	28	29	34.6	
Cloud Cover (%)	0	0	0	0	
4 th search: 12/03/2010					
Time	10:00	11:00	12:00		
Wind Speed (km/h)	4-8	7-14.5	4-8.2		
Air Temperature C	34	36.8	38		
Cloud Cover (%)	90	80	70		

3.3 HABITAT

The Alkimos LSP project area primarily supports the Quindalup Dunes characterised by distinctly undulating topography of pale sandy dune ridges, swales and inter-dunal basins. The vegetation is predominantly Quindalup dune complex which is characterised by extensive areas with a low ground layer vegetation stratum dominated by *Lomandra maritima*. The site disturbance history is evident with extensive tracks and clearings throughout, and the density of *L.maritima*. Some areas support patches of low open shrubs including *Xanthorrhoea*, *Hakea*, *Acacia* and Myrtaceous species.

Within the project area Graceful Sun Moths were consistently recorded occurring in areas with low vegetation community structure that were dominated by *Lomandra maritima* (Figure 3). The percentage ground cover for recorded GSM locations was found to be variable with some sites having high percentage ground cover of *L.maritima*, while other sites having areas with some open patches where there was less than 50% ground cover of *L.maritima* and other low strata plants. In addition to *L.maritima* as a consistent component for GSM occurrence, some individuals were recorded in vegetation communities with additional structure including *Xanthorrhoea* and *Acacia* species.

A number of Graceful Sun Moths were observed close to clearings such as old 4WD tracks, which is consistent with the DEC habitat data on the species association with areas of disturbance. Topographic data recorded shows that moths were recorded active over a range of locations within the dune profile including mid and upper slopes, dune crests and saddles on both the lee and windward sides of dunes, although lower moths were recorded active in dune swales.

4 Conclusion

Graceful Sun Moths were recorded within the Alkimos-Eglinton District project area. The number of individual moths recorded varied over the four survey days with a maximum 61 Graceful Sun Moths recorded on one day. The recorded locations were widely distributed over the project area and based on these locations, the distribution within the project area appears to be consistent with the occurrence of plant *Lomandra maritima* which represents known breeding habitat for the GSM. GSM was also found to be consistently absent in areas with either a paucity or absence of the plant *L.maritima*, including the Regional open Space area in the south-west of the study area.

The Graceful Sun Moth was only included on the EPBC Act Threatened species list in January 2009. To date very few projects have been considered that may have a significant impact on the species, and no approval/refusal decisions have been made relating to this species. Additionally DEC are yet collate and finalise results and findings from the seasonal surveys, which will ultimately provide a regional representation of the species current ecology.

Accordingly DEWHA's stance in relation to this species is uncertain. As such, a probable result for any federal referral pertaining to clearing of GSM habitat on site would likely result in a Controlled Action, requiring further assessment into the species and its habitat on site, moving forward towards approval.

5 References

ATA Environmental (2005). Metropolitan Regional Scheme Ammendments. 1029/33. Alkimos Eglinton Flora, Vegetation and Fauna Baseline Information. Unpublished Report for LandCorp, Eglinton Estates and WR Carperter.

Bishop, C., Williams, M., Mitchell,D., and Gamblin, T. (2009). Graceful Sun Moth Information Kit and Survey Methods. November 2009 version 1.0 Department of Environment and Conservation.

Riphey, E. and Rowland, B. (2004). Coastal Plants. Perth and the South-west Region. University of Western Australia Press.

RPS (2009). Alkimos Local Structure Plan Environmental Assessment. Part Lots 101 and 1004 Alkimos. Report Prepared for Landcorp.



HEAD OFFICE

Suite 4, Level 1
2-4 Merton Street
Sutherland NSW
T 02 8536 8600
F 02 9542 5622

SYDNEY

Suite 604, Level 6
267 Castlereagh Street
Sydney NSW 2000
T 02 9993 0566
F 02 9993 0573

ST GEORGES BASIN

8/128 Island Point Road
St Georges Basin NSW 2540
T 02 4443 5555
F 02 4443 6655

CANBERRA

Level 14
11 London Court
Canberra ACT 2601
T 02 6103 0145
F 02 6103 0148

HUNTER

Suite 17, Level 4
19 Bolton Street
Newcastle NSW 2300
T 02 4910 0125
F 02 4910 0126

NAROOMA

5/20 Canty Street
Narooma NSW 2546
T 02 4476 1151
F 02 4476 1161

COFFS HARBOUR

35 Orlando Street
Coffs Harbour Jetty NSW 2450
T 02 6651 5484
F 02 6651 6890

ARMIDALE

92 Taylor Street
Armidale NSW 2350
T 02 8081 2681
F 02 6772 1279

BRISBANE

93 Boundary St
West End QLD 4101
T 0429 494 886

WESTERN AUSTRALIA

108 Stirling Street
Perth WA 6000
T 08 9227 1070
F 08 9227 1078