



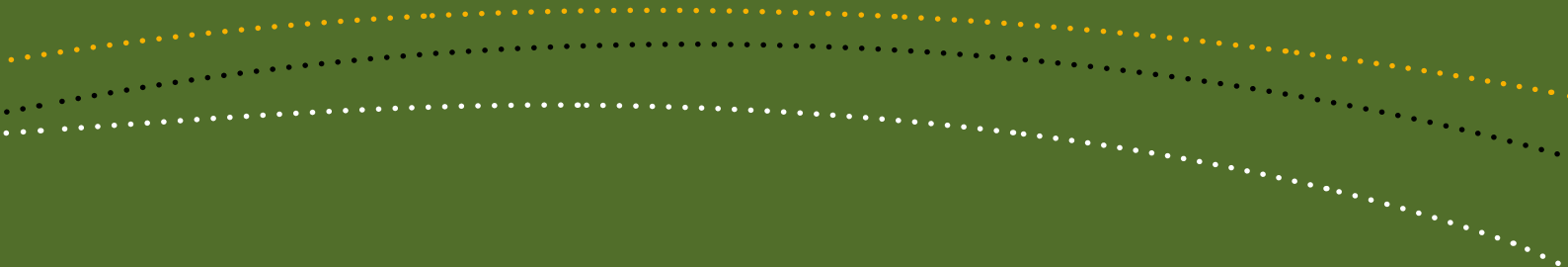
Australian Government

Department of the Environment,  
Water, Heritage and the Arts



# Significant impact guidelines for the critically endangered golden sun moth (*Synemon plana*)

Nationally threatened species and ecological communities  
EPBC Act policy statement 3.12



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# Introduction

The golden sun moth (*Synemon plana*) is listed as critically endangered under the Australian Government *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Listed threatened species and ecological communities are a matter of national environmental significance. Under the EPBC Act an action will require approval from the minister if the action has, will have, or is likely to have a 'significant impact' on a matter of national environmental significance.

A 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts. You should consider all of these factors when determining whether an action is likely to have a significant impact on matters of national environmental significance.

This policy statement is designed to determine whether a proposed action is likely to have a significant impact on the golden sun moth. The policy statement applies to grassland and open grassy woodland habitat across the current and historic\* range of the golden sun moth, from far western Victoria to south-eastern New South Wales, including the Australian Capital Territory.

This policy statement is based on the best available information, including:

- [EPBC Act listing advice](#)
- scientific literature
- consultation with species experts, and
- application of the national environmental legislation (EPBC Act).

This policy statement builds on the information and explanations in *EPBC Act policy statement 1.1 Significant impact guidelines – Matters of national environmental significance*.



\* Not including South Australia, where this species is considered to be extinct.

## How to interpret and apply these guidelines

The thresholds outlined in this policy statement are not designed to be prescriptive, but rather to clarify the level and types of impact likely to be significant at a national level, having regard for the biology, ecology and threats of the species.

If you are planning an action in grassland or open grassy woodland habitat in Victoria, New South Wales or the Australian Capital Territory you should consider the following:

- Does my site support the golden sun moth?
  - Consider vegetation, habitat, records and surveys on and near to the site (see page 5).
- What impacts, both direct and indirect, could result from my action?
- Could any of these impacts exceed the thresholds outlined in page 7?
- What measures could be taken to reduce the level of impact (see page 8)?

If you think that your action is likely to have a significant impact on the golden sun moth or any other matter of national environmental significance, or if you are unsure, you should refer the action to the federal environment minister. The minister will make a decision within 20 business days on whether approval is required under the EPBC Act. Substantial penalties apply for taking an action that has, will have or is likely to have a significant impact without approval.

## What other laws protect the golden sun moth?

The golden sun moth is also listed as a threatened taxon under the Victorian *Flora and Fauna Guarantee Act 1988*, and as endangered under the Australian Capital Territory *Nature Conservation Act 1980* and the New South Wales *Threatened Species Conservation Act 1995*. The listing of a species, subspecies or ecological community on the EPBC Act threatened species and ecological communities list recognises the importance of the matter from a national perspective, and does not replace listing under state, regional or local legislation or regulations.

Judgements on impacts may differ between Commonwealth, state and local decision making processes, due to the different scales of consideration. Any person undertaking an action that may affect the golden sun moth should consider their obligations under all relevant Commonwealth, state and territory, and local laws. Specific proposal submissions, permits and approvals may be required.





# Ecology of the golden sun moth

## The species

The golden sun moth is a medium-sized (wingspan 3.1–3.4 cm), day-flying moth.



Female moths have dark grey upperwings and bright orange hindwings.



Male moths have dark brown upperwings and bronze/brown hindwings.

## Life history of the species

The golden sun moth has two discrete life stages: the larval stage, which is spent underground and lasts for two to three years; and the adult stage, which is very brief, typically lasting only one to four days. Disturbance to the population during either stage is likely to disrupt the life cycle of the species.

**Table 1: Life stages of the golden sun moth**

<b>Larvae</b>	<ul style="list-style-type: none"><li>• Feed on the roots of native, and more recently exotic, grasses.</li><li>• Pupate into adult moths and emerge to breed between mid October and early January (depending on climate and geography).</li><li>• Are particularly vulnerable to: soil disturbance, such as ploughing, heavy grazing and compaction, frequent or intense fire and removal or degradation of grass plants.</li></ul>
<b>Adults</b>	<ul style="list-style-type: none"><li>• Emerge continuously across the breeding season.</li><li>• Are active during the warmest part of the day (1000 to 1400 h) (possibly up to 1700 h for females).</li><li>• Adult males are capable of active and prolonged flights, and fly about one metre above the ground on hot, sunny and still days searching for females displaying in the grass below.</li><li>• Adult females are poor fliers, and most likely walk between tussocks.</li><li>• Are unlikely to travel more than 100 m away from suitable habitat patches. Populations separated by distances greater than 200 m can therefore be considered effectively isolated, and sites from which the species has gone extinct are unlikely to be naturally recolonised.</li><li>• Are particularly vulnerable to: removal of grass plants, loss of inter-tussock space, fire, shading and predation.</li></ul>

## Habitat

The golden sun moth has been recorded in native grasslands and grassy woodlands containing wallaby grass (*Austrodanthonia* spp.), speargrass (*Austrostipa* spp.), and *Bothriochloa*, as well as in degraded grasslands dominated by the exotic Chilean needlegrass (*Nassella nessiana*), a weed of national significance. The golden sun moth currently occurs in two threatened ecological communities listed under the EPBC Act – the ‘Natural Temperate Grassland of the Victorian Volcanic Plain’ (see *EPBC Act policy statement 3.8*) and the ‘Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory’. Golden sun moths appear to favour slightly sloping, north facing sites with minimal shading. Areas of bare or sparsely covered ground between grass tussocks (inter-tussock space) are thought to be important in helping males locate females.

More information about the golden sun moth can be found in the background paper to this policy statement and the species profile on the department's SPRAT database [www.environment.gov.au/cgi-bin/sprat/public/sprat.pl](http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl).



## Principal threats to the golden sun moth

The golden sun moth is sensitive to certain development activities due to its:

- limited dispersal ability
- specific floristic and structural habitat requirements
- isolated and fragmented distribution
- seasonal lifecycle (making it cryptic for many months of the year) and,
- short adult lifespan.

The principal threats to the golden sun moth most relevant to judgements on significance include loss, degradation, modification and fragmentation of habitat through:

- removal of vegetation
- inappropriate fire regimes
- weed invasion
- overstocking (causing loss of habitat plants, changes to soil and plant structure or increased nutrient loads)
- changes to agricultural practices (for example fertiliser application, ploughing and overgrazing)
- rank growth (loss of inter-tussock spaces), and
- soil compaction.



# Survey guidelines for the golden sun moth

A guide to conducting surveys for the golden sun moth is outlined below. Surveys should:

- maximise the chance of detecting the species
- determine the context of the site within the broader landscape
- be conducted by a suitably qualified person, and
- account for uncertainty and error.



Consideration should be given to the timing, effort, methods and area to be covered in the context of the proposed action.

## Survey recommendations

Where it is not possible to conduct surveys in the manner recommended, survey methods and effort should be adjusted to compensate for the decreased likelihood of detecting the species.

A search of Commonwealth and state/territory databases (for example [protected matters search tool](#)) will provide a good starting point for determining the likelihood of having golden sun moth habitat in your area. Survey results should be lodged with the Commonwealth and relevant state or territory authority.

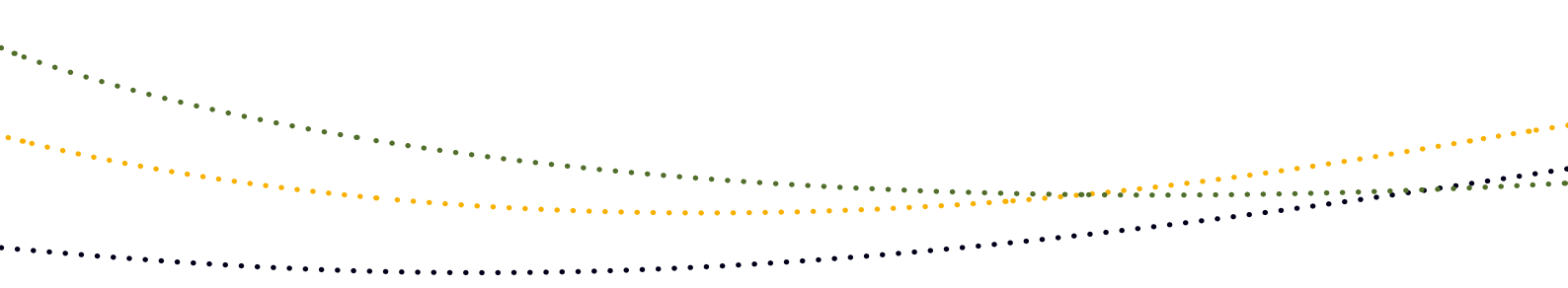
Where it is not possible to conduct surveys according to the recommended methods, timing and effort, the precautionary principle should be used. In these circumstances failure to detect the golden sun moth should not be considered indicative of its absence. Referrals of actions proposed in grassland and open grassy woodland habitat across the range of the golden sun moth may be considered incomplete unless accompanied by the results of recent and appropriate surveys.

In addition to undertaking surveys for the golden sun moth, the following characteristics should be assessed, as they are indicators of the likely

**Table 2: Survey guidelines for detecting the golden sun moth**

<b>Aim</b>	To detect flying males, but also to detect laying females/eggs and/or pupal cases to confirm that reproduction is taking place on the site.
<b>Timing</b>	During the local flying season (late October to early January)*.
<b>Effort</b>	Over at least four suitable days, at approximately weekly intervals. Once presence is established, surveys should focus on determining the relative distribution of the species on the site.
<b>Conditions</b>	<ul style="list-style-type: none"><li>• Warm to hot day (above 20 degrees celcius by 1000 hrs)</li><li>• warmest part the day (that is, 1000 to 1400 hrs)</li><li>• clear or mostly cloudless sky</li><li>• still or relatively still wind conditions during the survey period, and</li><li>• at least two days since rain.</li></ul>

\* As the timing of the flight season varies annually and geographically, the best indicator of key survey period is the presence of flying males at known local sites. Reference sites should be monitored during the expected flying period and used to guide survey timing at the target site.



presence of the species at a site and the quality of the habitat:

- presence of pupal casings
- abundance of suitable host plants (for example *Austrodanthonia* spp., *Austrostipa* spp. *Nassella neesiana*)
- other vegetation (native and exotic)
- exposure (amount of shading from trees, buildings etc.)
- aspect
- amount of bare ground (inter-tussock space)
- presence of rocky areas
- soil characteristics
- site history (for example grazing, cropping, biomass management, fertiliser/pesticide/herbicide use), including current management regime
- proximity to other known populations, including on adjacent sites, and
- presence of similar habitat connecting the site to occupied areas or other areas of grassland or grassy woodland.

## Larval surveys

Large scale larval surveys are not considered an appropriate survey technique for determining the presence of the species on a site due to the large search effort required and the potential for damage to the soil, plants and larvae. However, where small amounts of soil are disturbed (for example in installing pit-fall traps for other grassland fauna) soil could be inspected for golden sun moth larvae.

## What sorts of actions are likely to have a significant impact on the species?

Significant impact judgements must be made on a case by case basis and with consideration for the context of the action.

The potential for a significant impact on a listed threatened species will depend on:

- the intensity, duration, magnitude and geographic extent of the impact
- the sensitivity, value and quality of the environment on and around the site
- the cumulative effect of on-site, off-site, direct and indirect impacts, and
- the presence of this and other matters of national environmental significance.

For the golden sun moth, there is a real chance or possibility of a significant impact on the species if the action results in, or exceeds, the following impact thresholds.

Actions which may lead to the loss, degradation or fragmentation of golden sun moth habitat may include, but are not limited to:

- clearing of grassland or grassy woodland, including soil cultivation
- modification of habitat: for example changes to shading, hydrology, wind patterns, species composition
- management practices: for example changes in fire regime, slashing, mowing, increases or decreases in the intensity of a grazing regime
- weed introduction
- chemical application: for example pesticides, herbicides, fertilisers.





**Table 3: Significant impact thresholds for the golden sun moth**

Ecological element affected	Impact threshold	Comment
Large or contiguous habitat area (>10 ha)	Habitat loss, degradation or fragmentation >0.5 ha	Habitat is a similar or connected area within which the golden sun moth is found during surveys or known from records. The function of the area may include, but is not limited to: feeding, breeding, dispersal.
Small or fragmented habitat area (<10 ha)	Any habitat loss, degradation or fragmentation	<p>Small areas of habitat are more likely to suffer significant impacts from loss, degradation and fragmentation than larger areas.</p> <p>The limited dispersal ability of the golden sun moth means habitat areas separated by &gt;200 m are effectively isolated and should be considered as separate habitat areas.</p> <p>Extremely small, isolated and degraded habitat patches (for example &lt;0.25 ha) may support populations of golden sun moth but are unlikely to contribute to the overall ecological health of the species.</p>
Habitat connectivity	Fragmentation of a population through the introduction of a barrier to dispersal	Barriers to dispersal could include: breaks in habitat of >200 m; structures that prohibit movement (for example buildings, solid fences).

**Notes:**

The elements and thresholds in the table above give guidance to the level of impact that is likely to be significant for the species at a site. They are not intended to be exhaustive or prescriptive, but rather to highlight those actions that threaten the persistence and recovery of the golden sun moth (see Section 3).

Habitat and/or populations may, and often will, extend beyond the site boundaries. If the amount of golden sun moth habitat adjoining the site of the action cannot be determined the area of habitat will be considered to be the same as that identified within the site.



## What does this mean for actions in golden sun moth habitat?

If you plan an action that may have a significant impact then you should refer the proposal to the minister *before* commencing the action. The minister will decide, within 20 business days, whether assessment and approval is required under the EPBC Act.

More information on referral and assessment is available at [www.environment.gov.au/epbc/assessments/process.html](http://www.environment.gov.au/epbc/assessments/process.html).



## How can my action avoid having a significant impact on the golden sun moth?

Mitigation includes all measures undertaken on the site of the action to avoid or reduce its impacts. When planning an action, consider at the earliest stages how to:

- reduce the level of the impact to below the significant impact thresholds outlined in this policy statement, where possible
- monitor the performance of the mitigation measures (for example by using performance indicators measured at seasonally/annually nominated times), and
- feedback into an adaptive management plan, to quickly react to any changes in performance.

Mitigation and management actions must:

- make avoiding impacts the priority followed by impact reduction.
- avoid negative impacts on other matters of national environmental significance, and
- be consistent with relevant recovery, conservation or action plans.

The following measures may assist in minimising impacts on the golden sun moth. In many cases, a combination of mitigation measures may give the highest benefit.



**Table 4: Examples of mitigation measures for the golden sun moth**

<b>Avoiding impacts</b>	<ul style="list-style-type: none"> <li>• Retain habitat patches known or likely to contain the golden sun moth, and manage for the species (see 'Managing habitat' below).</li> <li>• Re-site roads or easements so as to avoid habitat disturbance.</li> <li>• Use trenchless installation of pipelines by subterranean tunnelling at a depth of &gt;0.5 m.</li> <li>• Conduct temporary or discrete activities at a time when they will not have a negative impact on the golden sun moth population. For example mosaic management such as patch burning or staggered weed control measures designed to avoid affecting the whole population at the same time.</li> <li>• Avoid introducing trees or structures that could encourage predatory birds to nest and breed.</li> </ul>
<b>Minimising impacts</b>	<ul style="list-style-type: none"> <li>• Reduce the impact of construction works by employing an appropriate buffer around golden sun moth habitat (for example 100–200 m around breeding habitat), restricting vehicular movement during times of high soil moisture, and when adult moths are flying.</li> <li>• Design fences to: <ul style="list-style-type: none"> <li>– allow the passage of golden sun moth adults, and</li> <li>– limit birds perching close to habitat patches, to limit predation on golden sun moths.</li> </ul> </li> <li>• Maintain previous management regime, or adapt it in a temporal and spatial mosaic so that experimental and adaptive management can be applied.</li> <li>• Avoid shading (from buildings, landscaping or other structures) in the middle of the day (in winter between 0900 and 1500 hrs) to minimise negative effects on soil temperature and moisture.</li> <li>• Maintain hygiene on maintenance and construction vehicles and machinery passing through golden sun moth habitat, to ensure that weeds are not spread.</li> <li>• Avoid landscaping that would introduce weeds or non-Indigenous plants into site.</li> </ul>
<b>Managing habitat</b>	<ul style="list-style-type: none"> <li>• Implement a biomass management program: <ul style="list-style-type: none"> <li>– Mow or slash grass outside of the local flying season for the golden sun moth. The appropriate cutting height will depend on the grassland structure and species composition. A 6–8 cm cutting height is employed successfully at the Nhill Sun Moth Reserve in western Victoria (Douglas 2004), while a greater than 10 cm height is reported to be appropriate for ACT grasslands (Cooper 2009). Equipment must be properly cleaned and grass cuttings removed to prevent the transport of weeds between sites.</li> <li>– Avoid fires, especially during and immediately following the flying season. If necessary, late summer or autumn fire is favourable for many of the host grasses used by the golden sun moth.</li> <li>– Use pulse grazing, at low intensities, with grazers removed prior to the commencement of the flying season.</li> </ul> </li> <li>• Control and reduce weeds in the area, taking care to avoid drift of herbicides onto native vegetation, and onto the soil crust: <ul style="list-style-type: none"> <li>– Through carefully applied and targeted spot-spraying or “wiping”.</li> <li>– For some weed species (for example <i>Phalaris</i>) a combination of fire and herbicide application has proven most successful.</li> </ul> </li> <li>• Improve degraded areas of habitat on the project site, and manage for the golden sun moth. Revegetated areas should be established prior to the removal of occupied habitat. Note however, that revegetation can be both intensive and expensive.</li> <li>• Fence habitat on three sides to limit use as a thoroughfare.</li> <li>• Place pathways (if necessary) outside of the reserve and interpretive/educational signage to highlight conservation significance.</li> </ul>



## Translocation

Translocation does not reduce the impact of an action. Translocation of the golden sun moth is not considered to mitigate or offset the impact of an action, as it is unlikely to result in a positive conservation outcome for the species.

In limited circumstances salvage translocation may be tried as an experiment, in addition to appropriate mitigating measures. Such translocation may be considered for salvage purposes, and must be undertaken in association with a fully costed and funded monitoring program and adaptive management strategy with clearly stated criteria for identifying success. Additional permits may be required to undertake salvage translocation.

## Where can I get more information?

The background paper to this policy statement is available from the department's website [www.environment.gov.au/epbc/guidelines-policies.html](http://www.environment.gov.au/epbc/guidelines-policies.html) and provides the biological and ecological context to the survey guidelines, significant impact thresholds and mitigation measures.

A range of other EPBC Act policy statements are also available to help you to understand the EPBC Act and your obligations. They are available from the department's website [www.environment.gov.au/epbc/guidelines-policies.html](http://www.environment.gov.au/epbc/guidelines-policies.html) or by contacting the community information unit by email: [ciu@environment.gov.au](mailto:ciu@environment.gov.au) or by phone: 1800 803 772.

The [protected matters search tool](#) can provide a good starting point for determining the likelihood of having matters of national environmental significance in your area. State and Territory Government agencies may also hold relevant information including habitat and species distribution information.

Further information including details on other listed threatened species and ecological communities is at the department's species profiles and threats database (SPRAT) at: [www.environment.gov.au/cgi-bin/sprat/public/sprat.pl](http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl).

### PHOTO CREDITS

#### FRONT COVER (left to right)

Golden Sun Moth depositing eggs (Reto Zollinger), Golden Sun Moth (Reto Zollinger), Golden Sun Moth female (Anett Richter), Golden Sun Moth male and female on grass tussock (Reto Zollinger)

#### INTERNAL PAGES

p1 Golden Sun Moth female (Reto Zollinger), p2 Belconnen Naval Station (Dena Weinhold), p3 Golden Sun Moth female (Anett Richter), p3 Golden Sun Moth male (Reto Zollinger), p4 Native Grassland conservation area (DEWHA), p7 Golden Sun Moth male and female on grass tussock (Reto Zollinger), p8 Golden Sun Moth depositing eggs (Reto Zollinger)

#### BACK COVER (left to right)

Golden Sun Moth male and female on grass tussock (Reto Zollinger), Golden Sun Moth female (Anett Richter), Golden Sun Moth (Reto Zollinger), Golden Sun Moth depositing eggs (Reto Zollinger)

