

Advice to the Minister for the Environment and Heritage from the Threatened Species Scientific Committee (the Committee) on Amendments to the list of Threatened Species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

1. Scientific name (common name)

Synemon discalis (Small Orange-spotted Sun-moth)

There is considerable uncertainty regarding the taxonomic status of Western Australian specimens and their relationship with the eastern *Synemon discalis*. As Western Australian specimens are comparatively larger and tend to have smaller orange markings on the upper side of their hind wings, it is possible that specimens from Western Australia may belong to an undescribed subspecies of *Synemon discalis* or an undescribed species (DSE 2003).

2. Description

The Small Orange-spotted Sun-moth is a medium-sized sun-moth with a series of prominent bright orange spots on the black uppersides of the hindwing. The species' wingspan is about 3.1 cm in males and 3.5 cm in females (DSE 2003).

Sun-moths (Family Castniidae) are broad-winged, colourful, moths with clubbed antennae and relatively slender bodies. They fly only during the day and their diurnal habits are so strong that if passing clouds block out the sunshine they will immediately settle and not take flight again (unless disturbed) until sunlight returns (DSE 2003). In the Big Desert, North-west Victoria, the Small Orange-spotted Sun-moth is on the wing at the same time as the superficially similar Orange-spotted Sun-moth (*Synemon parthenoides*), with which it can be easily confused (DSE 2003).

As adults, sun-moths have relatively brief lives of approximately four to ten days. Female sun-moths mate and start laying eggs shortly after they emerge from their pupae. They deposit their eggs beneath the soil, or near the base of their larval food plants. After hatching, the larvae tunnel to the food plants' roots and commence feeding. Each larva then constructs a vertical, silk-lined tunnel to just below the soil surface. Empty pupal cases protrude from the soil surface after the adult moth emerges. It is not known how long the Small Orange-spotted Sun-moth takes to complete a life cycle, however, a related species that occurs in New South Wales, *Synemon magnifica*, takes two to three years (DSE 2003).

In the case of the Small Orange-spotted Sun-moth in Victoria, experts state the larval host plant is likely to be *Gahnia lanigera* (Desert Saw-sedge). According to other experts, however, the plant communities where the species occurs differs across its national range and, in South Australia, pupal shells have been associated with a small unidentified sedge. It is possible that the Small Orange-spotted Sun-moth feeds on both plant species, neither of which are rare or confined to a limited or threatened plant community.

3. National Context

The Small Orange-spotted Sun-moth is endemic to Australia (Common 1990) and is known from ten locations across Victoria, South Australia and Western Australia, of which only seven may still be extant.

Within Victoria this species has been recorded at three localities in the north-west: in the south-eastern corner of the Big Desert, occupying an area of about 2 ha, and at Nowingi State Forest approximately 6 km north (Nowingi State Forest Site 1) and 10 km north (Nowingi State Forest Site 2) of the Hattah township (DSE 2003). The Small Orange-spotted Sun-moth is also known to occur in limited areas on the Yorke and Eyre Peninsulas in South Australia, and at Mount Ragged, Norseman, Yalgoo, Warwick and Waroona in Western Australia, although there is uncertainty regarding the taxonomic status of the Western Australian specimens (DSE 2003).

4. How judged by the Committee in relation to the EPBC Act criteria.

The Committee judges the species to be **not eligible** for listing under the EPBC Act. The justification against the criteria is as follows:

Criterion 1 – It has undergone, is suspected to have undergone or is likely to undergo in the immediate future a very severe, severe or substantial reduction in numbers.

With the exception of north-west Victoria, where survey effort has been reasonable since 1986, minimal survey effort has been undertaken for the species across its national distribution. In addition, surveying for this species can be difficult for a number of reasons. For example, the cryptic nature of the species (related to its subterranean immature stages) often makes measuring the population size of colonies impractical. Due to the species' often restricted flight periods, whereby the majority of the population emerges over a two to three week period, survey timing is critical. Furthermore, whilst surveys for empty pupal cases protruding from food plant tussocks can be conducted outside of flight periods, it is not possible to confidently identify *Synemon* species from pupal cases. As a result of minimal survey effort and difficulties associated with conducting surveys, there are no data on population numbers for this species across its national range.

Historically, it appears that the Small Orange-spotted Sun-moth may have had a more extensive distribution along the southern edge of the Big Desert in Victoria. It has been suggested that the clearing of natural vegetation after Europeans settled the area may have brought this species to the brink of extinction in Victoria (DSE 2003). However, there are no quantitative data available to substantiate this potential historical decline in the species' geographic distribution and population size in Victoria and there is inadequate information to assess the Victorian situation in relation to the national context.

Since 1997, surveys conducted in the Big Desert, indicate that the extent of the species' distribution has remained relatively stable at this location. If geographic distribution is used as a surrogate for population size, this suggests that the size of the Small Orange-spotted Sun-moth population at the Big Desert site has also remained stable over the last decade.

At Nowingi State Forest Site 1, little is known about population numbers. During a survey conducted at this site in October 1995, 12 individuals were recorded and a single female was collected (DSE 2003). Surveys in October 2005 failed to record the species, suggesting that the population may have died out at this location. At this time, however, surveys discovered the species at Nowingi State Forest Site 2, approximately 4 km from Site 1. Thirty-four specimens were observed at Nowingi State Forest Site 2, however, it is likely that this count included repeat observations.

It is not clear whether the specimens recorded at Nowingi State Forest Sites 1 and 2 are from separate colonies or are part of a single local colony. If colonies are distinct, then the loss of

specimens from Site 1 could represent a reduction in numbers in Victoria. However, as there is little information on the Small Orange-spotted Sun-moth's national population numbers, the significance of the decline in numbers at the national level cannot be determined.

In terms of a future reduction in numbers, it has been suggested that the Big Desert population may be vulnerable because it is known to occupy an area of little more than two hectares and is situated on either side of the Chinaman's Well Track, the maintenance of which involves firebreak clearing and potentially threatens the species' survival. However, as the distribution of the population at the Big Desert location has remained relatively stable over the last decade, it is likely that maintenance of the Chinaman's Well Track constitutes a minimal threat.

It has also been suggested that the population size of the Small Orange-spotted Sun-moth colony at Nowingi State Forest Site 2 may be adversely affected in the near future, if a nearby proposed Long Term Containment Facility (LTCF) for industrial waste is constructed. It has been speculated that this proposed development may result in clearing of the species' food plant, Desert Saw-sedge, which is contiguous with the vegetation supporting the colony and may therefore result in a contraction of the species' habitat at this site. However, the level of impact on the Small Orange-spotted Sun-moth is not clear. The Committee considers that, given the lack of knowledge on this species' taxonomy and distribution across its broad range of Victoria, South Australia and Western Australia, it is not possible to assess how this threat will impact on future population numbers of the species.

As a result of minimal survey effort and the difficulties associated with conducting surveys, there are no data on population numbers for this species across its national range. It is therefore not possible to judge the significance of purported trends in Victorian population numbers.

Therefore, there are insufficient data available to assess the species against this criterion.

Criterion 2 –Its geographic distribution is precarious for the survival of the species and is very restricted, restricted or limited.

Common (1990) states that *Synemon discalis* is "...widely distributed in western Victoria and South Australia". However, this statement is thought to be erroneous, as this species is only known to occur at a couple of locations in South Australia and was not known to occur in western Victoria until 1995 (DSE 2003).

The Small Orange-spotted Sun-moth is known from ten locations across Victoria, South Australia and Western Australia, of which only seven may still be extant. There are currently no reliable estimates of the species' extent of occurrence and area of occupancy. There is one suggestion that the species' geographic distribution is less than 5,000 km². It is not known how this estimate was derived, however, given the species is known to occur across three states and the species' known food plants are not rare or confined, this estimate may represent the species' likely area of occupancy.

There has been minimal survey work undertaken to date across the species' known national range. Therefore, there is insufficient information available to judge whether the species geographic distribution is very restricted, restricted or limited.

In addition to the potential threats operating on the species in Victoria discussed under criterion 1, a number of other threats possibly affect the Small Orange-spotted Sun-moth across its national range, mainly through altering the density of food plants available for

larvae. These include land clearing, altered fire regimes, introduced feral animals, pathogens and plants, particularly exotic grasses and weeds, and climate change. The impacts of these threats across the species range have not been quantified. As there is currently uncertainty about the Small Orange-spotted Sun-moth's geographic distribution and uncertainty about the level of threat posed by the aforementioned threats, there is insufficient information available to judge whether the species' geographic distribution is precarious for its survival.

Therefore, there are insufficient data available to assess the species against this criterion.

Criterion 3 – The estimated total number of mature individuals is limited to a particular degree and: (a) evidence suggests that the number will continue to decline at a particular rate; or (b) the number is likely to continue to decline and its geographic distribution is precarious for its survival.

As indicated under criterion 1, there are no data on population numbers for this species across its national range.

Therefore, there are no quantitative data available to assess the species against this criterion.

Criterion 4 – The estimated total number of mature individuals is extremely low, very low or low.

As indicated under criterion 1, there are no data on population numbers for this species across its national range.

Therefore, there are no quantitative data available to assess the species against this criterion.

Criterion 5 - Probability of extinction in the wild

There are no quantitative data available on probability of extinction in the wild to assess the species against this criterion.

5. CONCLUSION

The Small Orange-spotted Sun-moth is known from ten locations across Victoria, South Australia and Western Australia. As the taxonomy is uncertain, it is not clear whether or not the Western Australian population forms part of this species.

As a result of minimal survey effort and the difficulties associated with conducting surveys, there are no data on population numbers for this species across its national range. It is therefore not possible to judge the significance of purported trends in Victorian population numbers.

Likewise, without further survey work, it is not possible to estimate the species' extent of occurrence and area of occupancy. Therefore, there is insufficient information available to judge whether the species geographic distribution is very restricted, restricted or limited.

Although a number of threats possibly affect the Small Orange-spotted Sun-moth across its national range, mainly through altering the density of food plants available for larvae, as there is insufficient information available to determine the species' geographic distribution, its precariousness cannot be evaluated.

In conclusion, the species is not eligible for listing against any of the criteria.

6. Recommendation

The Committee recommends that the species *Synemon discalis* (**Small Orange-spotted Sun-moth**) is **not eligible** for inclusion in the list referred to in section 178 of the EPBC Act.

References cited in the advice

Department of Sustainability and Environment (DSE) 2003, 'Flora and Fauna Guarantee Act 1988 Action Statement No. 146: Five threatened Victorian Sun-moths (*Synemon* species)', [Online], Available at: <http://www.dse.vic.gov.au> (Accessed June 2006).

Common, I. F. B. 1990, *Moths of Australia*, Melbourne University Press, Carlton.