



Consultation Document on Listing Eligibility and Conservation Actions

***Thelymitra hygrophila* (blue star sun-orchid)**

You are invited to provide your views and supporting reasons related to:

- 1) the eligibility of *Thelymitra hygrophila* (blue star sun-orchid) for inclusion on the EPBC Act threatened species list in the Critically Endangered category; and
- 2) the necessary conservation actions for the above species.

Evidence provided by experts, stakeholders and the general public are welcome. Responses can be provided by any interested person.

Anyone may nominate a native species, ecological community or threatening process for listing under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or for a transfer of an item already on the list to a new listing category. The Threatened Species Scientific Committee (the Committee) undertakes the assessment of species to determine eligibility for inclusion in the list of threatened species and provides its recommendation to the Australian Government Minister for the Environment.

Draft information for your consideration of the eligibility of this species for listing as Critically Endangered starts at page 3 and information associated with potential conservation actions for this species starts at page 7. To assist with the Committee's assessment, the Committee has identified a series of specific questions on which it seeks your guidance at page 9.

Responses are to be provided in writing either by email to:
species.consultation@environment.gov.au

or by mail to:

The Director
Terrestrial Species Conservation Section
Wildlife, Heritage and Marine Division
Department of the Environment
PO Box 787
Canberra ACT 2601

Responses are required to be submitted by 15 January 2016.

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General background information about listing threatened species

The Australian Government helps protect species at risk of extinction by listing them as threatened under Part 13 of the EPBC Act. Once listed under the EPBC Act, the species becomes a Matter of National Environmental Significance (MNES) and must be protected from significant impacts through the assessment and approval provisions of the EPBC Act. More information about threatened species is available on the department's website at: <http://www.environment.gov.au/biodiversity/threatened/index.html>.

Public nominations to list threatened species under the EPBC Act are received annually by the department. In order to determine if a species is eligible for listing as threatened under the EPBC Act, the Threatened Species Scientific Committee (the Committee) undertakes a rigorous scientific assessment of its status to determine if the species is eligible for listing against a set of criteria. These criteria are available on the Department's website at: <http://www.environment.gov.au/biodiversity/threatened/pubs/guidelines-species.pdf>.

As part of the assessment process, the Committee consults with the public and stakeholders to obtain specific details about the species, as well as advice on what conservation actions might be appropriate. Information provided through the consultation process is considered by the Committee in its assessment. The Committee provides its advice on the assessment (together with comments received) to the Minister regarding the eligibility of the species for listing under a particular category and what conservation actions might be appropriate. The Minister decides to add, or not to add, the species to the list of threatened species under the EPBC Act. More detailed information about the listing process is at: <http://www.environment.gov.au/biodiversity/threatened/nominations.html>.

To promote the recovery of listed threatened species and ecological communities, conservation advices and where required, recovery plans are made or adopted in accordance with Part 13 of the EPBC Act. Conservation advices provide guidance at the time of listing on known threats and priority recovery actions that can be undertaken at a local and regional level. Recovery plans describe key threats and identify specific recovery actions that can be undertaken to enable recovery activities to occur within a planned and logical national framework. Information about recovery plans is available on the department's website at: <http://www.environment.gov.au/biodiversity/threatened/recovery.html>.

Information about this consultation process

Responses to this consultation can be provided electronically or in hard copy to the contact addresses provided on Page 1. All responses received will be provided in full to the Committee and then to the Australian Government Minister for the Environment.

In providing comments, please provide references to published data where possible. Should the Committee use the information you provide in formulating its advice, the information will be attributed to you and referenced as a 'personal communication' unless you provide references or otherwise attribute this information (please specify if your organisation requires that this information is attributed to your organisation instead of yourself). The final advice by the Committee will be published on the department's website following the listing decision by the Minister.

Information provided through consultation may be subject to freedom of information legislation and court processes. It is also important to note that under the EPBC Act, the deliberations and recommendations of the Committee are confidential until the Minister has made a final decision on the nomination, unless otherwise determined by the Minister.

Thelymitra hygrophila

blue star sun-orchid

Taxonomy

Conventionally accepted as *Thelymitra hygrophila* (R.J Bates) (Bates 2010).

Species Information

Description

Thelymitra hygrophila (blue star sun-orchid) was split from *Thelymitra holmesii* in 2010 (Bates 2010). The blue star sun-orchid is in the family Orchidaceae (Bates 2010). The blue star sun-orchid is a glabrous (free from hair or down), clumping terrestrial orchid that grows to 40 cm tall. The leaf is linear, 10–30 cm long, 2.2–6 mm wide, erect fleshy, 'v' shaped in cross section and dark green with sheathing for 2–6 cm above the base. The blue star sun-orchid has 1–5 flowers, 15–20 mm in diameter, pale blue to cornflower blue, opening easily on warm humid days and hardly fragrant. Buds are narrow, slate grey with pale blue margins to sepals. It flowers in October and is usually finished within 3 weeks. It is self pollinating and not all capsules set seed (Bates 2010).

Blue star sun-orchid plants without open flowers look like *T. holmesii* because of the slate grey buds, but the dense clumps of plants, less crowded flowers of a softer blue and the dense white terminal trichomes on the lateral arms of the column serve to set it apart. Unlike *T. holmesii* smaller plants may have a single sterile bract. In many ways the species could be confused with *T. exigua* which is also a clumping species, but has broader leaves, smaller flowers with buds that are not slate-grey and the trichomes spread along the entire length of the lateral lobes of the column (Bates 2010).

Distribution

The blue star sun-orchid is endemic to the Mt Lofty Ranges of South Australia. The species is known from two sites within a very restricted extent of occurrence (EOO) and area of occupancy (AOO), both of eight km² (DEWNR 2015). The species has only been found in the higher parts of the Mt Lofty Ranges in richer soils of river red gum grassy flats where vernal pools are scattered, either in the smaller pools or around edges of larger ones in rushes and sedges.

There were large populations of this species near Kuitpo in the southern Lofty region before the area was planted to pines (Bates 2010). The species was probably much more widespread prior to European settlement and likely to have occurred in similar habitat extending north to the southern Flinders Ranges before the destruction of this habitat through clearing, ploughing or grazing. More recently, decreased rainfall means the vernal pools in which it grows rarely contain water (Bates 2010). The tenure of the land where this species occurs requires clarification (possibly includes unreserved freehold land, Native Forest Reserve and / or a Conservation Park).

Cultural Significance

Thelymitra spp. are recorded as a traditional year round food resource for Aboriginal people in NSW (tuber eaten) (Australian National Botanic Gardens 2007 cited in Wilson and Bignall 2009).

Relevant Biology/Ecology

The blue star sun-orchid has been recorded in a mossy edged seepage area in river red gum (*Eucalyptus camaldulensis*) woodland and a vernal pool under river red gum in clay (Atlas of living Australia 2015). This species is highly habitat specific and is restricted to vernal pools (Bates 2010). *Thelymitra* is a genus of orchids known as 'sun orchids' in reference to their habit of the flowers only opening in warm weather.

Threats

Threats to the blue star sun-orchid include destruction of habitat through clearing, ploughing, grazing or planting to pines (Bates 2010). All orchid species are considered difficult to propagate and are at risk from illegal collection or damage, including unintentional damage, by people (Atlas of living Australia 2015). Future threats to the blue star sun-orchid include continuing land clearance and drying of its remaining habitat due to climate change (NPWC 2003) cited in Bates 2010).

The long-term viability of the plant populations may be affected if slashing occurs too early in the orchid growing season before the plants have been pollinated and seed dispersed (ForestrySA 2006).

Assessment of available information in relation to the EPBC Act Criteria and Regulations

Criterion 1. Population size reduction (reduction in total numbers)			
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered Very severe reduction	Endangered Severe reduction	Vulnerable Substantial reduction
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%
<p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.</p> <p>A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(a) cannot be used for A3]</p> <p>A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.</p>	<p><i>based on any of the following</i></p> <p>(a) direct observation [except A3]</p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</p>		

Evidence:

Insufficient data to determine eligibility

There are no data available to judge whether the species has undergone, is suspected to have undergone or is likely to undergo a reduction in numbers. The Committee considers that there is insufficient information to determine the eligibility of the species for listing in any category under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

Criterion 2. Geographic distribution as indicators for either extent of occurrence AND/OR area of occupancy			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
AND at least 2 of the following 3 conditions indicating distribution is precarious for survival:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

The EOO and AOO are both eight km² (based on two km grid as recommended by IUCN) (DEWNR 2015). Consequently, the geographic distribution is considered to be very restricted. Subpopulations are severely fragmented and there is continuing decline in extent of occurrence, area of occupancy; area, extent and quality of habitat; number of subpopulations and number of mature individuals.

The geographic distribution is severely fragmented and this species is highly habitat specific, restricted to vernal pools (Bates 2010), endemic to the Mt Lofty Ranges of South Australia.

There were large populations of this species near Kuitpo in the Southern Lofty region before the area was planted to pines (Bates 2010). The species was probably much more widespread prior to European settlement and likely to have occurred in similar habitat extending north to the southern Flinders Ranges before the almost total destruction of this habitat through clearing, ploughing or grazing. More recently, decreased rainfall means the vernal pools in which it grows rarely contain water (Bates 2010).

It can be inferred that the area, extent and quality of habitat is expected to continue to decline as a result of the fact that many threats (e.g. continuing land clearance, drying of its remaining habitat due to climate change, illegal collection, damage, including unintentional damage, by people, early orchid season slashing before the plants have been pollinated and the seed dispersed) have not ceased (NPWC 2003 (cited in Bates 2010); ForestrySA 2006; Bates 2010; Atlas of living Australia 2015).

The data presented above appear to demonstrate that the species is **eligible for listing as Critically Endangered** under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

Criterion 3. Population size and decline

	Critically Endangered Very low	Endangered Low	Vulnerable Limited
Estimated number of mature individuals	< 250	< 2,500	< 10,000
AND either (C1) or (C2) is true			
C1 An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future)	Very high rate 25% in 3 years or 1 generation (whichever is longer)	High rate 20% in 5 years or 2 generation (whichever is longer)	Substantial rate 10% in 10 years or 3 generations (whichever is longer)
C2 An observed, estimated, projected or inferred continuing decline AND its geographic distribution is precarious for its survival based on at least 1 of the following 3 conditions:			
(a) (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(a) (ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals			

Evidence:

There are no population data for this species.

The data presented above appear to be insufficient to demonstrate if the species is eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

Criterion 4. Number of mature individuals

	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low
Number of mature individuals	< 50	< 250	< 1,000

Evidence:

There are no population data for this species.

The data presented above appear to be insufficient to demonstrate if the species is eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

Criterion 5. Quantitative Analysis			
	Critically Endangered Immediate future	Endangered Near future	Vulnerable Medium-term future
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

Evidence:

Population viability analysis appears not to have been undertaken and therefore there are insufficient data to demonstrate if the species is eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

Conservation Actions

Recovery Plan

A decision about whether there should be a recovery plan for this species has not yet been determined. The purpose of this consultation document is to elicit additional information to help inform this decision.

Conservation and Management Priorities

Habitat loss disturbance and modifications

- Prevent habitat disturbance. Control access routes by limiting public access to known sites to protect this species from illegal collect or damage, including unintentional damage, by people.
- Implement an appropriate slashing regime within the species' habitat which would include avoiding orchid season slashing before these plants have been pollinated and the seed dispersed. Where possible the regime should aim to prevent slashing coinciding with the period in which this species is emerged.
- Ensure land managers are aware of the species' occurrence and are engaged in managing key and potential threats.
- Prevent modification of hydrology in the species habitat.
- Identify and assess disturbances within local and wider catchments that impact on the hydrological function of the habitat which the species relies on.
- Protect land from destruction of habitat through slashing, clearing, ploughing, grazing or planting to pine plantations where the species occurs through formal conservation protection or joint-management initiatives.
- Undertake appropriate seed and mycorrhizal fungi collection and storage to ensure the persistence of the species if there is further habitat loss or disturbance.
- Establish a representative ex-situ insurance population at the Adelaide Botanic Garden.

Stakeholder Engagement

- Provide signage at known localities (possibly Cromer Conservation Park and Knott Hill Native Forest Reserve) to encourage the public to keep to established paths and to not collect orchids or damage plants in any way.
- Raise awareness of the problems associated with illegal collection of specimens.
- Prepare and display leaflets for the SA Department of Environment and Heritage, Councils, landholders and the community to raise awareness of the need to conserve this threatened species.
- Consult with the Peramangk and southern Karuna Nation Indigenous representatives on the significance of this species to Aboriginal people.

Survey and Monitoring priorities

- Undertake surveys to more precisely assess population size, distribution, ecological requirements and the relative impacts of threatening processes by designing and implementing a monitoring program to obtain and clarify baselines for future reference of change.
- Undertake survey work in suitable habitat and potential habitat to locate any additional occurrences to more precisely assess population size and distribution.
- Support and enhance the existing monitoring program being undertaken by the Native Orchid Society of South Australia at localities where the species is known to occur (possibly Knott Hill Native Forest Reserve and adjacent pine plantations, and Cromer Conservation Park).
- Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.

Information and research priorities

- Investigate options for linking, enhancing or establishing additional populations
- Undertake seed germination and mycorrhizal trials to determine the requirements for successful establishment of insurance populations and translocations.
- Research the effects of public access where this is likely and the effects are unknown.
- Identify other potential climate change impacts and investigate latest research and techniques to combat them at a local scale.
- Investigate response by species to grazing by livestock and rabbits.

Collective list of questions – your views

Biological information

1. Can you provide any additional or alternative references, information or estimates on longevity, average life span and generation length?

Population size

2. Can you provide an estimate of the current population size of mature adults of this species (national extent)? Please provide supporting justification or other information.

If, because of uncertainty, you are unable to provide a single number, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of possible species numbers, and also choose the level of confidence you have in this estimate:

Number of mature individuals is estimated to be in the range of: <input type="checkbox"/> 1–50 <input type="checkbox"/> 51–250 <input type="checkbox"/> 251–1000 <input type="checkbox"/> >1000 <input type="checkbox"/> >10 000
Level of your confidence in this estimate: <input type="checkbox"/> 0–30% - low level of certainty/ a bit of a guess/ not much information to go on <input type="checkbox"/> 31–50% - more than a guess, some level of supporting evidence <input type="checkbox"/> 51–95% - reasonably certain, information suggests this range <input type="checkbox"/> 95–100% -high level of certainty, information indicates quantity within this range <input type="checkbox"/> 99–100% - very high level of certainty, data are accurate within this range

3. Please provide (if known) any additional evidence which shows the population is stable, increasing or declining.

Current Distribution/range/extent of occurrence, area of occupancy

4. At which sites has the species been recorded and what are the coordinates of the site/s?
5. Does the information consider the entire geographic extent and national extent of the species? If not, please provide justification for your response.
6. Has the survey effort for this species been adequate to determine its national distribution? If not, please provide justification for your response.
7. Do you agree that the way the current extent of occurrence and/or area of occupancy has been estimated is appropriate? Please provide justification for your response.

Can you provide estimates (or if you disagree with the estimates provided, alternative estimates) of the extent of occurrence and/or area of occupancy.

If, because of uncertainty, you are unable to provide an estimate of extent of occurrence, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of ranges of extent of occurrence, and also choose the level of confidence you have in this estimated range.

Extent of occurrence is estimated to be in the range of:

<100 km² 100 – 5 000 km² 5 001 – 20 000 km² >20 000 km²

Level of your confidence in this estimated extent of occurrence

0–30% - low level of certainty/ a bit of a guess/ not much data to go on

31–50% - more than a guess, some level of supporting evidence

51–95% - reasonably certain, data suggests this range of decline

95–100% -high level of certainty, data indicates a decline within this range

99–100% - very high level of certainty, data is accurate within this range

If, because of uncertainty, you are unable to provide an estimate of area of occupancy, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of ranges of area of occupancy, and also choose the level of confidence you have in this estimated range.

Area of occupancy is estimated to be in the range of:

<10 km² 11 – 500 km² 501 – 2000 km² >2000 km²

Level of your confidence in this estimated extent of occurrence:

0–30% - low level of certainty/ a bit of a guess/ not much data to go on

31–50% - more than a guess, some level of supporting evidence

51–95% - reasonably certain, data suggests this range of decline

95–100% -high level of certainty, data indicates a decline within this range

99–100% - very high level of certainty, data is accurate within this range

General

8. Can you confirm the tenure of the land on which this species is known to occur, and if it occurs in a conservation park or native forest reserve, provide the name / s of these areas?
9. If this species does occur in conservation park or native forest reserve, what conservation protection does this offer the species?
10. Is this species affected by modification of hydrological processes or hydrological function of local and wider catchments or is it simply reliant on rainfall?
11. If the species is affected by modification of hydrological processes or hydrological function of local and wider catchments, are the suggested conservation actions appropriate? Can you suggest alternate conservation actions to abate the affect of climate change.
12. Can you provide additional data or information relevant to this assessment?
13. Have you been involved in developing this nomination? If so in what capacity.

Threats

14. Do you agree that the threats listed are correct and that their effect on the species is significant?
15. To what degree are the identified threats likely to impact on the species in the future?
16. Can you provide additional or alternative information on threats, past, current or potential that may adversely affect this species at any stage of its life cycle?

Management

17. What planning, management and recovery actions are currently in place supporting protection and recovery of the species? To what extent have they been effective?
18. Can you recommend any additional or alternative specific threat abatement or conservation actions that would aid the protection and recovery of the species?
19. What individuals or organisations are currently, or potentially could be, involved in management and recovery of the species?

References cited in the advice

- Australian National Botanic Gardens (2007). *Aboriginal Plant Use - NSW Southern Tablelands*. Available on the Internet at: <http://www.anbg.gov.au/apu/>
- Bates, R.J. (2010). The *Thelymitra pauciflora* R.Br. complex (Orchidaceae) in South Australia with the description of seven new taxa. *Journal of the Adelaide Botanic Gardens* **24**, 17–32.
- DEWNR Department of Environment, Water and Natural Resources (2015). Regional Species Conservation Assessment Project, Adelaide and Mt Lofty Ranges Region. Available on the Internet at: http://www.environment.sa.gov.au/managing-natural-resources/plants-and-animals/Threatened_species_ecological_communities/Regional_significant_projects/Regional_Species_Conservation_Assessment_Project
- ForestrySA (2006). Mount Panorama, Knott Hill and Christmas Hill Native Forest Reserves Management Plan, ForestrySA, Adelaide, South Australia. Available on the Internet at: https://www.forestry.sa.gov.au/Portals/0/Publications/NFRMgtPlans/Ranges/NFR025_MountPanorama_KnottHill_Christmas%20Hill.pdf
- Wilson, A. And Bignall, J. (2009). Regional Recovery Plan for the Threatened Species and Ecological Communities of Adelaide and the Mount Lofty Ranges, South Australia. Department for Environment and Heritage, South Australia.

Other sources cited in the advice

- Atlas of living Australia (2015). *Thelymitra hygrophila* R.J.Bates Blue Star Sun-orchid. Available on the Internet at: <http://bie.ala.org.au/species/Thelymitra+hygrophila>
- Department for Environment and Heritage (2007). *Adelaide and Mount Lofty Ranges Regional Recovery Pilot Project Database*. Unpublished data extracted and edited from BDBSA, SA Herbarium (July 2007) and other sources.