

**Advice to the Minister for the Environment, Heritage and the Arts
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)

Rhizanthella slateri (Eastern Underground Orchid)

There are two described and one undescribed species of *Rhizanthella* in Australia. They are *Rhizanthella gardneri* from Western Australia, *Rhizanthella slateri*, commonly known as the Underground Orchid or the Eastern Underground Orchid, from New South Wales, and a related taxon from Lamington National Park in Queensland. The Queensland taxon is commonly treated in the literature as *Rhizanthella slateri*, however a relevant expert has indicated that this population is a new, undescribed taxon.

2. Description

The Eastern Underground Orchid completes most, if not all, of its lifecycle underground. The species was discovered by an amateur naturalist in 1931 on Alum Mountain, at Buladelah, in NSW (Clements & Groves 1987). The species lacks chlorophyll, roots and leaves (Australasian Native Orchid Society 1997), but consists of a whitish, fleshy underground stem of about 15 cm in length and 1.5 cm diameter, with prominent, overlapping bracts (NSW Scientific Committee 2005). The species flowers below the surface, or up to 2cm above the ground (NSW Scientific Committee 2005), and its flowers resemble a glistening purple dandelion (Australasian Native Orchid Society 1997).

The Eastern Underground Orchid is saprophytic, meaning it lives in a symbiotic relationship with mycorrhizal fungus in order to gain nutrients (Australasian Native Orchid Society 1997), and, unlike most orchid species, it maintains this relationship for its entire lifecycle (Lewis 1997). However, little else is known of the biology of the species. The biology of another member of the genus, *Rhizanthella gardneri* (Western Australian Underground Orchid), is better understood. The Western Australian Underground Orchid is pollinated by small insects such as flies, beetles and termites, and lives in a symbiotic relationship with Broom Honey myrtle (*Melaleuca uncinata*) (Brown 2002).

Whilst the Eastern Underground Orchid grows in *Eucalyptus* forest (Clements and Cribb 1984), no informative assessment of the likely preferred habitat for the species is available (NSW Scientific Committee 2002), and, unlike the Western Australian Underground Orchid, no particular vegetation type is associated with the species (Stephenson 1997). The pollinators of the Eastern Underground Orchid are unknown, though a study of the floral structure has ruled out self pollination (Jones 1988). The mechanism for seed dispersal for the species is also not well understood, though one theory is that small animals, for example bandicoots or lyrebirds (Banks 2002), may dig up and eat fleshy fruits, thereby dispersing seeds. The generation length of the species is not known.

3. National Context

The Eastern Underground Orchid is known from less than ten isolated populations along the NSW south to mid-north coast. These populations occur at the Blue Mountains, Nowra, Watagan Mountains, Wiseman's Ferry, Agnes Banks and Alum Mountain. Anecdotal evidence suggests that some of these known populations may already be extinct due to development activities. However, the cryptic nature of the species makes it difficult to detect and it is usually located only

when the soil is disturbed. Therefore there may be more locations of the species within its known range (NSW Scientific Committee 2002).

The Eastern Underground Orchid is listed as vulnerable under the NSW *Threatened Species Conservation Act 1995*, and the population in the Great Lakes local government area is listed as an endangered population.

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

The Committee judges the species to be **eligible** for listing as **endangered** 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

Due to its subterranean lifecycle, the Eastern Underground Orchid is a cryptic species, and therefore difficult to detect. The species has most often been located accidentally when the soil is disturbed, though specific surveys have been conducted on the largest known population at Alum Mountain in NSW. Since the species' discovery, approximately 90 individuals have been recorded, however, due to the cryptic nature of the species, it is possible that more individuals occur within the known range of the species.

Historically, the species has most often been discovered by accident as part of clearing for development, and often, individuals have subsequently been destroyed. There are two locations, one in the Blue Mountains and one in Nowra, where the species may now be extinct as a result of vegetation clearance for development. The species occurs in the *Eucalyptus* forests of the Great Dividing Range, which have been cleared extensively since European settlement, and therefore the species is likely to have undergone a reduction in numbers in the past. However, there are insufficient data available to quantify this reduction.

The largest known population of the Eastern Underground Orchid occurs on Alum Mountain. The area where the species is known to occur overlaps with the preferred new route for the Pacific Highway. The Pacific Highway is being progressively upgraded over 10 years, and the proposal for the Buladelah section was announced by the NSW Roads and Traffic Authority in 2001. The Environmental Impact Statement for the proposal went on exhibition in late 2004.

The Eastern Underground Orchid is threatened by clearing for housing or other developments at other known sites. The species is also threatened by weed invasion, including species of exotic perennial grass. Individuals of the species are also at risk from visitation and interference by orchid enthusiasts, as once uncovered, individuals must be recovered in a specific fashion to ensure that flowerheads are not damaged by the sun. The species may be at risk of a loss of pollinator and seed dispersal vectors, such as small mammals or birds, and could be vulnerable to changes in fire regimes.

Therefore, the number of individuals of the Eastern Underground Orchid is likely to undergo a reduction in the future, however there is insufficient information available to quantify this reduction. 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

Based on currently available information, the Eastern Underground Orchid has a relatively large extent of occurrence, from the NSW south coast to the mid north coast. However, the species is likely to have a very restricted area of occupancy, as it is known from fewer than 10 small, isolated populations within its extent of occurrence. However, there are insufficient data available to adequately quantify the species' geographic distribution.

The Eastern Underground Orchid occurs in the same area as the proposed route for the upgrade of the Pacific Highway at [REDACTED]. Other threats to the Eastern Underground Orchid include visitation and trampling, development at known sites, weed invasion, altered fire regimes and the potential loss of pollinating and seed dispersal vectors.

Though the Eastern Underground Orchid is likely to have a very restricted geographic distribution, and the species is likely to decline in future due to ongoing threats, there are no estimates of the extent of occurrence or area of occupancy of the species, and 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

Since the species' discovery, approximately 90 individuals have been recorded, and the largest known population consists of approximately 60 individuals. Due to the cryptic nature of the species, it is possible that more individuals occur within the known range of the species. However, based on available data, the number of mature individuals of the species is limited.

The largest known population of the Eastern Underground Orchid occurs in the proposed route for the upgrade of the Pacific Highway at [REDACTED], and other populations of the species are threatened by development, weed invasion, damage associated with visitation, trampling, altered fire regimes and the potential loss of pollinating and seed dispersal vectors. Therefore, the number of individuals of the species is likely to decline in the future, however there is insufficient information available to quantify the rate of this likely decline. As discussed under criterion 2, there is also insufficient information to establish the extent of occurrence or area of occupancy of the species. Therefore there are insufficient 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

Since the species' discovery, approximately 90 individuals have been recorded, with the largest known population consisting of approximately 60 individuals. Due to the cryptic nature of the species, it is possible that more individuals occur within the known range of the species. However, based on available data, the current population estimate for the species is very low, and therefore, the species is **eligible** for listing as **endangered** under this criterion.

Criterion 5 – Probability of extinction in the wild

Although the species is likely to decline due to the threats discussed under criteria 1 and 2, there are no quantitative data available to predict the likelihood of extinction of all populations of the Eastern Underground Orchid in the wild. Therefore, there are insufficient data available to assess the species against this criterion.

5. CONCLUSION

The Eastern Underground Orchid is known from fewer than ten isolated populations along the NSW south to mid-north coast, and since the species' discovery, approximately 90 individuals have been recorded. Due to its cryptic nature, it is possible that more individuals occur within the known range of the species, however, based on the available data, the estimated number of individuals is very low.

The largest known population of the Eastern Underground Orchid occurs in the proposed route for the upgrade of the Pacific Highway at [REDACTED]. The species is also threatened by development, damage associated with visitation, trampling, weed invasion, altered fire regimes and the potential loss of pollinating and seed dispersal vectors.

The species is **eligible** for listing as **endangered** under criterion 4.

6. Recommendation

The Committee recommends that the list referred to in section 178 of the EPBC Act be amended by **including** in the list in the **endangered** category:

Rhizanthella slateri (Eastern Underground Orchid)

Key references used to assess the nomination

Australasian Native Orchid Society (1997) *Discovery of Rhizanthella slateri (the Eastern Underground Orchid)*. <http://www.anos.org.au/groups/warringah/warringahframe.html>.

Banks, D.P. (2002) Eastern Underground Orchid rediscovered at Alum Mountain, Buladelah, NSW. *The Orchadian* **13**(12): 539.

Brown, A. (2002). Endangered underground orchid. *Landscape* **17**(3): 42.

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Lewis, M. (1997) Elusive underground orchid unearthed. *Australian Geographic* **46**: 19.

Jones, D. (1988) *Native Orchids of Australia*. Reed Books, Sydney.

NSW Scientific Committee (2005) *Preliminary determination to support proposal to list Rhizanthella slateri (Rupp) M.A.Clem. & Cribb, an underground orchid, population in the Great Lakes local government area as an endangered population*. Available at www.nationalparks.nsw.gov.au.

NSW Scientific Committee (2002) *Final determination to list the underground orchid Rhizanthella slateri (Rupp) M. A. Clem. And P.J. Cribb as a vulnerable species*. Available at www.nationalparks.nsw.gov.au.

Stephenson, A. (1997) A new recording of the Eastern Underground Orchid, *Rhizanthella slateri* at sea level. *The Orchadian* **12**(4): 188–189.