

NSW Threatened Species Scientific Committee

Conservation Assessment of *Homoranthus elusus*

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***Homoranthus elusus* L.M.Copel. (Myrtaceae)**

Distribution: Endemic to NSW

Current EPBC Act Status: Not listed

Current NSW BC Act Status: Not listed

Proposed listing on both NSW BC Act and EPBC Act: Critically Endangered

Conservation Advice: *Homoranthus elusus*

Summary of Conservation Assessment

Homoranthus elusus was found to be eligible for listing as Critically Endangered under Criterion D. The main reason for this species being eligible is: the species is known from a single population with an extremely low population size. Fewer than 50 individuals are believed to be extant and the last survey for the species conducted in 2003 failed to locate any individuals.

Description and Taxonomy

Homoranthus elusus was described by Copeland *et al.* (2011) as an “Erect shrub, glabrous. Leaves opposite, decussate, punctate, 8–13mm long, 0.2–0.4mm wide, 0.4–0.8mm thick, linear, mucronate, petiolate; blade in side view straight to incurved linear; petiole 0.6–1.1mm long. Flowering branchlets undifferentiated, with 2–4 flowers held erect in leaf axils at branchlet apex. Inflorescence a monad; peduncles 1.0–1.5mm long; bracteoles caducous, 4–7mm long. Hypanthium cylindrical, 5-costate, tuberculate between the ribs, with rounded, multicellular trichomes, 3.8–5.2mm long. Sepals 5, the apex distally lacinate with 3–6 slender processes, 2–2.5mm long. Petals 5, broadly obovate, the apex obtuse, 2.0–2.5mm long, the margin entire. Stamens 10; filaments ~0.6mm long; anthers globose, basifixed, yellow. Staminodes 10, alternating with the stamens, distinctly adnate to the adjacent antepetalous stamen. Style 8–10mm long, exceeding the hypanthium by 4–6mm at anthesis, minutely hirsute below the papillose stigma. Ovary unilocular; placenta sessile, axile-basal. Fruit a dry, indehiscent nut, brown.”

Copeland *et al.* (2011) note that “*Homoranthus elusus* is most similar to *H. bruhlii* from which it can be distinguished by its thinner leaves (0.4–0.8mm in *H. elusus* compared with 0.8–1.4mm in *H. bruhlii*). In addition, *H. elusus* also has several rounded, multicellular trichomes between the hypanthium costae – these trichomes are absent from the hypanthia of *H. bruhlii*. Although *H. elusus* was originally identified as *H. biflorus* on the label of the holotype, the two species are not closely related and *H. elusus* can be easily distinguished by the flowering branchlets being undifferentiated. In contrast, the flowers of *H. biflorus* are arranged in pairs on a strongly modified internode that superficially resembles a peduncle.”

Distribution and Abundance

The description of the species by Copeland *et al.* (2011) states that it is “Currently known from a single collection from Bluff Rock, ~13 km south of Tenterfield [NSW]” and that “A targeted search on Bluff Rock in 2003 failed to relocate the species, although an abundance of suitable habitat suggests that *H. elusus* could still be extant.”

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Homoranthus elusus has apparently not been observed in the wild since the collection of a specimen in 1992 that provided the Type for the species' description in 2011 (L. Copeland, pers. comm. May 2018). The species was not relocated during targeted surveys in 2003, suggesting it either occurs at very low densities, fluctuates in abundance over time in relation to disturbance or is now locally extinct. However, Copeland believes that the species is likely to persist in the wild, albeit in very low numbers. At present the species' known distribution remains restricted to one site. The area of occupancy is estimated to be 4 km², based on the species occupying a single 2 x 2 km grid cell, the spatial scale of assessment recommended by IUCN (2019). The extent of occurrence (EOO) is also 4 km². The EOO is reported as equal to AOO, despite the range of the species, measured by a minimum convex polygon containing all the known sites of occurrence, being less than AOO. The two figures are reported as equal in order to ensure consistency with the definition of AOO as an area within EOO, following IUCN Guidelines (2019).

There is apparently suitable habitat in the immediate vicinity of the known site of *Homoranthus elusus*. There may also be potential suitable habitat in the nearby Bluff River Nature Reserve. The species' association with heath and rock crevices may limit its detectability and it has been suggested it would be easy to miss during surveys if it occurs in only a single isolated patch (L. Copeland, pers. comm. May 2018).

Ecology

Copeland *et al.* (2011) state that "Hand-written notes on the herbarium label suggest that the species grows in scrub and heath patches in crevices of granite outcrops. Associated species include *Mirbelia confertiflora*, *Boronia microphylla* and *Hakea laevipes* subsp. *graniticola*" and that "Flowers and unopened floral buds on the type collection indicate that *H. elusus* flowers in July and August."

The life history of *H. elusus* is not documented but other species of *Homoranthus* are known to be killed by fire (obligate seeders) and regenerate post-fire from persistent soil stored seed banks (NPWS Fire Response Database 2014). This is consistent with the species' association with granite outcrops, which may act as fire refugia (Benwell, 2007). Five congeneric species of *Homoranthus* are listed as sensitive to high frequency fire in the NSW Flora Fire Response Database (Fire Ecology Unit OEH 2010). Factors that govern recruitment after fire in *Homoranthus* are unknown, however fire cues such as heat shock (which promotes germination in the closely related *Darwinia* species (Auld & Ooi 2009)) and smoke, along with temperature and rainfall, are likely to be important. The dispersal ability, life span and generation length are unknown for this species.

Threats

There is limited information on threats for *H. elusus*. The species has only been recorded on Crown land and has not been recorded during surveys of the nearby Bluff River Nature Reserve despite the presence of potentially suitable habitat on the same geological substrate.

Feral goats (*Capra hircus*) are known to occur in the area and may pose a threat through trampling and browsing of plants and seedlings (L. Copeland, pers. comm. May 2018).

Inappropriate fire regimes (i.e. too frequent: <5-10 years; or too infrequent: > life span of the species) may also represent a threat to *H. elusus* (L. Copeland, pers. comm. May 2018), as obligate seeders are sensitive to fires that occur too frequently or infrequently. According to the NSW NPWS Fire History - Wildfires and Prescribed Burns dataset accessed in March 2020, the reported location of the *H. elusus* population has no recorded fires.

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Assessment against IUCN Red List criteria

For this assessment, it is considered that the survey of *Homoranthus elusus* has been adequate and there is sufficient scientific evidence to support the listing outcome.

Criterion A Population Size reduction

Assessment Outcome: Data Deficient

Justification: To be listed as threatened under Criterion A the species must have experienced a population reduction of $\geq 30\%$ over three generations or 10 years (whichever is longer). There are insufficient data to assess population size reduction.

Criterion B Geographic range

Assessment Outcome: Near Threatened

Justification: *Homoranthus elusus* is known only from a single small patch. The geographic distribution of *H. elusus* is very highly restricted. The area of occupancy is estimated to be 4 km², based on the species' occupying a single 2 x 2 km grid cell, the spatial scale of assessment recommended by IUCN (2019). The extent of occurrence (EOO) is also 4 km². The EOO is reported as equal to AOO, despite the range of the species, measured by a minimum convex polygon containing all the known sites of occurrence, being less than AOO. This is to ensure consistency with the definition of AOO as an area within EOO, following IUCN Guidelines (2019). Both EOO and AOO estimates fall below the thresholds for Critically Endangered (<100 km² and <10 km² respectively).

In addition to these thresholds, at least two of three other conditions must be met. These conditions are:

- a) The population or habitat is observed or inferred to be severely fragmented or there is 1 (CR), ≤ 5 (EN) or ≤ 10 (VU) locations.

Assessment Outcome: Met at Critically Endangered threshold.

Justification: The species is known from a single population at one location. All plants could be impacted by a single threat such as a short fire return interval (<5-10 years) or a lack of fire during the entire life cycle, or browsing by feral goats.

- 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

Assessment Outcome: Data deficient.

Justification: There are currently no data to assess whether continuing decline is occurring.

- c) Extreme fluctuations.

Assessment Outcome: not met.

Justification: There is no evidence at present to suggest the species undergoes extreme fluctuations.

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Criterion C Small population size and decline

Assessment Outcome: Near Threatened

Justification: There are believed to be fewer than 50 mature individuals as the original collection represents an individual shrub and further surveys in 2003 failed to locate any plants. This falls below the threshold for Critically Endangered (<250 mature individuals). The species does not however, qualify as Critically Endangered under this criterion as there are insufficient data to determine whether there is continuing decline. There are several potential threats to the species that could contribute to such declines however due to the limited knowledge of its ecology and absence of population trajectory data, decline, is currently unknown.

At least one of two additional conditions must be met. These are:

- C1. An observed, estimated or projected continuing decline of at least: 25% in 3 years or 1 generations (whichever is longer) (CE); 20% in 5 years or 2 generations (whichever is longer) (EN); or 10% in 10 years or 3 generations (whichever is longer) (VU).

Assessment Outcome: Data Deficient.

Justification: No data are available to allow an assessment of the magnitude of any potential declines.

- C2. An observed, estimated, projected or inferred continuing decline in number of mature individuals.

Assessment Outcome: Data Deficient.

Justification: There are currently no data to assess whether continuing decline is occurring.

In addition, at least 1 of the following 3 conditions:

- a (i). Number of mature individuals in each subpopulation ≤ 50 (CR); ≤ 250 (EN) or ≤ 1000 (VU).

Assessment Outcome: Met at Critically Endangered threshold.

Justification: Fewer than 50 individuals have ever been observed.

- a (ii). % of mature individuals in one subpopulation is 90-100% (CR); 95-100% (EN) or 100% (VU)

Assessment Outcome: Met at Critically Endangered threshold.

Justification: All known individuals occur in a single population.

- b. Extreme fluctuations in the number of mature individuals

Assessment Outcome: not met.

Justification: There is no evidence at present to suggest the species undergoes extreme fluctuations.

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Criterion D *Very small or restricted population*

Assessment Outcome: Critically Endangered under Criterion D

Justification: There are believed to be fewer than 50 individuals of the species. This falls below the threshold for Critically Endangered (<50 mature individuals).

Criterion E *Quantitative Analysis*

Assessment Outcome: Data Deficient

Justification: There is insufficient data to quantify the Extinction Risk for this species.

Conservation and Management Actions

There is no National Recovery Plan and no NSW Save our Species program for this species. The following is derived from the threat information.

Stakeholders

- Inform and consult with land owners/managers of the area containing the single known population, regarding options for conservation management and protection of the species.
- Engage with land managers to establish an access agreement for researchers and agency staff as the outcrop *H. elusus* is found on does not have any public access.

Habitat loss, disturbance and modification

- Ensure appropriate fire regimes are maintained based on prioritised scientific research. While lifespan, primary juvenile period and fire response are unknown for this species, its occurrence on granite outcrops suggests it is adapted to extremely infrequent fires with intervals of perhaps decades.
- Prevent high fire frequency (i.e. maintain fire interval of > 15 yrs), avoid out-of-season fires (i.e. during mid-autumn to spring), protect from post-fire grazing (e.g. through goat control measures), protect from fire suppression impacts (i.e. exclude vehicles and machinery from site, exclude from fire retardant).
- Avoid hazard reduction burning until more is known about the fire requirements of the species. Two fires in quick succession are likely to cause declines and should be avoided.

Invasive species

- Monitor for the presence of feral herbivores such as goats and initiate controls if such species are detected in or near the known site.

Ex situ conservation

- Develop a targeted seed collection program for *ex situ* seed banking if plants in the wild can be rediscovered.
- Identify appropriate sites for a potential translocation.
- Develop an *ex situ* living collection in collaboration with botanic gardens as an insurance against stochastic events, which pose a high risk given the species highly restricted distribution and population size, and the failure of any attempts at translocation.

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Survey and Monitoring priorities

- Conduct surveys of the outcrop on which *H. elusus* was originally recorded as well as suitable habitat in nearby Bluff River Nature Reserve to develop a baseline for future monitoring.
- Monitor after planned and unplanned fires (where they occur) to improve understanding of the fire response of the species.
- Monitoring for increased habitat degradation, herbivory and stress following periods of extreme weather, such as drought.
- Conduct regular surveys of the known population to determine whether there is any change/decline in number.
- Monitor known plants for growth, survival and seed production.
- Monitor known site for any recruitment.

Information and Research priorities

- Use non-destructive sampling methods to investigate life history attributes, recruitment, seedling survival and survival, growth, fecundity and mortality of adult plants.
- Investigate seed ecology, particularly levels of viability, fecundity and dormancy and germination mechanisms and dispersal ability.
- Determine the fire response of mature plants.
- Examine the tolerance of the species to drought conditions.
- Investigate the cultivation requirements of the species.
- Improve understanding of the response of the species to different fire regimes and identify appropriate fire regimes for its conservation by undertaking appropriately designed experiments in the field and/or laboratory.
- Use understanding and research on fire responses among the congeneric species of *Homoranthus* that are listed as obligate seeders to develop fire management strategies for conservation.

References

- Auld TD, Ooi MKJ (2009) Heat increases germination of water-permeable seeds of obligate-seeding *Darwinia* species (Myrtaceae). *Plant Ecology* **200**, 117-127.
- Benwell A (2007) Response of rock-outcrop and fringing vegetation to disturbance by fire and drought. *Australian Journal of Botany* **55**, 736-748.
- Copeland LM, Craven LA, Bruhl JJ (2011). A taxonomic review of *Homoranthus* (Myrtaceae: Chamelaucieae). *Australian Systematic Botany* **24**, 351-374.
- NSW Fire Response Database (2014). NSW Flora Fire Response Database. Ver 2.1. OEH (NSW), Hurstville, NSW 1481.
- IUCN Standards and Petitions Subcommittee (2019) Guidelines for Using the IUCN Red List Categories and Criteria. Version 14 Prepared by the Standards and Petitions Subcommittee. <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>

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Expert Communications

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Assessment against BC Act criteria

Overall Assessment Outcome (Clause(s) with the highest category of threat)

Critically Endangered under Clause 4.5(a)

Clause 4.2 – Reduction in population size of species

(Equivalent to IUCN criterion A)

Assessment Outcome: Data Deficient.

(1) - The species has undergone or is likely to undergo within a time frame appropriate to the life cycle and habitat characteristics of the taxon:			
	(a)	for critically endangered species	a very large reduction in population size, or
	(b)	for endangered species	a large reduction in population size, or
	(c)	for vulnerable species	a moderate reduction in population size.
(2) - The determination of that criteria is to be based on any of the following:			
	(a)	direct observation,	
	(b)	an index of abundance appropriate to the taxon,	
	(c)	a decline in the geographic distribution or habitat quality,	
	(d)	the actual or potential levels of exploitation of the species,	
	(e)	the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.	

Clause 4.3 - Restricted geographic distribution of species and other conditions

(Equivalent to IUCN criterion B).

Assessment Outcome: Not Met.

The geographic distribution of the species is:			
	(a)	for critically endangered species	very highly restricted, or
	(b)	for endangered species	highly restricted, or
	(c)	for vulnerable species	moderately restricted.
and at least 2 of the following 3 conditions apply:			
	(d)	the population or habitat of the species is severely fragmented or nearly all the mature individuals of the species occur within a small number of locations,	
	(e)	there is a projected or continuing decline in any of the following:	
		(i)	an index of abundance appropriate to the taxon,
		(ii)	the geographic distribution of the species,
		(iii)	habitat area, extent or quality,
		(iv)	the number of locations in which the species occurs or of populations of the species.
	(f)	extreme fluctuations occur in any of the following:	
		(i)	an index of abundance appropriate to the taxon,
		(ii)	the geographic distribution of the species,
		(iii)	the number of locations in which the species occur or of populations of the species.

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Clause 4.4 - Low numbers of mature individuals of species and other conditions

(Equivalent to IUCN criterion Clause C)

Assessment Outcome: Not Met.

The estimated total number of mature individuals of the species is:			
	(a)	for critically endangered species	very low, or
	(b)	for endangered species	low, or
	(c)	for vulnerable species	moderately low.
and either of the following 2 conditions apply:			
	(d)	a continuing decline in the number of mature individuals that is (according to an index of abundance appropriate to the species):	
		(i)	for critically endangered species very large, or
		(ii)	for endangered species large, or
		(iii)	for vulnerable species moderate,
	(e)	both of the following apply:	
		(i)	a continuing decline in the number of mature individuals (according to an index of abundance appropriate to the species), and
		(ii)	at least one of the following applies:
		(A)	the number of individuals in each population of the species is:
		(I)	for critically endangered species extremely low, or
		(II)	for endangered species very low, or
		(III)	for vulnerable species low,
		(B)	all or nearly all mature individuals of the species occur within one population,
		(C)	extreme fluctuations occur in an index of abundance appropriate to the species.

Clause 4.5 - Low total numbers of mature individuals of species

(Equivalent to IUCN criterion D)

Assessment Outcome: Critically Endangered under Clause 4.5(a).

The total number of mature individuals of the species is:			
	(a)	for critically endangered species	extremely low, or
	(b)	for endangered species	very low, or
	(c)	for vulnerable species	low.

Clause 4.6 - Quantitative analysis of extinction probability

(Equivalent to IUCN criterion E)

Assessment Outcome: Data Deficient.

The probability of extinction of the species is estimated to be:			
	(a)	for critically endangered species	extremely high, or
	(b)	for endangered species	very high, or
	(c)	for vulnerable species	high.

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Clause 4.7 – Very highly restricted geographic distribution of species–vulnerable species
(Equivalent to IUCN criterion D2)

Assessment Outcome: Vulnerable under Clause 4.7.

For vulnerable species,	the geographic distribution of the species or the number of locations of the species is very highly restricted such that the species is prone to the effects of human activities or stochastic events within a very short time period.
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