Cucumis althaeoides – NSW assessment
Report to the NSW Scientific Committee
Rachael Gallagher & Judy Scott 6/11/2017

Species Status

Current Status in NSW	*not listed*	NSW endemic	*No*
Assessed Status in NSW	*CE*	LHI endemic	*No*
EPBC Act status	*not listed*	LHI & Norfolk Isl. endemic	*No*

Status in other jurisdictions

ACT	Vic	Qld	SA	WA	NT	Tas
Not listed	Not listed	Not listed	Not listed	Not listed	Not listed	Not listed

Species description

Trailing or climbing perennial herb, monoecious, most vegetative parts hispid, sometimes pilose; stems to 3 m long, to 1.6 mm diameter, ribbed, annually sprouting from a perennating rootstock. Tendrils simple, to 15 cm long. Leaves: subsessile or petiole to 38 mm long; lamina ovate or broadly lanceolate in outline, sometimes hastate, 24-75 x 18-70 mm, cordate, unlobed or shallowly 3-lobed, rarely 5-lobed, obtuse or acute, mucronate. Inflorescences unisexual. Male flowers in 3-10(-15)-flowered fascicles, sometimes in racemes with peduncles to 3 mm long; pedicels to 7 mm long; hypanthium narrowly campanulate, 3-3.4 mm long, hispid or pilose outside; calyx lobes linear, 0.8-1.4 mm long, hispid or pilose; corolla lobes ovate, 3.8-4.2 x 2.6-2.8 mm, rounded, mucronate, sparsely hispid outside, the hairs denser apically, glabrous or hispid along the veins inside, hispid around the mouth of the hypanthium tube, bright yellow; stamens inserted about the middle of the hypanthium tube; filaments ca. 0.4 mm long; anthers one 1-thecous, two 2-thecous, straight, 1.5-2 mm long; connective appendages minute; disc depressed globose, 0.8-1.4 mm diam. Female flowers 1 or 2, rarely 3 or 4 per axil; pedicels to 2 mm long; ovary ellipsoidal, ca. 3 mm long, pilose with antrorse hairs; hypanthium above the constriction narrowly campanulate, ca. 3 mm long; perianth similar to male; disc annular 1-1.2 mm diameter; style ca.1.5 mm long; stigmatic lobes 3, ca. 1.3 mm long. Fruit globose, 8-18 mm diameter, pale green with darker longitudinal markings, at maturity sparsely pilose, red, with 9-20(-25) seeds; fruiting pedicel to 6 mm long. Seeds ovate, 3.8-4.5 x 2.3-2.8 mm, buff, the faces convex, verrucose, the margin thickened, raised. Flowers and fruits April-August (adapted from Telford et al. 2011).

Taxonomy

Cucumis althaeoides (Ser.) P.Sebastian & I.Telford

Misapplied names: *Mukia madasperatana* (L.) M.Roem., *Cucumis maderaspatanus* L.

Distribution and number of populations

Known in NSW from seven unique herbarium collections made from three sites within the Oxley Wild Rivers National Park (OWRNP) in 2007 and 2008 by Copeland and Bell (J.T. Hunter also noted as a collector in Ecological Australia report, 2014). One earlier record (MEL 0593210A) was collected in a region adjacent to the current boundary of OWRNP in 1884, but latitude and longitude is likely to be unreliable.

There is abundant similar habitat both within the immediate area (e.g. in OWRNP) and the

broader region (north-eastern NSW), however the species has only ever been recorded from this very small part of OWRNP (L Copeland, additional notes to the nomination received 27/7/2016).

The three populations in OWRNP are the only documented occurrences of the taxon in NSW (AVH: http://avh.ala.org.au/; Ecological Australia report, 2014). There has been considerable survey effort in OWRNP to locate additional plants (L Copeland, additional notes to the nomination received 27/7/2016).

Record numbers	**Collector**	**Location**	**Habitat**
NE 90043; NSW 833114	Bell, D.M. 297	Oxley Wild Rivers National Park, Apsley River, c. 30 km E of Walcha, Reedy Flat. -30.8764, 152.016 21/3/2007	Riverside gravel bed. Sand and cobbles. *Casuarina cunninghamiana* seedlings, *Cleome viscosa, Digitaria sanguinolentis, Mitracarpus hirtus.* Rare; only 1 plant at site. Perennial with thickened rootstock, several prostrate stems to c. 3 m long. Fruits red.
NE 90306; NSW 833090	Copeland, L.M. 42203sz	Oxley Wild Rivers National Park, E bank of Apsley River, 300 m downstream of confluence with Rusdens Creek. -30.9889, 152.015 30/3/2007	Deep valley. Flat gravel bed adjacent to river. Sandy loam. *Casuarina cunninghamiana* woodland with many annual weeds. Occasional, localised, c. 10 plants seen. Climbing herb growing on *Bidens pilosa*. Fruit bright red. Photo.
NE 90584; NSW 833143	Copeland, L.M. 4240	Oxley Wild Rivers National Park, western bank of Green Gully Ck, 300 m upstream of junction with McCarthys Ck. -31.0083, 152.079 31/5/2007	Flat terrace above creekline. Gravelbed. *Casuaraina cunninghamiana* woodland with *Melaleuca bracteata, Stephania japonica* and *Bidens pilosa.* Occasional, localised. Slender climber growing on *Bidens pilosa*. Flowers yellow, fruit bright red.
NE 92009	Collector unknown. 13221	Oxley Wild Rivers National Park, Apsley River, E bank, c. 300 m downstream from confluence with Rusdens Creek. -30.989, 152.015 16/5/2008	Not available.

Ecology

Populations in OWRNP occupy rocky soil in gravel beds along major freshwater rivers and streams, in open habitats and occasionally beneath River Oaks (*Casuarina cunninghamiana*) (L Copeland, additional notes to the nomination received 27/7/2016). Also occurs in association

with *Melaleuca bracteata, Stephania japonica, Cleome viscosa, Digitaria sanguinolentis, Mitracarpus hirtus* and *Bidens pilosa and* 'many annual weeds' (NSW herbarium records). Across its broader range the species is recorded as growing on coastal sands or riverine alluvium in herbfields and *Casuarina* or *Eucalyptus* woodland (Telford et al. 2011).

Number of mature individuals

The number of individuals present in the populations is estimated to be extremely low and occurrence highly localised. Visual estimates of the abundance of plants was made at each location and estimated at roughly 16 individuals in total across the three sites (L Copeland, pers. comm. 25/1/2017).

Herbarium collections note the presence of a single plant in one location (NE 90043; NSW 833114) at "Reedy Flat". Since the initial discovery at this location no subsequent individuals have been found despite ongoing monitoring by J.T. Hunter and P. Thomas (NPWS Ranger) (L Copeland, pers. comm. 25/1/2017).

Threats – past

No past threats have been recorded for this taxon.

Threats – current

Grazing by feral animals (especially horses), competition from numerous exotic plant species, and very low population numbers (L. Copeland, nomination 18/5/16). Weeds growing in proximity to the *C. althaeoides* population in NSW include Bidens pilosa (Cobbler's Peg) B. subalternans, Zinnia peruviana, Tagetes minuta, Cuscuta campestris, Galinsoga parviflora and Lantana camara (L. Copeland in litt. 30/5/2017). Multiple Key Threatening Processes listed under the Act are likely to threaten this taxon including 'Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus* (*L.*)', 'Competition and habitat degradation by Feral Goats, *Capra hircus* Linnaeus 1758', and the invasion and establishment of exotic plant species and groups including *Lantana camara* and exotic vines and scramblers (Duggin and Gentle, 1998).

The limited geographic distribution of the populations increases the likelihood of negative impacts from localised, stochastic events such as inappropriate fire regimes, extreme drought conditions, and weed invasion. Populations are noted as co-occurring with, and growing on, the exotic species *Bidens pilosa* L. (cobblers peg, farmers friend, pitchforks).

Threats – future

No future threats have been documented for this taxon.

Extreme fluctuations

No extreme fluctuations in population numbers have been documented for this taxon.

Population reduction and continuing decline

No evidence of population reduction and continuing decline have been documented for this

taxon.

Extent of occurrence (EOO) and Area of occupancy (AOO)

Area of occupancy: The AOO of the species is estimated as 12 km^2. The AOO is equivalent to three (2 x 2 km) grid cells, the recommended measure for AOO in the IUCN guidelines (IUCN Standards and Petitions Subcommittee 2016). An AOO of <10 km^2 is required to meet the geographic range threshold for a critically endangered species (IUCN 2001). The AOO of this species meets the geographic range threshold for listing as an endangered species (<500km^2) (IUCN 2001).

Extent of occurrence: The EOO for this species is estimated as 39 km^2. An EOO of <100 km2 is within the geographic range threshold for a critically endangered species (IUCN 2001).

Severe fragmentation

This taxon is widespread in northern Australia, but the NSW populations are isolated and disjunct (L. Copeland, nomination 18/5/16). Populations of the taxon in NSW are at the southern range boundary of the species.

Information sources – written

Duggin JA & Gentle CB (1998) Experimental evidence on the importance of disturbance intensity for invasion of *Lantana camara* L. in dry rainforest–open forest ecotones in north-eastern NSW, Australia. Forest Ecology and Management **109**, 279-292.

Ecological Australia (2014) The Vegetation and Plant Species of the Oxley Wild Rivers National Park and State Conservation Area. Prepared for Northern Tableland Region of the National Parks and Wildlife Service, NSW Office of Environment and Heritage.

IUCN (2001) 'IUCN Red List Categories and Criteria: Version 3.1.' (IUCN Species Survival Commission: Switzerland)

IUCN Standards and Petitions Subcommittee (2016) 'Guidelines for Using the IUCN Red List Categories and Criteria. Version 12'. (Prepared by the Standards and Petitions Subcommittee).

Telford IRH, Sebastian P, Bruhl JJ, Renner SS (2011) *Cucumis* (Cucurbitaceae) in Australia and eastern Malesia, including newly recognized species and the sister species to C. melo. Systematic Botany **36**, 376-389.

The following databases were accessed January 2017:

National Herbarium of NSW, Royal Botanic Gardens, Sydney.

AVH (2017). Australia's Virtual Herbarium, Council of Heads of Australasian Herbaria,

http://avh.chah.org.au. Accessed (23/1/2017).

Information sources – verbal

Lachlan Copeland pers. comm. (25/1/2017). Email correspondence.

Assessment of proposed category against Biodiversity Conservation Regulation (2017)

Critically Endangered.

Assessment using categories and criteria of the IUCN Red List V. 3.1 (IUCN 2001)

An AOO of <500 km^2 is within the geographic range threshold for an endangered species (IUCN 2001).

An EOO of <100 km^2 is within the geographic range threshold for a critically endangered species (IUCN 2001).

The number of mature individuals seen at two of the three locations (16) meets criteria D for listing as a critically endangered species.

Existing threats, low population numbers and very highly restricted EOO, permit listing under clauses 7ad(b) and 8ad(ii) and 9a of the Act.

IUCN Standards and Petitions Subcommittee. 2014. Guidelines for Using the IUCN Red List Categories and Criteria. Version 11. Prepared by the Standards and Petitions Subcommittee. http://www.iucnredlist.org/documents/RedListGuidelines.pdf.

Clause 4.3 - Restricted geographic distribution of species and other conditions
(Equivalent to IUCN criterion B)

The geographic distribution of the species is:						
	(a)	for critically endangered species				very highly 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.~~			

Clause 4.4 - Low numbers of mature individuals of species and other conditions
(Equivalent to IUCN criterion Clause C)

The estimated total number of mature individuals of the species is:						
	(a)	for critically endangered species				very 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~~
	(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
			(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)

The total number of mature individuals of the species is:			
	(a)	for critically endangered species	extremely low.

National Assessment of *Cucumis althaeoides* (Ser.) P.Sebastian & I.Telford

6/11/ 2017

Distribution: NSW, Qld, NT, WA, SA
Current EPBC Act Status: Not listed
Current NSW BC Act Status: Not listed
Outcome: *Cucumis althaeoides* is not likely to be nationally threatened.

Summary of Conservation Assessment

Cucumis althaeoides is not likely to be eligible to be listed under any Criteria outside of NSW.

Distribution and Abundance in Australia

Cucumis althaeoides is described as occurring in "coastal and subcoastal Timor, southern New Guinea and northern Australia, from the Kimberley region in Western Australia eastwards through the Northern Territory, Queensland and south to near Walcha, New South Wales" (Telford *et al.* 2011). A single herbarium specimen has also been collected inside South Australia near the border with the Northern Territory (collector: P. Latz - 14/5/2010); Atlas of Living Australia, accessed 5/11/2017). The species is not considered of conservation concern and the distribution is described as "widespread and common, the species is not considered at risk" (Telford *et al.* 2011).

Threats

In NSW, the only known population of *Cucumis althaeoides* is exposed to threats including grazing by feral animals, including horses, goats and cattle, and competition from various weed species, including *Bidens pilosa* (Cobbler's Peg) *B. subalternans*, *Zinnia peruviana*, *Tagetes minuta*, *Cuscuta campestris*, *Galinsoga parviflora* and *Lantana camara* (L. Copeland *in litt*. May, 2017). The population's limited extent makes it highly susceptible to localised events such as grazing by feral animals and competition from weeds. 'Invasion, establishment and spread of Lantana (*Lantana camara* L. sens. lat)' and 'Competition and habitat degradation by Feral Goats, *Capra hircus* Linnaeus 1758' are listed as Key Threatening Processes under the NSW Biodiversity Conservation Act.

Assessment against IUCN Red List criteria

This assessment has been based on publicly available data in the Atlas of Living Australia (https://www.ala.org.au/) and Telford *et al*. (2011). In view of the large number of records for this species throughout Australia this information is sufficient scientific evidence to assess if this species is likely to be nationally threatened.

Criterion A Population Size reduction

Assessment Outcome: Criterion not likely to be met or data deficient.

Justification: there is no documented evidence of population declines throughout the range of *Cucumis althaeoides.* The species is described as common by Telford *et al*. (2011).

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Criterion B Geographic range
Assessment Outcome: Criterion not met.
Justification: The extent of occurrence (EOO) of *Cucumis althaeoides* in Australia is estimated as 4,968,566 km^2 based on a minimum convex polygon encompassing all known occurrence records in the Atlas of Living Australia (accessed 6/11/2017). This EOO exceeds 20,000 km^2 which is the IUCN threshold for a vulnerable species and is therefore considered 'least concern'. The estimated the area of occupancy (AOO) in Australia is estimated to be 1112 km^2. This is less than 2,000 km^2 which is the IUCN threshold for a vulnerable species. Despite an AOO which meets the vulnerable criteria there is no evidence that *Cucumis althaeoides* would meet any of the three sub-criteria (severe fragmentation, continuing decline or extreme population fluctuations) required to list the species as vulnerable at the national level under IUCN assessment. Populations of *Cucumis althaeoides* are described as "common and widespread" in Telford *et al*. (2011) and as "common" on more than 40 herbarium specimen labels collected across multiple years.

Criterion C Small population size and decline
Assessment Outcome: Criterion not likely to be met or data deficient.
Justification: The population size of *Cucumis althaeoides* in Australia is unknown but inferred to be more than 10,000 individuals which exceeds the IUCN threshold for a vulnerable species. In addition, there is no evidence of decline. This population size estimate is based on the examination of the abundance of *Cucumis althaeoides* as described on herbarium specimen labels. Across 42 collection sites (15%) *Cucumis althaeoides* is described as "common" and, therefore, the population is likely to consist of more than 10,000 individuals if abundance across the range follows this pattern. There are ~370 herbarium collections for this species across Australia. Across all herbarium specimen labels examined there is no description of populations suffering decline in numbers or low abundance.

Criterion D Very small or restricted population
Assessment Outcome: Criterion not likely to be met.
Justification: The total number of mature individuals in Australia of *Cucumis althaeoides* is estimated to be in excess of 1,000 which exceeds the IUCN threshold for a vulnerable species. This estimate is also based on the examination of the abundance of *Cucumis althaeoides* as described on herbarium specimen labels.

Criterion E Quantitative Analysis
Assessment Outcome: Criterion not likely to be met or data deficient.
Justification: Currently there is not enough data to undertake a quantitative analysis to determine the extinction probability of *Cucumis althaeoides.*

REFERENCES

Telford IR, Sebastian P, Bruhl JJ, Renner SS (2011) *Cucumis* (Cucurbitaceae) in Australia and eastern Malesia, including newly recognized species and the sister species to *C. melo*. *Systematic Botany* **36**, 376–389.